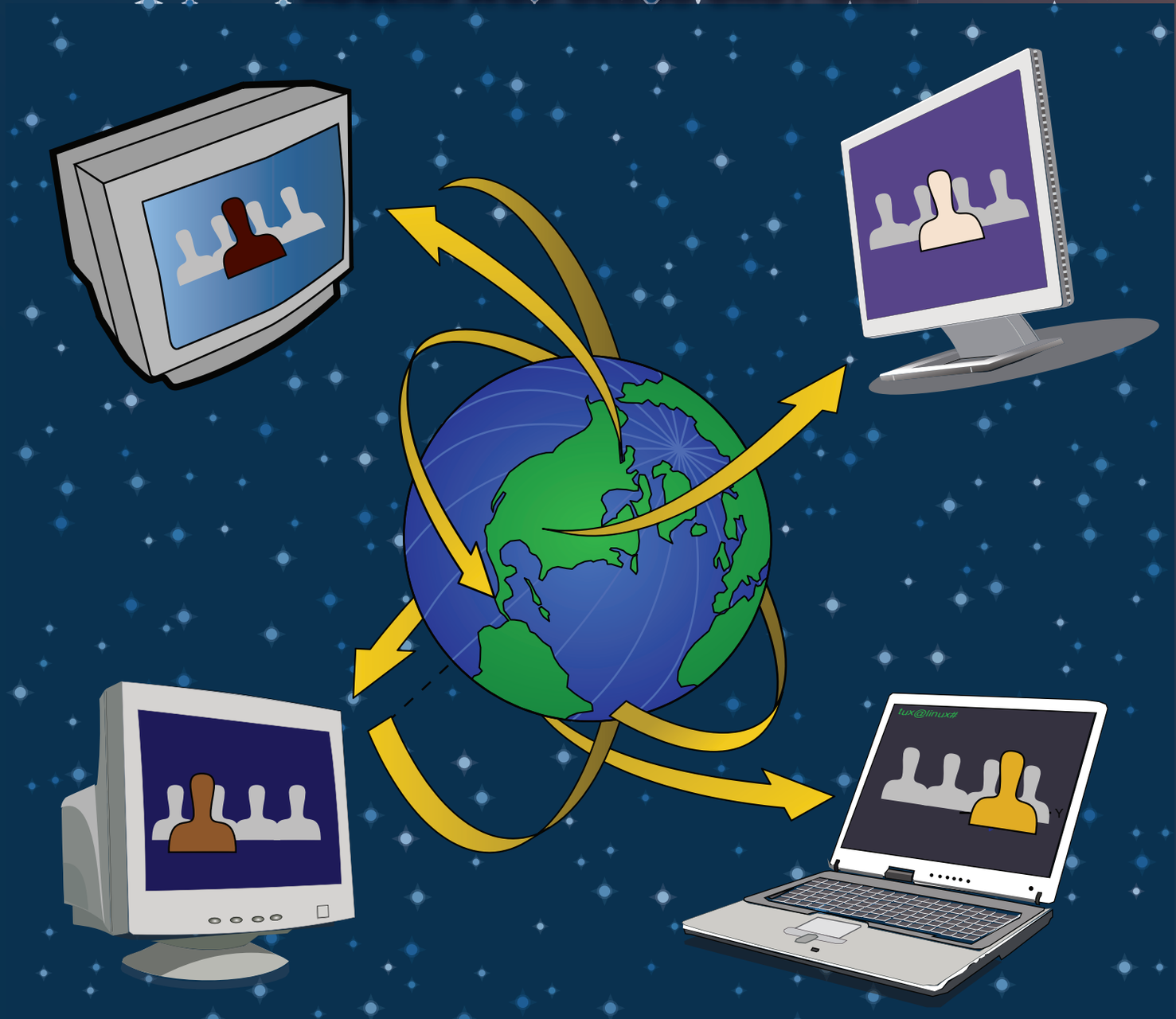
IMPROVING INTERNATIONAL RELATIONS CONFERENCES THROUGH VIRTUAL INTERACTIONS

Embodying A Multi-Agent Z Specification Framework

ROGERS WOD'OLOBO OKOT-UMA



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PROEFSCHRIFT

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aan de Technische Universiteit Delft,

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DEDICATION

This work is dearly dedicated, first and foremost, to my family, whose unwavering support and encouragement during the research period was profound. Second, to the entirety of my second-generation progeny to date and in the future. Particular homage is paid to my grand-daughter Frankie, who notably believes so much in grand-dad's intellectual ability and creativity and has sought to keep a repository of all book-publications by grand-dad: this work is one new addition to her precious collection. Third, to the memory of my father and to my mother, both of whose dreams, hopes and aspirations were to see their son at the acme of a knowledge-based advancement and innovation;Last, but not least, to all my relations, friends and acquaintances worldwide, for whose expectations this piece of work is a fulfilled testament.

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SUMMARY

This study investigates how an alternative to the implementation of a conventional international relations conference can be realised, whilst reasonably fulfilling and/or improving the conference deliberations. The study explores the problems and issues that frequently affect the implementation of such a conference. Actors in the international relations context, including international relations conferences, are characterised as 'states-as-actors' because they represent states (or nation-states) in interactions between and among states. International relations in the real world focus on the interactions between state-based actors who interact across state boundaries or geopolitical borders. These interactions are unique in that actors represent states and often the outcomes of these interactions are resolutions that affect states, regions, or the global community. International relations conferences are central to the successful achievement of group deliberations in international relations between nations. International relations conferences are, however, generally accompanied by problems and issues of operation, context and strategy, which have implications on the cost-effectiveness, performance and policy formulation with regard to the structures and systems of organisation for their implementation.

Specifically, this study investigates *virtual interactions* in international relations conferences, to improve group deliberations. This is done by addressing the problems and issues of operation, context and strategy, whilst reasonably fulfilling and/or improving the conference deliberations. The study deploys a *qualitative inductive research approach* through which a set of case studies, in which deliberations take place electronically, are investigated**.** The study's empirical data is collected through three case studies, which comprise the following: Virtual Embassy: Diplomacy in the Era of the Internet, Terrorism: Focus on 9/11, and Internet Governance and Standardisation. The implementation of the case studies involves inductive research**,** starting with data collection, making observations for group behaviours, and formulating concepts that describe deliberations in international relations. These states-as-actors concepts are used to specify states-as-actors behaviours. In particular, the study demonstrates how *virtual interactions in distributed collaboration* show, empirically, the *existence of states-as-actors behaviour***.** Furthermore, the study uses a formal specification language, Z, to model states-as-actors behaviour, in a goal to provide a broader generalisation, theory or framework as the research outcome.

The contribution of this research is three-fold. The prime contribution of this research is a framework – the Z specification framework - that describes virtual interactions, in terms of states-as-actors behaviour, in distributed collaboration in international relations conferences. As a formal specification framework which models a conceptual picture – in structure and process - of states-as-actors behaviour of the human actors in the international relations context, the Z framework provides a basic foundational framework which can be advanced to develop a computing programme to enable the implementation of an information system that suits the needs of multilateral negotiations and conferences that take place on the electronic communication medium. Second, the research contributes to the practical feasibility of a 'distributed collaboration system' as an implementable system on the electronic communication medium. Such a 'distributed collaboration system', as perceived by actor-participant respondents in an *ex-post* questionnare, is considered, first and foremost, to be *useful* (particularly with regard to automated record generation, process enablement, fit-for-purpose; followed by productivity, efficiency and effectiveness), with additional value accorded to *usage* (particularly with regard to access, availability, subject of discussion and affordability), followed, to a lesser extent, by *usability* (particularly with regard to human machine interface, and easy-to-effect usability). Nation-states worldwide, particularly the less resource-endowed developing nation-states, can make use of such a sytem in the conduct of an international relations conference. Third, the study provides a set of guidelines on how to run an electronic communications session in the international relations context. The Guideline comprises a 9-stage process-based strategy, which can be deployed by conference secretariats in nation-states worldwide.

Structure of this Thesis

The structure of the thesis is as set out below.

Chapter	Chapter Title and Description Summary
I	In this chapter, *International Relations Conferences and Virtual Interactions*, the study's research problem is identified and the study's research goal, purpose and research question in the international relations context is developed. A succinct overview is presented of the study's research approach in relation to the choice of qualitative research and choice of research strategy, and a choice is made of the qualitative inductive research approach, with implications for, first, the derivation of a 'tentative theory' for states-as-actors behaviour as inferred from empirical findings and, second, the formulation of a formal specification framework as an abstract and broad generalisation model of states-as-actors behaviour as the study's research outcome.
II	This chapter presents *Literature and Data Review*, in which a review of available literature on key aspects of the research question is undertaken. The available data on aspects of the research question relating to problems of operation, context and strategy, specifically on costings of the the implementation of conventional international relations conferences is also provided in this chapter.
III	In this chapter, *Coding Schema*, a coding schema is formulated on the basis of the study's empirical data comprising solely fragments of textual transcript data. In the coding schema, a framework is formulated for observed virtual interactions is, which employs: (i) a master comparator table for coding of data on information exchange interaction, interpersonal group interaction and knowledge exchange interaction; and (ii) a 'derived' master comparator table, for coding of data on states-as-actors behaviour. The coding schema is deployed as the basis for analysis of transcripts of textual data representing virtual interactions generated by actor-participant interventions during virtual (CSCW) sessions in the international relations context.
IV	This chapter presents *Case Studies of Virtual Workgroups*, in which a specification of criteria for case study selection is articulated, a selection of case themes for the study is presented and details of the empirical studies are articulated. The key to the empirical studies comprises the following: (i) the *setting up* of a framework of virtual interactions in distributed collaboration, consisting of a group of actor-participants interconnected by a distributed wide area network (WAN), with nodes at spatially-distributed locations worldwide, and with facilities for real-time individually-attributed interventions and for asynchronous, individually-attributed or non-attributed interventions; (ii) the *implementation of virtual interaction sessions*; and (iii) the *generation, collection, interpretation* for group behaviour and phenomena
V	This chapter presents *Findings from the Case Studies*, in which, virtual interactions in distributed collaboration in the international relations context is demonstrated to show, empirically, the existence of states-as-actors behaviour. In particular, states-as-actors behaviour is found to be characterised by four factors, termed the goal-orientedness factor, the self-motivation factor, the generic actionfactor and the engagement factor, which are empirically observed *vis â vis* immediate deliverables or outcomes drawn from samples of fragments of transcript from across the three case studies. The study's core element – 'distributed collaboration system' - viewed both in process terms (as

	'infostructure') and in 'wired' terms (as 'infrastructure'), is subjected to an *ex-post* evaluation, with focus on three 'system utility' parameters, namely, *usage*, *usefulness* and *usability*. Various insights are derived from the more generic standpoints of information exchange interactions, interpersonal group level interactions, and knowledge exchange interactions at the macro-level and meso-level. Basic transcript analysis of X-Link Creation Notifications is carried out with respect to multilateral negotiation on Internet Governance and findings are articulated in terms of a 9-stage process strategy.
VI	In this chapter, *A Theoretical Model for States-As-Actors Behaviour: A Multi-Agent Z Specification Framework*, a theoretical framework is presented, in which: (i) a 'tentative theory' is derived from the study's empirical analysis, demonstrating the existence of states-as-actors behaviour; and (ii) a formal system specification framework is formulated, which models states-as-actors behaviour. The framework deploys the 'agent metaphor', in which "live human actors (or actor-participants) interacting in a conventional face-to-face meeting or interacting virtually on the electronic communications medium in the international relations context" is considered to be an agent. In this theoretical formulation, a formal system specification using Z is deployed to provide a foundational framework, which models a conceptual picture – in structure and process - of states-as-actors behaviour of the human actors.
VII	The final chapter, *Conclusions*, summarises this study's findings; outlines the study's contribution to knowledge and practice; and makes recommendations as a set of practical insights and guidelines for deployment in the international relations context; and suggests and proposes an outlook for further research.

CHAPTER I

INTERNATIONAL RELATIONS CONFERENCES AND VIRTUAL INTERACTIONS

Introduction

In this chapter core components of this research study are stated as comprising the subject of international relations and interactions between nation-states, on the one hand, and the concept of distributed collaboration and virtual interactions in the international relations context, on the other. International relations conferences and state-based interactions are discussed. Problems of operation, context and strategy are presented as challenges to the implementation of a conventional international relations conference. Distributed collaboration is introduced to realise an alternative to a conventional international relations conference and to mitigate the challenges intrinsically associated with an international relations conference. The study's research purpose and research question are presented, which reflect the research problem. 'States-as-actors' are introduced as human actors - upon whose actions – interactions - the behaviour credited to states ultimately rests. Goals, discussed against a background of conflict and co-operation in the international relations context - are viewed as generated explicitly in the environment such as in a conference document or as generated intrinsically in a human actor on behalf of a nation-state.

1.1 International Relations Conferences

The central idea in the research study is two-fold, namely, the subject of international relations and interactions between nation-states, on the one hand, and the concept of distributed collaboration and virtual interactions in the international relations context, on the other. In this section, we discuss international relations and state-based interactions, and associated concepts and/or modes of practice. International relations is used in this study to identify *all interactions between state-based actors across state boundaries* [EVANS and NEWNHAM 1998]. The state (also called nation-state) is the dominant political entity of the contemporary world and as such is considered to be the primary functional unit of international relations in the real world.

In the international relations context, a number of *interactions* can be observed, which have potentials for insight into group behaviours which take place among states. International relations contexts are characterised by the convening and conducting of an **international relations conference** (or meeting), which is essentially a group meeting of human actors, called participants or delegates, traditionally interacting in a colocated, face-to-face, round-the-table arrangement over a specific subject, themes or issues of mutual importance to the participating states. An international relations conference or meeting can be considered to be a sequence of tasks or activities performed by two (in bilateral meetings) or more (in multilateral meetings) actors (or delegates) acting on behalf of the nation-states they represent or, sometimes, making observations or interventions in their own individual right as observers. A meeting in an international relations context will always have an agreed, designated, an ascribed, or prescribed goal or purpose. Although meeting processes cannot be defined or generalised [MORRISON and VOGEL 1991], the group interactions that are generated during the meetings can be deployed to give insight into resulting group behaviours among states.

International relations conferences are frequently accompanied by *problems* and *issues* of *operation, context* and s*trategy*, which have implications on the degree of cost-effectiveness, performance (efficiency, etc), policy formulation with respect to the structures and systems of organisation for the implementation of international relations conferences. We examine this in more detail in the following section.

1.2 Problems Around International Relations Conferences

The scope of international relations has progressively increased and diversified over recent years. **Conference practice and procedure** has similarly become more refined and standardised. International relations conferences are generally accompanied by *problems* and *issues* of *operation, context* and s*trategy*, which have implications for *cost-effectiveness, performance* and *policy challenges* with regard to the structures and systems of organisation for the implementation of international relations conferences, respectively. First, at the core of the international relations conference are **problems of operation**. These are problems frequently caused by the need for adequate **logistical arrangements** and associated **scheduling schemes**, to provide optimum delegate arrival and departure times.This category of problems may be described as operational tasks. The problems manifest as **costs** associated with operational tasks. Specifically, these costs relate to **delegate transportation**, in terms of both international and local transporation of delegates; delegate **security** and **protocol arrangements**, for delegate safety and security in the host country and venue; **health insurance and emergency arrangements**, as a risk containment strategy in the event that delegates are taken ill during the conference. Transportation of country delegates is generally by air, to and from the host airport, and also daily between the delegate hotels and the venue in the host country. In addition, country delegates in international relations conferences can, sometimes, be inordinately large in number, which has the potential to heighten the cost of conference logistics. Security equipment hire, and additional telecommunications equipment and facility are an essential requirement in the implementation of any international relations conference and hence count as an essential budget line. Health and emergency insurance attracts a mandatory cost in terms of group insurance. Last but not least is the cost of human resource outlay, and specialist security staff, to ensure optimum equipment operation and a conference-secure environment.

Problems of context, in this study, relate to conditions of a weak fit or a discrepancy between planned/expected and actual **performance outcomes**. In their traditional mode, international conference practices and processes and associated structures can be *inefficient, ineffective* and *wasteful of resources*. The processes and structures inherent or associated with international relations conferences are often **inefficient,** mainly because the lead time for prior preparation is generally long. These frequently involve the despatch and receipt of various correspondences between the host country or organisation and relevant national government ministries and, sometimes, selected observer intra-state and inter-state non-governmental organisational entities. Administrative arrangements for international relations conferences can also be **ineffective**. This is because often fewer than expected number of country delegates for an international relations conference actually attend the conference as scheduled. The reasons for such discrepancies [in delegate attendance] are varied and various, including protracted entry visa applications, airline travel schedule restrictions and, lately, terror alerts and threats. In general, international relations conferences can be **wasteful of resources**. This is because the conference preparations (pre-, during, and post- conference)

take up a large *financial outlay*, *dedicated time*, as well as *dedicated human resource* to drive the organisational requirements.

Problems of operation and context have implications for the formulation of specific conference **policies**. Conference policies underscore the strategies which are suitably formulated to address the high costs and the apparent performance inadequacies generally associated with the conduct and implementation of an international relations conference. International relations conferences, in this context, are said to be characterised by **problems of strategy**. Policies must be formulated, in which *conference frequency* must be limited to annual, bi-annual, biennual or even triennial conferences, for both the logistics to be manageable and the cost to be adequately controlled. The *choice of conference venue* must take into account access and security implications against acts of terrorism and against organised protests and demonstrations, which have become a contemporary phenomenon in meetings such as the G-7 or G-8 meetings or summits. *Conference timing* is also important, to take into account the time of the year which is suitable for most delegates in terms of weather conditions and/or in terms of a general high or low travel 'season'. In this respect, budgetary resource arrangements become a necessary policy requirement of the host country's annual budgetary allocations.

An important aspect of any international relations conference implementation is the setting up of an empowered **conference secretariat**, by the host government or nation-state, for the purpose of implementing, among others, the operational plan of the conference. While an empowered conference secretariat can do much to minimise costs, optimise performance and enhance policies, the problems of operation, context and strategy remain significant in the conduct and implementation of any international relations conference. An empowered secretariat is one that is vested with the authority to carry out relevant decisions on behalf of the host government or, sometimes, on behalf of a governing body. The conference secretariat provides the administrative backing to a conference: to the conference Chair, to representatives during the conference, in relation to pre-conference preparation, and in the aftermath of the conference. It is the conference secretariat that has the responsibility for invitations, protocol, reception and hospitality, transport, liaison with local authorities, and the arrangement of the conference hall, down to the last microphone, pencil and cup of coffee; but above all it will be concerned with the preparation and distribution of the agenda (or draft agenda) and the agenda papers, together with the rules of procedure for the conference where applicable. While the conference is in progress the secretariat will be responsible for its entire administration, including the keeping of such records of the proceedings as may be specified by the rules of procedure or required by the conference Chair. The additional human resource outlay required to drive an empowered conference secretariat is an additional cost layer on the conduct and implementation of an international relations conference.

This study will seek, among others, to address the problems of operation, context and strategy associated with the conduct and/or implementation of an international relations conference. To address this problem, this study will seek to demonstrate that a more cost-effective alternative, a better performance construct, and a more policy-free alternative to a conventional international relations conference can be realised

1.3 Research Goal and Research Question

The **goal of this research** is to *provide an alternative, that can be used in practice, to the implementation of a conventional international relations conference, which will address the problems and issues that frequently affect the implementation of such a conference whilst reasonably preserving or improving the conference deliberations*.

In order to be able to achieve the above, the research study must aim to do the following: demonstrate that an alternative that can be used in practice in relation to a conventional face-to-face international relations conference will mitigate or eliminate problems or issues of operation, context, and strategy. The study proposes the deployment of *distributed collaboration.* Distributed collaboration will be investigated as a viable alternative to enable some of the problems to be mitigated. Distributed collaboration is necessary, in this case, but not sufficient. For sufficiency, at least in part, the research study needs to be able to do the following: articulate a viable mode of collaboration within an 'architecture' of distributed collaboration. To this end, the study proposes the deployment of *virtual interactions* as an alternative to the deliberations in a conventional face-to-face international relations conference session. Virtual interactions will be investigated as a viable alternative to help preserve the core of conventional conference deliberations. It is a core task of this study to demonstrate that **virtual interactions in distributed collaboration** will reasonably preserve or improve the integrity (including scope and nature) of the deliberations whilst addressing problems of operation, context and strategy. The research study aims to achieve its goal by the implementation of:

- **Virtual interactions**, which are designed to reasonably represent deliberations in an international relations conference session and to originate as individually-attributed interventions by participants during a virtual session;
- **Distributed collaboration**, which is designed to address the challenges of **cost**, **performance** and **policy** implications which frequently characterise the implementation of conventional international relations conferences.

The motivation to deploy virtual interactions in distributed collaboration in the international relations context for deliberations is to address the above two tasks. Put in another way, the motivation is, not to search for a substitute to a conventional international relations conference, but to seek for an alternative, that can be used in practice, as and when it is deemed that a conventional international relations conference is, for example, not cost-effective to run at a selected venue or is too risky to implement because of some imminent security threats.

The foregoing leads to us to an articulation of the research question in terms of virtual interactions and distributed collaboration on the one hand, and fulfilling deliberations and addressing problems of operation, context and strategy, in an international relations conference, on the other. Accordingly, the **research question** being investigated in this study is:

> *How can **virtual interactions** in **distributed collaboration** be deployed to fulfil deliberations, and address problems of operation, context and strategy, in a conventional international relations conference?*

The research question for this study calls explicitly for two tasks which the study will seek to provide as **solutions** (or possible solutions) to the research question, namely:

- the study will seek to demonstrate how **virtual interactions** in distributed collaboration can be deployed to fulfil deliberations that normally take place in a conventional (face-to-face) international relations conference;
- the study will seek to demonstrate how virtual interactions in distributed collaboration, by virtue of the deployment of **distributed collaboration**, as opposed to conventional face-to-face, round-the-table sessions in an international relations conference, can be used to address the problems of operation, context, and strategy that frequently characterise the implementation of a conventional international relations conference.

The first task is the subject of the empirical research of this study and is a core issue that cuts across all the chapters. The second task is the subject of review of available data, involving the collection and analysis of internally documented costings (data) on selected conventional international relations conferences relevant to this study. The second task is designed to be a core issue in Chapter II.

The *raison d'être* for Distributed Collaboration

In this research study, the conduct of *distributed collaboration* in the international relations context is proposed to present a more cost-effective alternative, a better performance construct, and a more policy-free alternative. This assertion is made in contrast to the conduct of a conventional international relations conference whose organisation and implementation is frequently characterised by problems of operation, context and strategy.

It is the cost implications associated with the problems of operation, the performance inadequacies associated with problems of context and the policy implications associated with problems of strategy that form the basis for the *raison d'être* to deploy distributed collaboration in the international relations context. This study seeks to demonstrate the extent to which distributed collaboration is able to reasonably address these challenges, without compromising on the integrity of the deliberations.

The efficacy of distributed collaboration as a virtual alternative to a conventional international relations conference relies on the extent or degree to which generated virtual interactions can be said to reasonably meet basic functional requirements that are typical of group interactions, as exercised by real world delegates, in a conventional international relations conference. This can further be enhanced by the degree to which virtual interactions can make observable, evidence of phenomena that are sometimes ordinarily observed in conventional international relations conferences. To recap, distributed collaboration is being introduced in the research investigation as a possible alternative to a conventional face-to-face, round-the table sessions in an international relations conference. We note, however, that distributed collaboration *per se* is intrinsically associated with the general limitation of the inability, by the participants, (i) to enrich their interactions through direct observation of the usual nonverbal cues and body language associated with the **kinesics** that routinely characterise individuals and groups in face-to-face interactionss; and (ii) to further gain insight into their interactions through the observation of an otherwise human use of physical space in non-verbal communication which is inherent in the **proxemics** that routinely characterise individuals and groups in real world face-to-face, round-the-table, interactions. Distributed collaboration remains necessary, but not sufficient. For sufficiency, at least in part, the research study will seek to understand the interactions as states-as-actors behaviour. This forms the basis of discussion in the next section.

1.4 'States-as-Actors' and 'States-as-Actors' Interactions in Conventional Conferences

States (also called nation-states), which are the main functional units in the interactions occurring in the international system, are static, occupying immovable geographical or geopolitical regions or locations. Inevitably, however, international relations are concerned with human behaviour. In this context, human behaviour cannot be understood by separating the actor from his/her human action. 'States-as-actors' refer to those decision-makers who are empowered by their states to authoritatively speak and act in the name of the state concerned in the course of an international relations conference. These decision-makers are, by design, senior level government diplomats, executives and civil servants representing different states. 'States-as-actors' are **actors** in the international relations context. An actor in the international relations context may be defined as `a relatively *autonomous* 'unit' or 'entity' that exercises influence on the behaviour of other autonomous actors' in both the international system as a whole and in the regional or subregional supranational subordinate system. The key word, *autonomy,* is `the ability to behave in ways that have consequences in international politics and cannot be predicted entirely by reference to other actors or authorities' [HOPKINS and MANSBACH, 1973: 4]. The particular predispositions of these decision-makers will be essential variables in their dealings with similar authorities in other states. Their personal value preferences, temperament and rationality will be important in deciding the `state interests', the priorities among those interests and the level of energy and available resources to be devoted to the pursuit of these interests. State-as-actor accordingly calls for an understanding of international politics, particularly in terms of the behaviour of states as organised bodies of human beings - human actors - upon whose **actions** the behaviour credited to states ultimately rests. In the final analysis `state interests are human interests' as perceived by the decision-makers and `a sufficient number of men and women identify themselves with their state or nation to justify and render possible governmental action in the name of state interests' [WOLFERS, 1962: 6].

The behaviour of states in the international relations context is the result of actions and reactions or interactions that take place between and among actor-participants. The interactions are varied and various. To be able to adequately describe the behaviour of states, it is important for the study to be able to articulate a finite number of behaviours that are characteristic of actor-participants in the international relations context. In their specific role as 'states-as-actors' in an international relations conference, an actor-participant is perceived to display, implicitly or explicitly, **at any given instant** during an international relations conference session, one of the following finite number of behaviours: remain passive, namely, simply remain silent; or become active, and seek to pursue an action or set of actions *in a generic manner*; or become active, and seek to pursue an action or set of actions in a manner that is explicitly or implicitly guided by, a goal or set of goals; or become active, goal-oriented and self-motivated out of state interests to act in an autonomous manner.

1.5 Origin of Motivation for the Study

The origin of the motivation for this study derives from a series of international conferences, summits, workshops, seminars, symposia, consultations and meetings that the researcher

conducted and implemented for a period of over a decade while working with an intergovernmental organisation in London in the area of public sector informatics. These activities brought together, at various times, delegates from national governments of nation-states and a number of inter-governmental organisations worldwide. The general objective, in the main, of these activities was to *seek and build consensus on the nature, form and scope of regional, national and, sometimes, sectoral, information technology strategies for sustainable development*. Similar organisations and development co-operation agencies such as United Kingdom's Department for International Development (DFID), the Canadian International Development Agency (CIDA), Germany's international development agency (GTZ), Australia's international development agency (AusAID), and a number of regional development banks such as the Caribbean Development Bank, the African Development Bank and the Asian Development Bank, have all had consultation workshops and seminars and conferences organised under their auspices, in which delegates from different parts of the world have been supported to participate, at specific venues in developing or developed country locations away from their homes, to deliberate on specific issues in the international relations context. Characteristic features of these activities included the designation of heads of delegation by governments of individual nation-states, to take on the role of state-as-actor; budget allocation, by both participating and hosting governments, for various purposes relating to the activity; putting in place of security and logistical arrangements by government of the hosting state; and the creation of a conference secretariat by the hosting state. In one case, the Commonwealth Heads of Government Meeting, which was scheduled to take place in November 2001 in Australia, had to be postponed as a result of the "9/11" in September and the security flux into which the world was thrown at the time. The costs of logistical and administrative arrangements, for example, were large and unforeseen. These characteristic features demonstrate many of the features associated with the conduct and implementation of a conventional international relations conference, which is at the core of this research study.

1.6 Research Approach

In order for the study to be carried forward from its stated goal and research question, a number of strategies need to be put in place, which seek to provide a roadmap to a solution to the study's research question. In this section we seek to articulate these strategies as components of a **research approach**, namely, a framework for the implementation of strategies for the research study. Research approach, in the words of Galliers [GALLIERS 1992], is used to represent *a mode of implementing or executing one's research*. Research approach may employ a particular or specific style and may deploy more than one method or technique. In particular, qualitative research approaches are diverse, varied, and various. Below we justify specific choices in this study's research approach - deployment of **qualitative inductive research**. Research approach represents different strategies to collecting, analysing and making inferences with respect to qualitative data. The common thread is that *qualitative modes of analysis are concerned primarily with textual analysis* (whether verbal or written).

In this study, the research approach is motivated by the need and desire to observe virtual interactions in distributed collaboration for the purpose of implementing international relations deliberations on the electronic communication medium.

Qualitative Research

In this section, we seek to put in place the study's justification for the choice of qualitative research for the research investigation as a first step in carrying forward the study from its research question to providing an answer. Myers' quote [MYERS 2001] below frames qualitative research in terms of human beings as objects of study:

> "*The motivation for doing qualitative research, as opposed to quantitative research, comes from the observation that, if there is one thing which distinguishes humans from the natural world, it is our ability to talk! Qualitative research methods are designed to help researchers understand people and the social and cultural contexts within which they live".*
>
> - Myers, 2001

Qualitative research seeks to help researchers understand **people** and the **contexts** within which they interact. Qualitative research represents a method for the pursuit of knowledge involving **observation** with regard to a broad range of **non-numerical 'measurement' of data,** applied to an understanding of human behaviour and reasons that govern human behaviour. Simply put, qualitative research investigates the **how** and the **why** of an inquiry. This research study is designed to deploy the qualitative research approach. In this study, the *object of research* is **human actors**, labelled actor-participants; the *subject of research* is **virtual interactions** in distributed collaboration, which are designed to originate as individually-attributed interventions by actor-participants (human actors) during a virtual session; the *context of research* is the **international relations context**, with focus on international relations conferences; and the *problem domain* is represented by problems of operation, context and strategy intrinsically associated with the implementation of conventional international relations conferences. Virtual interactions in this study are, in the main, the result of individually-attributed actor-participant interventions in a virtual session of distributed collaboration. In general, this study seeks to understand the *behaviour of human actors in distributed collaboration in an international relations context and to gain insight into the role dynamics that they generate on the electronic communication medium. Particular reference is placed on the identification of virtual interactions in an international relations context with 'states-as-actors' behaviour.*

Qualitative research involves the use of qualitative data, to understand and/or explain social phenomena. Qualitative research data in this study comes in one single form, namely, textual data, or simply, data. This research data is generated as virtual interactions, originating as individually-attributed interventions by actor-participants, which are observable and recorded as fragments of textual transcript data. In its qualitative research approach, the study seeks to observe textual transcript data, and categorise observed data into suitably defined patterns as the primary basis for for organising and reporting results. In this study, the researcher will view virtual interactions as the result of human discourse and actions, represented as "text". However, the researcher will seek to understand this generated "text" through meanings or codings assigned to various fragments of text.

Research Design

Having articulated the study's justification for the qualitative research strategy, the next step is to anchor a strategy for its implementation. This leads us to the need for the identification

of that component of the research approach which describes the *way in which data is acquired* (or collected) and analysed in an empirical context, or specific methodological practice, namely, that strategy which *implements and anchors a research approach* in a specific empirical context, or in a specific methodological practice, and outlines the sequence of **data acquisition** and **data analysis** [DENZIN and LINCOLN 1994]. The selection of such component of the research approach depends on the amount of available existing theory, research focus, and the resources available to the researcher [ORLIKOWSKI and BARAOUDI1991; BENBASAT *et al* 1992]. Among those frequently used in the field of information systems research are the following: survey methods, **case studies**, field experiments, laboratory experiments, statistical sampling, simulation, action research [GALLIERS 1992]. Yin [YIN 2002] defines the scope of a **case study** as an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident. This study chooses the **case study method**, as the preferred method for its data acquisition and data analysis in the empirical context of the study. In the study, it is proposed to deploy three case studies, represented as virtual interactions in distributed collaboration within a real-life context of three different themes. A number of generic criteria for choice of theme were articulated, which formed the basis for the selection of the case studies. The three case studies were selected from amongst a large number of CSCW session cases which formed part of a larger project, which was being implemented under the auspices of the researcher, as a partnership between Commonwealth Secretariat in London and the Government of Malta, during the two years 2000 and 2001. First, there was the need, in the study's design, to deploy a *distinct and diverse set of thematic types for the study's subject of discourse.* The choice of Virtual Embassy, Terrorism and Internet Governance was consistent with this assertion. Second, there was the need, in the case study design, to *provide opportunity for suitably varied temporal epochs for co-operative technology deployment in international relations tasks*. This prompted the research study to seek to adopt *single-occasion usage, and multi-occasion usage, spanning different time epochs from short- to extended- deployment (extended deployment over time* and *longitudinal application)* of group support technology. Third, there was the need to deploy *themes that portrayed an international relations context, individually and severally*, aiming to attract special attention, at least in broad terms, among the nation-states represented by the actor-participants in the study. Fourth, there was *the motivation for cases to have characteristics of novelty, currency or technological impact.* This prompted the study to observe that the cases selected individually reflected (at the time of the conduct of this study) novelty (virtual embassy), currency (terrorism) and technological impact (Internet governance), which were severally of general interest to governments of the nation-states represented in the study.

Virtual Embassy: Diplomacy in the Era of the Internet, **Terrorism: Focus on 9/11**, and **Internet Governance and Standardisation** were initially selected, on the basis of the set of criteria outlined above, to form the basis for this research study. Selection of individual case studies was contingent upon a combination of these criteria and on case-unique factors and criteria, which are described later (Chapter IV) in the study.

Choice of Modes of Data Collection and Data Analysis

In this study, the choice of techniques deployed for **data collection** comprise, in the main, the following:

- Automated capture of virtual interactions generated *synchronously* as individually-attributed interventions, manifesting as fragments of textual **transcript**; and
- Automated capture of virtual interactions generated *asynchronously* as individually-attributed comments on aspects of the subject of discussion of a virtual (CSCW) session, manifesting as textual transcript labelled 'X-Link Creation Notifications'.

Virtual interactions generated *synchronously* as individually-attributed interventions in the three cases were used in their entirety - all fragments of transcript generated in the virtual sessions conducted in the study were subjected to analysis. For X-Link Creation Notifications, however, analysis was limited to fragments of transcript generated in virtual sessions conducted for Internet Governance and Standardisation. This was because Internet Governance and Standardisation case provided wide scope and broad opportunity for discovering the processes of multilateral negotiation.

The data analysis for this study comprises transcript analysis using a coding schema based on a master (standard) comparative table of behaviour primitives, which the researcher seeks to assign into categories, and are deemed to represent important aspects of the framework upon which the study's analysis of data relies, and upon whose number of occurrences in fragments of text generated relative to the total number of occurrences in a virtual (CSCW) session enables a drawing of inferences on actor-participant behaviour. Essentially, deployment of coding schema is concerned with the *meaning of signs and/or symbols, or codes* (words/signs) in fragments of textual transcript generated as individually-attributed interventions in a CSCW session. To a lesser extent, the study proposes also to deploy the concept of Quoting and Quotes as a mode of analysis. Quoting denotes the process of justifying discovered behaviour or patterns of interactions in relation to a specified phenomenon or part-component of a phenomenon in a universe (or domain) of discourse. Quotes are the result of placing Quoting in action. Essentially, deployment of quoting and quotes is concerned primarily with the *meaning of a text*, which the researcher comes to understand through oral or written text.

Employing the Qualitative Inductive Research Approach

The study deploys the qualitative inductive research approach. Three case studies are investigated, comprising the following: Virtual Embassy: Diplomacy in the Era of the Internet, Terrorism: Focus on 9/11, and Internet Governance and Standardisation. The key to the case studies was, first, *to set up a framework of virtual interactions in distributed collaboration*; next, *to run a series of virtual sessions on international relations themes* (virtual embassy, terrorism and internet governance); and finally *to examine, analyse and interpret generated fragments of textual data* for each implemented virtual session on the three themes. Analysis of the case studies involves an inductive research approach**,** starting with data collection, making observations for group behaviours, and formulating concepts that describe deliberations in the international relations context. These concepts are used to specify states-as-actors behaviour. These behaviours are translated using the Z specification language to develop a specification framework, which can be used to develop an information system to improve international relations conferences.

CHAPTER II

LITERATURE AND DATA REVIEW

Introduction

The research study begins by reviews, in this chapter, of available **literature** on relevant aspects of virtual interactions, and available **data** relating to problems of operation, context and strategy, specifically focusing on costings of the implementation of conventional international relations conferences. In this context, the purpose of this chapter is, first, to find aspects of research and/or theory that are pertinent or relevant to the research question; second, to establish current trends of research and theory in relevant areas of the research question; and third, to provide preliminary research to clarify and define the scope of the research question. Specifically, the purpose of a *review of available literature* is to focus on a number of aspects and/or issues, which have implications for the study's research question, including, group support systems and distributed collaboration; virtualisation and the virtual work environment; teams, workgroups and communities of practice; international relations conferences and associated challenges; knowledge generation, knowledge sharing and knowledge application; agent-based systems; and 'social space' in electronic virtual space. The purpose for carrying out a *review of available data* for this research study is, specifically, to focus on costings of the implementation of conventional international relations conferences, as part of research into problems of operation, context, and strategy contained in the research question. This involved a document review of the Commonwealth Secretariat/ CFTC Review of Activities, in the Commonwealth Secretariat Archives, in order to articulate costings from financial data associated with the implementation of conventional international relations conference.s, including those associated with the themes of the study's case studies.

REVIEW OF AVAILABLE LITERATURE

2.1..Group Support Systems and Distributed Collaboration

Distributed collaboration is central to this study, as it forms an integral component of the study's research question on how *virtual interactions in distributed collaboration* can be used to address the problems of operation, context, and strategy that frequently characterise international relations conferences. In this study, **group support systems** and **distributed collaboration** are seen as intrinsically related: group support systems provide support to distributed collaboration for the generation of virtual interactions on the electronic communication medium. In this section, we present the results of the study's literature review on group support systems, with particular reference to computer supported co-operative work and associated aspects. Specifically, this part of the literature review covers the subject of co-operative work, group processes and collaborative technology.

The emergence of the new information and communication technologies (ICTs) in recent years has provided the opportunity for their deployment to support groups. The term Group Support System (GSS) has emerged to denote systems which, by definition, do not limit the application of the technology to a specific group task, such as decision making, but is wide in

scope for the purpose of meeting the goals of computer supported co-operative work (CSCW). The electronic support provided for group activities under CSCW systems span both the time (temporal) and the place (spatial) dimensions. CSCW system is *the technology for the virtual workspace*: it is today the technology of choice in collaborative or co-operative work, to varying degrees of *form, functionality,* and *complexity.* The technology enables individuals and groups in different rooms, in different offices, in different cities, in different countries and on different continents, at same or different times, to work together without the necessity to come face-to-face. This forms the essence of distributed collaboration. The technology also allows for co-located, face-to-face collaboration to take place, either anonymously or in individually-attributed mode.

The review finds that most co-operative work research has been undertaken in a *context of single occasion usage* [PERVAN & ATKINSON 1992], in comparison to real life experiences in the deployment of collaborative technology in group processes over time. Notable exceptions have been few, which have focused on real life experiences in the use of GSS in group processes over time [CHUDOBA 1993; POOLE and JACKSON 1993; HVATUM *et al* 2005; KHAZANCHI and ZIGURS 2007]. There is evidence that until recently, most co-operative work research has predominantly *focused on Euro-American settings,* leaving collaborative technology field studies in other cultural jurisdictions scarcely or scantily documented [NUNAMAKER *et al* 1996-97]. In general, most co-operative work research appears to have, almost solely, been characterised by *collaboration, co-ordination and information sharing* [LOCKWOOD, LAVERY and LACHAL 1993; NUNAMAKER *et al* 1996-97], with research focus on *knowledge management and associated areas* becoming pre-eminent only in the last 5-10 years KOTLARSKY and OSHRI 2005]. Facilitation, facilitation issues and the facilitator role in co-operative work has formed an important part of various co-operative research studies [NIERDERMAN, BEISE and BERANEK 1993; ROMANO *et al* 1999; MACAULAY, ALABDULKARIM and KOLFSCHOTEN 2006; HELQUIST, KRUSE and ADKINS 2006; TER BUSH and MITTLEMAN 2006]

Of particular interest in the research study is the role of 'hard-wired' aspects of co-operative work. 'Hard-wired' aspects comprise the '**electronic structures and processes**' brought to bear by the deployment of collaborative technology that provide support to the electronic virtual space. Electronic support for facilitating group processes**,** generically termed Group Support Systems (GSS), Collaborative Systems, Co-operative Systems or Computer-Supported Collaborative Work (CSCW) systems, has arisen and proliferated co-operative work as a response to the *need to support problem-solving processes* not only in face-to-face meetings (as *Co-located Face-to-Face* GSS-supported Meetings) but also among groups of geographically dispersed individuals who cannot meet physically (as *Distributed* GSS-supported Meetings). To date research into hard-wired aspects of co-operative work continues [POOLE and DeSANCTIS 1990; TARMIZI *et al* 2006]. Of similar interest in the research study, too, is the role of 'soft-wired' aspects of co-operative work. Soft-wired aspects of co-operative work comprise the '**group structures and processes**' brought to bear by the role dynamics of actors in the electronic virtual space, created by the deployment of collaborative technology. *Group processes,* under these circumstances, would seek to play the role of integrating mechanisms that enable organisations, networks and network forms, workgroups, teams and communities of practice maintain a degree of communication, collaboration, co-operation, and consultation within and between themselves**.** To date research into soft-wired aspects of co-operative work continues unabated in many diverse

areas [DeSANCTIS and POOLE 1994; ZIEGLER, DIEHL and ZIJTLSTRA 2000; POOLE and DeSANCTIS 2004].

Key Insights

Key insights into the literature review findings on group support systems and distributed collaboration are that **distributed collaboration** can be designed to provide **group support** for the virtual interaction of actors at geographically disparate locations in diverse nation-states worldwide. **Implications for research** point to the possibility of demonstrating how virtual interactions in distributed collaboration, by virtue of the deployment of **distributed collaboration**, as opposed to conventional face-to-face, round- the-table sessions in an international relations conference, can be used to address the problems of operation, context, and strategy that frequently characterise the implementation of a conventional international relations conference.

Further insights are that collaborative research involving single-occasion usage, extended deployment of collaborative technology, longitudinal usage of co-operative technology, or deployment on an on-going basis is observed to be more of the single-occasion type, less of the other modes of deployment, and more or predominantly of the Euro-American settings compared to research in other cultural groups or jurisdictions. **Implications for research** in relation to the findings point to the requirement that tasks in the international relations context, such as consensus building or negotiation, demand more than single-occasion usage, and require usage across diverse cultural settings. This has implications for the study's empirical design in Chapter IV.

The results of the literature review provide a window of opportunity for this study to introduce two new concepts, labelled collaborative work 'infrastucture' and collaborative work 'infostructure', as a set of mutually complementary 'contrivances' for consideration of 'structures' and 'processes' associated with virtual collaboration (CSCW) across form, functionality or complexity. *Collaborative work 'infrastructure'* will be used to refer to the *electronic structures and processes* that form part or whole of the *collaborative technology* that is deployed in the support of co-operative work and associated group processes on the electronic communication medium. Structures and processes relating to *group support systems* (GSS), together with their associated electronic networks and data communication, will be taken to form part of the collaborative work 'infrastructure'. *Co-operative work 'infostructure'*, on the other hand, will be used to refer to the *human group structures and processes* that form part or whole of the interactions undertaken by actor-participants under the support of any collaborative technology such as the g*roup support systems* (GSS) and similar technologies. Under co-operative work 'infostructure' are included virtual interactions and the role dynamics of actors and group processes on the electronic communication medium, which are brought to bear by the deployment of collaborative technology. The terms 'CSCW system' and 'group systems' or, more specifically, GSS, will be used interchangeably. Similarly, 'group processes' and 'interactions' may occasionally be used interchangeably. Collaborative work infrastructure and collaborative work infostructure can thus be deployed to describe the technology aspects of distributed collaboration, as introduced in this study, and the virtual group interactions that are central to the study, respectively.

2.2 Virtualisation and the Virtual Work Environment

Literature review was also carried out on advances in the new information and communication technologies. The motivation for this lies in the observation that the overall research domain for this study is **virtual interactions** in **distributed collaboration**. A necessary condition for the implementation of virtual interactions in distributed collaboration is the deployment of a **co-operative** or **collaborative system.** Efforts specifically related to co-operative systems seek to *facilitate collaborative work,* which has implications for *the virtual work environment.* Such efforts are made possible by providing the tools for, among others, co-ordination, consensus building and decision-making necessary in the execution of a task facing a group.

Advances in the new information and communication technologies (ICTs) are increasingly making innovative applications possible for individuals, organisations and communities of practice involved in group processes. Technical support for groups and collaboration in distributed environments has to date been viable and widespread [CONSTANT *et al* 1996]. In particular, collaborative technologies have become the technology of choice in the work environment. To date these technologies are diverse, ranging from the simple traditional EMAIL system, electronic meeting systems (EMS), newsgroups, calendaring systems, VoIP systems, generic group support systems (GSS), through videoconferencing systems. Increasing virtualisation of the work environment is requiring people to manage relationships, share knowledge and expertise, and co-ordinate joint activities in entirely new ways and virtuality is now associated with activation that can take place anytime anywhere and anyway one desires, with no physical, geographical, or structural constraints [QURESHI and ZIGURS 2001]. Moreover, virtualisation and virtuality can be designed to be implemented equally in an organisation and across geographically dispersed locations. In particular, geographically dispersed workgroups can draw upon collaborative technologies to support rapid formation and continuing development of relationships, common goals, and communities of interest [QURESHI and ZIGURS 2001]. Todate, development in collaborative technology focusing on enabling diverse and distributed teams to come together are on the increase [JARVANPAA and LEIDNER 1999; PAUL *et al* 2004], including innovations in attribution accuracy in virtual environments [TER BUSH and MITTLEMAN 2006]; and idea production in virtual groups [ZIEGLER, DIEHL and ZIJLSTRA 2000], writing teams in asynchronous-distributed collaboration [LOWRY *et al* 2005], and facilitating distributed groups [HELQUIST, KRUSE and ADKINS 2006].

Key Insights

Key insights in the findings of the literature review on virtualisation and the virtual work environment point to observation that virtualisation is driven equally by co-operative or collaborative systems and by collaborative work, with implications for a realisation of the virtual work environment. To date virtuality is associated with activation that can take place anytime anywhere and anyway one desires, with no physical, geographical, or structural constraints. **Implications for research** in relation to the findings point to the need for further research in modes of practice where virtualisation is implemented, not for its own sake, but for the support of the virtual work environment. Such a virtual work environment can be realised as an essential part of collaboration that is co-located within the boundaries of an organisational entity, or distributed in geographically disparate locations worldwide. This has

implications for the study's research design in Chapter IV.

2.3 Teams, WorkGroups, Communities of Practice, and the International Relations Context

Organisations by and large consist of a combination of both permanent and temporary **groups**. In the international relations context, this is reflected by a manifestation, for example, of permanent, standing and *ad hoc* committees, which have become something of a familiar occurrence in core business routines. It is the invoking of work processes in the context of geographically disparate locations that seeks to motivate the deployment and implementation of *non-traditional* means of *group collaboration.* In the context of this study, *distributed collaboration* has the potential to bring about information exchange, interpersonal group interaction and knowledge exchange on the electronic communications medium (or electronic virtual space) without the necessity for a traditional or conventional co-located, round-the-table, face-to-face meeting.

In this study, a **group** may be defined as any collectivity of individuals with the potential to interact to bring about information exchange, interpersosal group interaction or knowledge exchange. In the work environment, the simplest group is the **workgroup,** which may be defined as a group under auspices which interactions can be perceived as *relating to work and work processes*. **Teams** may be perceived as workgroups in which some *formal procedures of operation* are defined and will, more often, have a leader and members. For the purpose of this study we need to be able to identify whether actor-participants are regarded as a "team" or as "workgroup"or, better still, as a "virtual team" or as a "virtual workgroup". Traditionally, both "team" and "group" have been used to describe small collections of people at work [COHEN and BAILEY 1997; LANGFRED 1998] or workplace. This duality in terminology has increasingly been questioned [FISHER *et al* 1997]. Several authors suggest that the term "team" should be reserved for those groups that display high levels of *interdependency* and *integration*, among others. A widely accepted definition of "team" is given by Cohen and Bailey (1997) [COHEN and BAILEY 1997] as "*a collection of individuals who are interdependent in their tasks, who share responsibility for outcomes, who see themselves and who are seen by others as an intact social entity embedded in one or more larger social systems, and who manage their relationship across organisational boundaries"*. The foregoing definition gives the following as defining features of a team: unity of purpose, identity as social structure, and shared responsibility for outcomes. Madkin *et al* (1996) [MADKIN *et al* 1996] distinguishes between several types of teams, including "work teams", each of which exhibits varying degrees of permanence, structure, processes, co-ordination, and support needs. Information technology (IT) can provide the infrastructure for necessary support needs and for co-ordination under auspices of collaboration.

Information technology (IT) is providing the infrastructure necessary to support the development of new organisational forms. Successful organisations are, among others, those organised in a dynamic network form that, using information technology as enabler, can quickly adapt to ever-changing competitive landscapes and customer requirements [JARVANPAA and IVES 1994]. "Virtual teams" and "virtual workgroups" represent two prime mechanisms under auspices which these new, ICT-based organisational forms take to comparative advantage. Virtual teams may be defined as "*groups of geographically, organisationally, and/or time dispersed workers brought together by information and*

communication technologies to accomplish one or more tasks" [ALAVI and YOO 1997; DeSANCTIS and POOLE 1997; JARVENPAA and LEIDNER 1999]. The foregoing definition gives the following as a virtual team's distinctive features: virtual teams as teams; virtual teams as having a preponderant reliance on the appropriation of information technology to communicate with each other; and virtual teams as having ability to transcend traditional organisational boundaries. A special type of virtual team is the "global virtual team" [JARVENPAA and LEIDNER 1999; KAYWORTH and LEIDNER 2000; MAZNEVSKI and CHUDOBA 2001], distinguished because it draws members that work and live in different countries and are culturally diverse. Over the last decade, a large body of literature on virtual teams and their application has emerged [POWEL *et al* 2004; WIESENFIELD *et al* 1999; KHAZANCHI and ZIGURS 2007; LOWRY *et al* 2005]. Among characterising factors of a virtual team the following have been identified: Trust [JARVENPAA, KNOLL and LEIDNER 1998; JARVENPAA 1999; SARKER and VALACICH 2003], leadership [KRISTOF *et al* 1995], group composition [JARVENPAA, KNOLL and LEIDNER 1998], culture [JARVENPAA, KNOLL and LEIDNER 1998; MASSEY *et al* 2001], and the appropriation of communication technology [MAJCHRZAK *et al* 2000]. In this research study, we select the socio-emotional attribute **trust** as a critical factor for practical team functioning. In the international relations context, specific committees constituted as teams (aptly described 'committee-teams') are, more often than not, a multi-state composition of decision-makers that are part of a 'states-as-actors' system in international consensus building, conflict resolution or multilateral negotiations. Such teams are committees charged with a specific mandate to come up, objectively, with recommendations or guidelines on an issue of mutual importance to nation-states at large.

Beyond teams are **communities of practice** [WENGER 1998; LAVE and WENGER 1991]. In general, communities of practice come together around common interests and expertise. They create, share, and apply knowledge within and across the boundaries of teams, workgroups, corporate units, and entire organisations, thus providing a path towards creating a true knowledge community [WENGER, McDERMOTT and SNYDER 2002]. In the international relations context, the role of 'states-as-actors' in a fairly extended time horizon during which a multilateral negotiation on some controversial theme or subject takes place may be described as a '**community of mutual interdependence'**, so described from the observation that the burden of proof of the success of their negotiation process will, almost invariably, rest with or depend on the nature of group behaviour espoused and/or exercised during the said extended period, during which the delegates may be perceived to act, react or interact as 'a community of practice' with a set goal to be realised.

Virtual workgroups, virtual teams, virtual communities of practice, and virtual communities of mutual interdependence will be used to denote workgroups, teams, communities of practice, and communities of mutual interdependence, respectively, interacting on the electronic communications medium, namely, in the *electronic virtual space*. It is the invoking of work processes in the context of geographically disparate locations that seeks to motivate the deployment and implementation of *non-traditional* means of *group collaboration*. This remains a common feature for all the virtual categories discussed in this section. This is true for virtual workgroups, as for virtual teams or virtual communities of practice. Lipnack and Stamps [LIPNACK and STAMPS 1997] concur that virtual teams have the potential to facilitate work across distances, time zones, geographical

and organisational boundaries with links strengthened by webs of communication technologies.

It will be useful to articulate the group-characteristics of actor-participants in the international relations context, both as in the traditional face-to-face mode, and as in a virtual distributed mode, with the objective of identifying actor-participant group behaviour in terms of one or other of the following: workgroup, team, community of practice, or community of mutual interdependence. Central to seeking to progress this line of discussion is the observation that *the goals of actors in the international relations context will, in general, be dissimilar owing to the diverse historical, cultural and social backgrounds. No state can expect only `gains for its own position on all values, at all times and in all places'* [SONDERMANN and OLSON 1966: 2, 4]. *All states recognise that in the international system there are **gains** to be made and **pains** to be endured, **compromises** to be reached, and **conflicts** and **threats** to be faced.* The relations of states must therefore be seen as *`a complex of **conflicts** and **co-operations** embracing hundreds of different kinds of situations in some of which power is apparently at stake and others of which mutual convenience is the real issue*' [HARTMANN, 1967: 4]. Dissimilar goals, circumstantial expectations, a complex of conflicts and co-operation all add up to portray that actors in an international relations context will, in general, carry a prescribed task as proponents, opponents and exponents, having to be kept going by the motivation to preserve pride in state sovereignty and, in the majority of cases, to perform a 'balancing act' in the state power game. The foregoing description demonstrates that group interactions in the international relations context essentially differ from group interactions in a traditional team. This is because, first, actors will '(…) identify themselves with their state or nation-state to justify and render possible governmental action in the name of state interests' [WOLFERS, 1962: 6]. On the other hand, actors in a traditional team will essentially work together as a group in order to arrive at a single organisational or task goal. More often, the output of an international relations discourse is a deliverable that can be aptly described as a compromise. The output of a traditional team is the realisation of a goal arrived at in a more cohesive and supportive manner. International relations context brings together foes and friends alike and is therefore inherently charged with both trust and mistrust as interactions progress between and among the actors. Members of a traditional team, on the other hand are, by definition, trusting of each other. Equally, trust remains an important socio-emotional issue particularly when virtual teams are spatially distributed and globally dispersed. Jarvenpaa, Knoll and Leidner [JARVENPAA, KNOLL and LEIDNER 1998] asserts, moreover, that while virtual team do not need "high trust" in the traditional sense, they need "swift trust", which is very much task-oriented and yet empathic enough in order to achieve good performance. Even this latter observation does not equate with the trust and mistrust that is associated with the international relations context, as for example, in negotiations. Teams in the international relations context, where they exist, have generally been described as 'committee-teams'. Committee-teams are rare and have generally been constituted to deliberate on specialist issues in the international relations context, requiring some *extended period of deliberation*. The composition of such committees would normally be contingent upon the specialist subject of discourse but would generically comprise senior-level government diplomats, executives and civil servants, representing different nation-states. Zigurs and Qureshi [ZIGURS and QURESHI 2001] suggest that *extended presence* in virtual teams may be deployed to enable virtual team-building. Sarker and Valacich [SARKER and VALACICH 2003] discusses in some detail virtual team trust in an educational environment.

Key Insights

The key insight on the findings of the literature review on the type of groups that characterise actor-participants in the international relations context reveal that *actor-participants in distributed collaboration in the international relations context as defined in this study may best be perceived and described as a **virtual workgroup**, not as a virtual team and, even remotely,less as a community of practice.* Groups formed by actor actor-participants in this study are postulated to comprise workgroups. The interactions exercised by actor-participants in this study are generally marked by varying degrees of a state of mistrust, which invalidates the groups being characterised as virtual teams. The interactions are also characterised by actor-participants limited to the same group of actor-participants, by virtue which groups of actor-particpants, as characterised in this study, cannot constitute communities of practice. This is because, in practice, in the international relations context, there is always an impending mistrust among states-as-actors, because of differing goals of different nation-states they represent with regard to a given issue for discussion. **Implications for research** in relation to the findings point to the requirement to perceive as virtual workgroups actor-participants in the international relations context in relation to virtual interactions in distributed collaboration. This is taken up in Chapter IV.

2.4 International Relations Conferences and Associated Challenges

As we have seen in Chapter I, international relations contexts are characterised, in the main, by the convening and conducting of an **international relations conference** (or meeting), which is essentially a group meeting of human actors, called participants or delegates, traditionally interacting in a co-located, face-to-face, or round-the-table arrangement over a specific subject, themes or issues of mutual importance to the participating states. As such international relations conferences are central to deliberations in multilateral consultations, and multilateral negotiations. They provide a useful mechanism for bringing together nation-states in a face-to-face, round-the-table meeting, to consult on, or negotiate on, issues of mutual interest, or of concern, to nation-states, bilaterally and multilaterally. International relations conferences are found to be generally accompanied by a number of problems, which have implications on the efficiency, cost-effectiveness, and polivy formulation of the structures and systems of organisation for the implementation of international relations conferences [CFTC 2001/02]. The structures of organisation for the implementation of an international relations conference include the conference secretariat, which is generally empowered to co-ordinate with individual nation-states on all matters relating to travel logistics, accommodation logistics, and entry visa requirements, for the conference delegates. In addition, the conference secretariat is responsible for all local preparations for the conference, including protocol logistics, local travel and transport, delegate security, medi-care emergencies, rapporteur services, secretarial services, entertainment services, delegate visits, and documentation.

Key Insights

A key insight from the literature review on the implementation of international relations conferences is that international relations conferences are frequently accompanied by

problems and *issues* of *operation*, *context* and s*trategy*, which have implications on the degree of cost-effectiveness, performance (efficiency, productivity, etc), policy formulation with respect to the structures and systems of organisation for the conduct and implementation of international relations conferences. As an **implication for research,** the study needs to be able to present and implement an alternative to a conventional international relations conference, with the objective of realising, first and foremost, relative cost-effectiveness and, possibly, enhanced efficiency and enhanced productivity, without compromising on the essence or functionality of the deliberations. This has implications for the study's review of available data, which forms the basis for § 2.8 of this Chapter.

2.5 Knowledge Generation, Knowledge Sharing and Knowledge Application

This section reviews knowledge management literature in relation to teams, workgroups and communities of practice; collaboration and collaborative technologies. Teams, workgroups, and communities of practice form entity groups, which are characterised by certain unique attributes. For members of an entity group to interact with each other, collaboration is primal. Collaboration among members of an entity group enables information to be exchanged, interpersonal group interactions to be dynamically observed, and knowledge to be exchanged. Knowledge exchange in this case is said to comprise the following three patterns of collaboration, that characterise general group interaction: knowledge generation, knowledge sharing and knowledge application.

The new information and communication technologies have to date become an enabler of knowledge and expertise, and as such drivers of value creation [VENKATRAMAN and HENDERSON 1998]. Collaborative technologies, among others, can be seen as technological solutions for managing an organisational entity's stock of knowledge [SHULTZE and LEIDNER 2000]. Developments in collaborative technology are increasingly focusing on enabling diverse and distributed groups and teams to come together [JARVANPAA and LEIDNER 1999; PAUL *et al* 2004]. This type of electronic collaboration has become a powerful means of capturing, exchanging, exploiting, and managing knowledge [QURESHI, BRIGGS and HLUPIC 2006]. The act of collaboration is the act of the shared creation and/or discovery in which two or more individuals with complementary skills interact to create shared understanding that none had previously possessed or could have come to on their own [SCHRAGE 1990]. Schultze and Leidner (2002) [SCHULTZ and LEIDNER 1990] suggest that concepts of collaborative work, as defined by Schrage (1990) are closely related to knowledge management. Knowledge management in this context is rendered manifest by current efforts which have concentrated on creating, sharing and storing knowledge [QURESHI, BRIGGS and HLUPIC 2006]. Strategies for implementing these efforts are reflected in the observation that current research [ROBEY *et al* 2000; POWELL *et al* 2000 and RUTKOWSKI *et al* 2000] and current practice [KLEN et al 2001; QURESHI and ZIGURS 2001; LEONARD and SWAP 2004] in knowledge management predominantly relate to the connection between knowledge and information and the role of electronic communication to leverage networks of people in various tasks. Notwithstanding this, many models of knowledge management continue to address the type of tasks being carried out [PEPPARD and RYLANDER 2001; SVEBY 1997; RYLANDER *et al* 2000]; only a few appear to address the type of knowledge needed and the level of collaboration needed to carry out the tasks. Furthermore, the use of activation of distributed knowledge in virtual space

[QURESHI and KEEN 2005] becomes central. In this case activation is the conversion of knowledge into action on the electronic communication medium. In the findings of their research on activation of knowledge through electronic collaboration, Qureshi and Keen (2005) [QURESHI and KEEN 2005] have revealed activation conditions that delineate processes in which electronic collaboration technologies can be most effective. This has implications for the creation of collaborative work environments that enhance knowledge activation in organisational entities.

Key Insights

A key insight from the literature review on knowlede generation, knowledge sharing and knowledge application reveals that in the new information and communication technologies, collaboration and knowledge management have a prime role to play in the progression of our understanding of knowledge as an enabler of a value chain in an organisational entity (groups and organisations alike) anywhere, anytime. **Implications for research** in relation to these findings point to the availability of a window of opportunity for the mounting of research into the nature or type of knowledge needed for the delivery of different levels of collaboration, ranging from the simple, basic information-exchange type collaboration, through the more complex knowledge-exchange (knowledge generation, knowledge sharing and knowledge application) type collaboration, to knowledge-to-action activation type collaboration. This has implications for the design of the study's coding schema (Chapter IV).

2.6 Agent-Based Systems

The purpose of an information model in the context of a co-operative application, as described in this study, is to *allow the representation of information that would typically be produced, consumed, stored and retrieved by groups of users engaged in collaborative work.* One area which this study will seek to explore in relation to an information model in collaborative work is the agent metaphor model. Agents have to date been viewed variously as many 'things', including software entities, computer programs, reasoning processes, and creatures. There is currently a diversity of labels for agents, ranging from the generic autonomous agents [JOHNSON and HAYES-ROTH 1977], software agents [GENESERETH and KETCHPEL 1994], and intelligent agents [WOOLDRIDGE AND JENNINGS 1995] to the more specific interface agents [LASHKARI and METRAL, and MAES 1994], virtual agents [AYLETT and LUCK 2000], information agents [KUOKKA and HARADA 1995], and mobile agents [CHESS, GROSOF, HARRISON, LEVIN, PARIS and TSUDIK 1995; WONG, PACIOREK and MOORE 1999]. The introduction of the notion of agents has found access into a number of areas, of which artificial intelligence (AI) has been primal. Introduction of the notion of agents in AI has partly been due to the difficulties that have arisen when attempting to solve problems relating to a real, external environment or to the entity involved in a given problem-solving process. The solutions constructed to address these problems can be limited and inflexible, in not coping well in real-world situations. In response, agents have been proposed as *situated* and *embodied* problem-solvers that are capable of functioning effectively and efficiently in complex environments. This means that the agent receives input from its environment *through some mechanism*, and acts so as to affect that environment *in some way*. Such a simple but powerful concept has been adopted with remarkable speed and vigour by many branches of computer science because of its usefulness and broad applicability.

In the now foundational survey of the field by Wooldridge and Jennings [WOOLDRIDGE AND JENNINGS 1995], a perspective of agency attributes is identified, which are broadly accepted by many as **key qualities** to assess 'agentness' [LUCK and D'INVERNO 2001]. These are *autonomy,* or ability to function without the need for external intervention; *social ability,* or ability to interact with other agents; *reactivity,* or ability to perceive and respond to a changing environment; and *proactiveness*, or ability to behave in a goal-oriented fashion. Etzioni and Weld [ETZIONI and WELD 1995] summarise **desirable agent characteristics** as including the following features: *Autonomy*, or ability to self-respond to situations; *Temporal Continuity*, or ability to behave in a time continuum, rather than simply as 'one-shot' or discrete or discontinuous interaction; *Believable Personality*, for the purpose of facilitating effective interaction; *Communications Ability*, for the purpose of interacting with other agents in particular modes; *Adaptability*, or ability to change and adapt to new conditions or environment; and *Mobility*, or ability to be functional across different applications. Etzioni further characterise **autonomy** as requiring that agents are *Goal Oriented* and accept high-level requests; *Collaborative* in that they can modify these requests and clarify them; *Flexible* in not having hard, scripted action; and *Self-starting* in that they can sense changes and decide when to take action**.** Muller [MULLER 1998] seeks to survey **autonomous agent architectures** by considering three strands, namely, Reactive Agents; Deliberative (or Proactive) Agents; and Interacting (or social) Agents**.**

The nature of software specification drives the quality of the resulting software. Informal specifications of software are often imprecise and usually insufficient to ensure the correctness of a system. This has stimulated attention, in recent years, to **formal specification and verification methods.** *Today these methods constitute a thriving area of research in systems development.* In particular. recent research in the area of CSCW infostructure has focused on whether the *application of formal methods* to CSCW can be usefully deployed in the design and evaluation of realistic case studies. Specific formal methods from human-computer interaction domain, for example, have been applied to analyse accidents [TELFORD and JOHNSON 1996]. Specific formal methods have also been attempted to formalise co-operative editing in the WWW [JOHNSON 1995] and in the design rationale in co-operative design [JOHNSON 1966]. All this must be seen in against a background of the absence of a well-defined and provably correct method of moving from the specification phase to the later stages of program development. In particular, the lack of a method for developing programs from Z specification is a widely recognised difficulty and challenge.

Key Insights

Key insights from the findings of the literature review on agents and/or agent-based systems are that agents have to date been viewed variously as many 'things', including software entities, computer programs, reasoning processes, and creatures. There is a considerable degree of freedom which is availed by the agent metaphor, to deployment in diverse areas, which makes the agent concept amenable to application in many situations for different purposes, and to application of some formal methods to model interactions that are generated. **Implications for research** point to the need for seeking insight into synchronous collaboration, for example, of multiple delegates ('states-as-actors') in an international relations conference through possible modelling as a multi-agent system using a formal

method. There are, however, new challenges that require the development of specialist formal methods. For example, the synchronous collaboration of multiple users under strict **timing constraints** requires formal methods that can represent timing properties within the context of the collaborative work 'infrastructure'. The synchronous collaboration of multiple delegates or actor-participants in a real world conference or electronic virtual space requires some formal methods that can model group interactions generated within the international relations context. In this study, it is argued that in CSCW, actor-participant interactions in electronic virtual space can be adequately modelled using the agent paradigm.

2.7 'Social Space' in Electronic Virtual Space

The concept of virtual interactions in distributed collaboration carries with it the notion of the existence of an 'area' or 'place' in electronic space in which interactions take place. This has been described in literature, variously, as *'social space'*, or *electronic social space*. Specifically, Harasim [HARASIM 1993] uses the term 'social space' to describe the way in which human communication has transformed computer networks into what she calls 'places' where people 'connect' with each other. The Theory of Adaptive Structuration [POOLE and DeSANCTIS 1990] takes the notion of 'social space' a step further by considering the social processes that affect interaction on the electronic communication medium and recognises that [collaborative] technology may have an effect on the social processes and hence the patterns of relations and behaviours that emerge and, conversely, that the patterns of relations and behaviour that emerge may have implications for the design of future systems. Qureshi [QURESHI 1995b] postulates 'electronic social space' to create within it a totally different way of communicating and brings forth sets of interactions that as yet have been non-existent and suggests the need for further investigation into both the nature of the technology and the nature of group behaviour within the context of a networked group environment over time.

Key Insights

Findings herein demonstrate that there is a role that is played by the existence of virtual group interactions, supported by collaborative technology, in 'areas of virtual space' labelled 'social space' or 'electronic social space'. In this social space or electronic social space, *human communication has transformed computer networks into 'places' where people 'connect' with each other; technology may have an effect on the social processes and ensuing patterns of relations and behaviours that emerge and, conversely, the patterns of relations and behaviour that emerge may have implications for the design of future systems; or may create within it a totally different way of communicating bringing forth sets of interactions that as yet have been non-existent and for which there is need for further investigation into both the nature of the technology and the nature of group behaviour within the context of a networked group environment over time.*

A key insight arising from the findings on social space in electronic virtual space points to the need to investigate further into the *scope of electronic social space* and the *nature of virtual interactions that take place in electronic social space,* with focus on group behaviour in the international relations context. To this end, this study introduces a new phenomenon aptly termed eSocialSpace. Broadly, the term *eSocialSpace* will be used to denote virtual social space of a wider scope than that defined by Harasim, Qureshi or postulated by the Theory of Adaptive Structuration. The phenomenon so-named can be perceived as used to model a

'microcosm' of electronic virtual space, which is supported in both real-time and asynchronously by a two-tier formulation concept comprising the following:'*Collaborative work infrastructure*', which is used to refer to *electronic structures and wired processes* that form part or whole of the collaborative technology that is deployed in the support of co-operative work; and '*Collaborative work infostructure*', which is used to refer to the *social structures and group processes* that form part or whole of actions, reactions, interactions, and any other type of communication that may become manifest under the support of collaborative technology. **Implications for research** point to the need for investigating the nature, scope and role of *e*SocialSpace from the standpoint of virtual interactions, in general, and the international relations context, in particular.

REVIEW OF AVAILABLE DATA

2.8 A Document Review of Costing Data in the Implementation of Conventional International Relations Conferences

In pursuit of this study's purpose to provide an alternative that can be used in practice in the implementation and conduct of a conventional international relations conference, and which can address the problems and issues that frequently affect the implementation of such a conference while reasonably preserving or enhancing the conference deliberations, the following was carried out: a document review of CFTC Review of Activities [COMSEC 2000] was carried out during October/November 2002 using documents and reports from the Commonwealth Secretariat Archives. Focus on the review was on Conference Schedules and Conference Costings of basic international relations conferences prior to the period 2000 - 2001, specifically with respect to the following three activities: Virtual Embassy, Terrorism and Internet Governance prior to the period 2000 – 2001, that is, during a period and time when the activities on Virtual Embassy and Internet Governance formed part of a three-week programme. The document review process undertaken in this study is consistent with the observation that the study's empirical data analysis is designed to be informed by Document Reviewing, Content and Textual modes of Data Analysis [COHEN & FREEDER 1974, FUNKHOUSER 1973, GOTTSCHALK 1979, GREENBERG 1980, LUCKENBILL 1981]

TABLES 2-1.1 through 2-1.4 (APPENDIX III) depict, respectively, a scheduling of Virtual Embassy, Terrorism and Internet Governance: (i) as a multithematic conference (TABLES 2-1.1); (ii) as individual themes for separate *international relations conferences* (TABLE 2-1.2); (iii) as individual themes in *virtual conferences* (TABLE 2-1.3); and (iv) in terms of unit costings of participation and logistics in a basic international relations conference (TABLE 2-1-4).

We focus in this section on analysis of costings data relating to the implementation of a basic conventional international relations conference compared with the implementation of a corresponding virtual international relations conference. A summary of the costings, for analysis between conventional and virtual international relations conferences is presented in TABLE 2-1 below.

TABLE 2-1: International Relations Conferences – Costing Data

Conference Theme/Item	Conventional International Relations Conference (Costings)	Virtual Interactions in Distributed Collaboration (Costings)
A: DELEGATE PARTICIPATION		
	Airfares:	**Airfares:**
Virtual Embassy (8 particpants)	£12,600	N/A
Internet Governance (15 particpants)	£26,250	N/A
Terrorism (11 participants)	£19,250	N/A
	Accommodation:	**Accommodation:**
Virtual Embassy (8 particpants for 2 Days)	£2,000	N/A
Internet Governance (15 particpants for 3 Days)	£5,625	N/A
Terrorism (11 participants for 4 Days)	£5,500	N/A
	Out of Pocket Allowances:	**Out of Pocket Allowances:**
Virtual Embassy (8 particpants for 2 Days)	£800	N/A
Internet Governance (15 particpants for 3 Days)	£2,250	N/A
Terrorism (11 participants for 4 Days)	£2,200	N/A
Delegate Participation (Airfares, Accommodation, Out-of-Pocket Allowances)		
Virtual Embassy	**: conventional -** £15,400	**virtual** - N/A
Internet Governance	**: conventional -** £34,125	**virtual - N/A**
Terrorism	**: conventional – £26,950**	**virtual** - N/A

B: LOGISTICS		
Virtual Embassy		
	Virtual Embassy (1 Day)	**Virtual Embassy (1.5 Hours)**
Reprographics	£500	N/A
Telecommunications	£700	£10 (8 participants)
Equipment Hire	£1,000	£1,200 (8 participants)
Reception	£300	
Local Travel and Transport (LTT)	£1,400	
Rapporteur	£500	
Health Insurance	£1,800	
Security	£1,500	
Administration	£1,000	
Logistics (sub-total costing)	**£8,700**	**£1,210**
Internet Governance (2 Days)		
	Internet Governance (2 Days)	**Internet Governance (4.5 Hours)**
Reprographics	£1,000	N/A
Telecommunications	£1,400	£75 (15 participants)
Equipment Hire	£2,000	£2,250 (15 participants)
Reception	£600	N/A
Local Travel and Transport (LTT)	£2,100	N/A
Rapporteur	£500	N/A
Health Insurance	£2,700	N/A
Security	£2,250	N/A
Administration	£2,000	N/A
Logistics (sub-total costing)	**£14,550**	**£2,325**
Terrorism (3 Days)		
	Internet Governance (3 Days)	**Internet Governance (6.0 Hours)**
Reprographics	£1,500	N/A
Telecommunications	£2,100	£55 (11 participants)
Equipment Hire	£3,000	£1,650 (11 participants)
Reception	£900	N/A
Local Travel and Transport (LTT)	£2,100	N/A
Rapporteur	£750	N/A
Health Insurance	£2,700	N/A
Security	£3,000	N/A
Administration	£2,500	N/A
Logistics (sub-total costing)	**£18,600**	**£1,705**
Conventional International Relations Conference Costing	**£41,850**	

Results and Findings

The results show an overwhelmingly contrasting difference in the costings between a conventional international relations conference and a virtual international relations conference for the three thematic 'subjects of discussion, comprising Virtual Embassy, Terrorism and Internet Governance, which form the basis of this study's empirical investigation. The basic cost of the implementation of a conventional international relations conference can be high, namely, by several orders of magnitude in relation to the implementation of a virtual international relations conference as the following observations, inferred from from TABLE 2-1, will illustrate: high by a factor of 20 for a 1-day conference of 8 participants, in the case of an international relations conference on Virtual Embassy; or by a factor of 21 for a 2-day conference of 15 participants, in the case of an international relations conference on Internet Governance; or by a factor of 28 for a 3-day conference of 11 participants, in the case of a virtual international relations conference on Terrorism. *This shows that the implementation of an international relations conference is relatively costly compared with the implementation of a virtual international relations conference.* The disparity factor beween the two costs of implementation in this study can go as high as 20 – 28, depending on participant number and the duration of the conference.

Key Insight

A key insight that arises from this review of available data on international relations conferences is that conventional international relations conferences are often more costly to implement compared to corresponding virtual international relations conferences or international relations conferences implemented on the electronic communication medium. Thus in order to address, at least in part, problems of operation, context and strategy that frequently attend conventional relations conferences, the implementation of a virtual international relations conference can serve as an alternative for use in practice.

At this stage, therefore, we can state with confidence that, in relative terms, a virtual international relations conference is more cost-effective than a conventional international relations conference.We can now attempt to answer the question *Under what circumstances would such an alternative be an acceptable or even preferable solution*? First and foremost,the implementation of a virtual international relations conference makes it possible to save costs. This is a very important factor, particularly for less resourced nation-states or, even generally under conditions of a worldwide recession or 'credit-crunch' of the kind affecting countries and corporate organisational entities to date. In addition to the cost-effectiveness factor associated with a virtual international relations conference, dicussed in this section, the following are some of the circumstances that may dictate the acceptability or preferability of virtual interactions in distributed collaboration as an alternative to the implementation of a conventional international relations conference:

- *Prevalence of widespread insecurity in the host country or region* eg the immediate aftermath of major acts of terrorism or serious insecurity implications posed by major organised protests and demonstrations of the kind that has become a worldwide phenomenon in G-7 or G-8 meetings;
- A *raison d'être for reducing the number of major conventional international conferences* that would normally be implemented within an international or inter-governmental

organisation's multiple-conference format, such as conferences that are biennual or triennial in character, or even those that are annual or bi-annual in character;

- *Small jurisdictions in which hosting facilities, security and location would be inadequate* to meet the requirements of some countries to habitually prefer to be represented by an inordinately large delegate number as a symbol or show of a "high powered" delegation level at an international relations conference;
- A *conference timing which, for reasons beyond the control of many heads of delegations, becomes unsuitable* for the majority of the potential conference delegates to leave home; and
- A *raison d'être for conducting an international relations conference which is characteristically of the nature of low key in both form and format*, thus not necessitating the implementation of a conventional form.

CHAPTER III

CODING SCHEMA

Introduction

In the study's review of available literature in Chapter II, we derived key insights and implications for research. We noted that the theme 'virtual interactions', or 'virtual interactions in distributed collaboration' presented a dominant feature that cut across the key insights and implications for research. To understand these virtual interactions in the context of this study's qualitative inductive research, it is essential that we derive or develop a framework which serves as a frame of reference and a methodology for the analysis and interpretation of virtual interactions. We will call this framework a **coding schema**. A coding schema in the context of this study is designed to comprise coding of text as the basis of analysis of virtual interactions generated as fragments of textual transcript in virtual sessions of the study.

3.1 Articulating the Coding Schema

Introducing Virtual interactions in terms of Information Exchange, Interpersonal Interactions and Knowledge Exchange

The agency of implementation of this research study's empirical vehicle is the computer-supported co-operative (collaborative) work session (CSCW session). Specifically, distributed collaboration in this study comprises *spatially-distributed synchronous sessions*, which consist of actor-participants at geographically dispersed locations (spatially-distributed) interacting in real time (synchronous). That is, actor-participants at **different places** (or locations) worldwide (spatially-distributed) generate individually-attributed interventions at the **same time**.

In this section, first we invoke a standard group-based framework – a coding schema - as a foundational framework for articulating **virtual interactions** generated by actor-participants in a collaborative virtual session and, second, seek to extend the framework for applicability in the international relations context. Several taxonomies have been proposed in the literature regarding the nature of the conduct of CSCW sessions. These date back to initial, early proposals by various researchers, which were later modified by more recent research works. Bostrom and his colleagues [BOSTROM and ANSON 1992; BOSTROM, ANSON, and CLAWSON 1993], proposed a taxonomy which comprises classification into four basic categories. These are described as follows: Generate, Organise, Evaluate, and Communicate. These are akin to the categorisations recently proposed by Briggs *et al* (2003) [BRIGGS *et al* 2003] as patterns of collaboration that characterise team interaction, namely, Diverge (synonymous with Generate), Converge (synonymous with Synthesise), Organise, Evaluate, and Build Consensus. Bostrom and his colleagues make an explicit distinction between information generation, which is *divergent* in nature, and information organisation, which is *convergent* in nature. In seeking to articulate a methodology for data analysis for this study, due cognisance is taken of these classifications and an alternative approach is proposed in

which the four-category classification by Bostrom and his colleagues and the five-category classification by Briggs and his colleagues can be perceived as remaining intrinsically inclusive.

In this study, **virtual interactions** are proposed to form the basic building block of the coding framewok. Specifically, the *coding framework* proposes to deploy a *three-tier categorisation*, which focuses on the nature of interactions generated by actor-participants on the electronic communication medium, such as during a CSCW session. The standard group-based framework is designed to comprise the following: **information exchange interactions** [RUBIN and GOLDBERG 1992; QURESHI 1995], and **interpersonal group interactions** [KAKABADSE, LUDLOW and VINNICOMBE 1987]. In this study, we propose to add the following as part of the overall foundational framework: **knowledge exchange interactions**. The three interaction categories, namely, information exchange interaction, interpersonal group interactions, and knowledge exchange interactions are defined below, in terms of pertinent elemental interaction types which, individually and collectively, give meaning to the three interaction categories. This addition has been proposed to take account of content-based concerns, as opposed to solely behaviour-based concerns, in order to allow for possible instantiations in generated fragments of transcript data in terms of a content chraracteristic, as opposed to a behaviour characteristic.

Information Exchange Interactions (IXI) in the context of this study is defined as comprising *interactions* in the manner suggested by Rubin and Goldberg [RUBIN and GOLDBERG 1992], namely, *information providing*; *information seeking*; *requesting action*; *confirming action*; and *seeking consensus*. This study proposes to provide modifications to the Rubin and Goldberg suggestion, to allow for a more flexible consideration of *interventions* in the international relations context. Specifically, we propose to add the following new interactions: *requesting response* (similar to existing *requesting action*), *requesting permission* (a requirement in an international relations meeting), *confirming response* (providing closure to *requesting response*), *confirming permission* (providing closure to *requesting permission), confirming consensus (*providing closure to *seeking consensus), confirming information (*providing closure to *information seeking).* Each of these representative information exchange interactions will be called an *information exchange interaction primitive or IXI primitive.* An IXI primitive represents the basic, indivisible component of the IXI category. Thus *information providing*; *information seeking*; *requesting action*; *confirming action*; and *seeking consensus* are IXI primitives, as are modifications provided in this section

Interpersonal Group Level Interactions (IGI) in the context of this study is defined as comprising *interactions* in the manner defined by Kakabadse, Ludlow and Vinnicombe [KAKABADSE, LUDLOW and VINNICOMBE 1987] who distinguish between three types of interactions, namely, *task-oriented* (proposing/initiating, building, clarifying, information seeking, supporting, disagreeing, testing/evaluating and summarising); *maintenance-oriented* (gate keeping/opening, encouraging, tension reducing, peace-keeping, compromising, feedback giving, gate-keeping/closing) and *self-oriented* (attacking/defending, blocking, diverting, recognition seeking, withdrawing, point scoring, overcontributing, and trivialising). The interpersonal group level interactions categorisation was partially deployed by Qureshi (1995) [QURESHI 1995] in her work on theoretical considerations on organisations and networks. Again, this study provides modifications to the Kakabadse, Ludlow and

Vinnicombe interaction modes, to give flexibility for general use in the international relations context. Specifically, we propose to add the following new interactions: *cautioning/point of order, acknowledging, apologising, halting, diverting, positioning, withdrawing/seeking withdrawal*.

Each of the representative interpersonal group level interactions (IGI) above will be called an *interpersonal group level interaction primitive or IGI primitive.* An IGI primitive represents the basic, indivisible component of the IGI category. Thus *each of the task-oriented, maintenance-oriented and self-oriented interactions above* are described as IGI primitives, as are modifications provided in this section.

It is significant to note that the maintenance-oriented component of the interpersonal group level interactions have a lot in common with one notable category of the role of the Chair in a group meeting, namely, the *procedural functions*. The procedural functions of a group meeting Chair comprise the following:

a) Opening, closing and adjourning meetings (*gate keeping/opening, gatekeeping/closing, halting*).
b) Calling on representatives to speak (*confirming permission*).
c) Limiting the length of interventions (or speeches) if necessary, or if the rules so require (*halting*).
d) Giving rulings on points of order and points of procedure (*point of order*).
e) Clarifying points where necessary (*clarifying*).
f) Calling for the termination of irrelevant remarks (*cautioning/point of order*).
g) Ensuring that the business of the meeting is carried out (*seeking consensus, confirming consensus*).

This has implications for the Chair who, among actor-participants in a group meeting, is likely to play a dominant role in the execution of maintenance-oriented interactions.

Knowledge Exchange Interactions (KXI) are defined as comprising *interactions* described as follows: *knowledge generation, knowledge sharing,* and *knowledge application.* Knowledge exchange interactions, as herein defined, takes cognisance of tacit knowledge as originally defined by Polanyi (1983) [POLANYI 1983], classification of knowledge into 'what to do with knowledge', as originally defined by Nonaka and Takeuchi [NONAKA 1991; NONAKA and TAKEUCH 1995]. Knowledge exchange concept is introduced in this study with the objective of providing a role for knowledge in collaborative sessions, in particular, and collaborative work, in general, in a motivation to bring in parity between knowledge exchange, on the one hand, and information exchange and interpersonal interactions, on the other. The motivation to include knowledge exchange interaction alongside information exchange and interpersonal group level interaction as part of a group-based framework has its origins in the role that can be played by knowledge management activities in collaborative work. In this study, we define knowledge management as the generation, representation, storage, transfer, transformation, and application of knowledge (adapted from Schultze and Leidner (2002) [SCHULTZE and LEIDNER 2002], similarly Hedlund (1994) [HEDLUND 1994], Alavi and Leidner (2001) [ALAVI and LEIDNER 2001] and Pentland (1995) [PENTLAND 1995]. We draw on the equivalence between knowledge exchange interaction (KXI) activities as defined in this study and knowledge management (KM) activities as defined in this section by mapping between knowledge generation in KXI

with generation of knowledge in KM, knowledge application in KXI with application of knowledge in KM, and knowledge sharing in KXI with the set of activities comprising representation, storage, transfer, and transformation in KM.

Each of the representative knowledge exchange interactions (KXI) above will be called a *knowledge interaction primitive or KXI primitive.* A KXI primitive represents the basic, indivisible component of KXI interaction category. Thus *each of knowledge generation, knowledge sharing and knowledge application represents a KXI primitive*. A deeper look at the Knowledge Generation (KGen) primitive through application of the 'conceptual analytical lens' – a conceptual contrivance to look deeper into a concept - onto the Knowledge Generation (KGen) may be perceived to reveal, as output, **instantiations** of the Knowledge Generation (KGen) primitive. These, in practice, may be perceived as representing actual 'contextually-elementary' instances of the Knowledge Generation (KGen) primitive. This application of the 'conceptual analytical lens' is said to return a more generic knowledge generation type – namely, *'content-type' output*, as opposed to *'interaction-type'* (also termed *'behaviour-type'*). Content-type outputs resulting from the application of the conceptual analytical lens to the knowledge generation primitive will be called 'theme primitives'. A theme primitive can be either repeatable in characteristic or of singular occurrence in characteristic. Theme primitives will be used to denote content-type interaction primitives, and are perceived to be unique. Theme primitives can be 'elemental', if it is perceivable as being not amenable to further 'magnification' by the conceptual lens, or to further decomposition into more component parts; it can, however, also be 'composite' (capable of being 'magnifiable' into elemental component parts), or 'compound' (conjugated, conjunctive or disjunctive in characteristic, being amenable to being 'magnifiable' further into distinct component parts which are in themselves, possibly, further 'decomposable'). In the main, interaction primitives and theme primitives will be used synonymously, with reference to individually-attributed interventions in this study.

Codes and Coding for Information Exchange, Interpersonal Interactions and Knowledge Exchange

This section presents, in the main, a **coding mode of analysis** that forms the basis for this study's **coding schema**, as applied to virtual interactions in the international relations context. Specifically, the coding schema is concerned with *meaning of codes* in fragments of transcript generated in virtual interactions. Interactions on the electronic communication medium are rendered observable as *fragments of transcript*, which collectively comprise the *session transcript* of a CSCW session.

An analytical tool will require, as one of its usability attributes, simplicity of use or deployment. **Coding** is perceived to be a simple *analytic procedure and tool* under auspices which basic interactions can be identified and symbolised for ease of analysis, interpretation and further insight. In this study, **coding** is used to *denote the process of representing or labelling individual interactions symbolically for ease of empirical transcript data analysis.* To enable a systematic investigation of interactions through empirical transcript data analysis, it is essential to construct a **master comparator table** of interaction primitives and interaction categories. The master comparator table in this study is constructed from a *modification*, to take account of the international relations context, of the definition by Rubin and Goldberg [RUBIN and GOLDBERG 1992] and others, for Information Exchange

Interactions (IXI); the definition by Kakabadse, Ludlow and Vinnicombe [KAKABADSE, LUDLOW and VINNICOMBE 1987] and others, for Interpersonal Group Interactions (IGI); and the definition by this study for Knowledge Exchange Interactions (KXI). The modifications involve an initial iterative systematic and part-systemic analysis of *samples of fragments of transcript* generated by the study, with the objective of making 'additions' (or 'deletions') in the context of international relations. The Master Comparator Table depicting the set of interaction primitives and their codes for each of Information Exchange Interaction (IXI), Interpersonal Group Interaction (IGI) and Knowledge Exchange Interaction (KXI) is depicted in TABLE 3-1.

The validity of application of the Master Comparator Table to fragments of transcript rests on the assumption that there exists, to a reasonable degree, a one-to-one (and, possibly, one-to-many) mapping between a discrete virtual interaction discovered and articulated in a fragment of transcript and one or more standard interaction primitives in the Standard (Master) Comparator Table. The discovered and articulated interaction in the fragment of transcript can then identified with the standard interaction primitive(s) and may be coded accordingly, in the codes of the corresponding standard interaction primitives in the Standard (Master) Comparator Table.

Categorisation of Virtual Interactions at Macro-, Meso- and Micro- Levels

The coding framework proposes a *three-level approach,* consisting of three hierarchies, namely, the ***macro-level***, which entails consideration of virtual interactions *in* terms of the *high-level categories,* namely, *information exchange interactions (IXI), interpersonal group level interactions (IGI) and knowledge exchange interactions (KXI);* the ***meso-level***, *which* entails consideration of virtual interactions in terms of the *elementary 'building blocks' ('interaction primitives')* of the three interaction categories IXI, IGI and KXI, and essentially comprises the interaction primitives, which may be simply termed *the interactions;* and the ***micro-level***, *which* entails adding value to the interactions through a *determination of a relative number of occurrences of individually-generated interactions across IXI, IGI and KXI in a virtual collaboration session.* Categorisation of virtual interactions into the three levels labelled macro-level, meso-level and micro-level is designed to enable group behaviour to be articulated at both the high-level (namely, at the *information exchange interactions, interpersonal group level interactions and knowledge exchange interaction* categories), and at the elementary or 'building block' level, in terms of *a relative number of occurrences of individually-generated interactions across IXI, IGI and KXI.*

In addition to the coding mode of analysis, which forms the core basis of analysis, due consideration can be made of quoting as an associated mode of analysis as applied, to a lesser extent, to virtual interactions. This mode of analysis is, in the main, concerned with the meaning of language represented as (written) text [RADNITZKY 1970]. It makes use of quoting. Quoting denotes the process of justifying *specific interactions or patterns of interactions, discovered behaviour primitives* or patterns of behaviour primitives, in relation to a given specific domain of discourse. Quotes are the result of placing quoting in action. Quotes will be used to represent **data** and **knowledge** by means which a given interaction or pattern of interactions is **justified** relative to a a given specific domain of discourse. This

study will make use of Quoting and Quotes, as and when deemed necessary, particularly with respect to X-link creation notifications.

TABLE 3-1: The Master Comparator Table (Coding Schema), with Modifications to Address the International Relations Context

Interaction Primitives / Category	Interaction Primitives, with customisation for the international relations context	Code
Information Exchange Interaction (IXI) [RUBIN and GOLDBERG 1992, QURESHI 1995; POWELLL and PICOLLI 2002; QURESHI and VOGEL 2001; with modifications in this thesis - see § 3.1]\	Information Providing Information Seeking Requesting Action/ Response Requesting Permission Confirming Action/Response Confirming Permission Seeking Consensus Confirming Consensus Confirming Information	**IP** **IS** **RA/RR** **RP** **CA /CR** **CP** **SC** **CC** **CI**
Task-Oriented Interpersonal Level of Group Interaction (IGI_TO) [KAKABADSE, LUDLOW and VINNICOMBE 1987, with modifications in this thesis - see § 3.1]	Proposing/Initiating Guiding/Sequencing Instantiating/Substantiating Building Clarifying Seeking Information Seeking Alternative Solution Supporting/Agreeing Disagreeing/Opposing Testing/Evaluating Summarising/Recapitulating	**PROP/INIT** **GUID/SEQU** **INST/SUBS** **BUIL** **CLAR** **SEEK** **ALTS** **SUPP/AGRE** **DISA/OPPO** **TEST/EVAL** **SUMM/RECA**
Maintenance-Oriented Interpersonal Level of Group Interaction (IGI_MO) [KAKABADSE, LUDLOW and VINNICOMBE 1987, BOSTROM *et al* 1992; with modifications in this thesis - see § 3.1]	Gate-Keeping (**Opening**) Encouraging Cautioning/Point of Order Reducing Tension/ Peace-Keeping / Acknowledging / Apologising / Compromising Giving Feedback Gate-Keeping (**Closing**)	**OPEN** **ENCO** **CAUT/PTOO** **REDT/PCKG** **/ACKN/ APOL/** **COMP** **FDBK** **CLOS**
Self-Oriented Interpersonal Level of Group Interaction (IGI_SO) [KAKABADSE, LUDLOW and VINNICOMBE 1987, with modifications in this thesis - see § 3.1]	Attacking/Defending Blocking/Halting Diverting Seeking Recognition / Positioning Withdrawing / Seeking Withdrawal Point-Scoring Over-contributing Trivialising	**ATTK/DFND** **BLKG/HLTG** **DVTG** **RECG/POSI** **WDRW/ SWDR** **PTSC** **OVER** **TRIV**
Knowledge Exchange Interaction (KXI) [*POLANYI 1983; NONAKA 1991; NONAKA and TAKEUCH 199;* SCHULTZE and LEIDNER 2002; HEDLUND 1994; ALAVI and LEIDNER 2001; PETLAND 1995]	**Knowledge Generation** **Knowledge Sharing** **Knowledge Application**	**KGen** **KShare** **KApp**

BOX 3-1 below is an excerpt of fragment of transcript data illustrating how in an X-Link Creation Notification, quoting is being applied to justify positioning as an observable strategy during a multilateral negotiation session. Transcript analysis by quoting differs from transcript analysis by coding. While quoting aims to attach meaning to the given transcript data (language) under quotes, coding simply associates a given fragment of transcript with a 'standard' interaction primitive.

Like content analysis, which includes analysis of written materials (full reports, textbooks, etc), coding and quoting modes of analysis remains practically unobstrusive and nonreactive. In general, in these modes of analysis, the researcher determines where the greater emphasis lies after the data have been gathered. The method of analysis is explicit to the reader. Facts can be checked, as can the care with which the analysis has been applied. *This study limits itself, in the main, to the deployment of coding as a mode of analysis involving, representing or labelling individual virtual interactions symbolically for ease of interpretation of fragments of textual data in terms of sets of specific group behaviour and, to a lesser extent, to the employment of quoting as a mode of analysis involving justifying or giving meaning to, some given individual virtual interaction in a fragment of textual data.*

BOX 3-1: An Example of Quoting to Illustrate Positioning During Multilateral Negotiation

Positioning: Positioning provided initial real-time opportunity for actor-participants to begin formulating and presenting their individual positions in the light of the goals of the nation-states they represented as 'states-as-actors', or in the light of issues, arguments and interpretations of the positions of the others in a multilateral discourse/dialogue. Further opportunity for positioning was provided as X-link Creation Notifications on aspects of Internet Governance. Positioning seeks to effect the transition from some unknown position to a more focused 'position' characterised by an explicit viewpoint on the subject of negotiation process. Specific illustrations of positioning include the following instances:

Text: *"The Saudi position strongly stress the importance of taking the common values and morals of the different societies into account"*;

Text: *"Although South Africa agrees in principle with the DD from BSA, it should always be noted that us developing countries cannot commit ourselves to enforcing strict copyright laws because we simply do not have the means to do so. Therefore it would be wrong for us to say we want strict copyright laws because our countries would be the first to breach those laws"*.

On the Specification of the Knowledge Exchange Interaction Primitives in a Fragment of Transcript

Interaction primitives for knowledge exchange interaction (KXI) are relatively more difficult to identify for coding and assignment in fragments of transcript compared to the identification and coding of interactives primitives for any of either information exchange interaction (IXI) or interpersonal level of group interaction (IGI). Whilst the identification and coding of IXI or IGI primitives in a fragment of transcript is almost mechanical in process, the articulation and coding of KXI primitives remain somewhat inherently implicit. To this end, a *formulaic procedure* is proposed, which seeks to derive, *in a systematic manner*, the three KXI primitives from given specific many-to-one mappings of IXI and/or IGI primitives onto KXI primitives.

An in-depth consideration is necessary in order to be able to articulate and identify the three knowledge exchange interaction (KXI) primitives with some precision and repetibility. This is because KXI primitives, in the context of this research study, are best considered to be 'derivative' primitives, that is, they are designed to derive from the set of elemental interaction primitives contained in the rest of the standard (master) comparator table, particularly interaction primitives of the information exchange interaction category. In order to be able to articulate knowledge exchange interaction (KXI) primitives in the specification of any fragment of transcript, use is made of the need to view a fragment of transcript as being intrinsically composed of four component parts designated as follows:

- 'Lead' Role interaction primitives;
- 'Intermediary' Role interaction primitives;
- 'Invariant' Role interaction primitives; and
- KXI primitives (KGen, KApp, KShar)

It is postulated that **specific** patterns of IXI and IGI primitives, recast as 'Lead', 'Intermediary' and 'Invariant' Role behaviours lead to an identification of the three Knowledge Exchange Interaction (KXI) primitives, namely, Knowledge Generation (KGen), Knowledge Sharing (KShar) and Knowledge Application (KApp) in a fragment of transcript. The *raison d'etre* for selecting, in particular, specific 'Lead' Role behaviours is related to the primary concepts inherent in KGen, KShar and KApp, namely, generation, sharing and application. **Generation** (of knowledge) is conceptualised in the INIT/PROP (initiating/proposing) interaction primitives, as these represesent 'best effort' action or reaction aimed at generating a new piece of knowledge. **Sharing** (of knowledge) is conceptualised in the INST (instantiating) or EVAL (evaluating), SUMM/RECA (summarising/recapitulating) and FDBK (giving feedback) interaction primitives, as these would appear to represent, again, 'best effort' action or reaction aimed at sharing some experiential piece of knowledge, or bringing (for all actor-participants to share) a recast of, or a concise summary of, the essence of the discussions so far, or bringing for all actor-participants to share, a value 'assessment' of what one thinks or feels about an issue within the context of the domain of discussion. **Application** (of knowledge) is conceptualised in the SUBS (substantantiating), AGRE/DISA (agreeing/disagreeing) or CI (confirming information) interaction primitives, as these would appear to represent explicit response to a situation (in the affirmative or in the negative) in a narrative, based on an application of some inherent or tacit piece of knowledge. The articulation of Knowledge Generation, Sharing and Application *vis â vis* 'Lead', 'Support' and 'Invariant' role behaviours form the

basis of illustrations in TABLE 3-2, TABLE 3-2a, TABLE 3-2b and TABLE 3-2c. The task here is to be able to find a determinant or set of determinants which 'double' up as discriminants for the identification of KGen, KShar and KApp in a manner that is reasonably precise and repeatable. As discussed in this section (§3.1), we define knowledge management in this study as the generation, representation, storage, transfer, transformation, and application of knowledge (adapted from Schultze and Leidner (2002) [SCHULTZE and LEIDNER 2002], similarly Hedlund (1994) [HEDLUND 1994], Alavi and Leidner (2001) [ALAVI and LEIDNER 2001] and Pentland (1995) [PENTLAND 1995]. We draw on the equivalence between knowledge exchange interaction (KXI) activities as defined in this study and knowledge management (KM) activities as defined in this section by mapping between knowledge generation in KXI with generation of knowledge in KM, knowledge application in KXI with application of knowledge in KM, and knowledge sharing in KXI with the set of activities comprising representation, storage, transfer, and transformation in KM. This is consistent with the assertion by Qureshi, Briggs and Hlupic (2006) [QURESHI, BRIGGS and HLUPIC 2006] that current efforts in managing knowledge have concentrated on creating, sharing and storing knowledge. A more direct mapping between this study's knowledge exchange interaction and knowledge management may be seen in Huber's suggestion [HUBER 1991] of a collection of activities for managing knowledge: knowledge acquisition and assimilation, dissemination and sharing, and utilisation.

TABLE 3-2 depicts a characterisation of fragments of transcript, generated a virtual interaction session, in terms of 'Lead', 'Intermediary', and 'Invariant' role interactions, respectively. The table sets out a foundational basis for the three role interaction concepts. It is important to note a number of important characteristics, which are intrinsic in the definitions attached to the 'Lead', 'Intermediary', and 'Invariant' role interaction primitives. The 'Lead' role interaction primitive is designed to be a 'dorminant' role interaction primitive in the determination of a particular KXI primitive, namely, knowledge generation, knowledge sharing or knowedge application primitives. The 'Intermediary' role interaction primitive is designed to provide a 'moderating' role, as to what takes place in the period following the determination of a particular KXI primitive. The 'Invariant' role behaviour primitive is designed to have no effect on the mode of determination of a particular KXI primitive. The 'Invariant' role interaction primitive is identical to the IP (Information Providing) primitive, which is perceived to be present in all KXI primitive determinations.

TABLE 3-2: Characterising Fragments of Transcript in terms of 'Lead'Role 'Intermediary' Role, 'Invariant' Role Interactions *vis a vis* KXI Primitives in a CSCW Session Transcript

	Role Classification of Primitives	Specification of Given Role Classification of Primitives
A FRAGMENT OF TRANSCRIPT FROM VIRTUAL INTERACTIONS GENERATED IN A CSCW GROUP SESSION IN A DISTRIBUTED IS ANALYTICALLY ' PARTITIONED ' INTO MULTIPLES OF THESE INTERACTION PRIMITIVES	**'Lead' Role Interaction Primitive**	These are IXI and IGI primitives defined to provide a many-to-one mapping onto relevant KXB primitive.
	'Intermediary' Role Interaction Primitives	These are IXI primitives defined to provide a 'support' role to the 'lead' role interactions
	The 'Invariant' Role Interaction Primitive	The 'invariant' role interaction is solely represented by the Information Providing (**IP**) primitive. The IP primitive is postulated to be associated with each of the three KXI primitives as represented by KGen, KShar and KApp. The presence of the IP primitive in all instances of KGen, KShar and KApp underscores the requirement that each of the KXI primitives is an information providing task manifesting as 'lead' role primitive supported by 'intermediary' interactions.
	Knowledge Exchange Interaction Primitives:	These comprise the **KGen, KShar** and the **KApp primitives,** derivable from Lead Role, Intermediary Role and Invariant Role Interactions in a formulaic manner.

TABLE 3-2a, TABLE 3-2b, and TABLE 3-2c provide a systematic procedure (described as 'formulaic') for the determination of the three KXI primitives, contingent upon the nature of the 'Lead', 'Intermediary', and 'Invariant' role interaction primitives.

Relating Knowledge Exchange Interaction Primitives to Information Exchange Interaction Primitives and Interpersonal Level Group Interactions (Task-Oriented, Maintenance-Oriented and Self-Oriented)

In this section, we seek to relate knowledge exchange interaction primitives, namely, the KGen, KShar and KApp primitives to information interaction primitives and interpersonal level group interactions (task-oriented, maintenance-oriented and self-oriented). The purpose of this is to find a 'formulaic' procedure, which is repeatable, for the assignment, transitively, of individual KXI primitives from IXI and IGI primitives assigned to fragments of textual data.

(a) **Knowledge Generation** (KGen) (see TABLE 3-2a)

TABLE 3-2a: Proposed Pattern for Derivation of the Knowledge Generation (Behaviour) Primitive from IXI and IGI Interaction Primitives

Derivation of Knowledge Generation (KGen) Interaction Primitive				
Line	**1 'Lead' Role Interaction Primitives**	**2 'Intermediary' Role Interaction Primitives**	**3 'Invariant' Role Interaction Primitive(s)**	**4 Knowledge Interaction Behaviour Primitive(s)**
#	INIT / PROP	BUIL CLAR GUID CR/CA POSI (IS/SEEK) (RR/RA) …. ALTS WDRW ACKN APOL CAUT/PTOO ATTK/HLTG REDT/PCKG PTSC TRIV	IP	**KGen**

Proposed Formula: Initiating/Proposing (INIT/PROP) interaction primitive heralds the core source of Knowledge Generation (KGen) in a virtual session. Knowledge Generation (KGen) will be accompanied by the Information Providing (IP) interaction primitive. It is postulated that instantiations of the Knowledge Generation (KGen) behaviour primitive will manifest as specific instances of knowledge, which are embedded in fragments of virtual discussion transcripts (a word, a line, a paragraph or paragraphs). These fragments of virtual discussion transcripts will, more often than not, manifest as building (BUILD), clarifying (CLAR), guiding (GUID), confirming action/confirming response (CA/CR) or positioning (POSI) interaction primitives.

Initiating/Proposing (INIT/PROP) intercation primitives will be identified by the recognition that "something new" is being asserted or introduced or proposed. This can be singular or standing alone, or can be part of a BUILD, CLAR, GUI, CA/CR or POSI interaction primitives in an on-going virtual discussion. Interaction primitives IS/SEEK or RR/RA become significant for INIT/PROP only after appropriate responses to them have been confirmed in terms of the interaction primitives CI or CR/CA.

Diffentiating between the IS/SEEK and RR/RA Interaction Primitives

For the purpose of consistency, the IS/SEEK Interaction primitive will be differentiated from the RR/RA interaction primitive as follows:

The IS/SEEK (Information Seeking/Seeking Information) primitive will be understood to expect a narrative or description or a clarification (or similar 'descriptor') for its specification. A simple YES or NO specification is not sufficient to specify the IS/SEEK interaction primitive.

The RR/RA (Requesting Response/Requesting Action) behaviour will be deployed in such a way that a simple YES affirmation (or equivalent) or a simple NO negation (or equivalent) will suffice for its specification.

(b) **Knowledge Sharing** (KShar) (see TABLE 3-2b)

TABLE 3-2b: Proposed Pattern for Derivation of the Knowledge Sharing (Interaction) Primitive from IXB and IGI Interaction Primitives

Devivation of Knowledge Sharing (KShar) Interaction Primitive				
Line	**1** **'Lead' Role Interaction Primitive**	**2** **'Intermediary' Role Interaction Primitive**	**3** **'Invariant' Role Interaction Primitive(s)**	**4** **Knowledge Exchange Interaction Primitive(s)**
#	INST ----- OR ------ EVAL SUMM/RECA FDBK	BUIL CLAR GUID CR/CA POSI (IS/SEEK) (RR/RA) …. ALTS WDRW ACKN APOL CAUT/PTOO ATTK/HLTG REDT/PCKG PTSC TRIV	IP	KShar

Proposed Formula: Instantiating (**INST)** interaction primitives, which essentially involve giving a specific instance (borne of experience), or the evaluating (**EVAL**), the summarising/recapitulating (**SUMM/RECA**) or the feeback (FDBK) interaction primitives herald the main source of Knowledge Sharing (**KGen**) in a virtual session. Like the Knowledge Generation interaction primitive, the Knowledge Sharing (**KShar**) interaction primitive will also be accompanied by the Information Providing (**IP**) interaction primitive. It is postulated that instantiations of the Knowledge Sharing (KShar) interaction primitive will manifest as specific instances of knowledge which are, again, embedded in fragments of virtual discussion transcripts (a word, line, a paragraph or paragraphs). These fragments of virtual discussion transcripts will, more often than not, manifest as building (BUILD), clarifying (CLAR), guiding (GUID), confirming action/confirming response (CA/CR) or positioning (POSI) interaction primitives.

The instantiating primitive will be identified by the recogntion that "something experiential" is being introduced as a specific example. This will normally be part of a BUILD, CLAR, GUID, CA/CR or POSI interaction primitive in an on-going virtual discussion. EVAL, SUMM/RECA and FDBK interaction primitives are postulated to serve similar functions in an on-going virtual discussion. Like the instantiating interaction primitive, these primitives will bring to the fore "something to be shared" about a particular "object or subject of discourse". Interaction primitives IS/SEEK or RR/RA become significant for INST only after appropriate responses to them have been confirmed in terms of the interactions CI or CR/CA.

Diffentiating between the CI and CR/CA Interaction Primitive

For the purpose of consistency, the CI primitive will be differentiated from the CR/CA primitive as follows:

The CI (Confirming Information) primitive denotes the 'response' to the IS/SEEK primitive, and is accordingly narrative in nature. In the event that the RR/RA primitive is 'responded' to in a narrative manner, then such a response will form a CI interaction primitive.

The CR/CA (Confirming Response/Confirming Action) primitive merely denotes the simple YES or NO responses (or equivalents) to the RR/RA primitive.

(c) **Knowledge Application** (KApp) (see TABLE 3-2c)

TABLE 3-2c: Proposed Pattern for Derivation of the Knowledge Application Primitive from IXB and IGI Interaction Primitives

Knowledge Application (KApp)				
Line	**1 'Lead' Role Interaction Primitives**	**2 'Intermediary' Role Interaction Primitives**	**3 'Invariant' Role Interaction Primitive(s)**	**4 Knowledge Exchange Interaction Primitive(s)**
#	SUBS AGRE/DISA CI	BUIL CLAR GUID CR/CA	IP	KApp

		POSI (IS/SEEK) (RR/RA) …. ALTS WDRW ACKN APOL CAUT/PTOO ATTK/HLTG REDT/PCKG PTSC TRIV		

Proposed Formula: The substantiating (SUBS) interaction primitive assumes application of some prior information/knowledge to derive some apparent logical justification for its introduction in a segment of virtual discussion. The AGRE/DISA primitive involves introduction of "something extra" in a situation that would otherwise be sufficiently described by a simple affirmation (YES) or a simple negation (NO). The CI primitive will be responding to the IS or SEEK interactions in a narrative or to the RR/RA interactions beyond the simple YES or NO, ie in a narrative. This, again, will normally be part of a BUILD, CLAR, GUID, CA/CR or POSI interaction primitive.

Like the KGen and the KShar primitives, the Kapp will be accompanied by the Information Providing (IP) interaction primitive. Primitives IS/SEEK or RR/RA become significant for SUBS, AGRE/DISA or CI only after appropriate responses to them have been confirmed in terms of the primitives CI or CR/CA.

On the basis of the patterns established in TABLES 3-2a, 3-2b and 3-2c, it is clear that the **determinant factor** in the differentiation between KGen, KShar and KApp is the 'lead' role behaviour primitive, namely, INIT/PROP (initiating/proposing) for **KGen** (knowledge generation); INST (instantiating) or EVAL (evaluating), SUMM/RECA (summarising / recapitulating), FDBK (giving feedback) for **KShar** (knowledge sharing); and SUBS (substantiating), AGRE/DISA (agreeing / disagreeing), CI (confirming information) for **KApp** (knowledge application). These determinant factors are also the **discriminating factors** between KGen, KShar and KApp.

Relative Number of Occurrences of Interaction Primitives in a CSCW Session

The basis for articulating the nature of ***virtual interactions*** *in a CSCW session is the number of occurrences of interaction primitives in a given CSCW - in real terms or relative terms. In this study, virtual interactions have their origins in individually-attributed interventions, which are generated during a CSCW session. These virtual interactions are observed in a CSCW session as fragments of textual transcripts. To enable an articulation of the nature of these virtual interactions in terms of behaviour characteristics, each fragment of transcript is mapped onto a*n **interaction *primitive*** *or* ***set of*** **interaction *primitives***, *as defined in the Standard [Master] Comparator Table of TABLE 3-1. A measure of the relative number of times that an interaction primitive is mapped from individually-attributed interventions as observed in fragments of transcript in a concluded CSCW session is the number of* occurrences of a given interactive primitive *relative to the sum total of the number of occurrences of all interaction primitives mapped from individually-attributed interventions over a CSCW session. The resulting relative number of occurrences will be represented in equivalent percentage terms.*

Insight into a specific or given actor-participant behaviour will involve discovering *'patterns' of virtual interactions*, as observed in the relative number of occurrences – in percentage terme - over a concluded CSCW session. It is the relative number of occurrences of interaction primitives that form the basis of analysis for interpretation and or making deductions on the nature of actor-participant behaviour in a CSCW session.

3.2 Extending the Coding Schema to 'States-as-Actors' Behaviour

Characterisation and Coding for Analysis

In this study, virtual interactions generated on the electronic communication medium are the result of individually-attributed interventions in CSCW sessions. To enable a systematic analysis, virtual interactions [through individually-attributed interventions generated in a fragment of transcript] are mapped onto interaction primitives defined in a Standard [Master] Comparator Table (TABLE 3-1). Specific phenomena or behaviour characteristics are mapped onto combinations of interaction primitives on the standard [master] comparator table, that can reasonably be perceived to represent a given behaviour characteristic of the given phenomenon. Of particular interest in this study is the 'states-as-actors' behaviour. States-as-actors behaviour is characterised by the following four distinct behaviour modes in a discussion session:

- **Passive**, because the state of behaviour is reflected by a tendency not to make a contribution;
- **Active,** because the state of behaviour is reflected by a tendency to pursue an action (or set of actions) that is **generic** in nature;
- **Active** and **goal-oriented**, because the state of behaviour is reflected by a tendency to pursue an action (or set of actions) which is guided by a **goal** (or set of goals); and
- **Active, goal-oriented** and **self-motivated**, because the state of behaviour is reflected by a tendency to pursue an action (or set of actions) that is guided by a **goal** (or set of goals) and an inherent **self-motivation**.

For ease of application in the analysis of empirical data, the four distinct 'states-as-actors' behaviour modes outlined above will be coded ActENT, ActOBJ, ActGOAL and ActAUTO. TABLE 3-3 gives a characterisation of the 'states-as-actors' behaviour modes, in the international relations context, in terms of interaction primitives selected or identified as corresponding closely to behaviour modes defined above. Specifically, a question that arises is: How can we relate ActENT, ActOBJ, ActGOAL and ActAUTO to the IXI, IGI and KXI interaction primitives? The study needs to be able to derive ActENT, ActOBJ, ActGOAL and ActAUTO from the IXI, IGI and KXI interaction primitives. The purpose of this new, derived, secondary coding is to enable this study to characterise 'states-as-actors' behaviour in terms of the information exchange, interpersonal group level and knowledge exchange interaction primitives. To be able to produce a consistent, integrative analytical framework, a mapping must be established from each **interaction primitive** in the standard comparative table (TABLE 3-1) onto one or more of **'states-as-actors' behaviour modes** in *accordance with some definition*.

TABLE 3-3: A Characterisation of 'States-as-Actors' Behaviour Modes

States-as-Actors Behaviour Mode	Coding	Description of Key Characteristics in a Discussion Session
Passive	**ActENT**	• Electing not to make a contribution, remaining passive, remaining quiet, simply listening to others • 'Acting' like an inanimate object – designated **ActENT** - remaining passive over a given period of time, not responding to any stimulus in the environment in which it resides • Represented by no interaction primitives.
(Active, Generic-based)	**ActOBJ**	• Ability to be interactive with others ('social ability') • Ability to be generic in response – designated **ActOBJ** - over a given period of time, responding to a stimulus in the environment in which it resides, without necessary recource to any higher goals other than an inherent tendency to effect interaction • Represented by interaction primitives CA/CR, SUPP/AGRE, ENCO, ACKN, APOL,/COMP, CLOS
(Active, Goal-oriented)	**ActGOAL**	• Ability to be *proactive* - goal-oriented and able to channel high-level requests - designated **ActGOAL** • Ability to be *collaborative* – able to receive requests and clarify them • Ability to be *responsive* or reactive - perceptive and responsive to an external stimulus ('irritability' or 'reactivity' attribute) • Ability to be *adaptive* – able to function across new or different situations ('adaptability' attribute) • Represented by interaction primitives IS, RA/RR,RP,CA/CR, CP, SC, CC,CI; GUID/SEQU, INST/SUBS, BUIL, CLAR, SEEK, ALTS, SUPP/AGRE, DISA, OPPO, TEST/EVAL, SUMM/RECA; OPEN, ENCO, CAUT/PTOO, REDT/PCKG/ACKN/APOL/COMP, FDBK, CLOS; ATTK/DFND, BLKG/HLTG, DVTG, RECG/POSI, WDRW/SWDR, KShar, KApp
(Active, Goal-oriented, Self-Motivated)	**ActAUTO**	• Ability to be *autonomous*, spontaneous or deliberative - function without need for an external intervention ('autonomy') – designated **ActAUTO** • Represented by interaction primitives PTSC, OVER, TRIV, ATTK/DFND, BLKG/HLTG,WDRW/SWDR, KGen

In other words a set of criteria must be established which enables interaction primitives from the standard [master] table to be mapped onto ActENT, ActOBJ, ActGOAL or ActAUTO. This is carried out by axiomatically mapping each of interaction primitives in the standard comparator table onto *one or more of 'states-as-actors' behaviour modes represented by ActAUTO, ActGOAL, ActOBJ and ActENT,* taking into consideration the 'matching' of definitions and characterisations of ActAUTO, ActGOAL, ActOBJ and ActENT contained in TABLE 3-3 in relation to the meanings attached to the individual interaction primitives in the standard (master) comparator table.

The outcome is a derived master comparative table (TABLE 3-4) for states-as-actors behaviour modes, which can be used to code fragments of transcript in terms of states-as-actors behaviour modes represented by ActAUTO, ActGOAL, ActOBJ and ActENT.

Articulating 'States-as-Actors' Behaviour Modes in a Fragment of Transcript

In order to be able to articulate states-as-actors behaviour in a virtual session of an international relations meeting, it is essential that interaction (behaviour) primitives are mapped onto states-as-actors behavior modes. The mapping between interaction primitives and states-as-actors behavior modes is, apparently, not just a simple and direct procedure. It requires that for *every* interaction primitive making up the Information Exchange Interaction (IXI), Interpersonal Group Level Interaction (IGI) and Knowledge Exchange Interaction (KXI) interaction primitives (as depicted in the master comparator table), a states-as-actors behaviour mode must be uniquely assigned. The specification of 'states-as-actors' behaviour modes in a fragment of transcript generated as virtual interactions from individually-attributed interventions in a CSCW session will be obtained, *axiomatically*, as follows:

- Assigning to **each 'lead' role interaction primitive** (TABLES 3-2a, 3-2b, 3-2c) and to **each KXB interaction primitive** (TABLES 3-2a, 3-2b, 3-2c) a 'states-as-actors' behaviour mode (ActAUTO, ActGOAL, or ActOBJ) in the manner stipulated in TABLE 3-4;
- Assigning to **each 'intermediary' role interaction primitive** (TABLES 3-2a, 3-2b, 3-2c) a 'states-as-actors' behaviour mode (ActAUTO, ActGOAL, or ActOBJ), again, in the manner stipulated in TABLE 3-4.
- Assigning a **'states-as-actors' specification** of an individually-attributed intervention by an actor-participant as a **listing of all *distinct* 'states-as-actors' behaviour modes** in the intervention, which may may appear individually as [ActAUTO], [ActGOAL], or [ActOBJ], or in such combinations as [ActOBJ, ActGOAL], [ActGOAL, ActAUTO] or [ActOBJ, ActGOAL, ActAUTO].

TABLE 3.4, which depicts a mapping of Information Exchange Interaction (IXI), Interpersonal Group Level Interaction (IGI) and Knowledge Exchange Interaction (KXI) primitives onto the 'States-as-Actors' behaviour modes ActAUTO, ActGOAL, Act OBJ and ActENT, *provides the study's comparative table for translating interaction primitives, as coded on fragments of text generated by various virtual interactions, into states-as-actors behaviour modes*. TABLE 3.4 is a critical link between the various interaction primitives generated by virtue of virtual interactions generated by individually-attributed interventions and the states-as-actors behaviour modes.

From the number of occurences of individual states-as-actors behaviour modes, *insight into the nature of 'states-as-actors' behaviour of actor-participants in a CSCW session may be obtained by determining and interpreting the relative number of occurences of each of the behaviour modes ActAUTO, ActGOAL, and ActOBJ.*

TABLE 3-4: A Master Comparative Table (Derived) for States-as-Actors Behaviour Modes (part quasi-axiomatic and part definitional)

Category	**Interaction Primitives,** with customisation for the international relations context	**Code** (from the Master Comparator Table)	**Mapping onto States-as-Actors Behaviour Modes**
Information Exchange Interaction (IXI) [RUBIN and GOLDBERG 1992, QURESHI 1995; POWELLL and PICOLLI 2002; QURESHI and VOGEL 2001; with modifications in this thesis - see § 3.1]\	**Information Providing**	**IP**	*
	Information Seeking	**IS**	ActGOAL
	Requesting Action/ Response	**RA/RR**	ActGOAL
	Requesting Permission	**RP**	ActGOAL
	Confirming Action/Response	**CA /CR**	ActOBJ, ActGOAL
	Confirming Permission	**CP**	ActGOAL
	Seeking Consensus	**SC**	ArtGOAL
	Confirming Consensus	**CC**	ActGOAL
	Confirming Information	**CI**	ActGOAL
Task-Oriented Interpersonal Level of Group Interaction [KAKABADSE, LUDLOW and VINNICOMBE 1987, with modifications in this thesis - see § 3.1]	**Proposing/Initiating**	**PROP/INIT**	ActAUTO
	Guiding/Sequencing	**GUID/SEQU**	ActGOAL
	Instantiating/Substantiating	**INST/SUBS**	ActGOAL
	Building	**BUIL**	ActGOAL
	Clarifying	**CLAR**	ActGOAL
	Seeking Information	**SEEK**	ActGOAL
	Seeking Alternative Solution	**ALTS**	ActGOAL
	Supporting/Agreeing	**SUPP/AGRE**	ActOBJ, ActGOAL
	Disagreeing/Opposing	**DISA/OPPO**	ActGOAL
	Testing/Evaluating	**TEST/EVAL**	ActGOAL
	Summarising/Recapitulating	**SUMM/RECA**	ActGOAL
Maintenance-Oriented	**-**	**-**	-
	-	-	-
Interpersonal Level of Group Interaction (IGI-MO) [KAKABADSE, LUDLOW and VINNICOMBE 1987, BOSTROM *et al* 1992; with modifications in this thesis - see § 3.1]	**Gate-Keeping (Opening)**	**OPEN**	ActGOAL
	Encouraging	**ENCO**	ActOBJ, ActGOAL
	Cautioning/Point of Order	**CAUT/PTOO**	ActGOAL
	Reducing Tension/ Peace-	**REDT/PCKG**	ActGOAL
	Keeping / Acknowledging /	**/ACKN/**	ActOBJ, ActGOAL
	Apologising / Compromising	**APOL/COMP**	ActOBJ, ActGOAL
	Giving Feedback	**FDBK**	ActGOAL
	Gate-Keeping (Closing)	**CLOS**	ActOBJ, ActGOAL
Self-Oriented Interpersonal Level of Group Interaction (IGI-SO) [KAKABADSE, LUDLOW and VINNICOMBE 1987, with modifications in this thesis - see § 3.1]	**Attacking/Defending**	**ATTK/DFND**	ActGOAL, ActAUTO
	Blocking/Halting	**BLKG/HLTG**	ActGOAL,ActAUTO
	Diverting	**DVTG**	ActGOAL
	Seeking Recognition / Positioning	**RECG/POSI**	ActGOAL
	Withdrawing / Seeking Withdrawal	**WDRW/ SWDR**	ActGOAL, ActAUTO
	Point-Scoring	**PTSC**	ActAUTO
	Over-contributing	**OVER**	ActAUTO
	Trivialising	**TRIV**	ActAUTO
Knowledge Exchange Interaction [*POLANYI 1983; NONAKA 1991; NONAKA and TAKEUCH 199;* SCHULTZE and LEIDNER 2002; HEDLUND 1994; ALAVI and LEIDNER 2001; PETLAND 1995]	-	-	-
	Knowledge Generation	KGen	ActAUTO
	Knowledge Sharing	KShar	ActGOAL
	Knowledge Application	KApp	ActGOAL

3.3 Engagement, Goal-Orientedness, Self-Motivation and Generic Action Factors: Implications for States-as-Actors Behaviour

This section is a sequel to the discussions, in the previous section, on the articulation of states-as-actors behaviour in CSCW sessions and implications for insights on the nature of states-as-actors behaviour. The objective of this section is to define a number of factors that are closely linked to states-as-actors behaviour, which may be deployed individually or in combinations thereof, for the purpose of gaining insight into states-as-actors behaviour. To be able to articulate such insight, this study proposes to define **factors of relative insight,** into states-as-actors behaviour, as comprising the following:

- **The 'engagement' factor**, requiring that at some instant in a CSCW session, all actor-participants in the session can be described as actively engaged in the given domain of discourse. The engagement factor will be defined as the 'relative time' to first intervention for 100% of the actor-participants in a session, which will be coded **RTTFI at the 100% level** or, simply, RTTFI-100. The engagement factor, RTTF-100, if realised, ensures that at least ALL actor-participants have been engaged, by way of initial individual interventions, in the delivery of a session.
- **The 'goal-orientedness' factor**, giving a measure of actor-participant interventions (actions, reactions and interactions) in a virtual session, that are of the goal-oriented behaviour type. The 'goal-orientednesss' factor will be defined by the measure of behaviour described as 'active and goal-oriented'**,** which is synonymous with states-as-actors behaviour coded ActGOAL. The 'goal-orientednes' factor, if realised, ensures that at least a minimal set of virtual interactions in a session is goal-oriented.
- **The 'self-motivation' factor**, giving a measure of actor-participant interventions (actions, reactions and interactions) in a virtual session, that are of the goal-oriented and self-motivated behaviour type. The 'self-motivation' factor will be defined by the measure of states-as-actors behaviour described as 'active, goal-oriented and self-motivated'**,** which is synonymous with staes-as-actors behaviour coded ActAUTO. The 'self-motivation' factor, if realised, ensures that at least a minimal set of virtual interactions in a session is 'self-motivated'.
- **The 'generic action' factor**, giving a measure of actor-participant interventions (actions, reactions and interactions) in a virtual session, that are of the generic action behaviour type. The 'generic action' factor will be defined by the measure of behaviour described simply as 'active and generic' - electing to pursue an action (or set of actions) that is generic in nature, which is synonymous with behaviour coded ActOBJ. The 'generic action' factor, if realised, ensures that at least a minimal set of virtual interactions in a session is generic in nature.

Intuitively, we note the following set of optimisation conditions in terms of *constraints* or *degrees of freedom* placed on the Engagement Factor **RTTFI-100,** the Goal-orientedness Factor **ActGoal,** the Self-motivation Factor **ActAUTO**, or the Generic action Factor **ActOBJ**:

- A **minimisation** of the RTTFI-100, namely, the smaller the RTTFI-100, the earlier the engagement by all in a virtual session, a condition requiring actor-participants to make interventions at the earliest opportunity available, to ensure a measure of 'extended' all-participant engagement;
- A **predominance** of Goal-orientedness (ActGOAL), Self-motivation (ActAUTO), or Generic action (ActOBJ), namely, the more frequent goal-oriented interventions, self-motivated interventions or generic action interventions become central, the 'better' is the focus on the domain of discussion, from the standpoints of goal-orientedness, self-motivation or generic

action. What differentiating aspects of these factors do we expect to 'discover' in a CSCW session in the international relations context? We will seek to provide a solution to this question in Chapter V.

It is essential in this section to articulate, at the outset, the role played by the states-as-actors behaviour specified by the coded description ActENT. Of particular significance is the role with respect to 'time' to first intervention by each of the participants in a CSCW session. To this end we proceed to articulate a definition with respect to 'time' to first intervention as follows:

- Number of Paragraphs ('Paras') to First Intervention as a Percentage of Total Number of Paragraphs in a completed CSCW session. A paragraph is herein defined by the fragment of transcript of textual data represented by the totality of an actor-participant's individually-attributed intervention in an unspecified slot of time during a CSCW session. The resulting metric, for an actor-participant's first intervention, is a relative quantity which we will term 'Relative Time To First Intervention' (RTTFI). In practical terms, RTTFI will be used to represent a measure of the equivalent of time extending between the Opening of a CSCW session and the point, in the session, at which an actor-participant makes an intervention for the first time during the session. In this formulation, a paragraph is represented by the totality of contribution or intervention undertaken by an actor-participant before another actor-participant initiates a contribution through a new paragraph.

3.4 X-Link Creation Notifications

We saw in Chapter I (section 1.5) that this study is designed such that virtual interactions originating from individually-attributed interventions are supplemented by a series of asynchronous interventions, called 'X-link Creation Notifications'. 'X-link creation annotations' comprise virtual interactions originating from individually-attributed actor-participant interventions on a specific aspect of the domain of discourse. 'X-Link Creation Notifications' are generated, not in real time, but at different times within a specified time period. 'X-Link Creation Notifications' include *e*Messaging prompts for 'New Annotations' or 'New Web Links' created by individual actor-participants on an individually-selected aspect of a theme, for addition or incorporation in whole or parts thereof, to draft hypertext documents being generated as a special deliverable of a collaboration - negotiation in specific real-time virtual meetings – a communique, a declaration, a negotiated settlement statement or some other similar international relations document.

X-Link Creation Notifications generate New Annotations which generally manifest as **hypertext documents** with **content** in the form of *comments* for alternative words, phrases and sentences; comments for re-drafting; *comments* for concrete amendments; and *counter-comments* or *perspectives* on particular *aspects* of a specific collective draft document, or a specific virtual intervention. X-Link Notifications also generate New Web Links, which serve the purpose of 'giving pointers' ('Information Providing') to URLs as a means of providing relevant reference or explanation to the issues under discussion. X-Link Creation Notifications serve as an **additional mechanism**, in asynchronous mode, for negotiation on aspects of a domain of discourse. Actor-participant real-time interventions during CSCW sessions and asynchronous hypertext interventions in New Annotations or New Web Links

during X-Link Creations Notifications may be referred to as ***e*Interventions.** Individual comments in CSCW sessions or X-Link Creation Notifications may be referred to as ***e*Comments**. Individual amendments in CSCW sessions or X-link Creation Notifications may be referred to as ***e*Amendments**. Two formats are employed in the X-Link Creation Notifications, namely:

EITHER:

```
New Annotation:
Title:
Text:
Created by:

Has been added to Document- [normally added to a document or
transcript being discussed or previously discussed, but still
open for further interventions]
```

OR:

```
New Web Link:
Description:
Type: (Explanation, Reference or other function)
URL:
Created by:

Has been added to Document [as above]
```

In general there can, theoretically, be as many 'X-Link Notifications' in relation to an issue, theme, or subject under the domain of discourse as there are the number of actor-participants. It is conceivable that the number of X-Link Creation Notifications could add to more than the number of actor-participants associated with a given domain of discourse. Equally true, not all actor-participants associated with a domain of discourse could opt to participate in an 'X-Link Notification', in which case the number of 'X-Link Creation Notifications' could be considerably reduced.

In view of the nature of information provided by the X-Link Creation Annotations, namely, its *supportive* nature to the the main, individually-attributed synchronous interventions, the study proposes to consider X-Link Creation Notifications in the context of one of the three cases, namely, Internet Governance and Standardisation. The choice of Internet Governance, as opposed to the the other two cases compring Virtual Embassy and Terrorism, is designed to essentially illustrate the power of X-Link Creation Notifications in giving additional insights into a specific aspect of the domain of discussion, in this case, 'multilateral negotiations'. Supportive information in terms of X-Link Creation Annotations becomes core for analysis, in this case.

CHAPTER IV

CASE STUDIES OF VIRTUAL WORKGROUPS

Introduction

In Chapter III, we provided a framework – in a coding schema - on how virtual interactions generated in the study can be analysed. In this chapter, we present three case studies of virtual workgroups comprising Virtual Embassy, Terrorism and Internet Governance. The key to the study's empirical phase comprises three stages. First, a *framework of virtual interactions in distributed collaboration* is set up, which comprises a group of actor-participants interconnected by a distributed wide-area network, with nodes at spatially-distributed locations worldwide, and with facilities for real-time and, to a lesser extent, for asynchronous, individually-attributed interventions. This is then *applied to a set or series of virtual sessions on international relations themes* (virtual embassy, terrorism and internet governance), which are implemented as an empirical set up, *giving rise to virtual interactions*. These are *captured/collected as fragments of textual transcript data*, and, using the coding schema, examined, analysed and interpreted for group behaviours and group phenomena, including states-as-actors behaviour and associated group behaviour.

4.1 Criteria for Choice of Research Cases

Generic Criteria for Selection of the Case Studies

In this section, we give a description of an aspect of the research study's story line, namely, we articulate in terms of criteria and motivation for selection, or rationale and *raison d'être* for selection, issues and problems addressed in the international relations context, and goals and expected outcomes. Three different themes are deployed, described as follows: **Virtual Embassy: Diplomacy in the Era of the Internet**, **Terrorism: Focus on 9/11**, and **Internet Governance and Standardisation**. For brevity, the three themes will frequently be referred to as simply Virtual Embassy, Terrorism and Internet Governance, respectively. A number of generic criteria for choice of theme were initially articulated, which formed the basis for selection of the case studies. The three case studies were articulated, starting with *desired criteria,* then *anticipated domain* and, finally, *envisaged theme*. The criteria used to select these case are as follows:

1) First, there was the need, in the study's design, to deploy a *distinct and diverse set of thematic types for the study's subject of discourse.* The choice of Virtual Embassy, Terrorism and Internet Governance was consistent with this assertion.

2) Second, there was *the motivation for cases to have characteristics of novelty, currency or technological impact.* This prompted the study to ensure that candidate cases individually reflected (at the time of the conduct of this study) novelty (virtual embassy), currency (terrorism) and technological impact (internet governance), which were of general interest to governments of various nation-states.

3) Third, there was the need to deploy *themes that individually portrayed an international relations context*, aiming to attract special attention, at least in broad terms, among various nation-states. This was consistent with: (i) choice of Virtual Embassy as a theme, as this represented an important area of diplomacy in the era of the Internet; (ii) choice of Terrorism as a theme, as this represented a most profound area of international concern around the period post-9/11; and (iii) choice of Internet Governance as a theme, as this represented one of the most central areas of concern as societies worldwide were gradually beginning to learn, work and live in the wired world.

4) Fourth, there was the need, in the case study design, to *provide opportunity for suitably varied temporal epochs for co-operative technology deployment in international relations tasks*. This prompted the research study to seek to adopt *single-occasion usage, and multi-occasion usage of collaborative technology, spanning different time epochs from short- to extended- deployment (extended deployment over time* and *longitudinal application)* of group support technology.

Accordingly, *Virtual Embassy: Representation in the Era of the Internet*, *Terrorism: Focus on 9/11* and *Internet Governance and Standardisation* were selected, initially, on the basis of the generic criteria outlined above, to form the basis for this research study. Selection of individual case studies was contingent upon a combination of the criteria described in this section, and on a set of case-unique factors and criteria, which are described in details set out below.

4.2 Details of the Individual Case Themes

4.2.1 Case Study I: Virtual Embassy – Diplomacy in the Era of the Internet

Case Study I: Virtual Embassy – Diplomacy in the Era of the Internet was selected mainly because of its apparent *relevance, novelty and futuristic outlook*, relative to the traditional brick-and-mortar embassy (bmEmb). In terms of ensuing interactions, it was perceived that the choice of Virtual Embassy as a domain of discourse or theme would provide a *non-controversial environment* for dialogue, or discourse. Virtual Embassy (vEmb), as discussed in this study, refers to diplomatic relations between any two states not on the basis of a traditional resident ambassador (resAmb) and a traditional physical brick-and-mortar embassy, but via the Internet, while the ambassador remains in his or her own home state capital.

The rationale for selection of Virtual Embassy as case study was to deploy distributed collaboration in the articulation of ideas, concepts and phenomena in an area of diplomacy that is futuristic but with potential for innovation and deployment in the international relations context. The data generated in the Virtual Embassy (vEmb) case study was in itself complete as an empirical study under the auspices of a *single-occasion usage* of group support system technology. The time duration for implementation of the case study was designed to have a longevity of 1.5 hours. Exactly one CSCW session was deployed.

Issues and Problems Addressed

One CSCW session on the subject of Virtual Embassy was conducted on 3 October 2000. The session was described as a ‘conceptualisation’ CSCW session. This is because Virtual

Embassy as the subject of discussion was new in the experience of the actor-participants. The session was therefore to provide a brainstorming discussion on the subject, with the aim of deriving a concrete or near-concrete picture of what the concept represented in international relations and diplomatic practice. The following is an outline of the issues of discussion that were prepared and made available by the study's 'conference secretariat' as guidelines to help focus discussions by the actor-participants:

- What is Virtual Embassy (vEmb)? What is not Virtual Embassy?
- Can Virtual Embassy be a substitute for the traditional physical brick and mortar embassy (bmEmb)?
- Is it possible to create a Virtual Embassy, technologically and legally?
- What would be the main merits and dismerits of a Virtual Embassy compared to the traditional embassy?
- What are the possible limits of Virtual Embassy in diplomacy?
- Is there any specific advantage of Virtual Embassy for developing countries?
- Could the Virtual Embassy help overcome the digital divide?
- What are the components of a Virtual Embassy architecture?
- What are the *strutures* and *processes* of a Virtual Embassy?
- Virtual Ambassador: What is it? Where is it usable? Where is a Virtual Ambassador located? How does the Virtual Ambassador obviate the ritual of physical presentation of credentials and other essentials of diplomatic accreditation?
- How is security of communication, authentication and exchange of documents resolved under Virtual Embassy?

Expected Outcomes and Goals

The *expected outcomes* of the Virtual Embassy Discourse, as presented in this case study, were described as the *conceptualisation* and *articulation* of the basic *structures* and *processes* required for the implementation of a virtual embassy between any two nation-states. The goal(s) were as follows: in the long run, to adopt virtual embassies as a mode of practice, for deployment in diplomacy and international relations practice. As a supplementary structure, such adoption could run alongside the traditional physical brick-and-mortar embassy in the capitals of collaborating states; as an alternate structure, such adoption could serve as an alternative choice to the traditional physical embassy; and as a substitute structure, such adoption could run as the *de facto* embassy, an embassy on the electronic communication medium.

4.2.2 Case Study II: Terrorism – Focus on 9/11

Case Study II: Terrorism – Focus on 9/11 was selected mainly because of the apparent global shock and awe that captivated the prevailing world order following the 9/11 terrorist attack on the United States and the subsequent enigmatic picture that this attack presented thereafter. In terms of ensuing **interactions**, it was perceived that the choice of Terrorism as a domain of discourse was potentially amenable to generating *controversy* and, perhaps, complete *lack of consensus*. Controversy and lack of consensus are examples of a typical genre in conventional interactions in the international relations context. Terrorism, as introduced in this research study, was left for the actor-participants to define, with the objective of arriving at a consensus.

The rationale for the selection of Terrorism as a case study was to deploy distributed collaboration in the articulation of definition and/or characteristic features in an area of diplomacy that was *contemporary, current, and dialectical in nature* in the international relations context. The data generated in the terrorism case study was in itself complete as an empirical study under the auspices of *extended deployment* of group support system technology. The time duration for implementation of the case study was 6.0 hours.

Issues and Problems Addressed

A total of four CSCW sessions were implemented in the course of different dates, during 27 September 2001 (16 days after 9/11), 9 October 2001, 11 October 2001, and 16 October 2001. The nature of the CSCW sessions are contained in the following titles or descriptions: A Conceptualisation of Terrorism (27 September 2001) – aimed at the motivation to come to a common understanding and/or perception of terrorism; Addressing the UN General Assembly on Terrorism – A Simulation (9 October 2001) - aimed at simulating individual country perceptions to terrorism at the UN; A Special Session on Terrorism (11 October 2001) - aimed at realising possible action points; and Further Conceptualisation – Guerrilleros, Freedom Fighters and Terrorists (16 October 2001) – aimed at exploring further the wider world of terrorism and associated concepts. The following is an outline of the issues of discussion that were prepared and made available by the study's 'conference secretariat' as guidelines to help focus discussions by the actor-participants:

- What is the definition of Terrorism? Can practical comparisons and contrasts be drawn for the entities Guerrilleros, Freedom Fighters, and Gangsters relative to Terrorism? What genres of actions are targeted by Terrorists, Guerrilleros, Freedom Fighters, and Gangsters?
- What legal framework(s) exist for the determination of who is a Terrorist, a Guerrilleros, a Freedom Fighter, or a Gangster?
- What is the relevance of the UN Security Council Resolution 1373 to Terrorist, a Guerrilleros, a Freedom Fighter, or a Gangster?
- What legal frameworks exist for the determination of who is a legitimate freedom fighter as opposed to a terrorist, a guerrilleros or gangster? Or, is it the case of "One Man's Freedom Fighter is another Man's Terrorist"?
- State Terrorism: Is is applied legitimately or indiscriminately against all genres of "trouble makers", including terrorists, guerrilleros, freedom fighters or gangsters or even political rebels? What genres of actions are targeted in state terrorism?

As indicated above, these questions were used as a guideline for virtual discussions on Terrorism.

Expected Outcomes and Goals

The *expected outcomes* of the Terrorism Discourse, as presented in this case study, are described as the *conceptualisation* and *articulation* of the basic *attributes* and *characteristics* of Terrorists, Guerrilleros, Freedom Fighters, and Gangsters. The goal(s) under the Terrorism Discourse were as follows: a common definition of Terrorism would be adopted that was universal and free of dialectics. The session 'Addressing the UN General Assembly on Terrorism' was designed to simulate the kind of interactions that take place among delegates at the UN General Assembly. The session entitled 'A Special Session on Terrorism' was

designed to pool together pertinent issues of discourse on Terrorism with expected outcomes and/or goals that had some minimal common understanding among the actor-participants.

4.2.3 Case Study III: Internet Governance and Standardisation

Case Study III: Internet Governance and Standardisation was selected mainly because of the apparent contemporaneity and the wide interest attached to it by governments of sovereign nation-states and because of the significance of the technological dimension it provides for negotiation in an international relations context. In terms of ensuing **interactions**, the choice of Internet Governance and Standardisation as a domain of discourse was amenable to providing environments for, first, a *conceptualisation* of Internet Governance; second, *positioning* for negotiation; and, finally, *multilateral negotiation*. To this end, Internet Governance presented a challenge for *consensus building*, with the objective of reaching a *compromise* that appealed, at least collectively, to the actor-participants. Positioning, Negotiation, Consensus Building and Compromise are examples of a typical set of genre in conventional interactions in the international relations context. Internet Governance and Standardisation, as introduced in this research study, provided a niche for exposure of actor-participants to multeral negotiation.

The rationale and *raison d'être* for selection of Internet Governance and Standardisation as a case study was to deploy distributed collaboration in the articulation of access, application, and participation by nation-states in an area of international relations that was a *technological presence in the working place and the home* but whose governance was litttle known to many nation-states in the developing world. The data generated in the Internet Governance and Standardisation case study was comparatively suitable for consideration as an empirical study under the auspices of *extended deployment* of group support system technology. The time duration for implementation of the case study was 6.0 hours

Issues and Problems Addressed

A total of three CSCW sessions were implemented during 13 March 2001, 15 March 2001, and 22 March 2001. The nature of the CSCW sessions were contained in the following titles of sessions:'A Conceptualisation of Internet Governance' (13 March 2001), 'Positioning for Multilateral Negotiation on Internet Governance' (15 March 2001), and 'Multilateral Negotiation on Internet Governance' (22 March 2001). The following is an outline of the issues of discussion on Internet Governance and Standardisation, which were prepared by the study's 'conference secretariat' and made available to the actor-participants, as aguideline for the virtual discussions:

- What is Internet Governance and Standardisation? Who controls or owns the Internet?
- Do nation-states have a role in Internet governance? What is the role of Governments, the Private Sector and the Civil Society in Internet governance and standardisation? What role does a national regulator have in Internet governance? What is the expected role of an existing institution, with reference to Internet governance? Should it be governmental, private, regulatory or a professional body?
- What legal framework(s) exist for interoperability within international, voluntary, and consensus-based environments for standards setting in Internet governance and standardisation?
- What should be the balance of interests and responsibilities so that the international

character of the Internet is recognised with respect to relevant jurisdictions around the world?

- What are the limits or degrees of freedom to dominance on the Internet?

Expected Outcomes and Goals

The *expected outcomes* of the Internet Governance and Standardardisation Discourse, as presented in this case study, were described as the *negotiated compromise on the rights, roles and responsibilies of nation-states, international bodies, non-governmental organisations, business and citizens to aspects of Internet Governance.* The goal(s) under the Internet Governance and Standardardisation Discourse were as follows: to regard the Internet as a resource that is owned by all humanity (a 'Global Common for All').

4.3 Key to the Case Studies

4.3.1 Set Up a Framework of Virtual Interactions in Distributed Collaboration

The key to the case studies was, first, to *set up a framework ('architecture') of virtual interactions in distributed collaboration.* The functional core of this comprised the *networked distributed workgroup environment*, under auspices which *virtual interactions* under distributed collaboration was designed to take place on the electronic communications medium. This necessited the setting up two components comprising the 'soft-wired' component consisting of the 'actor-participants' and the 'hard-wired'component consisting of the associated 'group support technology', namely:

- The setting up of a *group of actor-participants*, with a set of specifications for actor-participation, namely, the generation of *virtual interactions*;
- The setting up of *group support technology*, with the prime functionality of facilitating *distributed collaboration.* This was designed to provide electronic connectivity (*e*Connectivity) for a distributed wide-area network, with **nodes** at spatially-distributed locations worldwide, and with **facilities** for real-time interventions and, to a lesser extent, for asynchronous, individually-attributed interventions**.**

Under the auspices of this 'architecture' were the need for an articulation of specifications for the actor-paricipants, and specifications for the group technology deployed in the empirical study. These are described in more detail below.

a) Articulating Specifications for Actor Participation

Person Specifications

Actor-participants in this study comprised a 'professionally homogeneous' and a 'culturally heterogeneous' group of individuals located and distributed **at** geographically disparate locations in diverse nation-states of countries worldwide. All candidate actor-participants were required to provide their *personal biodata* (described as **BioPersonae)** and their *person specifications* (described as **personCapabilities**), which, for selection to participate, were referenced against a set of criteria in the manner outlined below.

(i) BioPersona: In the study, actor-participant *personal biodata* (described as **BioPersonae)** were designed to to comprise the following attributes: Name; Job Title, Qualification, Experience; Organisational affiliation, Country of origin; and Language of formal communication which, for decision-making with respect to initial partial-selection, were referenced against the following as criteria:

- Participation was strictly for diplomats and international civil servants who routinely *think and work and learn in the international relations context in the wired world*. Preference would be given to *senior or middle level management or executives in the area of international relations, and diplomacy categories*. In accordance with the objectives of the Commonwealth Plan of Action for Women and Development, preference would be given to suitably qualified and experienced female candidates.
- Candidates must have *at least a university degree* and *at least three years of work experience in international relations or diplomacy* and *must be able to communicate (both verbally and in written form) in English in a routine work environment*.
- Candidates performing the function of *Diplomatic Knowledge and Information Officer* (DKIO), or equivalent, in diplomatic services, international organisations, and other institutions involved in international affairs could also be considered.

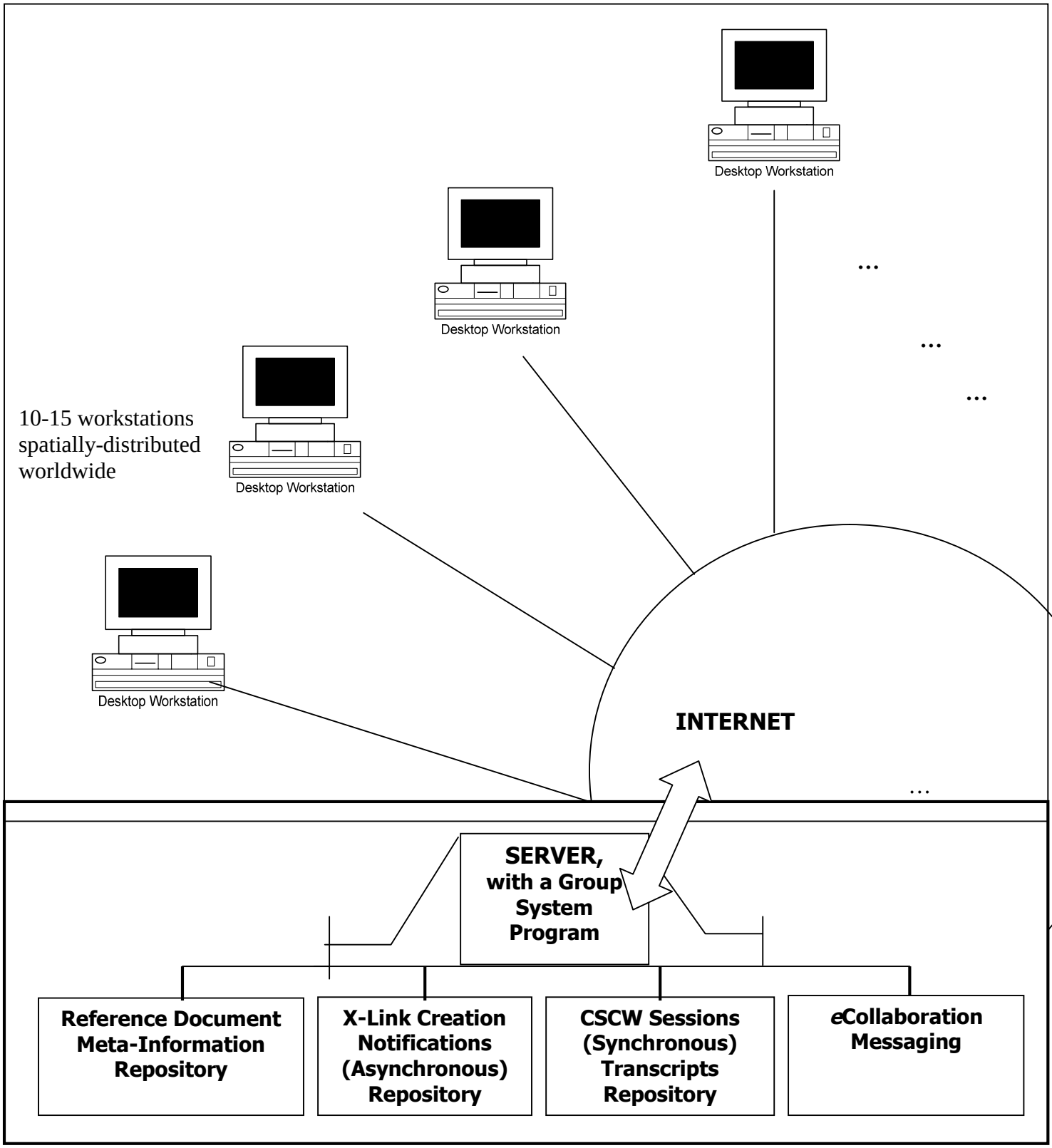
(ii) PersonCapabilities: In the study, *person specifications* (described as **personCapabilities**) were referenced against the following attributes as comprising the rest of the criteria for decision-making for initial partial-selection: ability to *negotiate in a multilateral situation*; ability to make *decisions on behalf of the state* that a delegate or actor-participant may be authorised to represent; ability to make proposals; and ability to *be perceptive and autonomous.*

The study comprised two distinct groups of actor-participants: Group of 2000 (designated 'Group2000'), and Group of 2001 (designated 'Group 2001'), during the years 2000 and 2001, respectively. The actor-participants comprised individual participants taking part *sur place* **at** geographically disparate/dispersed locations/nation-states worldwide in CSCW sessions. To some extent, each of 'Group2000' and 'Group2001' was perceived, by design, to be 'professionally homogeneous' but 'culturally heterogeneous'. There were as many nation-states represented as the number of actor-participants recorded on a CSCW session. Each of the CSCW sessions was thematic by design and the domain of discourse was in the international relations context.

b) Articulating Specifications for Group Support Technology

The core of the *group support technology* used in this study, with the prime functionality of facilitating *distributed collaboration*, was provided by **distributed group support technology**. Distributed group support technology was implemented as a web-enabled Group Support System with a central server located in Malta and a wide-area network (WAN), distributed worldwide, with nodes at the office-locations of participating actor-participants in the nation-states of several countries worldwide. The Group Support System had tools and/or facilities for the capture and recording of fragments of textual transcript data generated synchronously as individually-attributed interventions by actor-participants during scheduled CSCW sessions. The anatomy of of the research study's eConnectivity configuration is depicted in FIGURE 4-1.

FIGURE 4-1 : Anatomy of the Research Study's *e*Connectivity Configuration



In summary, distributed **group support technology** provided the necessary 'hard-wired' technology support for the facilitation of virtual interactions in distributed collaboration. Actor-participants provided the necessary 'soft-wired' drivers – human actors – for the generation of *individually-attributed interventions* that constituted *virtual interactions in distributed collaboration*. The subjecting of each actor-participant's **bioPersonae** and **personCapabilities** to a set of selection criteria enabled the choice of a 'professionally homogeneous' workgroup, from a 'culturally heterogeneous' background [dictated by the diverse nation-states], to be made.

Vital Parameters of the Study

Vital parameters of the study's 'architecture' of virtual interactions of distributed collaboration are depicted in TABLE 4-1. In particular, attention is drawn to the following factors:

- Design-driven factors **bioPersona/personCapabilities,** which relate to the actor-participants' cultural composition / identity. By this description, Case 1 had a cultural identity that was considered different from the cultural identity of Case 2 and/or Case 3;
- **Temporal usage, deployment or application** of CSCW technology, which differentiated between single-occasion usage, and multiple-occasion usage, such as between Case 1 and Case 2, or between Case 1 and Case 3, or between Case 2 and Case 3. *Single-Occasion Usage* is applied to the case Virtual Embassy, with a once-only implementation extending over a continuous total of 1.5 hours. Multiple-Occasion Usage comprises Extended *Deployment* [*of group support technology over time*] is applied to the case Terrorism, over four different occasions cumulatively totalling 6.0 hours, and to the case Internet Governance, over three different occasions cumulatively totalling 4.5 hours. The implementation of the two cases Terrorism and Internet Governance constitute a *Longitudinal Application* [*of group support technology over time*] over a cumulative total of 10.5 hours. In this case, both Terrorism and Internet Governance are implemented under the auspices of same actor-participants across two different cases through two different time epochs.

X-Link Creation Notifications Supplement

The core of this study's empirical mode of delivery of virtual interactions is the series of individually-attributed interventions, delivered in synchronous mode, by actor-participants in distributed collaboration. This mode of delivery was supplemented by a secondary mode of delivery of virtual interactions, namely, comprising a series of individually-attributed or non-attributed interventions, contributed in asynchronous mode by the actor-participants. Asynchronous interventions were designed to comprise comments, amendments or proposals on selected aspects of an on-going or an aspect of a previous domain of discourse. These formed the X-Link creation notifications. X-Link creation notifications had the objective to add value, where needed, to specific aspects of a domain of discussion and to provide a window of opportunity to enable actor-participants to make or propose additions, amendments, comments with regard to session discourses. In the study, X-Link Creation Notifications were limited to the Internet Governance case study, which focused on Conceptualisation, Positioning [for negotiation], and Multilateral Negotiation. The choice of case study for application of X-Link Creation Notifications was motivated by the need to investigate the process steps involved in a multilateral negotiation.

TABLE 4-1: Vital Parameters of the Case Studies

	Case Study 1 (Virtual Embassy)	Case Study 2 (Terrorism)	Case Study 3 (Internet Governance)
bioPersona and **personCapabilities.**	Nationals of a given set of nation-states	Nationals of a given set of nation-states	Nationals of a set of nation-states same as in Case Study 2
	Individual actor-participants with 'instructor-participant' and 'chair-participant' roles at CSCW sessions		
Spatial Mode	Remote/Distributed	Remote/Distributed	Remote/Distributed
Temporal Mode	Synchronous; Single-Ocassion Usage; Duration: 1.5 Hours	Synchronous; Extended Deployment over time; Duration: 6.0 Hours	Synchronous; Extended Deployment over time; Duration: 4.5 Hours
		Synchronous; Longitudinal Application (joint Case Study 2 and Case Study 3) Duration: 10.5 Hours	
Intervention Mode	Individually-attributed interventions	Individually-attributed interventions	Individually-attributed interventions
Supplementary Intervention and Mode	X-link Creation Annotations: Asynchronous	X-Link Creation Annotations: Asynchronous	X-Link Creation Annotations: Asynchronous

4.3.2 Run a Series of Virtual Sessions on International Relations Themes: Generation, Capture and Recording of Empirical Data

a) Individually-Attributed Interventions – Synchronous Mode

The key to the case studies was, next, to *run a set or series of virtual sessions on international relations themes* (virtual embassy, terrorism and internet governance), which are implemented as an empirical set up, by virtue which individually-attributed interventions are generated, *giving rise to virtual interactions*. These are captured and recorded as fragments of textual transcript data.

Specifically, a series of **distributed collaboration sessions** (CSCW sessions), based on the three themes virtual embassy, terrorism, and Internet governance, respectively, were made to run at suitably selected periods during the two years 2000 and 2001, with actor-participants located at various workstations worldwide. The distributed collaboration session (the CSCW

session) was designed to represent the basic unit for the generation of the research study's empirical data. Tabulated in TABLE 4-2 are CSCW session listings conducted in this research study at suitably selected periods during the years 2000 and 2001. Each CSCW session was implemented in three phases, in the following time-sequence:

- Session **Opening** Phase**,** which was, invariably, exercised by a session Chair. The session Chair was always one or more experienced actor-participants from either the Mediterrannean Academy of Diplomatic Studies or one of the diplomatic academies of excellence from elsewhere (eg India; Switzerland, or Barbados);
- Session **Discourse** Phase, which was implemented, individually, severally and, collectively, by all actor-participants in the CSCW session, with maintenance of order and session discipline conferred upon the session Chair; and
- Session **Closure** Phase, which was invariably exercised by the session Chair.

TABLE 4-2: A Recording of Listings of CSCW Session (Group Support Meeting) Transcripts Generated by the Case Studies

Subject/Domain of Discourse / Group	**Description of Specific CSCW Session**
Virtual Embassy **(Case Study 1)**	Diplomatic Representation in the Era of the Internet – Conceptualisation (3 October 2000)
Terrorism **(Case Study 2)**	Part I: A Conceptualisation of Terrorism (27 September 2001) Part II: Addressing the UN General Assembly on Terrorism – A Simulation (9 October 2001) Part III: Special Session on Terrorism (11 October 2001) Part IV: Further Conceptualisation – Guerillas, Freedom Fighters and Terrorists (16 October 2001)
Internet Governance and Standardisation **(Case Study 3)**	Part I: A Conceptualisation of Internet Governance (13 March 2001) Part II: Positioning for Multilateral Negotiation on Internet Governance (15 March 2001) Part III: Multilateral Negotiation on Internet Governance (22 March 2001)

The **deliverables** of the study's CSCW sessions comprised a recording of fragments of transcript of textual data consisting of the following: individually-attributed actor-participant interventions or interactions generated in synchronous mode during CSCW sessions. The totality of the empirical data generated in the course of the research study's CSCW sessions comprised fragments of transcript transcript data collected, recorded and documented as

CSCW Session Transcripts across the different time epochs represented by *single-ocassion usage*, and *multiple-occasion deployment* (extended deployment over time and longitudinal application) of the co-operative group support technology. In the implementation of the empirical study, complete transcripts - representing the study's empirical data - were generated and recorded for each of the CSCW sessions conducted for the three case themes comprising: **Virtual Embassy, Terrorism** and **Internet Governance**.

b) Individually-Attributed Interventions – Asynchronous Mode

In this study, core empirical data, namely, synchronously generated individually-attributed textual transcript data, was supplemented by a recording of asynchronously generated, individually-attributed actor-participant interventions on individually-selected aspects of the domain of discussion. These comprised the **X-Link Creation Notifications** and were designed to be generated *a posteriori* in relation to specific aspects of the domain of discussion in an on-going or past CSCW session. For the purpose of empirical data analysis aimed at articulating the processes of multilateral negotiation or consensus building, the implementation of X-Link Creation Notifications was limited to the case study on Internet Governance. This is because it was perceived that the sessions on Internet Governance offered a window of opportunity for insights into multilateral negotiation in the international relations context.

Outputs from the implementation of X-Link Creation Notifications were varied and various and consisted of a large number of brief hypertext transcripts relating to individually-selected aspects of an on-going or previous domain of discussion in the international relations context represented by Internet Governance.

The totality of transcript listings in this study is depicted in TABLE 4-2, which forms the basis of listings of CSCW sessions for this study's analysis. In their original raw state, the totality of the captured data generated from the research study's CSCW sessions was voluminous in size. Owing to the large size implication, the full content of generated raw data is not included in the body or appendix of this research thesis. The full volume of empirical recording, organisation and part-analysis of the research study, together with the X-Link Creation Notifications supplement, is found in a compendium, separate from the body of this thesis, described as ENHANCING VIRTUAL INTERATIONS: A DATA REPOSITORY COMPENDIUM. This forms the basis for the case study's **empirical data analysis** and can be made available, on request.

In this study, it is considered essential to preserve the totality of the original raw data and use has been made only of the exact duplicate copies of the original raw data, for organisation and analysis midstream and downstream. The purspose of preserving the original data resource is to demonstrate *transparency in data audit trail* and to leave open the *invoking of backward traceability* if this should become necessary at some point in time. This forms the essence of ensuring conformity to *reliability requirement* of the quality of a case study as well as for ensuring conformity to the *chain of evidence requirement* component of construct validity with respect to a case study.

4.3.3 Examine, Analyse and Interpret the Generated Fragments of Textual Transcript Data: Individually-Attributed Interventions (Synchronous)

The key to the case studies was, finally, *to examine, analyse and interpret the generated fragments of textual transcript data* for each implemented virtual session on the three international relations themes (virtual embassy, terrorism and internet governance). This forms the basis of the next chapter(Chapter V)

4.4 Associated Issues: Precursor Programme, Preparatory Phase, Scheduling and Timing

This research study had its provenance in a series of workshops on Diplomacy and Information Technology, which was launched in 1995 as a collaborative partnership between the Multilateral Affairs Directorate of the Ministry of Foreign Affairs of the Government of Malta and the Commonwealth Secretariat.

In its early, formative phase, the vehicle for partnership comprised, simply, a series of Workshops on 'Use of Information Technology in International Relations', implemented under the auspices of the Mediterranean Academy of Diplomatic Studies (MEDAC) of the University of Malta and the Commonwealth Secretariat (London). In his affliation with the Commonwealth Secretariat at the time, the researcher was chief programme officer and, as such, directed the programme on behalf of the Commonwealth Secretariat and was instrumental in the conception and inception, design and launch of the early programme. Initial solicitation of potential stakeholder purview on the programme revealed, in part, that the programme was poised to be one of the most 'unholy' alliances between two unrelated entities, diplomacy and information technology. Equally, many thought the programme would provide useful insights into diplomacy from the standpoint of the new information and communication technologies and that the programme would provide useful insights into the potentialities of information technology as deployed in the practice of diplomacy.

In its early form, the programme on information technology and diplomacy comprised a three-tier course focusing on (i) New political, social and economic environment for diplomatic activities; (ii) New topics on diplomatic agendas; and (iii) New tools for diplomats. The main objective of the programme was to provide participants with relevant conceptual and methodological skills for working in the new international environment, which was being perceived, by practitioners in the area of diplomacy and international relations, ad being shaped, to a large extent, by the new information and communication technologies

By design, the programme was transformed, in the period leading to the year 2000, to symbolise what became to be described in Commonwealth circles as 'the epitome of a unique, competitive, popular and successful world-class *skills training* and *knowledge-sharing* programme'. The programme comprised a *two-tier* characteristic, namely:

- An *Introductory Workshop*, conducted traditionally in Malta, lasting 10 days.
- A *Distance Learning Phase*, conducted via the Internet , lasting 9 months.

Genesis of, and Preparation for, the Cases

The research study was, in part, modelled after the second part of the newly-transformed two-tier programme, namely, it was modelled on the basis of the distance learning phase of the programme on 'Use of Information Technology in International Relations'. In the context of this study, the resulting design came to be described as *distributed* and *synchronous*. It comprised a series of computer supported co-operative work (CSCW) sessions, implemented characteristically as part of a combined *On-Line and Real-Time, 9-month programme* delivered *to participants at geographically disparate locations worldwide.* Details specifically describing the research study are given below.

Research study preparation comprised a number of steps, including the following:

- Planning for the Research Study within the context of the wider programme on the 'Use of Information Technology in International Relations'
- Invitation to Governments to Nominate Candidate Actor-Partcipants as part of the wider programme on the 'Use of Information Technology in International Relations'
- Articulation of Specifications for Actor-Participant Participation
- Articulation of *ePreparedness* Requirements for Actor-Partcipant Participation
- Schedling and Timing of the Research Study
- Implementation of the Preparatory Content-Based Phase

Planning for the Cases

The research study was planned to take place in the manner depicted in TABLE 4-3, which shows a timeline (schedules) against actions taken by the researcher/investigator and the expected deliverables to be generated from the actions (case study 'products').

Invitation to Nominate Candidate Participants pertained to the wider programme on the 'Use of Information Technology in International Relations'. The study was specifically kept in view for the purpose of designing the wider 'environment' of the programme in a way that would apply seamlessly to the study:

- Formal letter of invitation to governments to nominate candidate actor-participants was issued during the third week of the month of October 1999 and 2000, respectively. The circulation list contained 30 - 50 government Ministries/Departments of Foreign /External/Multilateral Affairs, or equivalent, from 30-50 nation-states of the Commonwealth.
- Content of message in Letter of Invitation gave governments flexibility to nominate up to two qualified actor-participants, in order of preference, for consideration for acceptance. It also notified governments of the sponsor's ability to accommodate in the activity only a total of 10-15 candidates, for whom confirmation of acceptance would be notified on or about 15 December 1999, 2000. Qualifications for Nominations were a combination of BioPersona and PersonCapabilities outlined in §4.3.1(a) above.

TABLE 4-3: Planning for the Case Studies

Dates in Calendar Year	Action by Researcher/Investigator	Deliverable (Case Study 'Product')
September 1999, 2000	Articulation of Proposed Activty Objectives	'Case Study' Brochure
October 1999, 2000 (research study 2000 & 2001)	Circulation of Formal Letter of Invitation to Governments to Nominate Candidate Actor-Participants	'Distributed'Awareness of Case Study Initiative
December 1, 1999, 2000 (Research Study 2000 & 2001)	Deadline for Receipt of Nomination to Participate	Tentative List of Candidate Actor-Participants
December 1999, 2000 (Research Study 2000 & 2001)	Processing of Returned Nomination Forms from Governments	Confirmed List of Successful Candidate Actor-Participants; Cultural Affinity Distribution Profile
January 2000, 2001 (Research Study 2000 & 2001)	Circulation of Formal Letter of Notification of Acceptance of Successful Nominees	Distributed 'Awareness' of of Individually-Confirmed Actor-Participant
February 1-15, 2000, 2001 (Preparatory Phase)	Implementation of Preparatory Content-Based Phase	Actor-Participants with Common Minimal Content-Base
March – June 2000, 2001 (Research Study 2000 & 2001)	Part-Implementation of Programme/ Research Study	Case Study Empirical Data and other Outputs; and Possible Outcomes.
July – August 2000, 2001	Long Recess	
September – December 2000, 2001 (Research Study 2000 & 2001)	Part-Implementation of Programme/ Research Study	Case Study Empirical Data and other Outputs; and Outcomes
Post-Implementation Period	Data Organisation, Processing, and Analysis; Literature Survey; Formulation of Conceptual Framework;' Findings of Study; Modelling of Fndings.	Replication Logic and Analytical Generalisation; Conceptual; A 'States-as-Actors' Model for CSCW in the International Relations Context. New Insights into Multilateral Negotiation.

Articulating *e*Preparedness Requirements for Actor Participation

Person specifications listed above were necessary but not sufficient. A further requirement was mandatory: a demonstration by affirmation that a participant had an un-inhibited and/or unlimited access to the Internet to enable his/her participation throughout the period of the programme, including specific periods of CSCW sessions specifically involving the research study.

Experience with similar group activities in previous years had delineated difficulties accessing online conferencing due to firewalls or restricted access to the Internet. Governments receiving Letter of Invitation to Nominate were prompted of the need to address such obstacles well before commencement of the study. Government responses to this issue had been excellent: the research study encountered no difficulties.

Implementation of a Preparatory Content-Based Phase

The Preparatory Content-Based Phase of the Research Study comprised the implementation of a *Conventional Two-Week Introductory Workshop on Knowledge, Information Technology and Diplomacy*, conducted under the aupices of the DiploProject at the Mediterranean Academy of Diplomatic Studies in Malta. This preparatory phase was, by design, content-ladden to provide prospective actor-participants for the wider programme and the research study with competencies that aimed to assist to bridge any existing knowledge and skills gaps, in preparation for commencement of the programme. Specifically, two core areas formed the basis of the preparatory content-based phase:

- **International Relations**, as exemplified by conventional training and refresher interventions in the broader areas of Diplomacy; New Social and Economic Environment for Diplomatic activies; diplomatic Documents; and New Topics for Diplomatic agendas; and
- **Information Technology** (in International Relations), as emplified by by conventional training and refresher interventions in the broader areas of Information Technology and Distance Learning; New Tools for Diplomatic Activities, incorporating IT and traditional Diplomatic Activities and Information systems for Diplomatic Services.

Scheduling and Timing of the Research Study

The central element of the research study was the Online Real-Time Participation required of actor-participants. The study was scheduled to run online real-time group meetings as CSCW sessions over the Internet during working hours, from 15:00 to 16:30 Hours Central European Time (CET), Tuesdays and Thursdays every week over the longevity of the wider programme on 'Use of Information Technology in International Relations', during each of the two years 2000 and 2001.

Actor-participants were required to participate in the group meetings over the Internet for at least 80 per cent of the duration of the study. In addition, actor-participants were required to spare adequate time to access the Internet to make "X-Link Creation Annotations" or comments and other types of intervention on aspects of the real-time domain of discussion. Participation in the research study was designed to involve, on average, five hours of Internet access time per week.

CHAPTER V

FINDINGS FROM THE CASE STUDIES

Introduction

This chapter presents the findings from the cases of Chapter IV. It presents listings of data resulting from the case studies. Virtual interactions in the international relations context is shown to manifest as states-as-actors behaviour and aspects of this are discussed with respect to actual outcomes of the Virtual Embassy, Terrorism and Internet Governance discourses. Empirical observations on Information Exchange Interaction, Interpersonal Group Level Interaction and Knowledge Exchange Interaction are articulated and illustrated with specific examples taken from selected fragments of textutal transcript.

5.0 Data Listings

Information Exchange, Interpersonal Group Interaction and Knowledge Exchange Behaviour

We saw in Chapter III [Coding Schema] that for the purpose of analysis of the empirical data generated in this study, it was designed to deploy, as a mode of analysis, Coding, which is primarily concerned with the interpretation of codes in generated text; and, as deemed necessary, the articulation of meaning of textual transcript content represented as (written) text [RADNITZKY 1970]. Coding in this study comprises, first, an interpretation of textual transcripts generated as individually-attributed interventions during a given CSCW session, followed by a coding of these interventions, as per the designations in the master comparator table (coding framework) of TABLE 3-1 or the derived master comparator table (coding framework) of TABLE 3-4**.** In this section, we present a summary of **listings** of empirical data that were generated as fragments of recorded textual data in the three case studies compring Virtual Embassy, Terrorism and Internet Governance. The basic subject of analysis comprises virtual interactions generated as individually-attributed interventions, and recorded as fragments of textual transcript for a total of eight distributed collaboration sessions. This is supplemented by empirical data comprising 'X-Link Creation Notifications and other Related Resources', which are generated asynchronously in relation to selected sessions of the research study. As indicated in Chapter IV, the full recording of raw empirical data for the complete set of eight CSCW sessions of the research study is designed to be separately available as a compendium, for reason of large size.

Transcript analysis in this study comprises, in the main, coding, which involves articulating or interpreting actor-participant interventions primarily through coding of generated text. In particular, virtual interactions, generated as individually-attributed interventions and recorded as fragments of textual transcript, are interpreted and coded in terms of information exchange interaction (IXI), interpersonal group interaction (IGI) and knowledge exchange interaction (KXI) in the manner defined by the master comparator table (coding framework) of TABLE 3-1

A listing of Data Organisation and Coding for individually-attributed CSCW Sessions (or Group Support Meetings) of the research study, as recorded during 2000 and 2001, is depicted in TABLE 5-1a. These listings, represented by TABLES 5-1.1 (Virtual Embassy), TABLES 5-2.1 through 5-2.3 (Terrorism), and TABLES 5-3.1 through 5-3.3 (Internet Governance) depict the *first level* coding of organised data for the totality of the eight CSCW sessions of the three empirical studies. These tables depict the percentage of interaction primitives in a series of CSCW sessions corresponding to the three case studies [represnted by the themes Virtual Embassy, Terrorism and Internet Governance]. These tables are depicted in APPENDIX II of this thesis.

TABLE 5-1a: A Listing of Data Organisation and Coding: Information Exchange Interactions, Interpersonal Group Interaction and Knowledge Exchange Interactions

Subject/Domain of Discourse	**Description of Specific Theme of Discourse**
Information Exchange, Interpersonal Group Interaction and Knowledge Exchange Behaviour for Analysis (Listings Only)	
Virtual Embassy (Case Study 1)	**CSCW 1: Diplomatic Representation in the Era of the Internet – Conceptualisation (3 October 2000)**
	TABLE 5-1.1: Virtual Consultation Session 31 October 2000 – Interaction Primitive Percentage Analysis: Virtual Embassy Discourse – Diplomatic Representation in the Era of the Internet
Terrorism (Case Study 2)	**CSCW 2: A Conceptualisation of Terrorism (27 September 2001)** TABLE 5-2.1: Virtual Consultation session – Interaction Primitive Percentage Analysis: Terrorism – Conceptualisation
	CSCW 3: Addressing the UN General Assembly on Terrorism – A Simulation (9 October 2001) TABLE 5-2.2: Virtual Consultation Session (9 October 2001) – Interaction Primitive Percentage Analysis: Terrorism – Addressing the UN General assembly – A Simulation
	CSCW 4: Special Session on Terrorism (11 October 2001) TABLE 5-2.3: Virtual Consultation Session (11 October

	2001) – Interaction Primitive Percentage Analysis: Terrorism – Special Session on Terrorism
	CSCW 5: Further Conceptualisation – Guerillas, Freedom Fighters and Terrorists (16 October 2001) TABLE 5-2.4: Virtual Consultation Session (16 October 2001) – Interaction Primitive Percentage Analysis: Terrorism – Further Conceptualisation
Internet Governance and Standardisation (Case Study 3)	**CSCW 6: A Conceptualisation of Internet Governance (13 March 2001)** TABLE 5-3.1: Virtual Consultation Session (13 March 2001) – Interaction Primitive Percentage Analysis: Internet Governance – Conceptualisation
	CSCW 7: Positioning for Multilateral Negotiation on Internet Governance (15 March 2001) TABLE 5-3.2: Virtual Consultation Session (15 March 2001) – Interaction Primitive Percentage Analysis: Internet Governance – Conceptualisation
	CSCW 8: Multilateral Negotiation on Internet Governance (22 March 2001) TABLE 5-3.3: Virtual Consultation Session (22 March 2001) – Interaction Primitive Percentage Analysis: Internet Governance – Multilateral Negotiation
TABLE 5-1.1 (Virtual Embassy)**, TABLES 5-2.1** through **5-2.3** (Terrorism) **,** and **TABLES 5-3.1** through **5-3.3** (Internet Governance) represent the *first level* of organised data for the totality of the 8 CSCW sessions of the research study, namely, Interaction Primitive Percentage Analysis for Group Behaviours in CSCW Sessions corresponding to Virtual Embassy, Terrorism and Internet Governance. These tables are displayed in ***APPENDIX II*** of this study.	

'States-as-Actors' Behaviour

Analysis of virtual interactions at the level of states-as-actors behaviour is made possible, however, through the deployment of a secondary mode of analysis, namely, through the derived master comparator table (coding framework) of TABLE 3-4. For the purposes of investigating states-as-actors behaviour, the researcher carried out the following sequence of tasks with respect to each individually-attributed intervention generated as a fragment of transcript in a CSCW session:

- Assigned to **each 'lead' role behaviour primitive** (defined in the manner depicted in TABLES 3-2a, 3-2b, and 3-2c) and to **each KXB behaviour primitive** (defined in the

manner depicted in TABLES 3-2a, 3-2b, 3-2c) a **'state-as-actor' behaviour mode** (ActAUTO, ActGOAL, or ActOBJ) in the manner stipulated in TABLE 3-4;

- Assigned to **each 'intermediary' role behaviour primitive** (defined in the manner depicted in TABLES 3-2a, 3-2b, 3-2c) a **'state-as-actors' behaviour mode** (ActAUTO, ActGOAL, or ActOBJ), again, in the manner stipulated in TABLE 3-4.
- Assigned a **'state-as-actor' specification** of an individually-attributed intervention by an actor-participant as a **listing of all *distinct* 'states-as-actors' behaviour modes** in the intervention, which may appear individually as [ActAUTO], [ActGOAL], or [ActOBJ], or in such combinations as [ActOBJ, ActGOAL], [ActGOAL, ActAUTO] or [ActOBJ, ActGOAL, ActAUTO].
- Determined, for each CSCW session, the Interaction Primitive Percentage with respect to the behaviour modes ActAUTO, ActGOAL, and ActOB, respectively.

For gaining insight into the nature of 'states-as-actors' behaviour of actor-participants in virtual interactions of a full CSCW session, the researcher carried out the following tasks:

- Interpreted the relative frequency distribution of the behaviour modes ActAUTO, ActGOAL], and ActOBJ; and
- Made inferences and drew conclusions based on an interpretation of the relative frequency spectrum of the states-as-actors behavior modes.

A listing of Data Organisation and Coding for 'states-as-actors' behaviour in CSCW Sessions (or Group Support Meetings) of the empirical research studies, as recorded during 2000 and 2001 is depicted in TABLE 5-1b.

TABLES 5-1b: A Listing of Data Organisation and Coding: 'States-as-Actors' Behaviour Analysis

States-as-Actors' Behaviour Analysis – Listings	
'States – As – Actors' Behavioural Analysis (Listings)	A: **Diplomatic Representation in the Era of the Internet – Conceptualisation (3 October 2000)** TABLE 5-6.1: Virtual Interactions Session (22 March 2001) – Interaction Primitive Percentage Analysis: Virtual Embassy – Conceptualisation B: **A Conceptualisation of Terrorism (27 September 2001)** TABLE 5-6.2: Virtual Interactions Session (22 March 2001) – Interaction Primitive Percentage Analysis: Terrorism - Conceptualisation C: **Addressing the UN General Assembly on Terrorism – A Simulation (9 October 2001)** TABLE 5-6.3: Virtual Interactions Session (22 March 2001) – Interaction Primitive Percentage Analysis: Terrorism - Addressing the UN General Assembly – A

	Simulation D: **Special Session on Terrorism (11 October 2001)** TABLE 5-6.4: Virtual Interactions Session (22 March 2001) – Interaction Primitive Percentage Analysis: Terrorism - Special Session on Terrorism E: **Further Conceptualisation – Guerillas, Freedom Fighters and Terrorists (16 October 2001)** TABLE 5-6.5: Virtual Interactions Session (22 March 2001) – Interaction Primitive Percentage Analysis: Terrorism - Further Conceptualisation F: **A Conceptualisation of Internet Governance (13 March 2001)** TABLE 5-6.6: Virtual Interactions Session (13 March 2001 – Transcript Analysis: Internet Governance – Conceptualisation G: **Positioning for Multilateral Negotiation on Internet Governance (15 March 2001)** TABLE 5-6.7: Virtual Consultation Session (15 March 2001 – Transcript Analysis: Internet Governance – Positioning for Multilateral Negotiation H: **Multilateral Negotiation on Internet Governance (22 March 2001)** TABLE 5-6.8: Virtual Consultation Session (22 March 2001) – Interaction Primitive Percentage Analysis: Internet Governance – Multilateral Negotiation

5.1 'States-as-Actors' Behaviour

a) Introduction

In this section the results of empirical data analysis on 'states-as-actors' behaviour are examined and interpreted. This relies on the determination, observation or otherwise, of the number of occurrences of each of the postulated 'states-as-actors' behaviour modes as depicted in the manner defined in TABLE 3-3 and coded in TABLE 3-4, relative to the various group interaction primitives in the IXI, IGI and KXI categories, namely:

- Active and generic behaviour, coded ActOBJ;
- Active and goal-guided behaviour, coded ActGOAL; and
- Active, goal-guided and self-motivated behaviour, coded ActAUTO.

Determinations were also made with respect to the following for each CSCW session of each of the three cases:

- Relative number of occurrences (in percentage terms) of the states-as-actors behaviour modes designated ActGEN, ActGOAL and ActAUTO.

TABLES 5-7.1, 5.7.2, 5-7.3, 5-7.4, 5-7.5, 5-7.6, 5-7.7, and 5-7.8 (APPENDIX II) depict results of the relative number of occurrences (in percentage terms) of 'states-as-actors' behaviour modes for each of the CSCW sessions of the three cases: Virtual Embassy (Case 1), Terrorism (Case 2) and Internet Governance (Case 3). A summary of observations on the 'states-as-actors' behaviour in CSCW sessions of the research study is depicted in TABLE 5-2.

Displayed in each of the tabulations is a determination of RTTFI at the 50% (RTTFI-50) and 100% (RTTFI-100) level of first intervention or first 'active' participation of actor-participants, respectively, for each of the CSCW sessions of the study, namely, Virtual Embassy (Case 1), Terrorism (Case 2) and Internet Governance (Case 3) of the research study:

- RTTFI at the 50% level (RTTFI-50) of first intervention or first 'active' actor-participant participation; and
- RTTFI at the 100% level (RTTFI-100') of first intervention or first 'active' actor-participant participation.

In this codification, 'RTTFI-50' represents a relative measure corresponding to the 'time equivalent' in the course of which 50% of participants in a session will have made their first interventions. 'TTTF-100' represents a relative measure corresponding to the 'time equivalent' during which 100% of participants in a session will have made their first interventions. A summary of observations on the 'states-as-actors' behaviour in CSCW sessions of the research study is depicted in TABLE 5-3.

b) Observations

An Empirical Demonstration of the Existence of 'States-as-Actors' Behaviour

Observations from TABLE 5-2 demonstrate that *the relative number of occurrences of states-as-actors behaviour modes ActOBJ, ActGOAL and ActAUTO are finite and non-zero. This shows that states-as-actors behaviour modes, postulated for actor-participants as 'active and goal-guided'* (coded 'ActGOAL'), *'active and generic'* (coded 'ActOBJ'), *and 'active, goal-guided and self-motivated'* (coded 'ActAUTO') *over the set of CSCW sessions are* ***existent*** *in all CSCW sessions.*

In particular, the 'states-as-actors' behaviour of actor-participants described as 'active and goal-guided' (coded 'ActGOAL') is observed to be generally predominant relative to 'active and generic behaviour' (coded 'ActOBJ'), and to 'active, goal-guided and self-motivated behaviour' (coded 'ActAUTO'). That the observed relative number of occurrences of each of 'active and goal-guided' behaviour ('ActGOAL'), 'active and generic behaviour' (ActOBJ), 'active, goal-guided and self-motivated behaviour' ('ActAUTO'), remains distinct over the set of CSCW sessions of the study is evidence that the three *'active' states-as-actors*

behaviours are co-existent in a given CSCW session. In particular, for a given actor-participant, 'active' states-as-actors behaviour modes are invoked to different levels of 'dominance', or '*predominance*'. This is observed to be independent of the nature of the cases.

TABLE 5-2: A Summary of Observations on the 'States-as-Actors' Behaviour in CSCW Sessions of the Case Studies – A Demonstration of the Existence of 'States-as-Actors' Behaviour in the International Relations Context in Virtual Space

CSCW Session (No of interactions)	**(Active, Generic): ActOBJ**	**(Active, Goal-oriented): ActGOAL**	**(Active,Goal-Oriented, Self-Motivated): ActAUTO**	**(Active, Generic): ActOBJ**	**(Active, Goal-Oriented): ActGOAL**	**(Active,Goal-Oriented, Self-Motivated): ActAUTO**
Case 1: Virtual Embassy – Diplomatic Representation (**473**)	19.7%	60.6%	19.7%	**Case 1**: Virtual Embassy 19.7%	**Case 1:** Virtual Embassy 60.6%	**Case 1**: Virtual Embassy 19.7%
Case 2: Terrorism – Conceptualisation (**183**)	24.5%	58.7%	16.8%	**Case 2**: Terrorism (percentage mean value of Active, Generic behaviour) 22.9%	**Case 2**: Terrorism (percentage mean value of Active, Goal-Oriented behaviour) 61.8%	**Case 2**: Terrorism (percentage mean value of Active, Goal-Oriented, Self-Motivated behaviour) 15.0%
Terrorism - Addressing UNGA (**125**)	20.5%	67.1%	12.4%			
Terrorism – Special Session (**80**)	22.1%	62.6%	14.3%			
Terrorism – Further Conceptualisation (**121**)	24.5%	58.2%	16.6%			
Case 3: Internet Governance – Conceptualisation (**210**)	29.2%	51.9%	18.8%	**Case 3**: Internet Governance (percentage mean value,as above) 25.5%	**Case 3**: Internet Governance (percentage mean value, as above) 54.9%	**Case 3**: Internet Governance (percentage mean value, as above) 18.6%
Internet Governance – Positioning (**147**)	21.9%	50.9%	27.2%			
Internet Governance – Negotiation (**101**)	29.0%	62.0%	9.7%			

Goal-Orientedness, Self-Motivation and Generic Action Factors

An observation of TABLE 5-2 reveals that Goal-orientedness is consistently dominant over either the self-motivation factor or the generic action factor across the totality of the CSCW sessions of the three case studies. It is observed that both the self-motivation factor and the generic action factor remain relatively small but finite compared to the goal-orientedness metric. This is consistent with international relations practice in multilateral negotiations, which seeks to characterise discourses, dialogues or negotiations by, among others, the goals of nation-states as advanced by the actor-participants representing those nation-states. The observation is also consistent with international relations practice to require adherents in discourses, dialogues or negotiations to seek diffuse rather than specific reciprocity, as advanced by combinations of generic action or self-motivated interventions and goal-oriented actions in a session, and to regard the outcomes from their collective efforts or collaboration as being indivisible between them.

An Empirical Demonstration of 'Relative Time To First Intervention' (RTTFI) in a CSCW Session

Observations from TABLE 5-3 demonstrate that *states-as-actors behaviour mode described as 'passive'* (coded 'ActENT') *is also found to be* ***existent*** *in a CSCW session*. While we cannot measure 'silence' as manifest in the definition of ActENT, we can, however, measure this indirectly, by determining RTTFI-50 and RTTFI-100 in the manner prescribed in §3.3. Specifically, RTTFI at the 50% level of 'active' actor-participant participation in the study is observed to range between 10.3% and 28.6%. This implies that about 50% of the actor-participants in a CSCW session become 'active' or register their 'first intervention' within the first 10% – 30%, approximately, of the 'duration' of the CSCW session.

Similarly, RTTFI at the 100% level of 'active' actor-participant participation in the study is observed to range between 47.6% and 99.2%. This implies that about 100% of the actor-participants in a CSCW session become 'active' or register their 'first intervention' within the last 50 – 100% of the 'duration' of the CSCW session. This gives vent to the empirical evidence of the possibility that an actor-participant can opt to remain 'passive' throughout a CSCW session.

That the 'observed' value of RTTFI ranges between a small finite value to some value approaching the whole duration of a CSCW session implies that the 'states-as-actors' behaviour mode described as 'passive' can span a whole duration of a CSCW session. An 'actor-participant' can opt not to make a contribution, remaining passive, nor responding to any 'stimulus' throughout the whole duration of a discussion or discourse in electronic virtual space.

An observation of TABLE 5-3 reveals that the measure for RTTFI-100 is least with respect to Internet Governance (66.6%), followed by Virtual Embassy (67.5%) and Terrorism (73.1%). To be able to obtain a meaningful interpretation of RTTFI-100 (the Engagementment factor), ActGoal (Goal-orientedness factor), ActOBJ (the Generic-action factor) and ActAUTO (the Self-motivation factor), we seek to articulate the expected outcomes of the CSCW sessions of the three case studies, in terms of the immediate deliverables. This forms the basis of discussion in the §5.2. Further insight into

states-as-actors behaviour is, however, discussed before looking at the four factors in terms of immediate deliverables or outcomes.

TABLE 5-3: A Summary of Observations on the 'States-as-Actors' Behaviour in CSCW Sessions of the Research Study – A Matrix of 'Relative Time' To First Intervention at the 50% and 100% Level of Participation

CSCW Session (No of interactions)	**RTTFI at 50% Level of 'Active' Participation (RTTFI-50)**	**RTTFI at 100% Level of 'Active' Participation (RTTFI-100)**	**RTTFI at 50% Level of 'Active' Participation (RTTFI-50)**	**RTTFI at 100% Level of 'Active' Participation (RTTFI-100)**
Case 1: Virtual Embassy – Diplomatic Representation (**473**)	28.6%	67.5%	**Case 1**: Virtual Embassy **28.6%**	**Case 1:** Virtua;l Embassy **67.5%**
Case 2: Terrorism – Conceptualisation (**193**)	10.3%	59.2%	**Case 2**: Terrorism **18.1%** (percentage mean value of 'Active' Participation of 50% of actor-participants))	**Case 2:** Terrorism **73.1%** (percentage mean value of 'Active', Participation of 100% of actor-participants)
Terrorism - Addressing UNGA Terrorism – Special Session (**80**)	18.0%	78.4%		
Terrorism – Further Conceptualisation (**121**)	19.8%	99.2%		
	24.2%	59.0%		
Case 3: Internet Governance – Conceptualisation (**210**)	26.3%	78.4%	**Case 3:** Internet Governance **16.1%** (percentage mean value of 'Active,' Participation of 50% of actor-participants)	**Case 3**: Internet Governance **66.6%** (percentage mean value of 'Active', Participation of 100% of actor-participants)
Internet Governance – Positioning (**147**)	16.8%	73.7%		
Internet Governance – Negotiation (**101**)	11.3%	47.6%		

An Interpretation of States-as-Actors Behaviour in terms of 'Process Internalisation' and 'Process Externalisation' in a Virtual Session

The foregoing observations and findings demonstrate, in particular, that no actor (or actor-participant) in a CSCW session of virtual interactions in the international relations context may generally be perceived as solely an 'autonomous unit' that exercises influence on the behaviour of other actors at all times during a session. An actor-participant in a CSCW session of virtual interactions in the international relations context may,

however, choose to act in a manner that spans a whole spectrum of observable behaviour modes, extending from the simple and primitive (coded actENT), where remaining passive is the core behaviour mode, to the complex and autonomous behaviour mode (coded actAUTO), where exercise of influence on the behaviour of other actors is significant. There exists a *state of internalisation* in the time interval when an actor-participant displays no observable intervention and hence maintains an implicit 'state-as-actor' behaviour mode (passive mode). There exists a *state of transition* when an actor-participant makes an observable transition between one 'state-as-actor' behaviour mode and another. There exists a *state of externalisation* in relation to intervention from one actor-participant to the others in a CSCW session, when an actor-participant intervention is explicit and manifests as an *individually-attributed synchronous intervention* (action, reaction or interaction), in which one or more 'states-as-actors' *behaviour modes may be observed in succession.* A state of '*process internalisatio*n' within a given 'state-as-actor' behaviour mode or a *state of transition* between one 'state-as-actor' behaviour mode and another is postulated to be precursor, proponent and exponent of **tacit knowledge [**POLANYI 1993], namely, knowledge which is personal to an individual, and is embedded and/or embodied in the individual. Tacit knowledge refers to the *internal representations* which exist in an individual. A state of '*process externalisation*' from one participant to the others in a CSCW session of virtual interactions, rendered manifest by the generation of fragments of *individually-attributed intervention* (action, reaction or interaction), is postulated to be precursor, proponent and exponent of **explicit knowledge [**POLANYI 1993]**,** namely, the set of *external representations*, which exist outside the individual, and is manifest as written or spoken representations, or other symbolic or coded representations within the context of a universe of discourse. In this study, explicit knowledge generated in a CSCW session of virtual interactions is rendered manifest as fragments of textual transcript data which remains as a record of all actor-participant interventions during a CSCW session.

It is postulated to identify the point at which tacit knowledge conceptually makes the transition to explicit knowledge as *Knowledge Disclosure Point* (KDP). This is akin to what Snowden describes as the point at which *knowledge* manifests as one or more of the following aspects, in what has been termed the ASHEN Model: *Artefacts, Skills, Heuristics, Experience*, and *Natural Talent* (ASHEN) [SNOWDEN 1998] or "*a point at which we use knowledge*" [SNOWDEN 2000a; SNOWDEN 2000b]. KDPs will be understood to comprise, *inter alia*, points at which the following are effected: decisions, judgments, problem resolution, problem solution, conflict resolution, issue resolution, negotiation, learning, consensus, compromise or, in the simplest case, an intervention (action, reaction or interaction) in a discourse or dialogue session. To the ASHEN model, this study proposes to add *social network,* as that aspect in which knowledge can be perceived to manifest itself as a sharerable resource, giving rise to what may be referred to as the Extended ASHEN model, namely, ASHEN plus Social Networks or simply the ASHENS model. Identification of the knowledge types that are manifest within the context of a KDP may accordingly be fully articulated through asking of meaningful questions within the context of the ASHENS model.

In summary, an 'architecture' of virtual interactions [in distributed collaboration] in the international relations context is characterised by the *existence* of 'states-as-actors' behaviour, which manifests as four distinct behaviour modes described as passive, interactive, goal-oriented and autonomous. By virtue of the interpretation introduced in this section, each behaviour mode is marked by a state of '*process internalisation*', which exists

as tacit knowledge, and also by a state of '*process externalisation*', which exists as explicit knowledge. The point at which tacit knowledge conceptually makes the transition to explicit knowledge, described as a *knowledge disclosure point* (KDP), is of special significance in the international relations context. In practice, a KDP represents a points at which the following, among others, are effected: a decision is reached, a judgment is made, problem resolution is arrived at, a problem solution is arrived at, a conflict resolution is made, a negotiation compromise is reached, a learning experience is gained, a consensus is arrived at, or, in the simplest case, an intervention (action, reaction or interaction) in a discourse or dialogue session is made.

5.2 Outcomes

a) Introduction

The outcomes of the three case studies were assessed from the standpoints of the realisation of *one or more* of the following deliverables:

Agreement, which is used to denote the act of agreeing, among actors (actor-participants or states-as-actors), over an issue in the subject of discussion in a session or set of sessions in a meeting or conferene and can be in the form of any of the outcomes listed below;

Unanimity, which denotes the state of complete agreement, among actors (actor-participants or states-as-actors), over an issue in the subject of discussion in a session or set of sessions in a meeting or conference;

Consensus, namely, unanimous agreement, among all actors (actor-participants or states-as-actors), over an issue in the subject of discussion in a session, or set of sessions in a meeting or conference.

Compromise, which is used here to denote mutual concession by actors (actor-participants or states-as-actors) who are engaged over an issue in a negotiation session;

Recommendation, which is used to denote a non-binding decision by actors (actor-participants or states-as-actors) who are engaged over an issue in a discussion session;

Declaration, which is used to denote a formal affirmation, among the actors (actor-participants or states-as-actors), about an issue in the subject of discussion in a session or set of sessions in a meeting or conference;

Resolution, which is used to denote a redefinition of relationships in such a way as to perceive that they can realise their goals without conflict or that they can redefine their relationships so that their goals no longer conflict;

Trade-Off, which is used to signify that an exchange of preferences has taken place between priorities;

Voting, which is used here to denote an expression of consent or preference in favour of a proposed course of action and/or statement of principles for a resolution to be carried by a meeting or conference.

b) Observations

Case 1: Virtual Embassy – Representation in the Era of the Internet

The *expected outcome* of the Virtual Embassy Discourse, as presented in this study (§4.2.1), was described as the *conceptualisation* and *articulation* of the basic *structures* and *processes* required for the implementation of a virtual embassy between any two nation-states. The goal(s) were stated as follows: virtual embassies adopted in the long run as a practical mode of practice, in a role as a supplementary structure, a substitute structure, or alternate structure relative to the traditional physical brick-and-mortar embassy in the capitals of collaborating states.

The *actual outcome* of the Virtual Embassy Discourse was an AGREEMENT on a PROPOSAL that conceptualises and articulates steps for the setting up of a diplomatic virtual mission between two nation-states. This is depicted in BOX 5-1, which represents a fragment of textual transcript from the Virtual Embassy Discourse, comprising a sample of generated virtual interactions, logically classified into three inherent phases, designated Argument, Proposal and Agreement.

X-Link Creation Notifications generated in the Virtual Embassy session of the study were observed to comprise, in the main, the following group interaction primitive types: Seeking Information, Information Providing, Proposing/Initiating, Agreeing/Supporting, Knowledge Generation and Knowledge Sharing, as 'matched' with respect to the nature of the "**Titles**" generated in the annotations and/ or web links of the pertinent X-Link Creation Notifications. The core genre for the session conceptual process for Virtual Embassy was *conceptualisation*.

BOX 5-1: A Fragment of Textual Transcript from the Virtual Embassy Discourse Demonstrating Proposal and Agreement as Outcomes

ARGUMENT …

<jov> [...] Representation is one of the key diplomatic functions (listed in the Vienna Convention). It was traditionally performed by envoys.

<jov> Important dilemma: Are we going to have any change in the concept of representation with introduction of the Internet?

<tri> With Foreign Ministers becoming able to speak directly to their counterpart/s a lot of the traditional role of representation was superceded by technology.

<jov> Level of representation is an art of diplomatic tactics. Does technology reduce or improve room for manoeuvre when it comes to representation?

<ela> Accessibility to message is quicker through the Internet. Efficiency level is increased.

<jov> Can we expect two "virtual " embassies – let's say Namibia and Malta representing two countries in cyber-space? Physically those two embassies will be websites with the possibility of exchanging docs, discussing various points, etc

<jov> Can we expect that [such] documents will be exchanged between two websites – [representing] "virtual embassies"?

<jov> Technically speaking it is officials in Namibian Ministry (ambassador in charge of virtual embassy) who will send through special secure part of the website a letter to virtual embassy of Malta. It will be received and read by Maltese ambassador in charge of virtual embassy.

<tri> Are the two "virtual" embassies in the same country? Not likely, or else they are not accredited to each other.

<tri> Let us assume for virtual authenticity that we do have the two virtual embassies, **which are each accredited in the respective country they are each accredited to.**

<jov> Well, Namibian VE is accredited to Malta and vice-versa. Does it make a difference?

<tri> If the Namibian Virtual Embassy sends a Note Verbale asking for an Air Services Agreement, say, to be negotiated with Malta that would be followed up by the Malta VE in Namibia with another Note Verbale, thus showing that the real embassies could be radically upgraded if not replaced!

<jov> Obviously there are security/re-assurance mechanisms that could be deployed in order to ensure authenticity of communication,etc.

<jov> One can imagine that transition will start with lower [level] of virtual diplomacy (consular affairs, regular administrative activities, etc) and moving towards human-intensive activities (negotiations, diplomatic signalling, etc).

<euc> Higher functions may be overlooked.

<jov>The solution could be "democratic centralism", vertical mechanisms are open for comments until the decision is made.

<jov>[..] One question: Can we envisage that countries (especially small ones like Malta) will start opening virtual embassies and establishing virtual diplomatic relations?

<kis> Perhaps one may encounter the strongest resistance there, not because of orthodoxy but because of the value placed on human interaction.

<loi> The first issue to look at is, can they afford it?

PROPOSAL …

<jov> We have more-or-less developed a model. One part […] is analysis of the possibilities of opening virtual diplomatic missions. It should be relatively simple and affordable. Let us go through necessary steps [case study Malta and Namibia]

1)Malta and Namibia decide to open virtual diplomatic missions [necessary paper work]

2)Two websites for virtual embassies are developed. Apart from graphical aspects the key would be to have clear protocols, for exchange, of documents (eg when input is official, etc). It is more a question of organisation than technology. Through XML (DiploML) specification format of exchange will be agreed.

3) Virtual Ambassadors will be accredited [one may [initially] make exception on this point and have "human" presentation of credentials].

4)Virtual Embassies will be opened. Functioning?

AGREEMENT …

<euc> I am convinced of your model.

<kis> I can see advantage in the sense that it would create the ambiance of contacts at very minimal cost and for small countries that has the value of creating of contacts at minimal cost. And for small countries that has the value of creating a friendly network of nations. Agreed.

[the others unanimously agreed to the model]

Case 2: Terrorism

The *expected outcome* of the Terrorism Discourse, as presented in this study (§4.2.2), was described as the *conceptualisation* and *articulation* of the basic *attributes* and *characteristics* of what constitutes a Terrorist (and, possibly, other related entities such as Guerrilleros, Freedom Fighters, and Gangsters). The goal(s) under the Terrorism Discourse were stated as follows: a common definition of Terrorism would be adopted that was universal and free of dialectics. The session 'Addressing the UN General Assembly on Terrorism' was designed to simulate the kind of interactions that take place among delegates at the UN General Assembly. The session entitled 'A Special Session on Terrorism' was designed to pool together pertinent issues of discourse on Terrorism with expected outcomes and/or goals that had some minimal common understanding among the actors.

The *actual outcome* of the Terrorism Discourse was an AGREEMENT on a PROPOSAL that spelled out that (i) no consensus was reached on the definition of Terrorism; (ii) conceptions on Terrorism was subject to change with time; and (iii) state-sponsored Terrorism could be mitigated by mounting a fight against that state. This is depicted in BOX 5-2, which represents a fragment of textual transcript from the Terrorism Discourse, comprising a sample of generated virtual interactions, logically classified into three inherent phases, designated Argument, Proposal and Agreement.

For CSCW sessions on Terrorism, no typical X-link Creation Notifications were planned for the generation of typical 'New Annotations' or 'New Web Links'. Instead, *e*Mail communications were generated, which were identifiable with the following group behaviour types: Knowledge Generation, Knowledge Sharing, and/or Information Exchange. In particular, *e*Mail communications were generated, which sought to share knowledge on 'Commonwealth Declaration on Terrorism' and 'Guerrilleros, Freedom Fighters, Terrorists, Gangsters '. X-Link Creation Notifications in respect of Terrorism were scanty because focus in the various CSCW sessions on terrorism was directed on seeking some *standard definition for terrorism*. Efforts in this direction were marred by difficulties associated with attempts relating to giving an *absolute definition* for terrorism, as opposed to agreeing on a *relative definition*. The dictum "One man's meat is another man's poison" sums up an apparent consensus that ensued, namely, that "One man's terrorist is another man's freedom fighter". This relativity of human thought was predominant to the extent that no absolute definition was arrived at. This apparent failure to arrive at an absolute definition of terrorism was reflected at the real world UN General Assembly debates conducted, almost contemporaneously with the study's CSCW sessions on Terrorism, during September 2001. The core genre for the session conceptual processes for Terrorism were *conceptualisation* and *positioning*.

BOX 5-2: A Fragment of Textual Transcript from the Terrorism Discourse Demonstrating Proposal and Agreement as Outcomes

ARGUMENT …
<sal> Who is a terrorist?
<jov> It has been used mainly for promoting particular political views. If we want to address this issue in a serious way the first step is to agree about definition (what is it - what is not.
<sib> Jov, it depends on the dictionary you us and where it's from.
<jov> Agree sal. There is an etymological link. But terrorism (if it has to be used) has exact legal elements that should be applied...
<cel> No straight definition. Freedom fighter or terrorist?
<jov> Cel, one notion from cold war - "Our terrorist - your freedom fighter"
<jov> It is easy to say but difficult to apply. It will be one of big challenges of international community.
<kap> One side's terrorist is the other's hero and vice versa
<jov> We have to be careful with definition of "terrorist". It has to be carefully used. It has been one of the most frequently misused term.
<sal> But Jov 'terrorism' comes from the word 'terror'. To strike terror in the hearts of people.
<kap> Guerrillas, Freedom Fighters and Terrorists – Can we find some simple distinctions?
<kap> Freedom fighter have often recourse to terrorism. How does this affect their status?
<tra> And double-standards have greatly hindered Washington's effectiveness in gaining international support and co-operation in the struggle against terrorism. Indeed, such hypocrisy raises the question of whether the U.S. is really opposed to terrorism in general or just to terrorism when it targets America and its allies.
<tra> This means changing policies that victimize vulnerable populations. Such victims often hold the U.S. responsible for their suffering and thus become easy recruits for anti-American terrorism
<sal> The irony of it is that the USA is a creature of our making.
SUMMARY:

PROPOSAL …
<secretariat/kap> I think the discussions showed several things, on which we all appear to agree:
1. There is no easy way to say what is terrorism and who is a terrorist.
2. Conceptions [over Terrorism] may change over time
3. If terrorism is done by a state... there may be a way to fight it by fighting that state.

AGREEMENT …
<secretariat/kap> There being no comments to the contrary, I can conform unanimous Consensus or agreement by all. Thank you all.

Case 3: Internet Governance and Standardisation

The *expected outcome* of the Internet Governance Discourse, as presented in this study (§4.2.3)., was described as the *negotiated compromise on the rights, roles and responsibilies of nation-states, international bodies, non-governmental organisations, business and citizens to aspects of Internet Governance.* The goal(s) under the Internet Governance and Standardardisation Discourse were as follows: the Internet regarded as a Global Common for All (§4.2.3).

BOX 5-3: A Fragment of Textual Transcript from the Internet Governance and Standardisation Discourse Demonstrating Proposal and Agreement as Outcomes

PROPOSAL(S) …

<chair> WE WOULD APPRECIATE IF INTERVENTIONS ARE MADE WITH CONCRETE PROPOSALS ABOUT RE-FORMULATION. IN THIS WAY WE WILL BE MORE EFFICIENT.
a) Governance and standardisation should be regulated within a single organisational framework, bearing in mind the contribution which could be made by relevant regional, financial and economic organisations.

REPACKAGING, BARGAINING …

<USA> Governance and standardisation should be regulated within a forum of bodies, professional and regional.

<BSA> Governance and standardisation should be regulated within forum of professional national and international bodies.

<canada> Canada agrees with the proposal of the USA concerning the regulation of gov. a. standardisation within forum of bodies.

<ITU> I agree with BSA's proposal and could be on the Global level.

<USA> Professional.

<Southafrica> I disagree with USA's proposal. I propose a single forum made up of professional and governmental national and international bodies.

<ITU> What is global? BSA mentioned international.

<South Africa> What is to be the status of this forum?

<chair> DD OF USA IF I UNDERSTAND CORRECTLY YOU NEED CLARIFICATION FROM ITU ABOUT "GLOBAL" AND FROM BSA ABOUT "INTERNATIONAL". WITH REGARD TO THE STATUS THIS ISSUE SHOULD BE TACKLED IN ORDER PARTS OF THIS COMPLEX NEGOTIATION.

<SaudiArabia> Does this single organisational framework include state representatives in addition to the other organizations (…)

<ITU> Global means every country have representation in this forum, small or big.

<tuvalu> (…) I agree with South Africa's first intervention and seek clarification on what contributions must be borne in mind regarding relevant regional, financial and economic organisations

<tuvalu> Their contributions that is. Is it financial? Sentence has ambiguities.

<USA> The phrase General Framework is acceptable.

<canada> The first sentence proposed by the Chair is acceptable for Canada.

AGREEMENT …

<chair> THANK YOU DD OF SAUDI ARABIA. WE HAVE THE FINAL FORMULATION - **A COMPROMISE** - WHICH SEEMS TO BE ACCEPTABLE BY ALL DELEGATIONS:
a) THE GOVERNANCE AND STANDARDISATION SHOULD BE REGULATED WITHIN GENERAL FRAMEWORK MADE UP OF REPRESENTATIVES OF PROFESSIONAL, REGIONAL AND NATIONAL INSTITUTIONS.

CLOSURE …

<chair> WE CAN CONCLUDE WITH PLEASURE THAT WE COMPLETED SUCCESSFULLY THE FIRST PART OF MULTILATERAL NEGOTIATION.

The *actual outcome* of the Internet Governance and Standardisation Discourse was a COMPROMISE, arrived at from a number of TRADE-OFFS on an initial formulation, by the Conference Secretariat, of a PROPOSAL on Internet Governance and Standardisation. This is depicted in BOX 5-3, which represents a fragment of textual transcript from the Internet Governance and Standardisation Discourse, comprising a sample of generated virtual interactions, logically classified into three inherent phases, designated Proposal, Repackaging and Bargaining, and Agreement/Compromise.

For CSCW sessions on Internet Governance and Standardisation, X-Link Creation Notifications were generated, which consisted of 'New Annotations and 'New Web Links', and focused on **conceptualisation**, **positioning** and **multilateral negotiation** on the electronic communication medium. This forms the basis of §5.6 on X-link Creation Notifications, in which additional insights are given on the realisation of a compromise as an outcome.

Relating the Goal-Orientedness Factor (ActGoal) and the Engagement Factor (RTTFI-100) to the Outcomes

From §5.1 above, we recall that for each of the cases Virtual Embassy, Terrorism and Internet Governance, the Goal-orientedness factor (ActGOAL) is found to be empirically dominant over either the Self-motivation factor (ActAUTO) or the Generic-action factor (ActOBJ). Furthemore, ActGOAL is observed to attain a maximum value with respect to the CSCW sessions on Terrorism (61.8%), followed by the sessions on Virtual Embassy (60.6%), then by the sessions on Internet Governance (54.9%). In addition, the Engagement factor (RTTFI-100) metric is found to measure least with respect to Internet Governance (66.6%), followed by Virtual Embassy (67.5%), then by Terrorism (73.1%). We seek to relate these observations to the outcomes in §5.2. The outcome for the Virtual Embassy Discourse was an AGREEMENT on a PROPOSAL that conceptualises and articulates steps for the setting up of a diplomatic virtual mission between two nation-states. The outcome of the Terrorism Discourse was an AGREEMENT on a PROPOSAL that spelled out that (i) no consensus was reached on the definition of Terrorism; (ii) conceptions on Terrorism was subject to change with time; and (iii) state-sponsored terrorism could be mitigated by mounting a fight against that state. The outcome of the Internet Governance and Standardisation Discourse was a COMPROMISE, arrived at from a number of TRADE-OFFS on an initial formulation, by the Conference Secretariat, of a PROPOSAL on Internet Governance and Standardisation.

While ActGOAL remains dominant across the three cases, it achieves a maximum value with respect to the Terrorism Discourse, and a minimum value with respect to the Internet Governance Discourse. The Terrorism Discourse, contrary to the expected outcome, failed to reach a consensus definition for a Terrorist. The Internet Governance Discourse, consistent with the expected outcome, succeeded in achieving a compromise. The factors relating goal-orientedness to observed outcomes would appear to be more complex than intuition would appear to indicate. This is probably consistent with the general assertion that international relations practice in multilateral deliberations (such as multilateral negotiations) require adherents to seek diffuse rather than specific reciprocity among the actors and to regard the outcomes from their collective efforts or collaboration as being indivisible between them. This is notwithstanding the observation that states-as-actors will each have an inherent state goal, which must be matched against some overarching conference goal. Where such an overarching conference goal is polarising, such as the case requiring the realisation of an outcome comprising a common definition of terrorism, individual state-goals tend to become dominant as the pertinent discourse fails to reach a consensus in line with the expected outcome.

In the study, RTTFI-100 attains a least value with respect to the Internet Governance Discourse, and attains a maximum value with respect to the Terrorism Discourse. Specifically, the Internet Governance Discourse succeeds in achieving a compromise, consistent with the expected outcome, while the Terrorism Discourse fails to achieve a consensus on the definition of terrorism, contrary to the expected outcome. This observation demonstrates that the smaller value for RTTFI-100 is associated with more latitude, temporally, for inter-actor engagement and a better chance for arriving at an agreement consistent with the expected outcome, and vice versa.

5.3 Virtual International Relations Conferences: An *Ex-Post* Evaluation of the Deployment of a 'Distributed Collaboration System'

a) Introduction

The core element of this study, namely, virtual interactions in distributed collaboration, recast as a 'distributed collaboration system', was subjected to an evaluation process. Specifically, distributed collaboration deployed in this study was, for the purpose of evaluation, viewed as a system. As such, the study's distributed collaboration system, viewed both in **process terms** ('infostructure') and in **'wired' terms** ('infrastructure'), was made the subject of an *ex-post* evaluation. Three parameters, namely, **usage**, **usefulness** and **usability**, were used in the context of the following definitions:

USAGE: Attributes that are generally perceived to be central to the frequency of use of the 'system' by 'states-as-actors' in the international relations context or by other groups or communities of practice in other or similar contexts. Five factors of Usage were identified for evaluation of usage, namely, Access, Availability, and Affordability, in addition to Existence of Subject of Discussion, and State of Timeliness of Discussion.

USEFULNESS: Value-added to conventional international relations conferences by the 'system' from the standpoint of virtual user interactions, technology (collaborative work 'infrastructure') and processes (collaborative work 'infostructure'). A total of ten factors of Usefulness were selected for evaluation, namely, Service, Process Enablement, People Enablement, System Enablement, Adequate Security, Efficiency, Effectiveness, Productivity, Fit-for-Purpose Characteristic, and Automatic Record Generation.

USABILITY: Degree of match or goodness-of-fit between virtual user interactions, technology (collaborative work 'infrastructure') and processes (collaborative work 'infostructure'). Two factors of Usability were selected for evaluation, namely, Human-Machine Interface and Adatability to Use. To what extent was the 'system' easy-to-use' from the standpoint of the interface for collaboration? To what extent was the 'system' easy-to-effect from the standpoint of adaptability to use?

This section aims to provide analysis of data obtained from the implementation of an *ex-post* Questionnaire. Specifically, an E*x-Post* Questionnaire (APPENDIX III) was constructed, based on the three parameters Usage, Usefulness and Usability. In the context of the questionnaire, the parameters Usage, Usefulness and Usability are said to form components of '**system utility**' and the factors of usage, usefulness and usability may be described as system utility factors or, simply, '**utility factors**'. A Likert 4-Point Scale assignment procedure was chosen for use in the evaluation of the distributed collaboration system used. The choice of a Likert 4-Point Scale, as contrasted against any other Likert Point Scale was arbitrary. A sample of 63 potential respondents, who had used the distributed collaborative system during the period from 1999 through 2003, was chosen from a list of Commonwealth Secretariat alumni during the said period. The respondents were required to assess Usage, Usefulness and Usability of the system using a nominal Likert 4-point scale assignment procedure. In addition, the respondents were required to rank the system utility factors in the

order of importance, as individually perceived by them. The questionnaire was administered during March – June 2002.

TABLE 5-5 depicts the data recorded in the *ex-post* evaluation, and analysis of the data in terms of the Likert 4-Point Scale, computed aggregate ranks and derived nominal ranking of the factors of utility; TABLE 5-6, and TABLE 5-7 depict an **alternative approach**, in which the respondents assign direct nominal rankings to the 17 factors of utility, for analysis in terms of computed aggregate ranks and derived nominal ranking of the factors of utility. The two computed nominal rankings, one indirectly from the Likert 4-Point Scale and the other directly through nominal rankings, are compared for rank correlation of the difference in the rankings. A total of 28 respondents from the original 63 alumni (that is, 44%) responded. Computed aggregate 'rank', <x>, is defined as the mean of the variables $\mathbf{x_1}$, $\mathbf{x_2}$, $\mathbf{x_3}$, and $\mathbf{x_4}$, occurring $\mathbf{f_1}$, $\mathbf{f_2}$, $\mathbf{f_3}$ and $\mathbf{f_4}$ number of times, respectively, where $\mathbf{x_1}$, $\mathbf{x_2}$, $\mathbf{x_3}$, and $\mathbf{x_4}$ represent the Likert 4-point scale assignments 1, 2, 3, and 4, respectively. The ranking of these computed aggregate ranks, from 1 (for highest value) to 17 (for least value), gives the derived nominal ranking of the study's factors of utility, denoted by the variable **X**. This is compared against a variable denoted by **Y** (TABLE 5-6), representing the respondent's direct ranking of the 17 factors of utility, in accordance with the *Ex-Post Evaluation Questionnaire*.

TABLE 5-5: Respondent Likert Point Scale Assignment, Computed Aggregate 'Ranks' and Derived Nominal Ranking

Components of Utility (Usage, Usefulness, and Usability)		**Factors of Utility**	**Likert 4-Point Scale**				**Computed Aggregate 'Rank'**	**Derived Nominal Ranking of Factors of Utility**
			1 $\mathbf{x_1}$	**2** $\mathbf{x_2}$	**3** $\mathbf{x_3}$	**4** $\mathbf{x_4}$	**<x>= $\Sigma x_i f_i / \Sigma f_i$,**	**X (1 to 17)**
			No of Respondents choosing 1,2,3,or 4 $\mathbf{f_1}$	$\mathbf{f_2}$	$\mathbf{f_3}$	$\mathbf{f_4}$	**i=1,2.3, 4**	
USAGE Attributes that are generally perceived to be central to the frequency of use of the 'system' by 'states-as-actors' in international relations context or by other groups or communities of practice in other or similar contexts	**1**	**Access**	2	3	14	9	3.07	8
	2	**Availability**	2	5	13	8	2.96	9
	3	**Affordability**	3	4	14	7	2.89	11
	4	**Existence of Subject of Discussion**	2	8	8	10	2.93	10
	5	**State of Timeliness of Discussion**	5	9	12	2	2.39	16
To what extent , on a 4-point Likert scale do you consider **USAGE** central with respect to the **factors of utility**								

listed in the next column?								
	*	**USAGE Aggregate**	-	-	-	-	2.84	*
USEFULNESS Value-addedness to conventional international relations conferences	**6**	**Service**	3	7	8	9	2.86	12
	7	**Process Enablement**	0	4	7	17	3.46	2
	8	**People Enablement**	2	5	17	4	2.82	13
	9	**System Enablement**	4	16	7	1	2.18	17
	10	**Adequate Security**	3	13	4	8	2.61	15
	11	**Outcome - Efficiency**	0	4	16	8	3.14	6
To what extent , on a 4-point Likert scale do you consider **USEFULNESS** central with respect the **factors of uitlity** listed in the next column?	**12**	**Outcome - Effectiveness**	3	4	8	13	3.11	7
	13	**Outcome - Productivity**	1	2	16	9	3.18	5
	14	**Fit-for-Purpose Characteristic**	0	1	16	11	3.36	3
	15	**Automatic Record Generation**	0	0	7	21	3.75	1
	*	**USEFULNESS Aggregate**	-	-	-	-	3.07	*
USABILITY Degree of match or goodness-of-fit between users, technology and processes	**16**	**Easy-to-Use Human-Machine Interface**	1	2	12	13	3.32	4
	17	**Easy-to-Effect Adaptability to Use**	3	6	15	4	2.71	14
To what extent , on a 4-point Likert scale do you consider **USABILILITY** central with respect to the **factors of uitlity** listed in the next column?								
	*	**USABILITY Aggregate**	**-**	**-**	**-**	**-**	**3.02**	*
Ranking the Issues Please use **the last column** of this table, rank the **factors of uitlity** in the order in which you perceive them as important to you as a state-as-actor, from **MOST** important **(order 1)** to **LEAST** important **(order 17)**								

TABLE 5-6: Respondent Nominal Ranking of the Factors of Utility, Computed Aggregate Ranks and Derived Nominal Ranking

	Nominal Ranking →	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	Computed Aggregate Rank	Derived Nominal Ranking
	Factors of Utlilty ↓	Number of Respondents Per Nominal Ranking for a Given Factor of Utility																	↓ $\langle y \rangle = \Sigma y_i f_i / \Sigma f_i$, $i=1,..17$	↓ Y
		f_{17}	f_{16}	f_{15}	f_{14}	f_{13}	f_{12}	f_{11}	f_{10}	f_9	f_8	f_7	f_6	f_5	f_4	f_3	f_2	f_1		
USAGE Attributes that are generally perceived to be central to the frequency of use of the 'system' by 'states-as-actors' in international relations context or by other groups or communities of practice in other or similar contexts	**Access**				2	2	2					6	2	4	2	3		3	6.96	9
	Availability				1			1	4	1	4	2	5	3	3		2	1	5.56	2
	Affordability	1				2	1	3	1	2	4	2	1	3	3	3		1	7.59	13
	Existence of Subject of Discussion					1	1	5	2	5		1	2	3	3	1	2	1	7.30	11
	State of Timeliness of Discussion	2			3		2		3	3	4	6			2	2			9.07	14
USEFULNESS Value-addedness to conventional international relations conferences	**Service**			4	4	2	3	2	1	4	1	1	1	1	2	1			9.37	15
	Process Enablement									2		1		2		2	13	7	2.74	1
	People Enablement		1		1	3	5	4	5	1	2		3			2			10.07	16
	System Enablement	2		8	10	7													14.26	17
	Adequate Security		2	2	4	3	2	1				1					1	11	7.52	12
	Outcome - Efficiency		1				1	2	4	3	3	3	1	2	1	3	3		6.81	7
	Outcome - Effectiveness				1		4	1	3		2	1	3	1	3	7	1		6.81	7
	Outcome - Productivity						1	3	1	2		5	3	5	3	1	1	2	6.19	4
	Fit-for-Purpose						2		1	5	5	3	3	1	2	5			5.70	3
	Characteristic Automatic		1	2			1	2			3	3	1		4	3	4	3	6.19	4

USABILITY Degree of match or goodness-of-fit between users, technology and processes	**Record Generation Easy-to-Use Human-Machine Interface**		1		2	1	4		3	2	2	3	3	4`	1			1	6.63	6
	Easy-to-Effect Adaptability	2		2			1	2			3	4	1	1	4	2	4	1	7.11	10

TABLE 5-7: Determining the Rank Correlation Between the Two Modes of Ranking of the Factors of Utlity of the Study's Distributed Collaborative System

Components of Utility (Usage, Usefulness and Usability)		Given Factors of Utility	Nominal Ranking Derived from Respondent Likert Point Scale Assignments (X)	Nominal Ranking Derived from Repondent Direct Ranking of Factors of Utility (Y)
			(1 to 17)	(1 to 17)
USAGE Attributes that are generally perceived to be central to the frequency of use of the 'system' by 'states-as-actors' in international relations context or by other groups or communities of practice in other or similar contexts	**1**	**Access**	8	9
	2	**Availability**	9	2
	3	**Affordability**	11	13
	4	**Existence of Subject of Discussion**	10	11
	5	**State of Timeliness of Discussion**	16	14
USEFULNESS Value-addedness to conventional international relations conferences	**6**	**Service**	12	15
	7	**Process Enablement**	2	1
	8	**People Enablement**	13	16
	9	**System Enablement**	17	17
	10	**Adequate Security**	15	12
	11	**Outcome - Efficiency**	6	7
	12	**Outcome - Effectiveness**	7	7
	13	**Outcome – Productivity**	5	4
	14	**Fit-for-Purpose Characteristic**	3	3
	15	**Automatic Record Generation**	1	4
USABILITY Degree of match or goodness-of-fit between users, technology and processes	**16**	**Easy-to-Use Human-Machine Interface**	4	6
	17	**Easy-to-Effect Adaptability**	14	10

Computing the Measure of Correlation Between the Nominal Ranking Derived from the Respondent Likert Point Scale Assignments and the Nominal Ranking Derived from the Respondent Direct Ranking of the Factors of Utility in the Respondents' Prioritisation of Factors of Utility

TABLE 5-7 above depicts the results of the two modes of the determination of ranking of the factors of utility, as exercised by the respondents in the prioritisation of the factors of utility. Two variables, X and Y, are defined as follows:

- X denotes the Nominal Ranking derived from the respondent Likert Point Scale Assignments to the factors of Utility;
- Y denotes the Nominal Ranking derived from the respondent Direct Ranking of Factors of Utility

To measure the correlation between the two variables X and Y. requires a deployment of non-parametric methods. [BLANCHE and DURRHEIM 1999]. The variables X and Y are ranked in the order of importance, from 1 to 17. In general, when the variables can be ranked from 1 to N in the order of some charateristic attribute (size, volume, importance, priority, etc), it is logical to invoke the Spearman's Rank Correlation [BLANCHE and DURRHEIM 1999]. In this study, the variables X and Y are ranked in the order of importance or priority. The Coefficient of Rank Correlation (r) between any two variables X and Y may be computed using Spearman's Formula for Rank Correlation [UOL 1999], which yields the following value:

r = 0.8554

On the assumption that r has a Student's t-distribution [BLANCHE and DURRHEIM 1999] , we can calculate the t-score or t Statistic for our correlation coefficient, to give the following value:

t = 6.38,

which demonstrates that the sample correlation coefficient r is SIGNIFICANT at the 5% level of significance. That is, the rank correlation between the two different modes of ranking of the factors of utility, namely, (i) nominal ranking as derived from respondent Likert 4-point scale assignments, and (ii) nominal ranking as derived from respondent direct ranking of factors of utility.is not random.

To note is that the above result does not prove a cause-effect relationship in any way between the two different modes of ranking of the factors of utility deployed in the research study. Also, this test has a further restriction as it assumes that the sample of (X,Y) pairs was drawn from a normal distribution.

b) Observations

That the rank correlation between the two different modes of ranking of the factors of utility is shown to be significant (5% level of significance) paves the way for a discussion of the observations which can be made with respect to the factors of utility. An interpretation of the results and observations on the *ex-post* evaluation may be made more explicit and

comprehensive by examining the rankings of the 17 factors of utility in terms of four 'quartiles', with the first quartile (Q1) comprising the first four factors of utility in the respondent rankings; the second quartile (Q2) comprising the next four factors of utility in the respondent rankings; the third quartile (Q3) comprising the next four factors of utility in the respondent rankings; and the fourth quartile (Q4) comprising the rest (5) of the factors of utility in the respondents rankings.

The results of the *ex-post* evaluation demonstrate that from the standpoint of a sample of users of the distributed collaboration sytem USEFULNESS is perceived to be a more important factor of utility relative to USAGE and USABILITY. Specifically, the following factors of USEFULNESS take 75% of Q1: Automated record generation, Process enablement, and Fit-for-Purpose characteristic, as applied to the distributed collaboration system. This is, not surprising as, for example, **automated record generation** eliminates the labour of rapporteur tasking, verbatim record writing, or audio recording, which are typical of conventional international relations conference proceedings; **process enablement** is deemed to keep the core business of the subject of discussion in focus; and **fit-for-purpose characteristic**, merely reinforces the perception by the respondents that the system is relevant for the purpose for which it was set up. The remaining 25% of Q1 is taken up by easy-to-use **human-machine-interface,** which is a usability factor. The following factors, again, of USEFULNESS take 75% of Q2: Productivity, Efficiency and Effectivenes, as applied to the distributed collaboration system. This is consistent with the search for a system and a practical alternative to the implementation and conduct of a conventional international relations conference, which will address the problems and issues that frequently affect the implementation of such a conference, whilst reasonably fulfilling and/or improving the conference deliberations. As observed in Chapter I (§1.1), international conference practices and processes and associated structures can be *inefficient, ineffective* and *wasteful of resources*. The respondents 'verdict' in the *ex-post* evaluation show that the distributed collaboration system deployed in this study is highly productive, efficient and effective, occupying the top 50% of the factors of utility rankings. The remaining 25% of Q2 is taken up by access, which is a usage factor, coming into the rakings for the first time. Access was accompanied by a number of comments including the need for not only participatory access in the context of states-as-actors in the international relations context, but also universal access, to extend the scope of the system to deployment by other groups, including communities of practice in other aspects of international relations beyond international relations conferences. The following factors of USAGE are predominant in Q3: Availability, Subject of discussion and Affordability. These are essentially factors of utility that act as prerequisites for the staging of an international relations conference using a distributed collaboration system. The rest of the factors of utility in Q3 is made up by Service, which is a usefulness factor. The upper quartile Q4 contains a diffuse set of the rest of the factors of utility: people enablement, easy-to-effect adaptability, adequate security, state of timeliness of discussion and System enablement, which span usage, usefulness and usability. No obvious trend is discernible.

c) Findings

The findings on the evaluation of the deployment of distributed collaboration as a system for use in the international relations context, including international relations conferences, demonstrate that in the perspective of the user of such a system, USEFULNESS is perceived

to be a more important factor of utility relative to USAGE or USABILITY. In particular, usefulness manifests as *Automated record generation, Process enablement, and Fit-for-Purpose characteristic, as applied to the distributed collaboration system.* In the perspective of the user of a distributed collaboration ***automated record generation*** *eliminates the labour of rapporteur tasking, verbatim record writing, or audio recording, which are typical of conventional international relations conference proceedings;* ***process enablement*** *is deemed to keep the core business of the subject of discussion in focus; and* ***fit-for-purpose characteristic****, merely reinforces the perception by the respondents that the system is relevant for the purpose for which it was set up.* Furthermore, in the perspective of the user, ***Productivity***, ***Efficiency*** and **Effectivenes**, *as applied to the distributed collaboration system come next in precedence*. This is consistent with the search for a system and a practical alternative to the implementation and conduct of a conventional international relations conference, which will address the problems and issues that frequently affect the implementation of such a conference, whilst reasonably fulfilling and/or improving the conference deliberations. The respondents 'verdict' in the *ex-post* evaluation show that the distributed collaboration system deployed in this kind of application is highly productive, efficient and effective, thus providing rationale for bolstering application of distributed collaboration as an alternative, a substitute or a supplement, to *conventional international conference practices and processes and associated structures which* can be can be inefficient, ineffective *and* wasteful of resources. USAGE, which is found to occupy the next layer of perceived importance, is found to manifest in the following utility factors: Access, Availability, Subject of Discussion and Affordability, the whole set of which serves as an essential pre-requisite suite for deployment of the system.

On the Quality of a Distributed Collaboration System

A question that may be posed at this point is whether the quality of results using a distributed collaboration system is different when compared with corresponding results from a conventional face-to-face setting in the international relations context. To be able to answer this question, it is important, first, to provide a definition of quality, namely, as "*the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs*"[GILBERT 1994], or, simply put, "*ability to satisy conformance to requirements*".

In both the deployment of a distributed collaboration system and the conduct of a conventional face-to-face setting, group interactions take place over a subject of discourse. While the interactions over a distributed collaboration system result in the direct generation of individually-attributed textual transcript, the interactions in a conventional face-to-face setting result in the generation of individually-attributed oral submissions or presentations. In a distributed collaboration system, the interactions are recorded in real-time in electronic textual form; in a conventional face-to-face setting, the interactions are recorded in real time in human voice (sound) form, digital or analogue or are recorded verbatim or transcribed into textual form from the recorded vocal delivery. Interactions over a distributed collaboration system take place within the confines of the delegates offices while in a conventional face-to-face setting, delivery of delegate presentations takes place in the presence of the other delegates.Whereas in a distributed collaboration system non-verbal interactions cannot be delineated [in the design utilised in this study], a conventional face-to-face setting is allows

for a manifestation of non-verbal interactions associated with the kinesics and proxemics that accompany real-world face-to-face consultations, dialogues, negotiations or discussions. Whereas an international conference based on the deployment of a distributed collaboration system requires no elaborate ceremony, a conventional international relations conference will nearly always be preambled by some elaborate physical ceremony. In addition, interactions during a convential international relations conference will be supplemented by an ample window of opportunity for informal "corridor diplomacy" and for various informal "reception networking".

If, for the purpose of articulating quality, stated or implied needs of the delegates and/or the nation-states they represent comprise (i) group interactions (formal); (ii) group interactions (informal, including "corridor diplomacy" and "reception networking"; (iii) a timely report with high attribution accuracy; and (iv) opportunity for non-verbal interactions (body-language, delegate proximity during presentations), then it is easy to see that, overall, a conventional international relations conference has a quality advantage over a virtual international relations conference because of the features provided by the window of opportunity provided for informal group interactions, and the kinesics and the proxemics of non-verbal interactions. If, however, stated or implied needs of the delegates simply comprise the need for a timely report with a high attribution accuracy, then a distributed collaboration system has a quality advantage over the conventional face-to-face conference.

5.4 Information Exchange Interactions, Interpersonal Group Level Interaction and Knowledge Exchange Interactions: Observations at the Macro Level

a) Introduction

At the macro-level, we are looking for a 'big picture pattern' of behaviour exhibited by actor-participants in a CSCW session. On the basis of this, Information Exchange Interaction (IXI) is taken to represent a measure of resultant behaviour derived from the collectivity of all IXI behaviour primitives during a CSCW session; Interpersonal Level Group Interaction (IGI) is taken to represent a measure of resultant behaviour derived from the collectivity of all IGI behaviour primitives during a CSCW session; and Knowledge Exchange Interaction (KXI) is taken to represent a measure of resultant behaviour derived from the collectivity of all KXI behaviour primitives during a CSCW session. TABLE 5-4.1 depicts analysis of the number of occurrences (in percentage terms) of the group behaviour between categories IXI, IGI and KXI applied to the eight CSCW sessions of the research study

b) Observations

The observations of the research study at the macro-level, namely, with respect to Information Exchange Interaction (IXI), Interpersonal Group Level Interaction (IGI) and Knowledge Exchange Interaction (KXI), as depicted in TABLE 5-8, demonstrate that group behaviours in CSCW sessions are inherently shared between Information Exchange Interaction (IXI), Interpersonal Group Level Interaction (IGI) and Knowledge Exchange Interaction (KXI), *not in equal measure but in proportions that are contingent upon the nature of the theme or domain of discourse, the objective of the session and the cultural composition of the session.*

This is true for Case 1 (Virtual Embassy), and equally for Case 2 (Terrorism), as well as for Case 3 (Internet Governance).

The observations (deduced from TABLE 5-8) show that of the three generic group behaviour categories, Interpersonal Group Level Interaction (IGI) is predominant, followed by Information Exchange Interaction (IXI), then by Knowledge Exchange Interaction (KXI). Within Interpersonal Group Level Interaction, Task-Oriented behaviour stands out predominant, followed by Maintenance-Oriented behaviour, then by Self-Oriented behaviour. There is no evidence in the study to suggest that this observed, specific distribution of group interactions would replicate in any other set of CSCW sessions. These observations, specific though they are, are observable in each of the three cases represented by Virtual Embassy (Case 1), Terrorism (Case 2) and Internet Governance (Case 3).

TABLE 5-8 On Information Exchange Interaction, Interpersonal Group Level Interaction and Knowledge Exchange Interaction at the Macro Level

Case Studies	**Domain of CSCW Session Discourse**	**Information Exchange** (TABLE 5 - 1.1, Apendi II)	**Interpersonal Group Level interaction (IGI)** (Derived from TABLE 5-2.1, TABLE 5-2.2, TABLE 5-2.3, TABLE 5-2.4, Appendix II)			**Knowledge Exchange** (TABLE 5-3.1, TABLE 5-3.2, and TABLE 5-3.3, Appendix II)
Case Studies	**Theme (No of interactions)**	**IXB**	**Task-Oriented: IGI-1**	**Maintenance-Oriented: IGI-2**	**Self-Oriented: IGI-3**	**KXB**
Case 1	**Virtual Embassy (473)**	33.3%	40.8%	7.5%	0.4%	19.6%
Case 2	**Terrorism (1718)**	27.7%	37.0%	9.0%	1.8%	20.4%
Case 3	**Internet Governance (1435)**	33.5%	33.8%	12.6%	1.4%	19.4%

The three group interaction categories IXI, IGI and KXI are found to be *existent* in all the CSCW sessions of the research study, that is, in all the sessions pertinent in each of the cases represented by Virtual Embassy (Case 1), Terrorism (Case 2) and Internet Governance (Case 3). This is demonstrated by the existence of a *finite* value of cumulative number of occurrences of group behaviour / group interactions, for each session of a case, of 'functionally matching' IXI, IGI and KXI categories. In particular, however, *the group behaviour category IGI is observed to show a consistent predominance of occurrence in all the eight CSCW sessions of the research study.* This is followed by a prevalence of the group behaviour category IXI and then by a prevalence of the group behaviour category KXI.

Again, this is true for Case 1 (Virtual Embassy), and equally for Case 2 (Terrorism), as well as for Case 3 (Internet Governance).

We illustrate the preceding assertions by considering, as an example, a random selection of fragment of transcript from one or more of the three Discourses. Box 5-4 depicts a fragment of transcript, with codings embedded, from the Terrorism Discourse, focusing on the question: What is a terrorist act?

BOX 5-4: "Interpersonal Group Level Interaction is predominant …"

What is a terrorist act … ?

<**kap**> What is a terrorist act? [**SEEK**] Can it be done by a non-terrorist? [**ENCO**, RR/RA, **SEEK**] Can terrorists change into another category? [**ENCO**, RR/RA, **SEEK**]. How does this affect their treatment by the international community? [**ENCO**, RR/RA, **SEEK**]

<**teb**> I think a "non -terrorist can easily become a terrorist [**PROP**, CI; IP; KGen, KApp].

<**kap**> Yes, it happens all the time [**AGRE**; IP; KApp].

<**tra**> A terrorist act is the calculated use of violence or the threat of violence to inculcate fear, intended to coerce or to intimidate governments or societies in the pursuit of goals that are generally political, religious, or ideological [**INIT**;CR/CA;IP;KGen]. Some "terrorists" believe that their actions are justified [**INST**;**BUIL**;IP;KShar]

<**teb**> … which is why I think that fighting them back does not solve anything. Diplomacy in the end is what will solve most crises [**PROP**;IP;KGen]

<**tra**> I agree with sal [AGRE]. The US has refused to co-perate fully in efforts to prosecute state terrorists--such as Chilean General Augusto Pinochet -- when attempts are made to bring them to justice, and the Bush dministration has opposed creation of the International Criminal Court [**INIT, INST**; IP; KGen, KShar].

<**tra**> Sometimes these US-trained terrorists have subsequently used the skills and weapons they acquired against the interests of their trainers, as in the case of some supporters of the anti-Soviet Afghan resistance. Osama bin Laden and many of his followers were initially trained by the CIA in Afghan refugee camps and in Pakistan during the 1980s [**INIT**, **INST**; IP; KGen, KShar].

In this fragment of transcript (What is a terrorist act?), Interpersonal Group Level Interaction (IGI) is found to be predominant (43%), followed by Information Exchange Interaction (IXI) (31%), and then Knowledge Exchange Interaction (KXI) (26%). The total number of coded interactions in the given fragment of transcript is 39. Within the Interpersonal Group Level Interaction (IGI), Task-Oriented behaviour stands out predominant (82%), followed by Maintenance-Oriented behaviour (18%), then by Self-Oriented behaviour (0%). These observations are consistent with the overall observations made, in this study, with respect to the Terrorism Discourse as a whole.

The empirical observations cited above point to a number of important observations. First, the observations point to the realisation that at the macro-level, group behaviour in a CSCW

session is human action, reaction and interaction between actor-participants, viz: group interpersonal action, reaction and interactions. Second, the observations point to the realisation that the nature of content that generically takes place in the context of group interpersonal interactions (IGI) is identifiable in terms of both **information** (by virtue of information exchange interaction) and **knowledge** (by virtue of knowledge exchange interaction). Third, these observations appear to be independent of the nature of themes under auspices which the CSCW sessions are implemented, and therefore, independent of the nature of the cases.

c) Findings

From the observations of the research study with respect to Information Exchange Behaviour (IXI), Interpersonal Group Level Interaction (IGI) and Knowledge Exchange Interaction (KXI) at the *macro level,* as depicted in TABLE 5-8, the following findings may be registered**:**

- **Group interpersonal interactions** take precedence, at least as demonstrated empirically in this study, mainly because, in the view of the study, *it is human interaction that gives basis for cohesion that sustains a CSCW session.*
- **Information Exchange** and **Knowledge Exchange** may be perceived as the two main types of *resources* that are exchanged in the human interactions that take place in a CSCW session. Empirical data reveals that Information Exchange, as opposed to Knowledge Exchange, is the more predominant of the two types of resources in the whole of the research study.
- The nature of resources (Information or Knowledge) in the behaviour categories IXI and KXI are not entirely mutually exclusive.
- The preceding findings are independent of the nature of the cases, mainly because Information exchange interactions, Group interpersonal interactions, and Knowledge exchange interactions cut across themes.

5.5..Information Exchange Interactions, Interpersonal Group Level Interaction and Knowledge Exchange Interactions: Observations at the Meso Level

a) Introduction

At the meso-level, Information Exchange Interaction (IXI), Interpersonal Group Level Interaction (IGI) and Knowledge Exchange Interaction (KXI) is discussed in terms of transcript analysis applied to *interaction primitives* corresponding to the IXI, IGI and KXI categories, giving rise to more detailed observations, as depicted in TABLE 5-5.1; TABLES 5-5.2A, 5-5.2B, and 5-5.2C; and TABLE 5-5.3 (APPENDIX II).

b) Observations

For each of the three cases, namely, Virtual Embassy (Case 1), Terrorism (Case 2), and Internet Governance (Case 3), the number of occurrences of interaction primitives for the pertinent categories IXI, IGI and KXI is found to be finite and therefore *existent* in each of the CSCW sessions of the research study. Specifically, group interaction sub-category IGI-1

(task-oriented IGI, or 'IGI-TO' – depicted in TABLE 5-5.2A) is observed to show a general predominance of occurrence. This is followed by a prevalence of the group interaction sub-category IGI-2 (maintenance-oriented IGI or 'IGI-MO' – depicted in TABLE 5-5.2B) and then, to a lesser extent, by a prevalence of the group behaviour sub-category IGI-3 (self-oriented IGI or 'IGI-SO' - depicted in TABLE 5-5.2C). In particular, at the task-oriented IGI level, observation shows a predominance of the group *interaction primitives* 'Initiating'/'Proposing' (INIT/PROP) and 'Building' (BUIL). At the maintenance-oriented IGI level, the group *interaction primitives* 'Encouraging' (ENCO) and 'Acknowledging'/'Apologising' (ACK/APOL) are predominant. At the self-oriented IGI level, pertinent group interaction primitives are found to be random in distribution, however, with no clearly defined trend. Group interaction category IXI (depicted in TABLE 5-5.1) is observed to manifest in a predominance of the following group interaction primitive(s): 'Information Providing' (IP). It is significant to note that this predominance appears to be somewhat 'mirrored' by the interaction primitive 'Information Seeking' (IS). This is because IP and IS essentially play somewhat reciprocal functional roles, one providing information (IP), the other seeking information (IS). Group Interaction category KXI (depicted in TABLE 5-5.3) is observed to manifest in a predominance of the group interaction primitive 'Knowledge Generation' (KGen), followed by a relative prevalence of the group interaction primitive 'Knowledge Application' (KApp), followed by the group interaction primitive 'Knowledge Sharing' (KShar).

A special observation may be cited with respect to the group interaction primitive 'Requesting Permission' (RP) and Confirming Permission' (CP), which appear to characterise, in the main, the following two CSCW sessions: *Addressing the UN General Assembly*, and *Special Session (on Terrorism).* In these two CSCW sessions of the research study, two group behaviours RP and CP provide basic procedures that must be exercised by an actor-participant and reciprocated by the session Chair, respectively, before an actor-participant can make an intervention during a session**.** A special observation may be cited with respect to 'Knowledge Generation' (KGen) and 'Knowledge Sharing' (KShar), which would appear to be jointly predominant with respect to the CSCW sessions *Addressing the UN General Assembly*, and *Special Session (on Terrorism).* In this case, reciprocity between KGen and KShar is not obvious

We seek to illustrate the observations made in this section by considering, as an example, a fragment of transcript from the Terrorism Discourse. We choose a fragment of transcript, with codings embedded, from the study's Special Session on Terrorism, focusing on the drafting of Recommendation or Resolution on Terrorism. This is depicted in Box 5-5.

In this fragment of transcript (The Drafting [partial] of a Resolution on Terrorism), Interpersonal Group Level Interaction (IGI) is found to be predominant (50%), followed by Information Exchange Interaction (IXI) (23%), and then Knowledge Exchange Interaction (KXI) (27%). The total number of coded interactions in the given fragment of transcript is 71. Within the Interpersonal Group Level Interaction (IGI), Task-Oriented behaviour stands out predominant (45%), followed by Maintenance-Oriented behaviour (4%), then by Self-Oriented behaviour (1%). These observations are consistent with the overall observations made, in this study, with respect to the Terrorism Discourse as a whole.

BOX 5-5: A Fragment of Transcript from the Study's Special Session on Terrorism – The Drafting [partial] of a Resolution on Terrorism

Special Session on Terrorism - The Drafting [partial] of a Resolution on Terrorism

<**CHAIR**> WE WILL MOVE TO THE NEXT AMENDMENT WHICH WAS SUBMITTED BY DD OF FINLAND [**INIT**].
<**CHAIR**> THANK YOU. DD OF FINLAND AMENDMED THE FOLLOWING DRAFT TEXT (PARAGRAPH**) [, ACKN, INST; IP; KShar]**
(e) Ensure that any person who participates in the financing, planning, preparation or perpetration of terrorist acts or in supporting terrorist acts is brought to justice and ensure that, in addition to any other measures against them, such terrorist acts are established as serious criminal offences in domestic laws and regulations and that the punishment duly reflects the seriousness of such terrorist acts **[PROP/INIT; IP; KGen].**
<**CHAIR**> AND PROPOSED THE FOLLOWING AMENDMENT **[BUIL]:**
e)Ensure that any person who participates in the financing, planning, preparation or perpetration of terrorist acts or in supporting terrorist acts should be brought to(ICJ)or any international legal body and ensure that, in addition to any other measures against them, such terrorist acts are established as serious criminal offences in domestic laws and regulations and that the punishment duly reflects the seriousness of such terrorist acts **[PROP/INIT; IP; KGen]**.
<**CHAIR**> COMMENT: Finland is specifying "brought to justice" which could be controversial **[ALTS, PROP;BUIL;IP;KGen]**. International Criminal Court could be proper jurisdiction. This proposal may get objection both from the USA (against this court) and other states (reducing sovereignty)... but it is along the EU-policy lines **[INST;Shar].**
<**USA**> As we has stipulated before, it is difficult to mention an international court as in the present case.. **[DISA;IP;KApp]** how can one bring certain terrorists to an international court? [**SEEK]** How do we get them, when they are buried like foxes... after carrying out such atrocities... **[SEEK].**
<**USA**> The court is only effective when there is a precedence before it **[SUBS;IP;KApp].**
<**Egyp**t> Mr Chairman, DD's I may be excused to withdraw from the session, please. Due to my vast exposure in these sessions I have been requested to officiate at government high powered meeting on this topic . I apologise to the meeting **[SUBS;WDRW;IP;KApp]**.
<**SouthAfrica**> Mr Chairman, the DD of the USA addresses the issue of bringing the perpetrators to justice through courts of law as if it is a new phenomenon. As we have seen with the Lockerbie case, it can be done successfully through diplomatic channels, and it satisfies all parties **[INIT; ACKN;IP;KGen]**.
<**SouthAfrica**> We implore the USA to accept this as a workable means of dealing with the issue **[BUIL, ENCO].**
< **USA**> Our position is clear...diplomacy when certain atrocities are meted out is not negotiable **[DISA/OPPO]**. In the real situation facing us, diplomacy was offered and it was rebuffed there was an absolute refusal to present the perpetrators of the heinous crimes against democratic freedom **[PROP;IP;KGen]**. And that is why we have to huntdown these [terrorists] wherever they hide in whatever hole **[PROP, SUBS;BUIL;IP;KGen, KApp]**
< **USA**> The international court of justice cannot carry out such a task.. we need real teeth in dealing with such a matter **[EVAL; BUIL; IP;KShar]**.
<**SouthAfrica**> DD of USA, South Africa, more than most of us in this room can say, has been through hell and back, and in the end, after all the fighting, diplomacy brought us where we are today **[INST;IP;KShar]**
<**jov/Secretariat**> COMMENTS - We have impasse - USA does not want ICJ. In reality some backdoor negotiation would happen since EU has many countries behind its proposal. thus some trade-off could be made. Please think how USA can be accommodated? **[RECAP, SUMM; IP;KShar]**
<**kap/Secretariat**> There is some confusion. The ICJ is a Court for disputes between States. It is the International Criminal Court that should be mentioned **[PROP;GUID, CLAR; IP; KGen]**
<**kap/Secretariat**> The USA does not want to ratify the Statute of that Court**[INST;BUIL;IP;KShar]**
<**Iran**> Yes, kap is right. First we must define the acts of terrorism, and then to accept the jurisdiction of ICC **[AGRE, INIT; IP;KGen, KApp]**.

c) Findings

The findings from the foregoing observations on Information Exchange Interaction (IXI), Interpersonal Group Level Interaction (IGI) and Knowledge Exchange Interaction (KXI) at the *meso level*, as depicted in TABLE 5-5.1; TABLES 5-5.2A, 5-5.2B, and 5-5.2C; and TABLE 5-5.3 (APPENDIX II), demonstrate that the empirical observations are simply a re-confirmation, at the meso-level of analysis, of the predominance of the IGI group behaviours, followed by the prevalence of IXB group behaviours, then by the prevalence of KXB group behaviours. The group interaction primitives represented by 'Initiating/Proposing' (INIT/PROP), 'Building (on previous)' (BUIL) and 'Information Providing' (IP) and 'Knowledge Generation' (KGen) appear to be the predominant group behaviours in a CSCW session at the meso-level of analysis. These findings are found to be independent of the nature of the cases.

5.6 X-Link Creation Notifications

a) Introduction

As we saw in Chapter IV, the subject of analysis of this study comprises, in the main, a set of virtual interactions, generated as individually-attributed interventions, and recorded as fragments of textual transcript for distributed collaboration sessions. This is supplemented, to a lesser extent, by empirical transcript data described as 'X-Link Creation Notifications', which comprised text generated asynchronously in relation to selected aspects of the domain of discussion in sessions of the research study. TABLE 5-9 depicts a listing of data organisation of X-Link Creation Notifications and other related resources. For the purpose of this study, this is limited to Internet Governance.

TABLE 5-9: A Listing of Data Organisation for Analysis (A Listing of X-Link Creation Notifications and Other Related Resources for Internet Governance)

A Listing of 'X-Link Creation Notifications and Other Related Resources for Internet Governance	
X-Link Creation Notifications and Other Related Resources	**A1.1: X-Link Creation Notifications and Other Related Resources – Internet Governance**
A full recording of the fragments of transcript of textual data used in this study is depicted in the *Compendium* of this study.	

The recording, organisation and part-analysis of the research study's empirical data with respect to X-Link Creation Notifications is found in the study's compendium, aptly named IMPROVING INTERNATIONAL RELATIONS CONFERENCES: A DATA REPOSITORY COMPENDIUM, separate from the body of this thesis. In the study, X-Link Creation Notifications - limited to Internet Governance - are analysed using both the coding schema and the quoting mode of analysis.

The reason for liming consideration of X-Link Creation Notifications to Internet Governance derives from the reason that the sessions on Internet Governance were specifically designed to provide ample opportunity for drawing out learning experiences with respect to steps involved in multilateral negotiation in the international relations context. The choice of Internet Governance, as opposed to Virtual Embassy and Terrorism, for X-Link Creation Notifications analysis, relies on the observation that for Virtual Embassy (Case 1), the main process involved is limited to *conceptualisation*, while for Terrorism (Case 2), the main session conceptual processes involved are *conceptualisation*, *addressing the UN Security Council* and *addressing a Special Session* on Terrorism.

In both the sessions on the UN Security Council and the Special session on Terrorism, nation-states were poised to *positioning* on pertinent issues on Terrorism. The case of Internet Governance was designed to comprise *conceptualisation*, *positioning* for negotiation and multilateral *negotiation*. In effect, in terms of analysis involving different session conceptual processes (*conceptualisation*, *positioning* and *negotiation*), it can be said that analysis relating to Internet Governance was designed to be inclusive of the session conceptual processes designed for Virtual Embassy (conceptualisation) and Terrorism (conceptualisation and positioning). The choice of Internet Governance for analysis with regard to X-link Creation Annotations w therefore appropriate.

Internet Governance

X-Link Creation Notifications generated for Internet Governance consisted of 'New Annotations and 'New Web Links', which focused on **conceptualisation**, **positioning** and **multilateral negotiation** on the electronic communication medium. The New Annotations generated were observed to comprise interventions of the following group interaction types: Information Providing, Information Seeking, Proposing/Initiating, Clarifying, Agreeing/Supporting, Knowledge Generation and Knowledge Sharing. New Web Link 'Titles' provided new information and new knowledge for sharing among actor-participants..

In international relations negotiations, it is generally in the nature of group interactions that 'states-as-actors' will initially find themselves at variance with each other, to varying degrees. **Negotiation** comprises a method of resolving these natural variances (or 'conflicts') with a view to finding solutions (or 'compromises') acceptable to all parties (bilateral or multilateral). A question that may be generally poised with respect to multilateral negotiations is presented below with particular reference to Internet Governance:

> *What is the nature of dialogue/discourse that takes place in a multilateral negotiation on the electronic communication medium, taking multilateral negotiation on Internet Governance as a basis for the articulation of specific group processes pertinent to such a dialogue*?

This question may be considered against the background that the sessions on Internet Governance were designed to comprise the following three parts:

- **Part I**: *Conceptualisation*
- **Part II**: *Positioning* for Multilateral Negotiation
- **Part III**: Multilateral *Negotiation*

b) Observations

On "Coding" and [X-Link Creation] "Notifications"

The observations set out below are the result of the deployment of an "X-Link creation analysis", and "Coding" to the various fragments of textual transcript on Internet Governance. The result is a mapping between group interaction primitives (as per the Master Comparator Table depicted in TABLE 3-1) and matching X-Link Creation Notification Types. This is depicted in TABLE 5-10. The mapping between group interaction primitives and X-Link Creation Notification Types is made easier by virtue of the 'Titles' allocated to the Notifications, which serve as a good guide to the search for a mapping of 'matching types' between the primitives and the Notifications. *The first layer of analysis of X-Link Creation Notifications thus comprises a* ***coding mode of analysis.***

Analysis of the content of X-Link Creation Notifications involves seeking to attach meaning to salient aspects of the pertinent content. This is supplemented by attaching meaning to selected fragments of textual transcript generated in Internet Governance and Standardisation Discourse. The combined meaning associated with X-Link Creation Notifications types and the meaning attached to selected segments of textual transcript is central to the formulation of insights with respect to the stages that are core to the Negotiation Process in the international relations context.

Opening: Opening of a Negotiation is marked by the procedural 'step' that marks the start of the negotiation process. It is performed by the session or conference CHAIR. In the study's multilateral negotiation on Internet Governance and Standardisation, the Opening is simple:

<**jov/CHAIR**> WE WILL START TODAY WITH DISCUSSION ON THE INTERNET GOVERNANCE AND STANDARDISATION – **OPEN**

In the preceding fragment of transcript, the stage is set for initial conditions, as indicated by the group interaction primitive coded OPEN.

Preparation: For the purpose of **preparation** as a phase in the Negotiation Process, X-Link Creation Notifictions are despatched electronically, by the Conference Secretariat, to all designated delegates. This means sending pieces of information in asynchronous mode within a designated period preceding the conference. On the basis of X-Link Creation Notification types, **preparation** invariably comprises asynchronous messaging marked by a variety of X-Link "titles", described as X-Link New Annotation **titles,** such as "Explanation", "Input", "[need for] Specificity", "protection of copyright" and "legal framework" or in New Web Link "Types" such as "Explanation" and "Reference".

TABLE 5-10: Embodying X-Link Creation Annotations and Other Resources: Focus on Internet Governance – Conceptualisation, Positioning for Negotiation

Embodying X-Link Creation Annotations and Other Resources: Focus on Internet Governance – Conceptualisation, Positioning for Negotiation			
	Group Behaviour / interaction	**Nature of Generated X-Link Creation Notifications (Observations)**	
		Corresponding X-link Creation Notification: New Annotations-'Titles'	**Corresponding X-link Creation Notification: New Web Links – 'Types'**
Internet Governance & Standardisation	Information Providing Information Seeking Proposing/ Initiating Clarifying Agreeing/ Supporting Knowledge Generation/ Knowledge Sharing	o "Explanation"; o "Input"; o "Participation aspect"; o "Specificity" o "Proposal for new formulation" o "Explanation"; o "Agree in principle"; o "Governance and standardisation" o "Co-ordination among international organisations" o "Private sector input" o "Standards" o "Protection of copyright" o "Legal framework"	o "Reference" o "Explanation" o Other web resources provided as *e*Mail communications

These are designed to take the form of of asynchronous hypertext interventions, attributed by the conference secretariat**.** Preparation was also designed to take the form of ***e*Briefs** contained despatched as *e*Mail communication from the "Conference Secretariat".

From a different standpoint, preparation for Negotiation comprised arranging a conceptualisation session, comprising a discourse session, chaired by the "Conference Secretariat", in which the delegates participated in an objective to discuss the theme of discussion from the standpoint of "familiarising" themselves with essential aspects of the subject of discussion. In the study's multilateral negotiation on Internet Governance, a conceptualisation session was arranged as a preparatory phase for the multilateral negotiation session. To this end, the conceptualisation session was generally marked, among others, by the following types of intervention: Idenfifying and understanding the issues, by way of Information Providing (IP), Information Seeking (SEEK), Confirming Information (CI), Proposing/Initiating (PROP/INIT), Agreeing/Supporting (AGRE/SUPP), Disagreeing /

Opposing (DISA/OPPO), Knowledge Generation (KGen) and Knowledge Sharing (KShar). The following fragments of textual transcript will illustrate this assertion:

> <**jov/CHAIR**> First one important clarification..
> <**jov/CHAIR**> we should make difference between...
> <**jov/CHAIR**> a) eGovernance (use of internet and computers for performing government functions) and
> <**jov/CHAIR**> b) Internet governance (governing internet development – INIT/PROP

The foregoing is identifiable with the following behaviour/interaction primitives: **INITIATE/PROPOSE** (INIT/PROP. Alternatively, preparation may manifest as an information seeking task, among others, as illustrated in the following fragments of transcript:

> <**teb**> what about universal service and access then, that's them out the window once we start getting all excited about regulation - SEEK
>
> and
> <**ann**> Sal with out regulation what becomes of your country's DNS plans? – SEEK
>
> and
> <**sal**> There are over 167 countries, how will it be regulated for international linkages. we are still trying to protect ourselves - SEEK
>
> And
>
> <**jov**> WELL, IT SEEMS THAT THERE IS ONE PRE-QUESTION - IS THERE A NEED TO REGULATE THE INTERNET? COMMENT ON JUNGLE - SEEK

Furthermore, preparation may manifest as a clarification task, among others, as illustrated in the following “quotes”, which are identifiable with the following behaviour/interaction primitives: clarifying, coded CLAR:

> <**sal**> Ann, DNS is different from regulation of the internet. The sale of a DNS to me is a sovereign right - CLAR

Furthermore, still, prepararion may become identifiable with the following behaviour/interaction primitives: BUILD, SEEK, as illustrated in the following “quote”:

<sib> we all live in a world of rules and regulations so how is the internet different from other information sources

Argument: On the basis of group interaction primitives, **argument** may be defined in terms of the following: Improving the quality of multilateral discourse through informed, quality inputs, including Information Providing (IP), Proposing/Initiating (PROP/INIT), Knowledge Generation (KGen) and Knowledge Sharing (KShar), in real-time (synchronous) sessions, as demonstrated in the following “quotes”:

> <**cel**> But can government control/censor the Internet? - RA/RR
>
> <**jov**> CAN WE AGREE THAT THERE IS A NEED TO REGULATE THE INTERNET (RISK OF ANARCHY, COMMERCIAL INTEREST, PROTECT DEVELOPING COUNTRIES & DISADVANTAGED SOCIAL GROUPS, ETCD.) – SC (seeking confirmation.
>
> <**WTO**> I agree about a need to regulate [the]internet. What would it be like with pornography, illegal activity, etc. And also e-commerce has to

be regulated – CC (confirming consensus), AGRE (Agreeing), SEEK (seeking information),IS (information seeking),

<**jov**> There are stakehodlers, approaches, initiatives... Our objective is to explore them and to anchor our brainstorming session in reality (very often hard reality – BUIL (building), IP (information providing), and CLAR (clarifying.

These are confirmed, in broad terms, by X-link creation notifications (asynchronous) that manifest as New Annotations and/or New Web Links (with titles such as "Explanation", "Reference", "Input", "[need for] Specificity", "Agree in principle", "[need for] protection of copyright" and "[need for] legal framework"), which are generated as a sequel to real-time sessions and their associated virtual interactions generated as individually-attributed interventions.

Argument, which is typically manifest as **real-time interventions** during CSCW sessions, becomes **asynchronous [hypertext] interventions** in New Annotations or New Web Links in X-Link Creation Notifications.

Signalling: On the basis of group interaction primitives, **signalling** may be defined in terms of the following: Seeking Information, Seeking Consensus, and Seeking Alternative Solution, which *seek to receive the other party's signals*; or the following: Confirming Response, Confirming Information, Confirming Consensus, Clarifying, Supporting/Agreeing, Building, Disagreeing/Opposing, which *seek to tactfully reciprocate, re-adjust or act upon the other's signals*. Receiving the other party's signals, and tactfully reciprocating, re-adjusting or acting upon the other's signals is said to constitute **signalling** in the context of multilateral negotiation. There is a whole range of X-link Creation Notifications, which are identifiable by assertions such as the following: "Agree in principle", or "Disagree", "Do you Agree?". These quotes are perceived as justifying the majority of group interaction primitives cited in the definition of signaling.

Positioning: Positioning provided initial real-time opportunity for actor-participants to begin formulating and presenting their individual positions in the light of the goals of the nation-states they represented as 'states-as-actors', or in the light of issues, arguments and interpretations of the positions of the others in a multilateral discourse/dialogue. Further opportunity for positioning was provided as X-link Creation Notifications on aspects of Internet Governance. Positioning seeks to effect the transition from some unknown position to a more focused 'position' characterised by an explicit viewpoint on the subject of negotiation. process. Specific illustrations of positioning include the following instances:

Text: *"The Saudi position strongly stress the importance of taking the common values and morals of the different societies into account"*;

Text: *"Although South Africa agrees in principle with the DD from BSA, it should always be noted that us developing countries cannot commit ourselves to enforcing strict copyright laws because we simply do not have the means to do so. Therefore it would be wrong for us to say we want strict copyright laws because our countries would be the first to breach those laws"*.

The formulation of **Proposals** forms the basis of negotiation in **any** negotiation, whether bilateral or multilateral. **Repackaging** may be perceived as providing a repositioning process either following a change of conditions of existing negotiation process or effecting variation in positioning, sometimes following a 'reality check', with home capitals; **Bargaining** may be perceived as providing a further repositioning process**.**

- **Proposals:** Proposals are initially formulated as the basis for explicit positioning through argument, signalling and repositioning. In the study, the following set of proposals, called *e*Proposals, were initially provided by 'Conference Secretariat' as basis for multilateral negotiation, formulated on the basis of some anticipated, most likely consensual positioning.

  (a) *"Governance and standardisation should be regulated within a single organisational framework, bearing in mind the contribution which could be made by relevant regional, financial and economic organisations"*.

  (b) *"Future developments of governance and standardisation should facilitate both the interest of business and technical community, and the private sector and public national and international interests".*

  (c) *"An existing institution within each member country and an existing international institution should be used as a preferable forum for the discussion of the question of governance and standardisation"*.

Proposals are formulated and presented as the basis of negotiation in the context of a multilateral negotiation become the subject as amendments (comments, additions, deletions, reformulations, etc), in virtual interactions to reach a consensus. The following virtual interactions were generated asynchronously as X-Link Creation Notifications as part of multilateral negotiation to reach a consensus:

Specific:

Text: Germany and other member states of EU consider that an effort is called for to reach a balance of interests and responsibilities, so that the international character of the internet is recognized with respect to the relevant jurisdiction around the world. We recommend that the US administration limits its direct regulatory intervention in the internet to only to those relationships which fall clearly under existing contracts between the agencies of the US gov and their contractors and that all other decisions be referred to an appropriate internationally constituted and representative body – **Created by Germany**.

Text: Germany and other members of the EU agree that it will be necessary to take steps to ensure the private sector in Europe and the rest of the world icluding users and industry fully participate at all relevant levels in the process – **Created by Germany.**

Text: Policies should failitate inter-operability within an international, voluntary and consensus-based environment for standards setting. For example, in the area of eCommerce, the market needs a fully interoperable architecture, which must be developed within existing standards-setting institutions or by market forces. In addition to enforcing appropriate

competition laws, governments should ensure that customs, taxation and other relevant governmental agencies accept standards – **Created by WTO.**

Text: The USA absolutely cannot accept this proposal. We do not think that the International community is yet at the stage where an International Orgnisation can be set up. Changes in governance need to evolve over time and not to be thrust upon us. As to this idea of an existing Int'l Org. being a forum for Internet issue, this is quite ludicrous. Which organisation? The existing ones are barely able to cope with their current portfolios. We are being over optimistic, if not naïve and simplistic if we think that they are going to cope with a rapidly change entity like the Internet. For us the best formulation for this time would be a 'Davos' like arrangement – **Created by the USA.**

Text: I(ITU) disagree with this,if we are going to allow the governance and standarisationis up to each single organizational framework, this will creat monopoly power for the stronger relevent oranisations in the regional financial or economical organisations. The country who own the stronger oranisation in the regional sector(financial and or economic)will follow the interest of that single country in governance and standarisation such as ICANN and the USA – **Created by ITU.**

Text: It is essential for international organisations and professional bodies whose interest lies in internet standardization and governance and policy-related aspects, to establish close working relations. For example, the holding of discussions at staff level among various organizations such as the World Intellectual Property Organization (**WIPO**), International Trade Centre(**ITC**), World Trade Organisation (WTO), United Nations Economic Commission for Europe (UNECE) , and United Nations conference On Trade and Development (**UNCTAD**), as well as organisations like the **ITU**, **ICANN**, etc will increase co-operation and information sharing, and reduce or eliminate duplication, inefficiency, and inconsistency in the formulation of regulations – **Created by WTO**.

Text: BSA is deeply concerned especially about the differentiation of copyright legislation between the countries all over the world. Keeping in mind the global nature of the INTERNET, a single legal framework on copyright protection or at least the harmonization of national and international copyright laws would regulate governance and standartisation in the development of INTERNET. BSA relies on its conviction that without strong copyright laws, and the enforcement of those laws throughout the world, the stifling of creativity in the marketplace is a very real threat particularly nowadays when e-commerce is constantly growing – **Created by BSA.**

Repackaging: A process of minimisation of individual differences through argument, signalling and repositioning in relation to the proposals, aiming at concession assessment for a possible optimisation of benefits pertinent to an actor-participant's individual position. The following virtual interactions, generated asynchronously as X-Link Creation Notifications, assist in the process of **repackaging** through a process to minimise differences between different states-as-actors in the multilaral negotiation process. This is illustred in part by the followinh 'quotations':

On proposal (a):

<**sal**> I see regulation of the Internet similar to what is being attempted by UN organisations and they fail.

On proposal (c):

<**teb**> I think global standardisation is ok, as for policing...

<**WTO**> Could you have like int'l organisations or governments come together to set up some standardisation of regulations, or like security organisations could police, or could we have the search engines regulate the content.

Bargaining: A process of counter interventions, again through argument, signalling and repositioning, with the objective of further minimisation of individual differences and a possible further optimisation of benefits pertinent to an actor-participant's individual position. This is illustrated in part by the following 'quotation':

<**jov**> Thus here we will need good compromise. What would you use as counter-argument against the US position to keep ICANN as main regulatory body?

Agreement: Finding solutions that are mutually acceptable to all parties in the multilateral negotiation. Agreement may be referred to as securing a "compromise" **.** This is illustrated in part by the following quotations:

<**jov**> Now - We agree that there is a need for the Internet regulation. Trouble starts - How to regulate it?

<**sal**> It is my view that standardisation is necessary. That will **ensure** access to all once we catch up with the industrialised world. However although we vote them in power, governments are seen as useless. International bodies are seen as panderers to the international power brokers

Closing / Concluding: Closing is marked by a restatement of the transformed ('negotiated') *e*Proposals, as agreed at the compromise stage and heralds a concluding of the negotiation process.

It is important to point out one significant mechanism that was utilised in the multilateral negotiation process, namely, a mechanism aptly termed 'Reality Check', where actor-participants wishing to check their 'positioning' with their Foreign Office in the Home Capital in rare circumstances were able to do so before confirming their individual positioning on specific issues. This was not withstanding the fact that actor-participants in held the role of 'states-as-actors' and were vested with the authority to be automous at an international relations multilateral negotiation, within the context of the goals of their respective nation-states.

Subject : MULTILATERAL NEGOTIATIONS – SUMMARY

<**jov/CHAIR**> we can expect developing countries, institutions, China to go with this. On the other side there will be the USA. Europe will try to cover middle-ground.

1 The multilateral exercise had several important objectives: to practice more on negotiation, in general and to implement

Internet-based negotiations, to analyse a new subject – Internet - related issues, etc.

2 For the maximum benefit, positioning was kept as objective as possible, as close as possible to reality. Limitations are obvious: the fact that actors need to make maximum use of Internet resources, and a bit of imagination in order to make their interventions as realistic and as objective as possible.

3 The committee on the legal basket was responsible for the following proposal.

a) *"Governance and standardisation should be regulated within a single organisational framework, bearing in mind the contribution which could be made by relevant regional, financial and economic organisations"*.

The following tempo of pertinent Negotiation was realised:

- The USA opposed this proposal.
- **Canada** opposed the proposal, but remained open to some compromise regarding "a single organisational framework" - by broadening and diluting this statement.
- **WIPO** supported this proposal.
- BSA was close to Canada - correctly highlighting copyright aspect whenever possible.
- **ICANN** was close to the American position with the possibility of suggesting ICANN as the "single organisational framework"

b) *"Future developments of governance and standardisation should facilitate both the interest of business and technical community, and the private sector and public national and international interests"*.

The following tempo of pertinent Negotiation was realised:

- USA opposed this statement on the basis that there is no need or this paragraph (possible compromise by not specifying what type of interests).
- Canada supporte this paragraph.
- WIPO & BSA had nothing significant against this paragraph.
- ICANN followed the American view.

c) "An existing institution within each member country and an existinginternational institution should be used as a preferable forum for the discussion of the question of governance and standardisation".

The following tempo of pertinent Negotiation was realised:

GENERAL COMMENT: This paragraph accommodated various views. It was a great success of previous negotiations both in terms of compromise and formulation.

- USA tried to exclude specification (especially regarding the

international institution).

- **Other actors** were fine with this formulation.

The final result of the three proposals, after a period of protracted negotiation had only minor additions and deletions , in matters of style rather than content.

c) Findings

The findings arising from the foregoing observations demonstrate that X-Link Creation Notifications are amenable to purposeful design to generate, in asynchronous mode, transcript data that can be put to logical use in conjunction with the transcript data generated in the associated CSCW sessions. Application of X-Creation Notifications to multilateral negotiation with respect to Internet Governance as a domain of discourse evolved into identification of multilateral negotiation on the electronic medium as comprising a 9-stage task:

TABLE 5-11: Multilateral Negotiation as a 9-Stage Task

Stage	Process
Stage I	Preparation
Stage II	Argument
Stage III	Signalling
State IV	Positioning
Stage V	Proposals
Stage VI	Repackaging
Stage VII	Bargaining
Stage VIII	Agreement
State IX	Closing / Concluding

The modelling of a multilateral negotiation framework helps to demonstrate a confirmation, from the standpoint of X-Link creation notifications, that states-as-actors deliberations in a virtual international relations conference is able to implement real-world multilateral negotiation in virtual space.

The pattern that has been discerned above is sequential in nature. As such, it can be prescribed as a sequential procedural format in any multilateral negotiation meeting. It has not been possible to investigate, empirically, the circumstances which are amenable to the 9-stage process and the circumstances in which the 9-stage process will not work. This is left as outlook for future action research

CHAPTER VI

A THEORETICAL MODEL FOR STATES-AS-ACTORS BEHAVIOUR: A MULTI-AGENT Z SPECIFICATION FRAMEWORK

Introduction

This chapter represents the culmination of progression along the roadmap from initial observations of empirical transcript data, through to a derivation of a 'tentative' theory of states-as-actors behaviour and a generalisation into a multi-agent Z specification framework as the research outcome.

6.1 A 'Tentative' Theory of States-as-Actors Behaviour

In the last chapter, we saw an empirical demonstration that virtual interactions in distributed collaboration can reasonably be realised as an alternative to a conventional international relations conference, and that group behaviours, in general, and states-as-actors behaviour, in particular, are a reality.

Empirical findings in §5.1 of Chapter V demonstrated that the relative number of occurrences of states-as-actors behaviour modes described as 'active and generic' (coded 'ActOBJ'), 'active and goal-guided' (coded 'ActGOAL'), and 'active, goal-guided and self-motivated' (coded 'ActAUTO') are finite and non-zero. This demonstrates that actor-participant behaviour modes over a set of CSCW sessions are realisable as states-as-actors behaviour modes which are, therefore, demonstrated to be **existent** in a CSCW session in the international relations context. The three 'active' states-as-actors behaviour modes may be perceived as specific manifestations of individually-attributed interventions in a CSCW session in the international relations context. In addition to these three 'active' behaviour modes, there exists a fourth states-as-actors behaviour mode, described as 'passive', which can span a whole duration of a CSCW session in an international relations context. Specifically, the results show that 'states-as-actors' have certain specific behaviours which manifest as components of a multi-dimensional behaviour and are characterised by the following distinct behaviour modes:

- **Passive (**coded as ActENT), because the state of behaviour is reflected by a tendency, by an actor-participant (or a state-as-actor), not to make a contribution but to remain in a state of inactivity**;**
- **Active/Interactive** (coded as ActOBJ), because the state of behaviour is reflected by a tendency, by an actor-participant (or a state-as-actor), to pursue an **action** (or set of actions), or to interact with others, in a mode that is *generic* in nature**;**
- **Goal-oriented** (coded as ActGOAL), which describes that mode of states-as-actors behaviour in which an actor-participant (or a state-as-actor) is characterised by *proactiveness* or ability to behave in a goal-oriented mode, namely, by pursuing an action or set of actions that is guided by a goal or set of **goals**; and

- **Autonomous (**coded as ActAUTO), which describes that mode of states-as-actors behaviour in which an actor-participant (or a state-as-actor) is characterised by **autonomy** or ability to function without the need for external intervention, namely, by pursuing an action or set of actions that are guided by *self-motivation* arising out of state interests.

Put in another way, the findings demonstrate that for a given actor-participant in the international relations context, states-as-actors behaviour modes are invoked to different levels of 'presence, 'dominance', or 'predominance' or 'manifestation' during a CSCW session of an international relations conference. In general, empirical evidence from the case studies demonstrates that irrespective of the general heterogeneity, or diversity, of the bioPersonae of the actor-participants in a CSCW session, an actor-participant may not act at all, may act in a manner that is not necessarily guided by a goal (or sets of goals), may act in a manner that is guided by a goal (or sets of goals), or may exercise a state of self-motivation or autonomy to act to influence other actors' behaviours. In the context of this study, these findings can be perceived to form the basis of a 'tentative theory' of states-as-actors behaviour. In this study, we started off with specific *observations*, manifesting as transcripts of textual data based on the three cases Virtual Embassy, Terrorism, and Internet Governance; this was followed by *analysis* of the observed data based a coding schema; *empirical findings* from analysis of the observed data showed the existence, in particular, of *states-as-actors behaviour*, which is characterised by four states-as-actors behaviour modes coded ActENT ('passive'), actOBJ ('active'), actGOAL ('goal-oriented') and actAUTO ('autonomous'). These findings cut across the three international relations cases, which deployed a total of eight CSCW sessions. This is consistent with developing a 'tentative theory' which, so far can be said to be limited within the confines of the three international relations cases. and developing a broader generalisation, theory or framework as the **research outcome**. An imminent question that arises for analysis is, therefore, Can we derive a comprehensive **model** or **framework, as the research outcome,** draw a conclusion in terms of a formal system specification framework representing states-as-actors behaviour stipulated in the 'tentative theory'. The search for such a model or framework is consistent with **inductive reasoning** and forms the basis of this chapter. It is consistent with the recognition of the process of generalising from the empirical statement to the theoretical statement in the manner stated by Klein and Myers (1999), which recognises the inductive approach and the proviso that *" [it is] important that theoretical abstractions and generalisation should be carefully related to the case study details as they were experienced and/or collected by the researcher"* [KLEIN and MYERS 1999]. This is also consistent with the view held by some investigators that the development of a theoretically informed interpretation is a most powerful way to bring reality to light [BLUMER 1969; DIESING 1971; GLASER 1978]. Building theory in the context of this study implies **observing** specific data, **analysing** and **interpreting** observed data, **conceptualising** data and defining **relationships** between the concepts, to give, first, a 'tentative' picture of reality which, in this study, is represented by a 'tentative' theory of states-as-actors behaviour, then a generalisation of the 'tentative' theory into a formal specification framework. The theoretical formulation that results not only can be used to explain that reality but provides a framework for future research outlook. Building theory has implications for a most systematic way of building, synthesising, and integrating knowledge which, in this study, has its provenance in empirical findings of the study.

6.2 Introducing a Formal Specification Language and the Agent Metaphor to Model States-As-Actors Behaviour

Introduction

In Chapter I, we noted that nation-states in the international relations context must be represented by human actors known as 'states-as-actors'. It is upon states-as-actors that the role of nation-states depend with respect to:

- authoritatively speaking and acting on behalft of a nation-state;
- making decisions on behalf of a nation-sate;
- negotiating on behalf of a nation-state; or
- acting as an autonomous entity in the exercise of influence in the international relations sytem in ways that cannot be predicted entirely by reference to other actors or authorities [HOPKINS and MANSBACH 1973].

The driving force behind interactions in an international relations system is 'state interest'. States-as-actors behaviour calls for an understanding of the multilateral environment in terms of 'behaviour of states' as organised human beings – human actors – upon whose **actions** the beaviour credited to nation-states rests.

The behaviour of states in the international relations context is the result of actions and reactions or interactions that take place between and among human actors. In their specific role as 'states-as-actors' in international relations conferences, a human actor is perceived to display, implicitly or explicitly, extrinsically or intrinsically, at any given instant during an international relations conference session, exactly one of the following finite number of behaviours: remain silent, with a tendency not to make a contribution; or become active and choose to pursue an action or set of actions *in a generic manner;* or become active and choose to pursue an action or set of actions in a manner that is explicitly or implicity guided by, a goal or set of goals; or become active goal-oriented and self-motivated out of 'state interests' to act in an autonomous manner.

Moreover, in Chapter II, the review of available literature revealed that in the field of agents and agent-based systems, there is a considerable degree of freedom which is availed by the agent metaphor, to deployment in diverse areas. This makes the agent concept amenable to application in many situations for different purposes.

In this chapter, we propose to build a **theoretical model** of states-as-actors behaviour as a multi-agent system using the Z formal specification language. The rationale for the choice of Z as a specification language and the deployment of 'live human actors' as an agent metaphor are described below.

First, the Choice of Z Specification Language …

In this chapter we set ourselves the task to derive a comprehensive model or framework, specifically, a formal system specification framework representing states-as-actors behaviour stipulated in the 'tentative theory'. The starting point is an articulation of the rationale for the the choice of language made for the specification of this framework, namely, the specification language Z. The choice of Z relies on the observation that Z is a well-established specification language that has a distinguishing mechanism of modularisation. Z's

distinguishing mechanism of modularisation is based on refinement calculi and as such is well placed for defining the four states-as-actors behaviours in an incremental manner. Z is a well-established formal specification language that has a distinguishing mechanism of modularisation, namely, the Z schema. The Z standards panel hails Z for its adequacy, completeness and isomorphism. The Z language is increasingly being used and studied by a large array of researchers and practitioners in formal specification language, both in industry and academia. giving rise to numerous books [BOWEN 1996; HAYES 1993; BOWEN, FETT and HICHEY 1998], and articles [BOWEN and HALL 1994; SPIVEY 1998; BOWEN, HINCHEY and TILL 1997], as a strong elegant means of formal specification. Furthermore, Z is gaining increasing acceptance as a tool within the artificial intelligence (AI) community [LUCK and D'INVERNO 1995; GOODWIN 1995; CRAIG 1991; MILNES 1992] and is therefore appropriate in terms of standards and dissemination capabilities.

The Z Specification Language …

The next point is an articulation of the capabilities of the Z language. The formal specification language, Z, is based on *typed set theory* and *first order predicate calculus*. Z extends the use its inherent typed set theory and first order predicate calculus by allowing an additional mathematical type known as the *Z schema type*. Z schemas have two parts:

- The upper **declarative part**, which declares *variables* and their *types*; and
- The lower **predicate part**, which *relates and constrains these variables*.

The type of any schema can be considered as the Cartesian product of the types of each of its variables, without any notion of order, but constrained by the schema's predicates. The facilities offered within the Z language include the following, which may be referred to as the **Z Toolkit**:

- **Basic Data Types**, including sets (including Natural Numbers), relations, functions, and sequences, which essentially form the essence of the characterisation of the variables, namely, *declarations in the declarative part of the Z Schema*;
- **Operations** on the basic data types, which form the paraphernaliae by *means which variables are related and constrained in the predicate part of the Z schema*.

Modularity is facilitated in Z by allowing schemas to be included within other schemas. We can select a state variable, *var*, of a schema by writing *schema.var*. The essential Z building blocks are basic and can be found in any books on introduction to Z. They nevertheless serve as an essential preamble to the explication of current understanding on agents and agent-based systems, which are central to the modelling of actor-participant 'states-as-actors' behaviour in CSCW sessions in the international relations context.

Then the Agent Concept

Agents in research literature convey a concept that is varied and various in scope. Agents thus include software entities, computer programs, reasoning processes and creatures, to mention a few. Moreover, as we have seen in Chapter II, there is a considerable degree of freedom which is availed by the agent metaphor, to deployment in diverse areas. In this study, we identify and deploy as a new agent metaphor 'live human actors', described in this study as actor-participants in general, and states-as-actors, in particular. Specifically, in this study, agents will be taken to be inclusive of "*live human actors interacting on the electronic communication medium*".

And the Multi-Agent System …

In the literature review, agents are proposed as *situated* and *embodied* problem-solvers, namely, it is postulated that an agent **receives** [specific] input from the environment [eg **action** from another agent in the environment or **reaction** from another agent in the environment] through some mechanism – an **event** or **operation** - and **acts** so as to affect that environment in some way [eg cause another agent to interact]. In this study, we postulate as follows:

> Agents are proposed as *situated* and *embedded*/*embodied* in an *environment.* In the environment, an agent is postulated as having ability, capability or potential to *interact* [with another agent or other agents] in a *temporal continuum*, during which it has ability, capability or potential to display a finite spectrum of *mutually-exclusive* distinct/discrete behaviours which can be described as follows:
>
> - **Passive 'agency'**, assuming an agency form that remains passive, does not interact with the environment;
> - **Interactive agency**, assuming a *social ability* or ability to **interact** with the environment, possibly by pursuing an action or set of actions that are generic in nature;
> - **Goal-oriented agency**, assuming *proactiveness* or ability to **interact** in a goal-oriented mode, by pursuing an action or set of actions that are guided by a goal or set of goals;
> - **Autonomous agency**, assuming *autonomy* or ability to function without the need for external intervention, by pursuing an action or set of actions that are guided by a goal or set of goals (explicit or implicit) and self-motivation (intrinsic/tacit).

Some Initial Assumptions …

To facilitate the formulation of a multiagent formal Z specification framework, first, we postulate the existence of an abstract 'space' called *environment*, which is 'occupied', or 'populated' by a finite set of 'things' generically labelled 'agents', but individually categorised as *entities, objects, agents* and *autonomous agents* (EOAAa), which are characterised by a set of 'properties' labelled *attributes, actions, goals* and *motivations* or *self-motivation* (AAGSm), respectively. An agent is proposed as *situated* and *embedded* or *embodied* in an *environment* and is deemed, individually as entity, object, agent or autonomous agent, as **receiving input from its environment** through some mechanism – an **event** or **operation** - and **acting so as to affect that environment** *in some way*. through the mechanism of **generation or origination** of same action or interaction by another agent or some other **event** or **operation**. 'Acting so as to affect that environment' involves the generation of an action, reaction or interaction in response to some initial action, or interaction. The result is envisaged to be a Z formal specification framework with insight into virtual interactions represented as states-as-actors behaviour and representing a broader generalisation, theory or framework as the **research outcome**. FIGURE 6-1 depicts, in a schematic manner, a taxonomy and an abstraction of 'states-as-actors' behaviour in a CSCW session.

And the Z Specification Language Again for the Multi-Agent Framework …

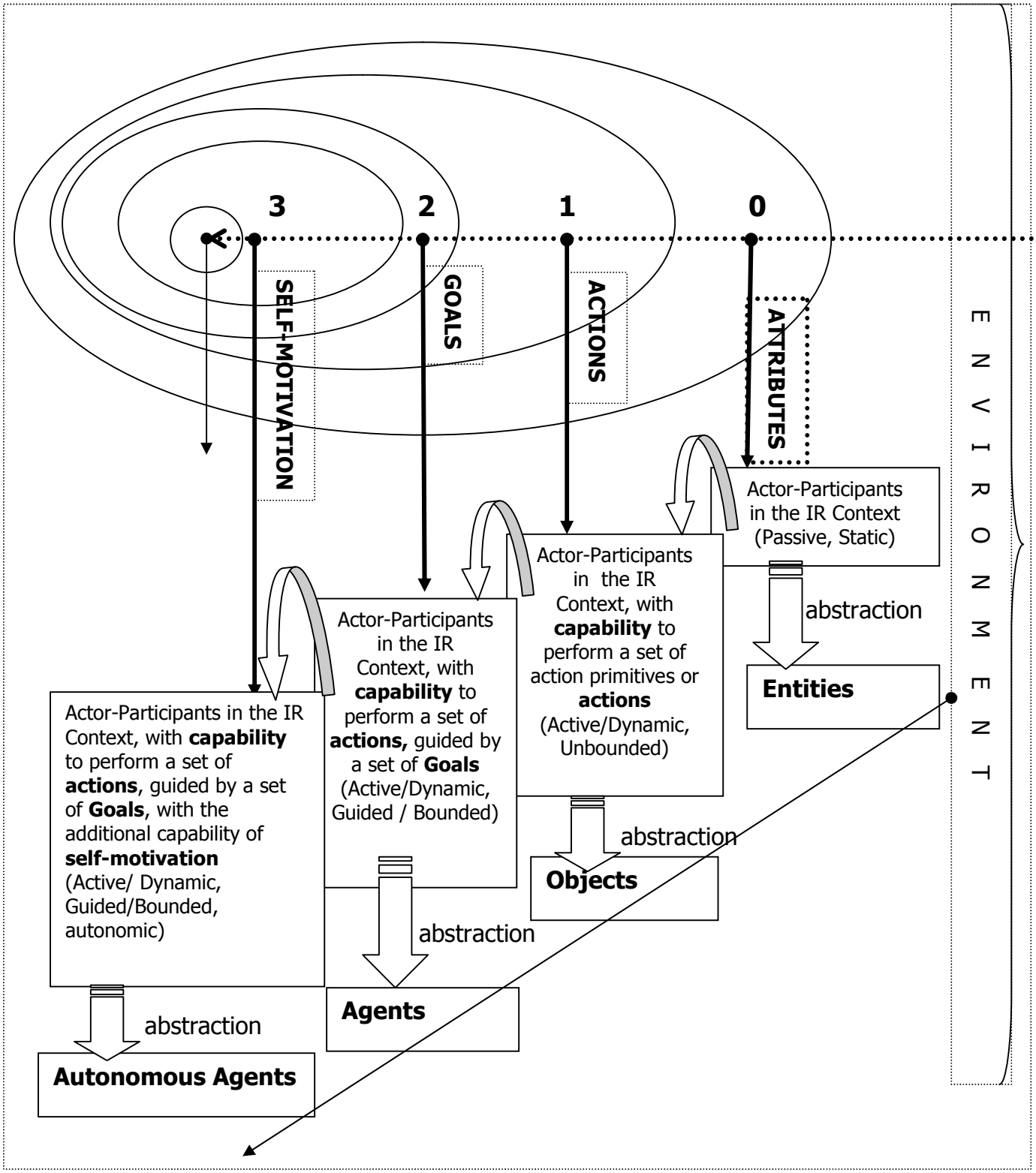
It is proposed to deploy the Z formal specification language to build a foundational framework that seeks to model the physical reality of 'states-as-actors' behaviour of actor-participants into the theoretical abstraction of a formal system Z specification. The result should be a demonstrable agent architecture that should be amenable to a wider applicability. The choice of the Z specification formalism is motivated mainly by the ease-of-use of the elegant schema methodology of the Z language, which is similar to the object-oriented encapsulation methodology. In the process of developing the Z specification framework, attempts will be made, to the extent possible, to relate the abstract Z specification formalism to the physical reality of 'states-as-actors' behaviour in a CSCW session in an international relations conference, and the postulated empirical realisation of virtual 'states-as-actors'behaviour in the international relations context.

6.3 An Actor-Participant in a Session Can Opt to Remain Passive

A human actor (delegate or actor-participant) in the international relations context may generally be perceived as a relatively *autonomous* unit that exercises influence on the behaviour of other actors. A human actor may, however, choose to act in a manner that spans a spectrum of observable behaviour extending from the simple and primitive, where remaining passive is the core behaviour, to the complex and autonomous, where exercise of influence on the behaviour of other actors is the dominant behaviour. A human actor (or delegate) may accordingly not act at all, may act in a manner that is not necessarily guided by any goal, may act in a manner that is guided by a goal (or sets of goals), or may exercise a state of self-motivation to act to influence other actors' behaviour.

In this section we focus on the simplest and most primitive behaviour type in an interactive session, that in which the human actor chooses to remain silent, or passive, not to act by way of intervention, by virtue of an innate tendency, or compelled by context, preserving a behaviour type that is more akin to an inanimate 'thing' than to a live human actor. This behaviour may be perceived as the most elemental or most primitive or as the trivial case of agent behaviour in an interactive session. Though trivial in character, this agent behaviour is important to consider, as it represents one of the behaviour types which a human actor will, from time to time assume, revert to during a collaborative session. Below, we assign this behaviour type some formal specification in Z.

FIGURE 6-1: The Agent-Based System Concept in States-as-Actors Behaviour – A Taxonomy and an Abstraction of Physical Reality



(a) Z Specification Schema Abstraction: Attributes, Entities

Attributes

The terminology **attribute** will be used to denote a *perceivable or observable feature or characteristic*. In Z, the set of all attributes, or the attribute type, is defined as follows:

[Attribute]

An attribute represents an observable PRIMITIVE of the *universum* of discourse. A primitive in the context of Z implies having a most elemental property in a given hierarchy of properties. This primitive in Z is distinct from an interaction primitive in virtual interactions, which are identified as *observed specific elemental behaviours exercised by actor-participants in a CSCW session.*

Entities

An **entity** is that which is characterised by *a set* or *collection of attributes.* Generally, it will be taken to be the norm that *entities will be described as distinct by virtue of being characterised by distinct attibutes*.

The Entity Schema, *Entity*

In Z, an entity is defined in terms of the Z specification schema, namely, the entity schema. The **entity schema**, denoted ***Entity***, will be specified as that which declares an entity as *a set of attributes* and predicates that *the said set of attributes is non-empty*.

Entity

$attributes : \mathbb{P}\ Attribute$

$attribute \neq \varnothing$

Attributes and Entities: Physical Reality Preamble and Empirical Interpretation

Attributes

Attributes in the **physical reality** of an international relations context will be used to refer to *characteristics attributed to the state or nation-state and to the human actors upon whose actions on behalf of the state the behaviour credited to states ultimately rests*. The state or nation-state is the dominant political entity of the contemporary world and as such comprises the primary unit, or the main actor, in international relations. It has a legal personality and

therefore possesses certain rights and duties in international law. States must possess the following qualifications or *attributes*: a permanent population; a defined territory; and a government capable of effective control over its territory and of conducting international relations with other states. The human actors upon whose interventions at international relations meetings the behaviour credited to states ultimately rests must equally possess certain *attributes* which enable them to act on behalf of the states or nation-states. These attributes will be described generically in the physical reality of the international relations context as Job Title, Qualification and Experience. An instantiation of the ordered triplet (Job Title, Qualification, Experience) would, for example, correspond to the ordered triplet (Chief Diplomat, Diplomacy and International Relations Degree, Minimum of 10 Years as Diplomat).

Attributes in the empirical international relations context in this study comprise the same descriptions as those of the human actors representing states (or nation-states) in the normal context of international relations discourses, dialogues, meetings or conferences. All candidate actor-participants were required to submit their *individual* **bioPersonae** in accordance with the following: Name; Job Title, Qualification, Experience; Organisational affiliation, Country of affliliation; and Language of formal communication, against the following as partial criterion references for decision-making for selection: Evidence of commitment of time and effort; Must be an expert, policy maker, planner or international civil servant; Must have minimum of university degree level education; and Must have minimum of three years working experience of international negotiation and/or consensus building in the international relations context. The rest of the criterion-referenced requirements for decision-making for selection were the following **personCompetencies:** ability to negotiate in a multilateral situation; ability to make decisions on behalf of the state that a delegate or actor-participant may be authorised to represent; ability to make proposals; ability to be perceptive. The **bioPersonae** of individual delegates or actor participants are considered to be *attributes of a public domain nature, as these are generally displayed as part of delegate or actor-participant listing in conference documentation*. Individual **personCompetencies**, on the other hand, remain tacit, intrinsic and can only be inferred when applied at decision-making points, or generally, when **interventions** are made during a session. It is well to note that bioPersonae will remain unchanged irrespective of events (interventions) that take place during a session. Similarly, individual personCompetencies are a characteristic of an actor-participant and remain a time-invariant. Instantations of personCompetencies are observable at various decision-making points exercised in relation to different events in the environment.

Entities

Entities in the physical reality of an international relations context comprise *human actors described by a specific set of bioPersonae and a specific set of personCompetencies*. Entities in the physical reality of international relations therefore refer to the human actors upon whose individually-attributed interventions on behalf of the state - actions - the behaviour credited to states ultimately rests

The state or nation-state is the dominant political entity of the contemporary world and as such comprises the primary unit, or the main actor, in international relations. The human actors acting on behalf of the states they represent – entities in abstract Z terminology - are *delegated, by the governments of the states, or vested with the authotity, to act on behalf of*

the states. A meeting in an international relations context can be considered to be a sequence of tasks or activities performed by two (bilateral) or more (multilateral) human actors - called delegates in the international relations terminology - on behalf of the states they represent or, sometimes, making observations or interventions in their own individual right. The formal process of accreditation carried out at the beginning of any meeting in the international relations context formalises the recognition of the human actors vested with the authority to represent a given state at the meeting. The composition of delegations is normally provided for in the Rules of Procedure. In multi-delegate state representations, it is generally the case for the convenor-secretariat to recognise the head of the delegation, representatives and alternate representatives, and as many advisers, experts, and specialists, as are required.

Entities in the empirical international relations context in this study are represented by actor-participants. The essence of the research study's focus is on an 'international relations *virtual* workgroup' as the 'unit of analysis' on the electronic communication medium. This is designed to comprise *a set of similarly skilled people working conjointly on a task (or series of tasks) of some complexity, in the international relations context, over some designated, albeit limited, period of time*. The bioPersonae and the personCapabilities of actor-participants remain similar to those of delegates in the physical reality of conventional international relations conferences.

As entities, delegates (in the physical reality of a coventional international relations conference), and actor-participants (in the empirical reality of the international relations context on the electronic communications medium) will, during specific slots of time in the course of a discussion session (face-to-face or virtual) remain quiet, non-contributing, and passive. This is particularly true during the early phases of a session, when a delegate or actor- participant will, in general, remain non-interventionist in behaviour, prior to intervening for the first time during a session. It is conceivable during this period of inactivity to specify a delegate or actor-participant fully solely by the actor-participant's own set of inherent bioPersonae **attributes.**. In the beginning, in particular, actor-partcipants may be perceived simply as a set of human actors characterised by **attributes**, **no actions**. In this phase, the personCompetencies remain intrinsic as none can be inferred by way of an observable intervention in the environment.

(b) Z Specification Schema Abstraction: Environment

In Z, **Environment** will be defined as the *set of attributes that describe all the features (within that environment) that are currently True*. A new set-theoretic type, *Env*, may be defined as *a non-empty [power] set of attributes*

$$\boldsymbol{Env} == \mathbb{P}_1 \, Attribute$$

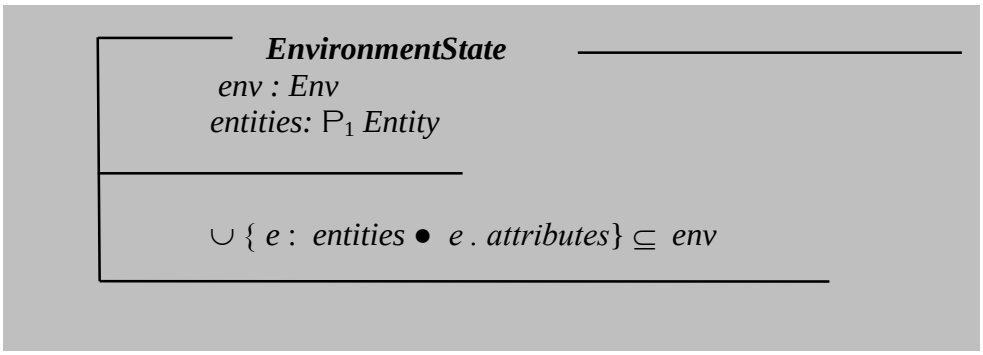
Environment State Schema, *EnvironmentState*

To formalise the environment concept in Z, it is necessary to define a schema, which may be aptly named the ***EnvironmentState.*** First, however, it is necessary to introduce the concept of

environment scope. Environment **scope**, by definition, will be used to specify all the features that are included and all the features that are not included in the definition of environment. Environment scope in this case comprises all the features within the environment that are currently True and all the features that are not currently True. The ***EnvironmentState*** schema formalises the fact that an environment will include *all the entities within its scope*. The ***EnvironmentState*** schema will therefore be characterised by a signature (declarative part) which does the following:

- Introduces the variables *env* and *entities*; and
- declares that the variable *env* is of the set-theoretic type *Env;* and assigns the variable *entities* a non-empty set of the set-theoretic type *Entity*.

The predicate part of the*EnvironmentState* schema states that the environment will consist of all the entities within its scope.



The *EnvironmentState* schema is predicated as the generalised union of a set of entities within the environment's scope ie relating all features included and all features not included (in the definition of Environment).

Environment: Physical Reality and Empirical Interpretation

International relations comprise *all interactions between state-based actors, across state boundaries* [EVANS and NEWNHAM 1998] *or geopolitical borders*. International relations conferences provide an example of a mechanism in which these interactions can be effected in a multilateral mode. International relations contexts, such as **bilateral** or **multilateral negotiations**, are characterised, in the main, by the convening and conducting of a conference, which is essentially a group meeting traditionally involving face-to-face interactions, or interventions, on consultations, negotiations or debate over a specific subject, themes or issues of mutual importance to the participating parties or entities. *A meeting in an international relations context will always have an agreed, designated, an ascribed, or prescribed **broad goal** or **purpose***. Although meeting processes cannot be defined or generalised [MORRISON and VOGEL 1991], they can be described in terms of task taxonomies by defining a set of atomic or primitive generic tasks that take place in group meetings

In this study, participants are described as actor-participants who interact in the international relations context under the auspices of a computer-supported co-operative work (CSCW) environment. The CSCW environment in this case comprises distributed collaboration over the electronic communication medium. Specifically, actor-participants are designed, in the

main, to collaborate in real-time with each other from locations that are geographically dispersed worldwide and widely separated by time zones. The environment under auspices which **virtual interactions** takes place in real time comprises an electronic communications medium, synonymous with what we have termed *eSocialSpace*. An *eS*ocialSpace will be used to denote the set (or totality) of all **entities** and **interventions** or **interactions** (actions, reactions) - **structures** and **processe**s - that describe all the features within its scope. This includes the set of all behaviour primitives operating in the electronic communications medium, in which actor-participants operate (or 'are situated'), namely, information exchange interaction (IXI) primitives, interpersonal group level interaction (IGI) primitives and knowledge exchange interaction (KXI) primitives, together with any postulated or derived phenomena of interest, such as the 'states-as-actors' behaviour modes. It is to be asserted that the set of all entities and interventions - structures and processes – that characterise the environment in the electronic communications medium, will include the collectivity of bioPersonae, which can be described as fixed during a CSCW session, and a collectivity of personCompetencies, which may be instantiated from time to time and inferred from fragments of individually-attributed interventions generated by actor-participants during a CSCW session.

It is apparent that instead of delegates in the physical environment of a conventional international relations conference, which relies on a face-to-face, round-the-table interventions during a conventional conference, actor-participants in the empirical setting of this study are designed to rely on electronic means of *communication, collaboration* and *co-operative work* for their interventions or interactions (actions and reactions).

6.4 An Actor-Participant in a Session Can Opt to be Active but Not Goal-Oriented

Beyond the elemental behaviour type discussed in § 6.3, we have the case where a human actor, instead or remaining passive, becomes **active,** namely, displays ability to act or to carry out an action, by way of making an intervention, *albeit* without an observable intrinsic goal. This description represents behaviour type of a human actor chooses to remain not goal-oriented, by default or otherwise. Below, we assign this behaviour type a formal specification in Z.

(a) Z Specification Schema Abstraction: Objects, Actions

(i) Introducing Objects

At the basic level, an entity may be perceived as having the *capacity to interact with its environment*. This transforms an entity from a level in which it is perceived as being passive or inactive to a level in which it can be identified with *action*. An entity with the capacity (or ability) to interact with its environment gives rise to a new entity type, called an **object**.

In abstract terms, an **object** will be used to denote an entity *with the capacity (or ability) to interact with its environment.*

(ii) Action and Action Type

In order to provide a formal specification for an object, there is need to introduce a new set-theoretic primitive, called **action**. An action may be defined as *a discrete event that can change the state of the environment when performed.* This is because actions can change environments by *adding* or *removing* attributes or *changing values of attributes*. In Z, the *set of all actions*, or the *action type*, is defined as follows:

[Action]

A new set-theoretic type, *Actions*, may be defined to be a non-empty [power] set of actions:

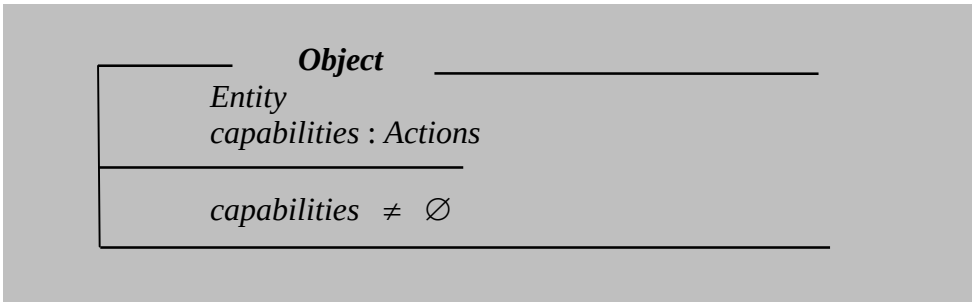
$$\textbf{\textit{Actions}} == \mathbb{P}_1\ Action$$

(iii) Objects, Actions, Capabilities and Object Schema (*Object*)

In Z, an **object** will be used to denote *an entity to which the notion of a set of basic capabilities (*called, or manifesting as, *actions) may be ascribed*. The set of basic capabilities comprise the ability or capacity of an object to interact with the environment in which it is 'situated', in terms of its *actions*

The object schema, denoted ***Object***, formalises the definition of an object and is characterised by a signature (declarative part) which comprises, as schema inclusion, the ***Entity*** schema and refines it by declaring the *capabilities* as a set-theoretic variable of type *Actions*. The effect of schema inclusion of the ***Entity*** schema in the signature of ***Object*** schema is to view an object as comprising, in addition to a set of actions, a *set of attributes*.

The predicate part of ***Object*** specifies the constraint that the set capabilities is non-empty. The ***Object*** schema will thus *comprise a set of actions, and a set of attributes* which are 'encapsulated' in the *Entity* schema.



Object attributes include **configuration**, which include references to the body of the object. The *attributes of an object are accessible from the environment* (namely, can be perceived, are observable, extrinsic or are explicit), while the *capabilities of an object remain latent*,

tacit, intrinsic or implicit and are rendered manifest only when an object performs an action (or series of actions) in the environment.

Object: **Physical Reality and Empirical Interpretation**

In the physical reality of an international relations conference, an **object** (in Z formalism) is deemed *to model human actors, called delegates, under the aegis of those whose voices or actions the behaviour credited to states is attributed.* In the empirical realisation of the international relations context in virtual space (or, specifically *e*SocialSpace) – as contained in this study - an **object** (in Z formalism) is deemed to *model human actors, called actor-participants, whose actions mirror the behaviour modes generally attributed to delegates at international relations sessions*. In Z, an object is said to have ability or capability to exercise **actions**. In the physical reality of **delegates in an international relations session**, or the empirical realisation of actor-participants in an international relations context on the electronic communications medium, delegates or actor-participants as objects are said to *have ability to generate individually-attributed **interventions** (actions and reactions) or, equivalently, **interactions,** in the environment*. In this study, actor-participant attributes are pre-defined in terms of 'bioPersonae' and 'personCompetencies'. BioPersonae attributes remain time-invariant in the course of an international relations session; personalCompetencies, however, remain tacit but become observable or explicit by virtue of manifestation as **interventions** (actions and reactions). Evidence of **actor-participant behaviour** in the international relations context *manifest as interventions (actions and reactions) or, equivalently, interactions that are undertaken by delegates or actor-participants in the physical environment or in eSocialSpace, respectively*.

(iv) **Object Action Schema, *ObjectAction***

A basic premise that needs to be postulated at this point is the requirement of a simple mechanism that relates *environment* to *actions*. An **object** will be deemed to ***receive input from its environment*** *through some mechanism, and will* ***act*** *(with* ***action*** *manifesting as* ***interventions*** *or* ***interactions) so as to affect that environment*** *in some way*. The object action schema, denoted ***ObjectAction***, will be used to *refine the object schema,* ***Object,*** *taking cognisance of the need to relate environment to actions*. Specifically, ***ObjectAction***, will *consist of a* **signature** *which comprises, as* **schema inclusion**, *the* ***Object*** *schema, which formalises* ***Object****, and* **declares a variable**, ***objectActf****, to which it assigns the set theoretic type* total function *represented as a mapping from the environment to a set of object actions*. The total function ***objectActf*** may be termed the *action-selection function,* and determines which set of actions are performed next in the environment. That is, given an environment, the action-selection function returns a [possibly empty] set of actions. Note that the possibility that the action-selection function can return a possibly empty set of actions allows for a seamless transformation from an **object** as ' *an entity comprising a set of actions*' to an **entity** as simply '*a set of attributes*'.

The predicate part of the *ObjectAction* schema constrains the next actions to be taken by the object to be within the object's capabilities.

The information included in the ***Object*** and ***ObjectAction*** definitions, namely, the variables *capabilities* and *objectActf,* relate to *the* **intrinsic object properties** of the object and not to

the **object stat**e which is only defined once an obejct is placed or is 'situated' in an environment.

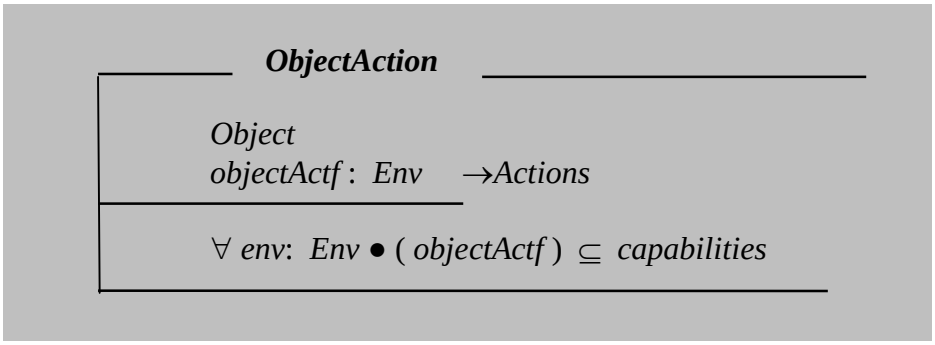


FIGURE 6-2 depicts a symbolic relationship between the action-selection function *objectActf* (Z abstraction) and *delegate/actor-participant actions* (physical reality/empirical realisation), for the purpose of drawing insight into the Z specification model. When, for example, the environment is described by an epithet such as 'tense' or 'consensual', these epithets become **attributes** that are True at the given instant. The said description is therefore a manifestation of the result of **actions** implemented in the environment. *The action-selection function models that which prompts an actor to assess the 'state of the environment' (as interpreted from the transcripts generated or being generated by other actors) with the intention of making a decision on a selection of next actions.* In the formulation of the object action schema, ***ObjectAction,*** it is observable that *Actions* in Z are mapped onto a non-empty collectivity of interactions represented by the totality of the information exchange interaction (IXI) primitives, the interpersonal group level interaction (IGI) primitives and the knowledge exchange interaction(KXI) primitives.

(v) Object State Schema, *ObjectState*

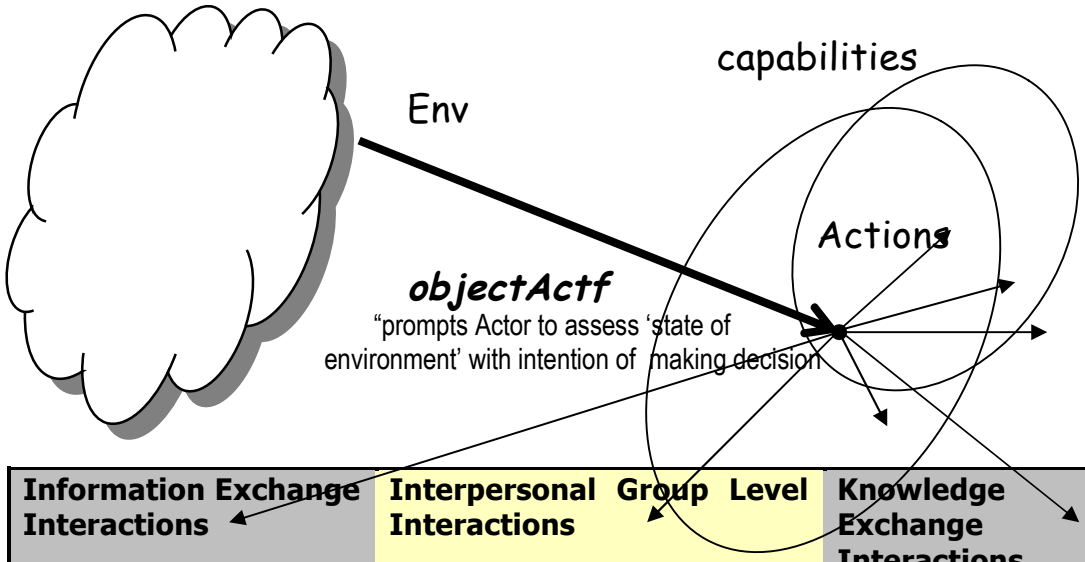
The object state schema, denoted ***ObjectState****, formalises the state of an object situated in an environment*. An object must be situated in an environment for the object state to be specified. The environment provides a 'substratum' for a determination, by an action-selection function, of those actions (within the object's capabilities) that the object is to perform next. Accordingly the ***ObjectState*** schema is defined to include the following schema in its declarative part:

- ***EnvironmentState*** schema, which formalises the actual or physical context within which an object will perform its next action; and
- ***ObjectAction*** schema, which relates to the intrinsic object properties represented by the variables *capabilities* and *objectActf* .

A variable denoted ***nextAction*** defines and specifies the next actions that the object will perform. It is redundant since it is recoverable in exactly the same way in which it is specified by applying the ***objectActf*** function from the ***ObjectAction*** schema to the current environment, *env,* and is a subset of the capabilities of the object.

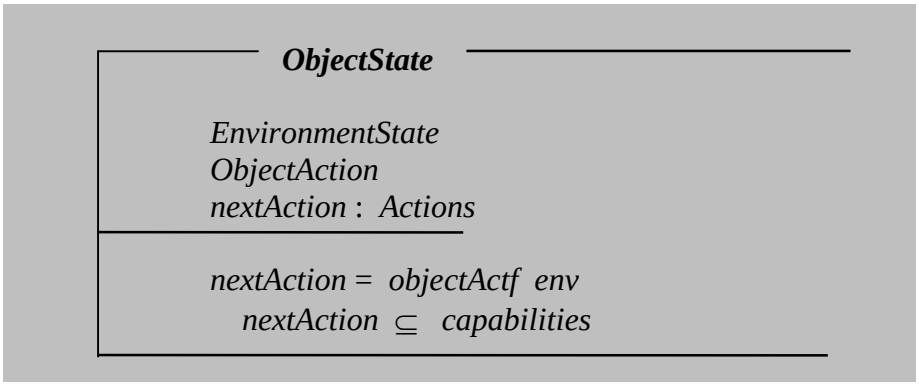
The predicate part of ***ObjectAction*** schema shows how ***nextAction*** is computed (or selected) by application of the action-selection function, ***objectActf,*** to the environment. Different states will give different actions as determined by application of the action-selection function**.**

FIGURE 6-2: Relating **Action Selection Function**, *ObjectActf*, to **Actions** of Delegates or Actor-Participants



Information Exchange Interactions	**Interpersonal Group Level Interactions**	**Knowledge Exchange Interactions**
Information Providing	Information Providing	Knowledge Generation
Information Seeking	Information Seeking	Knowledge Sharing
	Requesting Action/ Response	Knowledge Application
Requesting Action/ Response	Requesting Permission	
Requesting Permission	Confirming Action/Response	
Confirming Action/Response	Confirming Permission	
Confirming Permission	Seeking Consensus	
Seeking Consensus	Confirming Consensus	
Confirming Consensus	Confirming Information	
Confirming Information	----------	
	Proposing/Initiating	
	Guiding/Sequencing	
	Instantiating/Substantiating	
	Building	
	Clarifying	
	Seeking Information	
	Seeking Alternative Solution	
	Supporting/Agreeing	
	Disagreeing/Opposing	
	Testing/Evaluating	
	Summarising/Recapitulating	

	Attacking/Defending	
	Blocking/Halting	
	Diverting	
	Seeking Recognition / Positioning	
	Withdrawing / Seeking Withdrawal	
	Point-Scoring	
	Over-contributing	
	Trivialising	



(vi) Object Operation and Change in Object State Schema, Δ*ObjectState*

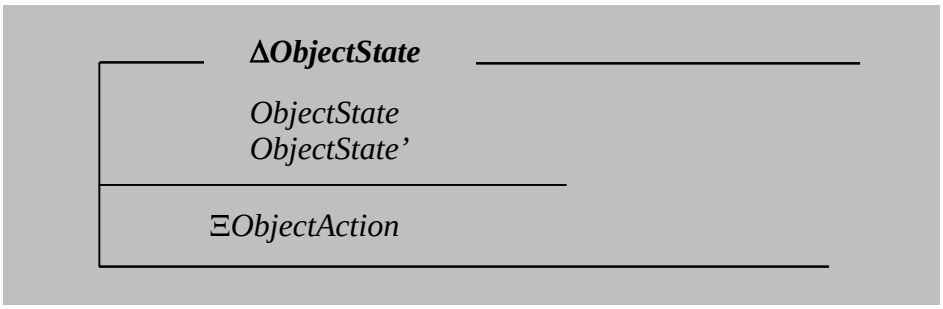
There are two types of properties that a Z specification reflects. The first type is represented by the **static properties**. These are predicates which always hold over the course of time no matter what event occurs. An **event** is an *occurrence which is of interest to the specifier*. Predicates with static properties are often known as **invariants**. The second type of property comprises the **dynamic properties**, namely, those which characterise the *effect of an event*. These properties are embodied in **observations**, namely, observations made before an event occurs (‘**pre-condition**’), and observations made after the event (‘**post-condition**’).

The three schemas ***Object, ObjectState*** and ***ObjectAction*** are designed to formalise a *description of object*, a *specification of the environment* [(actual or physical context) in which the object is situated or within which an object will perform its next actions], and a *specification of the way in which next actions are selected.* Object **operation** describes how the performance of these actions affects the environment in which the object is situated. In particular, the following prevail:

- Variables that *relate to the* **state of the object**, in particular, its *next actions*, **can change**;
- Variables that are *not concerned with the state, but with the* **nature of the object** (namely, its *attributes, capabilities*, and *action-selection function*) **remain unchanged**.

A change in any variable <u>not</u> concerned with the state of the object results in an ***instantiation of a new object.***

Change in the object state schema, denoted **Δ*ObjectState***, formalises the behaviour of ‘state’ variables (such as *nextActions*) and ‘natural’ variables (such as *attributes, capabilities* and *action-selection function*) in the event of the execution of object **operation** or implementation of an **event**. Specification that a change to the ***ObjectState*** schema will leave the ***ObjectAction*** schema unchanged is denoted by ***‘ΞObjectAction’***, which states that none of the **variables** included in the ***ObjectAction*** schema and in the **schemas** included in the ***ObjectAction*** schema (such as *Object* schema) are affected by a change of state, ie ‘natural’ variables such as *attributes, capabilities*, and *action-selection function* do not change. ***ObjectState*** *and* ***ObjectState’*** schemas formalise in a pre-condition and a post-condition, respectively, an object situated in an environment.



Object Interaction and *ObjectInteracts* Schema

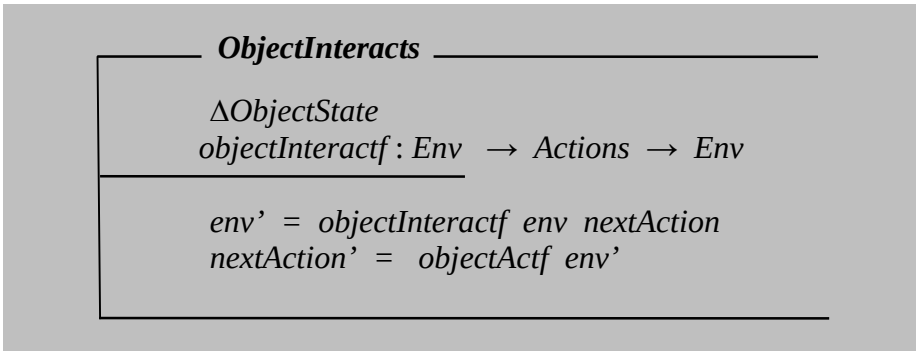
Interaction is said to take place *when actions are performed in an environment*. Interaction has the effect of changing the state of the environment by adding and/or removing attributes. For simplicity, all actions will be taken to result in change to an environment whether taken by an object (or higher-order 'objects' represented by agent or autonomous agent).

A function, denoted ***objectInteractf,*** may be defined which formalises how the environment is affected by actions performed or generated within it, namely, a function which is a *mapping from the current environment and the performed or generated actions to the resulting environmen*t.

$$objectInteractf : Env \rightarrow Actions \rightarrow Env$$

An object interacts schema, denoted ***ObjectInteracts***, *formalises the manner in which an object interacts with its environment, namely, the way in which both the state of the object and environment change*:

- The signature (declarative part) of ***ObjectInteracts*** includes the change in object state schema, ***ΔObjectState***, which formalises the manner in which 'state' variables and 'natural' variables behave (change or remain unchanged) with the performance or generation of object actions in the environment in which the object is situated;
- In the predicate part of ***ObjectInteracts*** schema, ***objectInteractf*** function is applied to the *current state of the environment and the current set of actions to produce a new environment*, which in turn is used to determine the next set of actions to be performed by applying *objectActf* again.



6.5 An Actor-Participant in a Session Can Opt to be Active and Goal-Oriented

Beyond the elemental behaviour type (passive) discussed in § 6.3, and the generic behaviour type (active) discussed in § 6.4, we have the case where a human actor, instead of remaining passive, or becoming active and remaining generic in outlook**,** behaves in such a way as to *display ability to act or to carry out an action, by way of making an intervention under the guidance, explicitly or implicitly, of a **goal** or set of goals*. This description represents the behaviour type of a *human actor who opts to be active but chooses to be goal-oriented, by default or otherwise*. Below, we assign this behaviour type a formal specification in Z.

(a) Z Specification Schema Abstraction: Primary Level Agent Behaviour – Goals

Introducing the Agent Concept, Goals and Goal Type

An **agent** can be defined at a basic level in terms of its *dispositions, subservience to some purpose, either to itself or to another,* as well as associated *object attributes*. In this sense, an **agent** may be perceived simply as *an object with a set of dispositions or **purposes***. In order to provide a formal specification for an agent, there is need to introduce a new PRIMITIVE, related to purpose, called a **GOAL.**. A **goal** will be used to describe a state of affairs - or purpose - that is desirable in some way. Specifically, a **goal** denote**s** *a purpose to be achieved in the environment.* Goal generation relies upon either the existence of a goal or set of goals set *â priori* in the environment ie by virtue of some general *raison d'être* for the theme or domain of discourse in a CSCW session or meeting, or a goal or set of goals may be intrinsically generated by an individual agent itself. It is the former, not the latter, that concerns us in this section. In Z, the *set of all goals,* or the *goal type,* may be defined as follows**:**

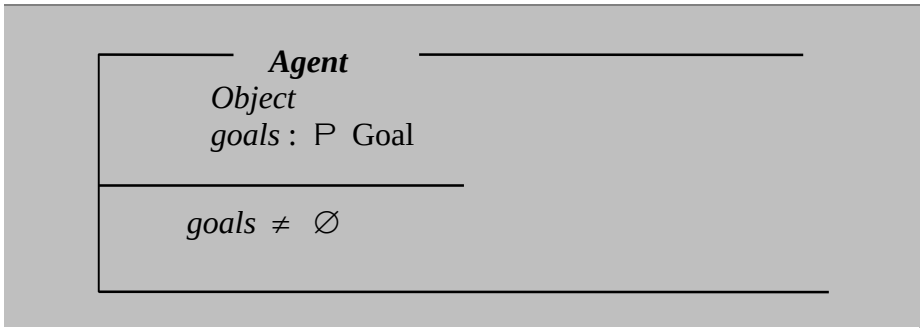
$$[Goal]$$

A new set-theoretic type type, *Goals,* may be defined to be a non-empty set of goals:

$$\boldsymbol{Goals} == \mathbb{P}_1\, Goal$$

Agent Schema, *Agent*

An agent can then be defined in terms of an object and goals as set out below. To formalise the agent definition, it is necessary to define a schema, aptly named ***Agent.*** The agent schema refines the object schema, ***Object,*** by declaring a set-theoretic variable *goals.* An agent is therefore defined as comprising an *object with a set of goals* which is predicated to be non-empty.



Corollary: Objects, Goals and Agents

Any **object,** computational or otherwise, can be an agent once it is *serving a purpose, has a goal or set of goals, intrinsically embodied in it, ascribed to it, prescribed to it, embedded in it, or generated by the object itself*. It is on the basis of the presence or absence of a **goal**, explicit or implicit, that an object may be perceived as an agent or, simply, as as a basic object. A goal need not be explicitly represented, but can instead be implicit in an agent's design**.** *It is merely necessary for there to be a goal of some kind for an object to be described as an agent.*

An **agent** is said to retain its set of goals over any instantiation of its lifetime horizon. Agency can be transient, momentary and even instantaneous: an object that becomes an agent at some instant of time may subsequently revert to being an object. There exists, accordingly, a spectrum of behaviours that is available for agents, spanning the range between the following two end-points, namely:

- At the lower end of the spectrum, an object can be [described as] passive, inactive, inert, dormant or non-computing but can have goals imposed upon it, ascribed to it, assigned to it, or prescribed to it; and
- At the higher end of the spectrum, an object can be [described as] capable of actively manipulating the environment by performing actions designed to satisfy its goals.

Goals: Physical Reality and Empirical Interpretation

Positioning of a state or a state-as-actor (delegate or actor-participant) in an international relations meeting *relies on the explication of a goal, or set of goals of a state relative to the theme [or goal] of domain of discourse*. As a policy, **multilateralism** in the international relations context can be viewed to be *deliberate action by a state [through a state-as-actor] in concert with others, to realise certain **goals** in particular issue areas of the domain of discourse in an international relations meeting*. The **goals** of human actors on an international relations issue will, in general, continue to be *dissimilar owing to the diverse historical, cultural and social backgrounds*. This situation reflects the absence of, sometimes, easily achievable consensus among the various groups which participate in international relations. Therefore, no state can expect only `gains for its own position on all values, at all times and in all places' [OLSON and SONDERMANN, 1966: 2, 4]. All states recognise that in the international system there are **gain**s and **losses** to be made, **compromises** to be reached, and **conflicts** and **threats** to be faced. A goal need not be explicitly represented, but can instead be implicit in human actor's or delegate's

positioning. It is merely necessary for there to be a goal of some kind. This is consistent with the definition of goal in the Z specification which holds *that a goal need not be explicitly represented, but can instead be implicit in the agent's design. The existence of a goal of some kind will suffice.*

States-as-actors behaviour in terms of *interventions or interactions driven or influenced by goals* is said to give rise to an instantiation of a new set of states-as-actors (or delegates) which enables nation-states to effect positioning of the nation-states on issues or themes under discussion.by virtue of possessing goals or set of goals. Specifically, the modelling of states-as-actors behaviour in terms of actions that are dependent on goals is said to give rise to the concept of **goal-oriented delegate** [or actor-participant] **behaviour**, corresponding to **agent behaviour** *at the primary level*. Goal-oriented delegate/actor-participant behaviour, models actor-participant interventions or interactions that can be characterised as g**oal-oriented**, namely, the delegates and/or actor-participants are perceived as being guided by a goal or set of goals; which can remain implicit in nature or can manifest in an explicit manner. In the study, the existence of goals are rendered manifest in one way or other, at least broadly, through a *goal-oriented descriptive title* of the domain of discourse, such as the following: conceptualisation, positioning for negotiation, and negotiation.

(b) **Z Specification Schema Abstraction: Secondary Level Agent Behaviour – Perception**

Perceiving Actions

An agent in an environment can have, as part of what may be termed *secondary-level agent behaviour*, a set of actions, possibly empty, that enable it to *perceive its environment*. The set of actions is said to comprise an agent's *perceptual behaviour*, its *set of perceptions* or, simply, its *perceiving actions*. The set of perceiving actions may be denoted by the set-theoretic variable *perceivingActions*, a subset of the capabilities of an agent.

Possible Perceptions* and *canPerceive Function;Actual Perceptions and actuallyPerceivesFunction

An agent's behaviour may, however, be characterised by any of the following categories of perceiving actions:

- A set of **possible perceptions**, designated *possiblePerceptions,* which denotes the possible attributes that an agent could perceive (to base its possible actions on), subject to its capabilities and current state. The set of attributes that an agent is *potentially capable of perceiving* is a function of the current environment and agents perceiving actions. The attributes that are potentially available to an agent through its perception capabilities is determined by a function denoted by *canPerceivef* function
- A set of **actual perceptions**, designated *acualPerceptions,* which denotes the actual set of attributes that an agent will be able to base its actions on, subject to its capabilities and current state. The set of attributes *actually perceived* by an agent is the result of the extent to which relevant resources become available to the agent and the agent must make a selection based on its goals. This set of attributes is a *function of current goals* of the agent. The attributes that are actually perceived by an agent through its perceptual abilities is determined by the *actuallyPerceivesf* function

Inability to Perceive

An agent may, also, have any of the following possible behaviour charactersitics:

- **Inability to perceive at all,** whereon an agent's *set of possible perceptions will be empty* and, equally, an agent's *set of actual perceptions will also be empty*. It is not a requirement of an agent that it is able to perceive.
- **Inactive perceptual capabilities,** whereon an agent responds directly to its environment and makes no use of perceptual abilities even if they are available. Perceptual capabilities are said to be inert, passive, or inactive in the context of objects.

***It is only meaningful to consider perception, perceptual abilities or perceivig actions in the context of goals*.**

FIGURE 6- 3 depicts, in a schematic representation, a visualisation of Goals to Actions via Perceptions.

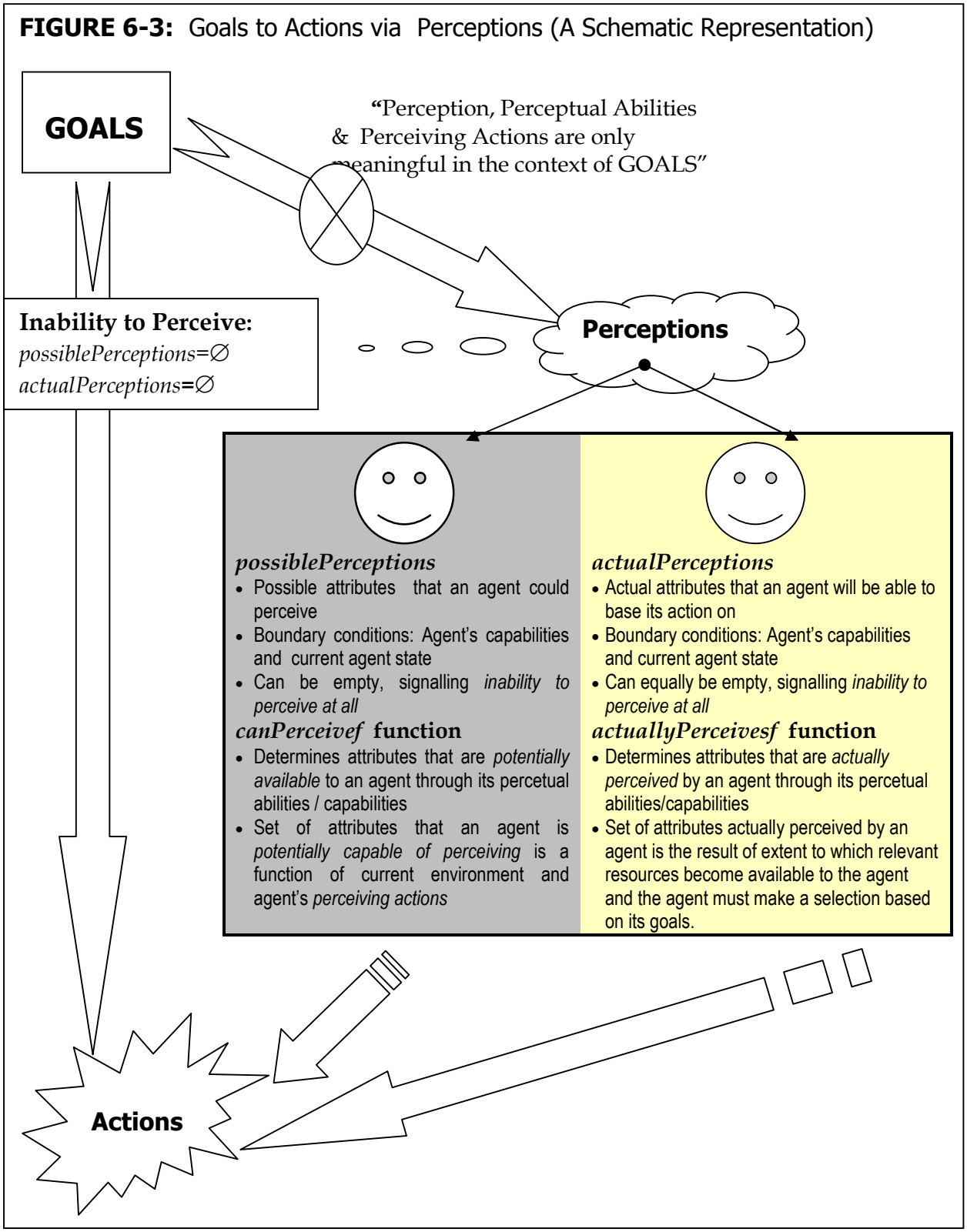
Perceptions: Physical Reality and Empirical Interpretation

Perception is a *process by means which individuals or groups construct their reality of a situation*. The result of the process of perception in the international relations context may be referred to as **Definition of the Situation**. All perceptions in decision-making are conditional assumptions or inferences about an entity (person, delegate, idea, proposal, etc). These assumptions and inferences will seek to attribute certain intentions to the said entities, upon which basis certain responses or actions will be made. Jarvis [JARVIS 1976], in his work on the subject of perception and misperception, argues that the tendency of individuals to seek consistency (cognitive) or balance in perceiving is inevitable: 'intelligent decision-making in any sphere is impossible unless significant amounts of information are assimilated to pre-existing beliefs'. It is conceivable that these pre-existing beliefs will be both immediate, contingent concerns ('evoked sets') as well as more deeply held attitudes and images.

International relations conveys the notion of *all interactions between state-based actors* [EVANS and NEWNHAM 1998]. In particular, in a multilateral discourse, for example, certain viewpoints are noted and acted upon and others are ignored. Taking account of perception in international relations accordingly involves an understanding of behaviour at the individual state-as-actor level of analysis. In particular, the mode of decision-making and how key 'players' perceive their stuation will form a large part of the overall dynamics of perception in international relations.

In the context of 'states-as-actors' (delegates) in a multilateral discourse, perception becomes central. Specifically, the particular predispositions of the states-as-actors decision-makers will be essential variables in their dealings with similar authorities in/from other states. Their personal value preferences, temperament and rationality will be important in deciding the `state interests', the priorities among those interests and the level of energy and available resources to be devoted to the pursuit of these interests. State-as-actor accordingly calls for an understanding of international relations as a two-tier process:

FIGURE 6-3: Goals to Actions via Perceptions (A Schematic Representation)



- Behaviour of states as organised bodies of human beings - human actors – who are deemed to be reasonably 'objective' relative to 'state interest' and are expected to make decisions based on the reality of facts in view relative to 'state interest'; and
- Behaviour of states as moderated by inherent predispositions of the human actors – their mental constructs of reality - described as **perceptions**.

In the final analysis `state interests are human interests' as perceived by the decision-makers and 'a sufficient number of men and women identify themselves with their state or nation to justify and render possible governmental action in the name of state interests' [WOLFERS, 1962: 6]. Of significance in an international relations discourse, however, is that a total commitment to subjective phenomenalism should be avoided.As a policy, multilateralism is *deliberate action* by a state, in concert with others, to realise goals (or objectives) in particular issue areas. To mitigate the impact of inherent subjectivity (such as subjective phenomenalism), multilateralism requires its adherents to seek diffuse rather than specific reciprocity and to regard the outcomes from their collaboration as being indivisible between them.

(c) Z Specification Schema Abstraction: View and Perception

View

The concept of perception applied to environment in which an agent is situated calls for the need to differentiate between representation of an **actual environment** (physical reality of a round-the-table, face-to-face conference or the empirical context of distributed collaboration on the electronic communication medium) and representation of agent's **perceived (or mental) model of the environment**. To be able to distinguish between representation of a perceived model of environment and representation of actual environment, it is necessary to define a new set-theoretic type, *View*. The concept *View* will be used to denote *agent perception of the environment*. This leads to *View* as a *representation of a tacit model of the environment by an agent or from the standpoint of an agent*, which may be defined as a non-empty set of attributes:

$$\textbf{\textit{View}} == \mathbb{P}_1\, Attribute$$

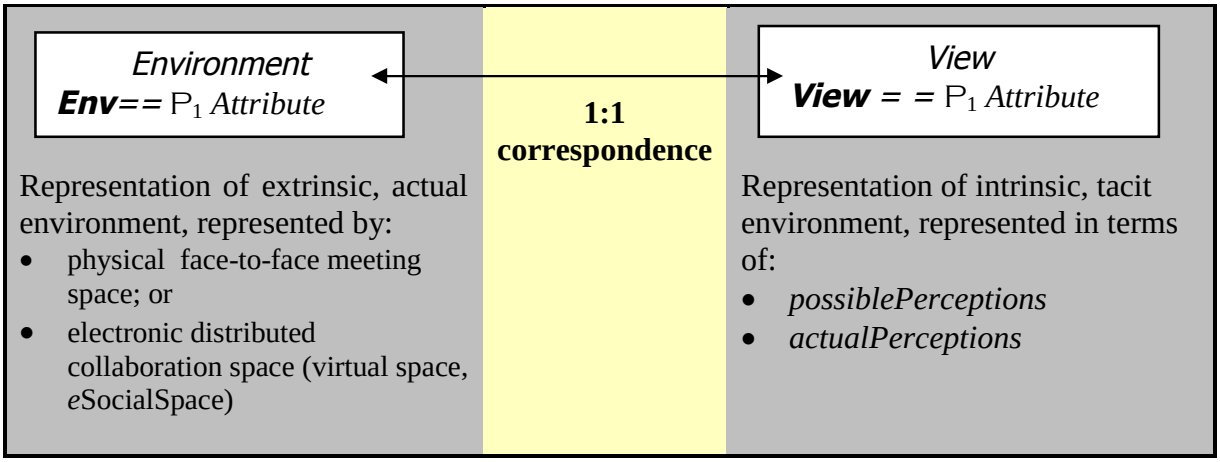
This new set-theoretic type, *View*, has an equivalent type to that of *Environment*. To this end, one can distinguish between actual (eg physical face-to-face meeting or electronic distributed collaboration) and tacit components of the same type.

Agent Perception Schema, *AgentPerception*

The perception capabilities of an agent are defined in the ***AgentPerception*** schema. The signature of the ***AgentPerception*** schema, by design, comprises as schema inclusion, the ***Agent*** schema and refines it by declaring three variables:

- The set of perceiving actions, denoted by ***perceivingActions***, and representing a subset of the capabilities of an agent;

FIGURE 6-4: ***Environment*** and ***View*** are Actual and Intrinsic Equivalents



- The ***canPerceive*** function, denoted ***canPerceivef***, determining the attributes that are *potentially* available to an agent through its perceptual capabilities. The function ***canPerceivef*** is applied to an environment in which it is situated, and *returns an intrinsic environment*, *View*. The second argument of this function is constrained to be equal to *perceivingActions*.
- The ***actuallyPerceives*** function, denoted ***actuallyPerceivesf***, determining the attributes that are *actually* perceived by an agent through its perceptual abilities. The function ***actuallyPerceivesf*** is always applied to the goals of the agent and, in contrast to the *canPerceivef* function, takes a tacit (intrinsic) environment, and *returns another tacit (intrinsic) environment*.

The predicate part of the ***AgentPerception*** schema states as follows:

- The set ***perceivingActions*** is a subset of the capabilities of the agent;
- For all attributes in the actual anvironment and all perceiving actions, perceiving actions form elements of the domain of the ***canPerceivef*** function over the environment;
- The ***actuallyPerceivesf*** function is always applied to the goals of the agent and the domain of the ***actuallyPerceivesf*** function returns the set of goals of the agent.

AgentPerception

$$
\begin{aligned}
&Agent \\
&perceivingActions : Actions \\
&canPerceivef : Env \rightarrow Actions \rightarrow View \\
&actuallyPerceivesf : \mathbb{P}\, Goal \rightarrow View \rightarrow View \\
\hline
&perceivingActions \subseteq capabilities \\
&\forall\, env : Env;\ act : Actions \bullet act \in \mathrm{dom}\,(canPerceivef\ env) \\
&\Rightarrow act = perceivingActions \\
&\mathrm{dom}\ actuallyPerceivesf = \{ goals \}
\end{aligned}
$$

Entity-Object-Agent Taxonomy Revisited

Any **agent** can be viewed in the context of an Entity-Object-Agent taxonomy, comprising entity, object and agent (see TABLE 6-1 and TABLE 6.2). At the **entity level of abstraction**, an agent does not exist. Rather, at the entity level, entity prevails. **Entity** may be viewed simply in terms of its *attributes*, which provides all the information for modelling. At the basic **object level of abstraction,** an agent does not exist. Rather, at the basic object level, object prevails. **Object** may be viewed simply in terms of *actions*, which directs object behaviour. At the **primary agent level of abstraction**, **goals** may be viewed as directing agent behaviour (primary level behaviour). At the **secondary agent level of abstraction, *goals*** and ***perceptions,*** and ***the environment*** (mental/tacit/intrinsic and actual/physical) may be viewed as directing behaviour (secondary level behaviour).

TABLE 6-1: Entity-Object-Agent Taxonomy Revisited

Entity, Object, Agent and Autonomous Agent	Attributes, Actions, Goals and Perceptions (symbolic)	Interpretation (textual)
1 Entity	Attributes	An Entity is completely specied by virtue of its Attributes
2 Object	Entity ⊕ Actions	An Obbject is an Entity to which the notion of a non-empty set of basic capabilies (called Actions) is ascribed
3 Agent (Primary Level Agent Behaviour)	Object ⊕ Goals	Primarily, an Agent is an Object with a non-empty set of Goals
3.1	Object ⊕ Goals	At the lowest, primary level of agent taxonomy an agent can be an object passively embedded in the environment (passive, inert, inactive, dormant non-computing,) but can have goals imposed upon it, ascribed to it, prescribed to it, etc)
3.2	Object ⊕ Goals	At the highest, primary level of agent taxonomy, an object is capable of manipulating the environment, by performing actions designed to satisfy goals
4 Agent (Secondary Level Agent Behaviour)	Object ⊕ Goals ⊕ Perceiving Actions	At the secondary level of agent behaviour, an agent in an environment can have a set of actions, possibly empty, that enable the agent to perceive its environment: this denotes perceptual behaviour and

		is characterised by a set of perceptions or perceiving actions, which may be denoted by *perceivingActions*, which is a subset of the capabilities of an agent.
On Perception, Possible Perceptions and Actual Perceptions		
4.1 **Perception** – Only meaningful in the context of goals. It is only meaningful to consider perception in the context of goals.	**Possible Perceptions** The possible attributes that an agent could perceive, subject to its capabilities and current state, comprises a set of possible perceptions, designated *possiblePerceptions*	**Actual Perceptions** The actual set of attributes that an agent will be able to base its actions on, subject to its capabilities and current state, comprises a set of actual perceptions, designated *actualPerceptions*
On Object Again, *canPerceive* function and *actuallyPerceives* function		
4.2 **Object Revisted**: An object responds directly to its environment and makes no use of perceptual abilities even if they are available. Perceptual capabilities are said to be inert, inactive, passive, dormant, or inactive in the context of objects.	***canPerceive* function:** The set of attributes that an agent is *potentially capable of perceiving* and is therefore potentially available to an agent through its perceptual capabilities is determined by a function denoted *canPerceive* function. This set of attributes is a function of the *current environment* and agent's *perceiving actions*	***actuallyPerceives* function:** The set of attributes that are *actually perceived by an agent through its perceptual abilities* is determined by a function denoted *actuallyPerceives* function. The set of attributes *actually perceived* by an agent is the result of the extent to which relevant resouces become available to the agent and the agent must make a selection based on its goals.

TABLE 6-2 : Any Agent Can Be Viewed as Entity, Object or Agent

Level of Abstraction	Associated categorization	Drivers of Agent Behaviour
Entity	**Non-existent**	Not applicable. An agent does not exist. Entity prevails. Entity viewed simply in terms of its attributes
Object	**Basic**	Not applicable. An agent does not exist. Object (basic) prevails. Actions direct object (basic) behaviour.
Agent	**Primary Level**	Goals direct agent behaviour (primary level)
Agent	**Secondary Level**	Goals and Perceptions , as well as Environment (actual and/or intrinsic/tacit) direct agent behaviour (secondary level)

Defining Agent Action Schema, *AgentAction*

It is observed in the foregoing section that at the agent level of abstraction, *goals and perceptions*, as well as *the environment* (actual and intrinsic), can be viewed as directing agent behaviour at the secondary level. This requires modelling in terms of the Agent Action schema, denoted ***AgentAction,*** which 'encapsulates' in its signature the ***Agent*** schema and the ***ObjectAction*** schema and refines them accordingly in the manner stipulated below:

- Embeds and possibly refines the ***Agent*** schema;
- Embeds and possibly refines ***ObjectAction*** schema, enabling application of the action-selection function, ***objectActf***, for modelling the agent solely at the object level; and
- Specifies the action-selection function, ***agentActf,*** which is dependent on (i) the goals; (ii) the actual perceptions of the agent; and (iii) the current environment itself;

The predicate part of the ***AgentAction*** schema provides the means of computing ***agentActf*** function as follows:

- The first predicate requires that ***agentActf*** returns a set of actions within the agent's capabilities; and
- The second predicate constrains ***agentActf*** 's application to the agent's goals.

AgentAction

$$
\begin{array}{l}
Agent \\
ObjectAction \\
agentActf : \mathbb{P}\, Goal \rightarrow View \rightarrow Env \rightarrow \mathbb{P}\, Action \\
\hline
\forall\, g : \mathbb{P}\, Goal;\ v : View;\ env : Env \bullet \\
\qquad (agentActf\ g\ v\ env) = perceivingActions \\
\text{dom}\ agentActf = \{ goals \}
\end{array}
$$

The two action-selection functions, ***objectActf*** and ***agentActf,*** operate at the object and agent levels. If there are no perceptions, then the action-selection function***, agentActf***, is dependent only on the environment, as it is with ***objectActf.***

Agent State Schema, *AgentState*

The Agent State schema, denoted ***AgentState,*** has the *function to formalise an agent situated in the environment*. To specify the ***AgentState*** schema, one needs to describe an agent situated in the environment with *capabilities* and *behaviours for action and perception*. The signature of the *AgentState* schema comprises a schema inclusion of the *AgentAction* schema, the *AgentPerception* schema and the *ObjectState* schema and refines them accordingly:

- Embeds and possibly refines the schema defining the agent as a situated object, namely, ***ObjectState***.
- Embeds and possibly refines the schema for action, ***AgentAction*;** and
- Includes and possibly refines the schema for perception, ***AgentPerception***.

AgentState

AgentPerception
AgentAction
ObjectState
possiblePerceptions, actualPerceptions : *View*

$actualPerceptions \subseteq possiblePerceptions$
$possiblePerceptions = canPerceivef\ env\ perceivingActions$
$actualPerceptions = actuallyPerceivesf\ goals\ possiblePerceptions$
$perceivingAction = \varnothing \Rightarrow possiblePerceptions = \varnothing$
$nextAction = agentActf\ goals\ actualPerceptions\ env$

In addition, since the *attributes of the environment are now accessible*, it is possible to declare and specify the following:

- Possible perceptions of the agent, denoted by the variable ***possiblePerceptions,*** which is computed using the ***canPerceivef*** function; and
- Actual perceptions of the agent, denoted by the variable ***actualPerceptions,*** which is computed using the ***actuallyPerceivesf*** function.

Goals are fixed for any agent. Changes to the actual perceptions of an agent affect its selection of actions. An agent without perceptions does not therefore have any increased functionality as a result of having goals. The behaviour of an agent without perceptions can, however, still be viewed and modelled in terms of goals affecting its action selection.

Agent Operation and Change in Agent State Schema, Δ*ObjectState*

Agent operation, namely, *the set of operations that characterise agent behaviour*, is constrained to effect only certain aspects:

- The **agent variables** ('natural' variables) described by *attributes, capabilities, actions, goals, perceptual capabilities, perceiving actions,* and *action-selection functions* remain ***unchanged by any agent operation***. If any of these variables change, a new agent is said to be 'created' or instantiated (see FIGURE 6-5). Specific characterisations of these variables uniquely describe a specific agent.
- The **'state' variables** –*variables necessarily associated with the state of the agent* – described by the agent's situation, *possible perceptions* and *actual* perceptions, ***may change*** (see FIGURE 6-6).

These constraints are formalised in the change in agent state schema, denoted **Δ*AgentState***, which defines a change in agent state, and includes the following schemas, together with a number of 'predicates':

- **Δ*ObjectState***, to ensure that only the state properties of objects change;
- ***AgentState*** schema, which formalises, in a pre-condition, an agent situated in the environment;

- ***AgentState'*** schema, which formalises, in a post-condition, an agent situated in the environment.

- **Δ*ObjectState,*** which ensures that only state properties of agents as stuated objects change;
- **Ξ*AgentAction***, to ensure that the variables included in the *AgentAction* [inclusive of *agentActf* and *objectAction*] are unaltered**;**
- **Ξ*AgentPerception***, to ensure that the variables included in the *AgentPerception* [inclusive of *perceivingActions*, *canPerceivef*, and *actuallyPerceivesf* are unaltered.

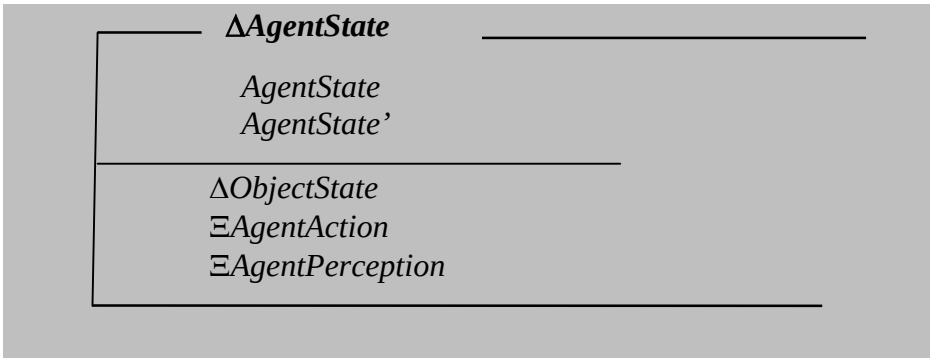


FIGURE: 6-5: A Schematic of Variables Remaining Unchanged by Agent Operation

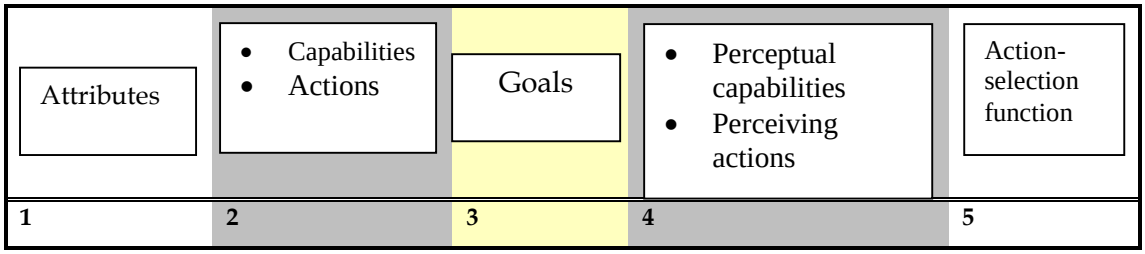
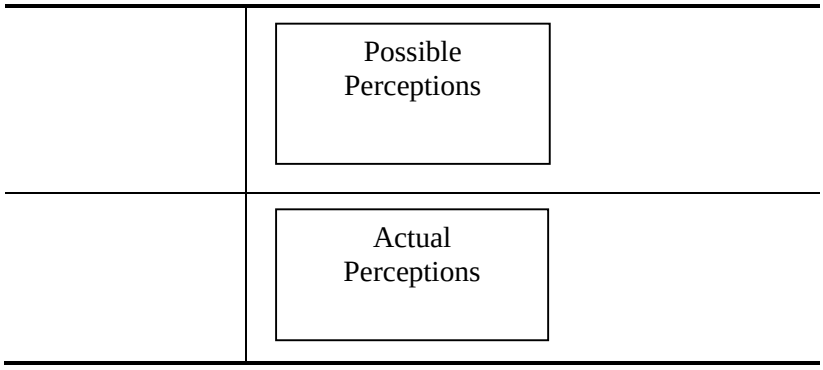


FIGURE: 6-6: A Schematic of Variables That May Change by Agent Operation



Agent Interaction and Agent Interacts Schema, *AgentInteracts*

When an agent acts in an environment, the environment changes according to the specific actions peformed. This does not depend on whether the entity is an object or an agent. The schema describing object interaction is therefore still applicable. Formally, ***AgentInteract*s** schema formalises how the environment is affected by actions generated/performed within it: the environment changes according to the specific actions performed/generated. ***AgentInteracts schem***a comprises a schema inclusion of the **Δ*AgentState*** , which it refines by declaring the set-theoretic variable ***ObjectInteracts***, which specifies both the state of the object and the resulting environment change. The predicate part of the ***AgentInteracts*** schema shows explicitly how the schema variables ***actualPerceptions, possiblePerceptions*** and ***nextAction*** are computed or updated

Ag*entInteracts*

$\Delta AgentState$
$ObjectInteracts$

$actualPerceptions' = actuallyPerceives\ f\ goals\ possiblePerceptions$
$possiblePerceptions' = canPerceive\ f\ env'\ perceivingActions$
$nextAction' = agentAct\ f\ goals\ actualPerceptions'\ env'$

View and Perceptions: Physical Reality and Empirical Interpretation

The concept of perception applied to the environment in which the human actor (delegate or actor-participant) is 'situated' calls for a need to differentiate between representation of actual environment (physical reality) and representation of human actor's perceived (or mental reality) model of the environment. An international relations deliberation is said to be charaterised by two distinct but complementary viewpoints: an **actual view** of the environment in which the human actor is situated and an **intrinsic view** of the environment.

6.6 An Actor in a Session Can Opt to be Autonomous

Beyond the elemental behaviour type (passive) discussed in § 6.3, and the generic behaviour type (active) discussed in § 6.4, and the the goal-oriented behaviour type (active) discussed in § 6.5,we have the case where a human actor displaying ability to act or to carry out an **action**, by way of making an **intervention** through explicitly or implicitly being goal-active and with a self-motivation capability to effect action. This description represents a mode of behaviour in which a human actor is described to be **autonomous**, namely, pssessing the ability to function ('exercises influence on the behaviour of other actors') without the need for external intervention. Below, we assign to this behaviour type a formal specification in Z.

(a) Z Specification Schema Abstraction: Autonomy

Agent Autonomy

Goal adoption relies on either the existence of other agents providing the goals that are adopted when an agent is instantiated or, for some agents, the generation of their own goals. Agents that generate their own goals are said to be **autonomous** since they are not dependent on the goals of others. **Autonomous agents** possess goals that are *generated within* rather than *adopted from other agents*.

Motivation, Motivation Type

Motivation *is an intrinsic characteristic (or primitive) of an agent – a desire or preference – that can lead to the generation and adoption of goals and that affects the outcome of the reasoning or behavioural task intended to satisfy those goals*.

Motivations are different from goals in that they are *qualitatively intrinsic to an agent and are not describable in terms of the environment. Motivations are, however, a necessary condition for specification of an autonomous agent*.

As with attributes and actions, the type of all motivations is defined as a given set, namely:

[Motivation]

A new set-theoretic type, *Motivations*, is defined to be a non-empty set of **motivations:**

$$\textbf{\textit{Motivation}} == \mathbb{P}_1\ \textit{Motivation}$$

Autonomous Agent Schema

An **autonomous agent** is defined as *an agent with a non-empty set of motivations*.

The formal description of an autonomous agent is specified by the autonomous agent schema, ***AutonomousAgent***, the signature of which refines the agent schema, ***Agent,*** and declares the variable ***motivations*** as a [possibly non-empty] set-theoretic type; and the predicate part constrains the set of motivations to be non-empty.

AutonomousAgent

$$\textit{Agent}$$
$$\textit{motivations} : \mathbb{P}\ \textit{Motivation}$$

$$\textit{motivation} \neq \varnothing$$

Autonomous Agent Perception Schema, *AutonomousAgentPerception*

For an autonomous agent, it is both **goals** and **motivations** that are relevant to determining what is perceived in an environment. This is formalised in the ***AutonomousAgentPerception*** schema, which comprises the following two schema in its signature:

- the ***AutonomousAgent*** schema, which specifies an autonomous agent as comprising a non-empty set of motivations; and
- the ***AgentPerception*** schema, which defines perceiving actions within an agent's capabilities and specifies functions for computing possible and actual perceptions of an agent.

Autonomous agent perception schema *refines* the two schema, ***AutonomousAgent*** and ***AgentPerception***, through a declaration of a modified version of the non-autonomous agent's ***actuallyPerceivesf*** function as simply the ***perceivesf*** function, which is applied to the set of agent motivations and returns, or maps transitively (through a set of goals and the actual/physical environment) onto, a mental environment. That which an autonomous agent is potentially capable of perceiving at any time - namely, attributes of the environment that are potentially available or accessible to an agent - are independent of its motivations and goals, and there is consequently no equivalent increase in functionality to the ***canPerceivef*** function, which is used to compute possible perceptions of an agent.

AutonomousAgentPerception

$$AutonomousAgent$$
$$AgentPerception$$
$$perceivesf : \mathbb{P}\ Motivation \rightarrow \mathbb{P}\ Goal \rightarrow Env \rightarrow View$$

$$\text{dom}\ perceivesf = \{\ motivations\ \}$$

The predicate part of the ***AutonomousAgentPerception*** schema constrains the domain of ***perceivesf*** to be the set of *motivations* of the agent.

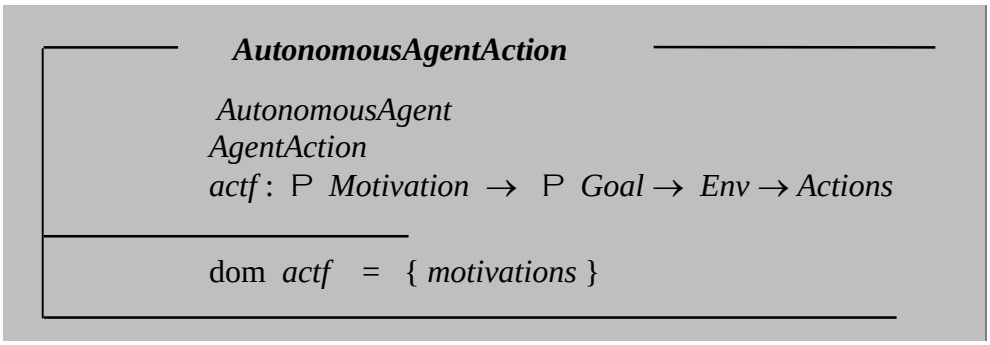
Autonomous Agent Action Schema, *AutonomousAgentAction*

The behaviour of an autonomous agent is determined by both *external* and *internal factors*:

- An **autonomous agent has motivations**, which ***are non-derivative*** and ***are governed by internal inaccessible rules***, as compared to an agent, that simply has goals, which are derivative but relate to perceptions; and
- The **action-selection function** for an autonomous agent is ***produced at every instance by the motivation of the agent***, compared to an agent, that simply has goals, which are derivative but relate to environment.

The ***AutonomousAgentAction*** schema accordingly comprises in its signature the following schema inclusions:

- The ***AutonomousAgent*** schema, which specifies an autonomous agent as comprising a non-empty set of motivations; and
- ***AgentAction*** schema, which enables application of the action-selection function for modelling autonomous agent solely at the agent level.



The ***AutonomousAgentAction*** schema refines these two schema by declaring the variable action-selection function *actf* (essentially and synonymously *autonomousagentActf*), which is applied to the set of agent motivations and returns, or maps transitively (through set of goals and the actual/physical environment) onto a set of actions (that are a subset of its capabilities).

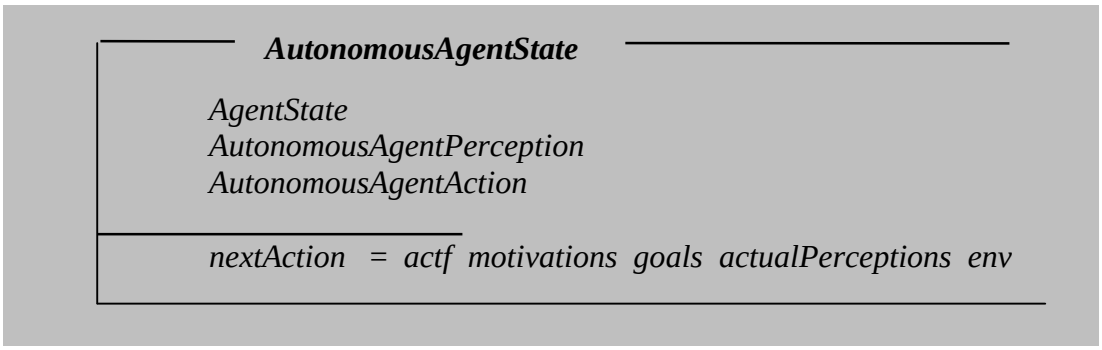
The predicate part of the ***AutonomousAgentAction*** schema constrains the domain of the variable ***actf*** function to be equal to the set of motivations of the agent.

Autonomous Agent State Schema, *AutonomousAgentState*

The actions performed by an autonomous agent are a function of its motivations, goals, perceptions and environment.

The autonomous agent state schema, denoted ***AutonomousAgentState***, comprises, as schema inclusion, the following schema:

- ***AgentState*** schema, which formalises an agent situated in the environment;
- ***AutonomousAgentPerception*** schema, which formalises what is perceived by an autonomous agent situated in environment; and
- ***AutonomousAgentAction*** schema, which formalises the action-selection function for an autonomous agent situated in the environment.



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The autonomous agent state schema is predicated by a specification of the next action performed by an autonomous agent, which is a function of its motivations, goals, perceptions and environment.

Autonomous Agent Operations and Change in *AutonomousAgentState* Schema

In considering the definition of a change in state for an autonomous agent, it is essential to highlight some subtle but important differences with a change in state for an agent. Whereas goals are fixed for agents as capabilities are for objects, one cannot explicitly state whether motivations change when actions are performed:

- If goals do change, then the agent functions, *actuallyPerceivesf* and *Actf*, will also change;
- If, however, goals remain fixed, motivations may, independently, generate new and different goals for the agent to pursue**.**

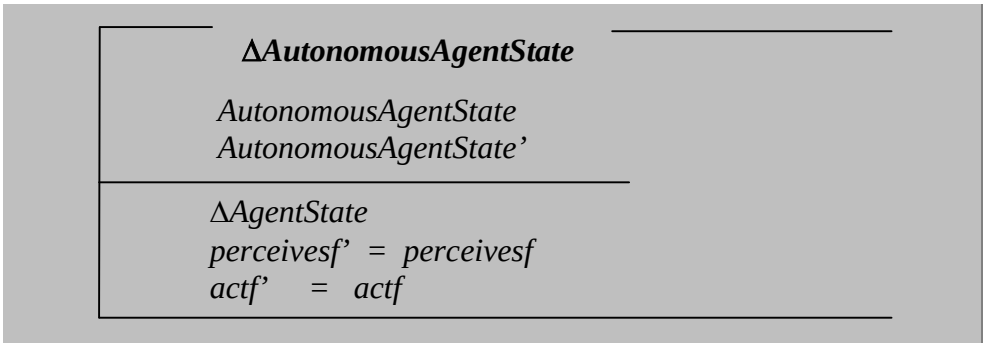
In any of the above cases, the characterising features of an agent are in flux. Under the circumstances, an autonomous agent can be regarded as *a continually re-instantiated non-autonomous agent*. In this case, autonomous agents are permanently [basic] agents as opposed to transient non-autonomous agents, which may revert to being objects.

Change in ***AutonomousAgentState*** schema, denoted Δ*AutonomousAgentState,* is specified by effecting a schema inclusion of the following:

- ***AutonomousAgentState*** schema, which formalises, in a pre-condition, an autonomous agent situated in the environment;
- ***AutonomousAgentState'*** schema, which formalises, in a post-condition, an autonomous agent situated in an environment.

Change in ***AutonomousAgentState*** schema is predicated as follows:

- Δ*AgentState*, which ensure that only the state properties of agents change;
- *perceivesf' = perceivesf*, which ensures that the variable *perceivesf* is unaltered by any autonomous agent operation
- *actf' = actf,* which ensures that the variable *actf* is unaltered by any autonomous agent operation



Autonomous Agent Interacts Schema, *AutonomousAgentInteracts*

The ***AutonomousAgentInteracts*** schema formalises the operation of an autonomous agent *performing its next set of actions*, and comprises a schema inclusion of the Δ***AutonomousAgentState*** schema and the ***AgentInteracts*** schema.

AutonomousAgentInteracts

Δ*AutonomousAgentState*
A*gentInteracts*

possiblelPerceptions' = canPerceivef env' perceivingActions'
actualPerceptions' = a*ctuallyPerceivesf motivations' goals' possiblePerceptions'*
nextAction' = actf motivations' goals' actualPerceptions' env'

Agent Autonomy

Autonomy: Physical Reality

An actor in international relations may be defined as `a relatively *autonomous* unit that exercises influence on the behaviour of other actors' in both the international system as a whole and in the regional or subregional supranational subordinate system. The key word is *autonomy,* `the ability to behave in ways that have consequences in international politics and cannot be predicted entirely by reference to other actors or authorities' [HOPKINS and MANSBACH, 1973: 4].

In an international relations deliberation, a 'state-as-actor' (or delegate) will in general become active, with capability, and/or electing, to pursue an action or set of actions that are *guided by a goal or set of goals* and *self-motivation arising out of state interests*. This defines the characteristics of a state-as-actor (or delegate) in an autonmous mode.

Autonomy: Empirical Realisation

An actor-participant in an international relations context in *e*SocialSpace will be chracterised by a number of "states-as-actors" behaviours, one of which is **autonomy**. In the study, this state-as-actor beaviour has been modelled as ActAUTO, representing goal-active behaviour and having a self-motivation capability. The key word is, again, *autonomy, representing* `the ability to behave in ways that have consequences in the international relations context in *e*SocialSpace and cannot be predicted entirely by reference to other actor-participants' [adapted in this study from HOPKINS and MANSBACH, 1973: 4].

6.7 A Summary of the Multi-Agent Z Specification Framework for States-As-Actors Behaviour In Virtual Sessions and Conclusion

Summary

A multi-agent Z specification framework is deployed in this study to model states-as-actors behaviour in virtual sessions in the international relations context. A summary of the Z Specification Schema Framework for 'States-as-Actors' Behaviour in Virtual Sessions is depicted schematically in TABLE 6-3. A foundational assumption of the Z framework is the application of the **agent metaphor** to designate as agents, "*live human actors interacting on the electronic communication medium*". The framework postulates the existence of an abstract 'space' called *environment*, which is 'occupied', or 'populated' by a finite set of 'things' generically labelled '**agents**', but individually categorised as *entities, objects, agents* and *autonomous agents* (EOAAa), which are characterised by a set of 'properties' labelled *attributes, actions, goals* and *motivations* or *self-motivation* (AAGSm), respectively. An agent is proposed as *situated* and *embedded* or *embodied* in an *environment* and is deemed, individually as entity, object, agent or autonomous agent, as *receiving input from its environment* through some mechanism – an **event** or **operation** - and *acting so as to affect that environment in some way* through the mechanism of **generation or origination** of some action or interaction by another agent or some other event or operation. **Action** in the *environment* is considered mapped onto a non-empty collectivity of interactions represented by the totality of the information exchange (IXI), interpersonal group level interaction (IGI) and knowledge exchange (KXI) *interaction primitives*. The result is an agent 'architecture', which is marked by agent **actions** in the environment. **Interactions** are said to take place when **actions** are performed in an environment. Interactions have the effect of changing the **state of the environment** by adding and/or removing attributes and therefore effecting individual agent **instantiations.** These instantiations spell a finite spectrum of behaviour, which may be described and modelled in the manner stated in the section following.

An actor-participant can opt to be **passive** in a virtual session. This states-as-actors behaviour mode is modelled as an **entity**, defined solely as *a set of attributes* and specified by the **entity schema**. An actor-participant can opt to be [simply] **active** in a virtual session. This mode of states-as-actors behaviour is modelled as an **object**, which is defined as an entity with **capabilities** or the capacity (or ability) to exercise **actions**, or interact with the environment and is specified by the **object schema**. An actor-participant can opt, at a *primary level*, to be **active and goal-oriented** in a virtual session. This states-as-actors behaviour is modelled as **agent**, defined as an *object with a goal* or *set of goals, intrinsically embodied in it, ascribed to it or prescribed to i*t and is specified by the **agent schema**. At a secondary level, an agent in an environment can have, in addition, *a set of actions, possibly empty, that enable it to perceive its environment* and which comprise an agent's *perceptual behaviour*, its *set of perceptions, set of perceiving actions* or, simply, its *perceiving actions*, characterised as either **possible perceptions** or **actual perceptions**. **Goals**, **perceptions** and the **environment** (actual and intrinsic) are modelled as directing secondary-level agent behaviour. An actor-participant can opt to be **autonomous** in a virtual session. This mode of states-as-actors behaviour is modelled as an **autonomous agent s**, defined as an agent with a [self-]

motivation, or set of motivations. and is specified by the **autonomous agent schema**. For an autonomous agent, it is both **goals** and **motivations** that are relevant to determining what is *perceived in an environment*. The actions performed by an autonomous agent are, however, a function of its *motivations, goals, perceptions* and *environment.*

Interactions among and between actor-participants in a virtual session require that a mechanism exists which prompts an actor to assess the 'state of the environment', with the objective to make a decision for *next actions*. This is modelled in Z by an **action-selection function**, which is dependent on the current environment, physical or mental; the goals; or the goals and motivations jointly, to deliver next actions. In the model, variables that relate to the **state** of an object , agent or autonomous agent, **may change** in any operation in the environment. These include the following variables: *next actions, possible perceptions*, and *actual perceptions*. However, variables that are related to the **nature** of an object , agent or autonomous agent **remain unchanged in any operation.** These include the following variables: *attributes, capabilies, actions, goals, perceptual capabilies, perceiving actions*, and *action-selection function*. Some subtle differences with change in state for an autonomous agent, however, emerge from the model, namely, whereas goals are fixed for agents as capabilities are for objects, one cannot explicitly state whether motivations change when actions are performed.

The agency behaviour types outlined above may be recast into four distinct instantiations of behaviour, which may be described as *passivity, interactive agency, goal-oriented agency and autonomous agency*, respectively: **passivity**, characterised by inability to interact with the environment in which it is 'situated', effectively manifesting simply as 'non-agent'; i**nteractive agency**, characterised by ability to interact with the environment in which it is situated or, equivalently, with other agents in the environment ('*social ability'*), and generally pursuing an action or set of actions that are generic in nature; g**oal-oriented agency**, characterised by ability to behave in a goal-oriented mode, by pursuing an action or set of actions that are guided by a goal or set of goals ('*proactiveness'*); and a**utonomous agency,** characterised by ability to function without the need for external intervention, by pursuing an action or set of actions that are guided by self-generated goal or set of goals (*autonomy*).

An agent is said to retain its set of goals over any instantiations of its lifetime horizon. Agency can be transient, momentary and even instantaneous: an object that becomes an agent at some instant of time may subsequently revert to being an object. Similarly, an entity is said to retain its set of capabilities to generate actions over instantiations of its lifetime horizon. An entity that becomes an object at some instant of time may subsequently revert to being an entity without capabilities to interact with the environment. It is possible for an autonomous agent to revert to being an agent or to being an object or to being an entity during any instantiations of its lifetime.

The multi-agent architecture developed in this study to model states-as-actors behaviour in the international relations context can be viewed as comprising a 'closed' system configuration in which agent behaviour displays a quasi-dynamic environment that is continually characterised by alternating instantiations ('agent creation') of a new agent and annihilations ('agent deletion') of an existing agent during brief time periods of a session or meeting. It is important to note that the four states-as-actors behaviour 'suite' apply

dynamically to each single human actor or actor-participant as he/she records his/her intervention on an aspect of the domain of discussion. An actor-participant as a states-as-actor in a session may best be described as '*a metamorphic binary system of agent deletion and agent creation*'.

To note, however, is that the creation of new agent types beyond the basic 'states-as-actor' agent types outlined in this study carries with it the need for a theoretical complexity that must take into account the evolution of the system over time, namely, deployment of temporal logics. Among others, new agent types that are most amenable to creation include the following: proactive agent type, reactive agent type, and adaptive agent type.

Conclusion

The modelling of states-as-actors behaviour as a multi-agent formal Z specification framework is a major contribution of knowledge to our understanding of states-as-actors behaviour in the international relations context, on the one hand, and, equally, a major contribution to our understanding of the agent metaphor, applied for the first time with respect to a formal specification formulation to *'live human actors interacting on the electronic communication medium in the international relations context*'. An architecture of virtual interactions manifesting as states-as-actors behaviour in distributed collaboration is viewed as comprising a 'closed' system configuration which displays a quasi-dynamic environment that is continually characterised by alternating instantiations ('agent creation') of a new agent and annihilations ('agent deletion') of an existing agent during brief time periods of a session or meeting. It is important to note that the four states-as-actors behaviour 'suite' apply dynamically to each single human actor or actor-participant as he/she records his/her position on an aspect of the domain of discussion. An actor-participant as a states-as-actor in a session may best be described as '*a metamorphic binary system of agent deletion and agent creation*'.

As a formal Z specification framework which models a conceptual picture – in structure and process - of states-as-actors behaviour of the human actors in the international relations context, the framework provides a basic foundational framework which can be advanced, further downstream, to develop a programming language equivalent to enable the implementation of an information system that suits the needs of multilateral negotiations and conferences that take place on the electronic communication medium. As a model, the validity of the multi-agent formal Z specification framework for states-as-actors lies with the building and testing of the physical model. In the context of this study's multi-agent formal Z specification framework, this assertion transforms to the need to build and test an information system that seeks to meet the the needs of multilateral negotiations in the manner described in the multi-agent formal Z specification framework.

TABLE 6-3: A Summary of the Z Specification Schema Framework for 'States-as-Actors' Behaviour in CSCW Sessions

Active But Not Goal-Oriented	Active and Goal-Oriented	Active and Autonomous
Entity *attributes* : P *Attribute* *attribute* ≠ ∅		
EnvironmentState *env : Env* *entities* : P *Entity* ∪ { *e* : *entities* • *e . attributes*} ⊆ *env*		
Object *Entity* *capabilities* : P *Actions* *capabilities* ≠ ∅	***Agent*** ***Object*** ***goals* : P *Goal*** ***goals* ≠ ∅** ***AgentPerception*** ***Agent*** ***perceivingActions* : *Actions*** ***canPerceivef* : *Env* → *Actions* → *View*** ***actuallyPerceivesf* : P *Goal* → *View* → *View*** ***perceivingActions* ⊆ *capabilities*** **∀ *env* : *Env*; *act* : *Actions* • *act* ∈ dom (*canPerceivef env*) ⇒ *act* = *perceivingActions*** **dom *actuallyPerceivesf* = { *goals* }**	***AutonomousAgent*** *Agent* *motivations* : P *Motivation* *motivations* ≠ ∅ ***AutonomousAgentPerception*** *AutonomousAgent* *AgentPerception* *perceivesf* : P *Motivation* → P *Goal* → *Env* → *View* dom *perceivesf* = { *goals* }

ObjectAction

$object$

$objectActf : Env \rightarrow Actions$

$\forall env : Env \bullet (objectActf) \subseteq capabilities$

AgentAction

$Agent$

$ObjectAction$

$agentActf : \mathbb{P}\ Goal \rightarrow View \rightarrow Env \rightarrow \mathbb{P}\ Action$

$\forall g : \mathbb{P}\ Goal;\ v : View;\ env : Env \bullet (agentActf\ g\ v\ env) = perceivingActions$

$\text{dom}\ agentActf = \{ goals \}$

AutonomousAgentAction

$AutonomousAgent$

$AgentAction$

$actf : \mathbb{P}\ Motivation \rightarrow \mathbb{P}\ Goal \rightarrow Env \rightarrow \mathbb{P}\ Action$

$\text{dom}\ actf = \{ motivations \}$

ObjectState

$EnvironmentState$

$ObjectAction$

$nextAction : Actions$

$nextAction = objectActf\ env$

$nextAction \subseteq capabilities$

AgentState

$AgentPerception$

$AgentAction$

$ObjectState$

$possiblePerceptions, actualPerceptions : View$

$actualPerceptions \subseteq possiblePerceptions$

$possiblePerceptions = canPerceivef\ env\ perceivingActions$

$actualPerceptions = actuallyPerceivesf\ goals\ possiblePerceptions$

$perceivingAction = \varnothing \Rightarrow possiblePerceptions = \varnothing$

$nextAction = agentActf\ goals\ actualPerceptions\ env$

AutonomousAgentState

$AgentState$

$AutonomousAgentPerception$

$AutonomousAgentAction$

$nextAction = actf$ motivations $goals\ actualPerceptions\ env$

ΔObjectState

$ObjectState$

$ObjectState'$

$\Xi ObjectAction$

ΔAgentState

$AgentState$

$AgentState'$

$\Delta ObjectState$

$\Xi AgentAction$

$\Xi AgentPerception$

ΔAutonomousAgentState

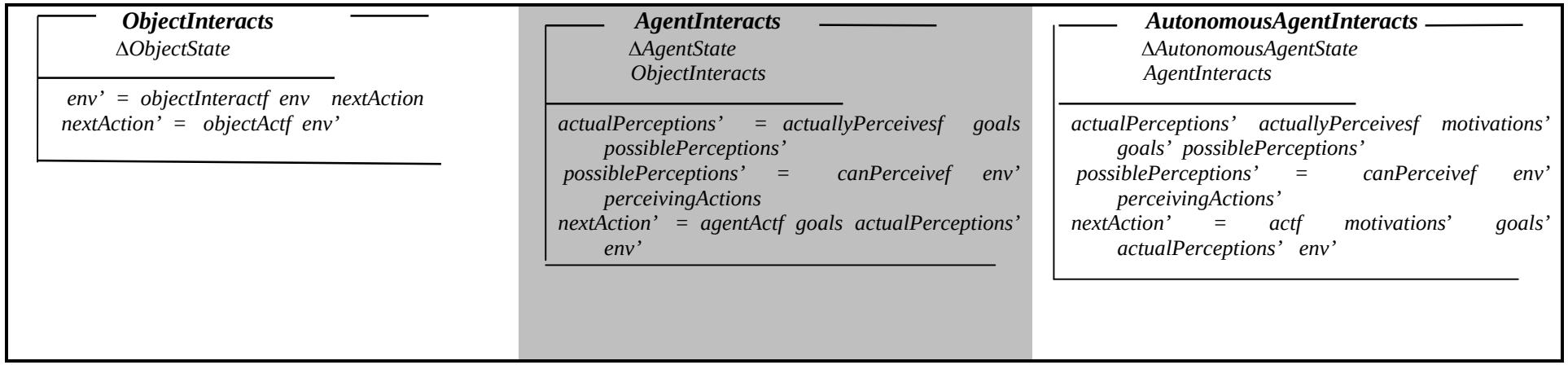
$AutonomousAgentState$

$AutonomousAgentState'$

$\Delta AgentState$

$perceivesf' = perceivesf$

$act\ f' = actf$


ObjectInteracts
ΔObjectState
env' = objectInteractf env nextAction
nextAction' = objectActf env'
AgentInteracts
ΔAgentState
ObjectInteracts
actualPerceptions' = actuallyPerceivesf goals possiblePerceptions'
possiblePerceptions' = canPerceivef env' perceivingActions
nextAction' = agentActf goals actualPerceptions' env'
AutonomousAgentInteracts
ΔAutonomousAgentState
AgentInteracts
actualPerceptions' actuallyPerceivesf motivations' goals' possiblePerceptions'
possiblePerceptions' = canPerceivef env' perceivingActions'
nextAction' = actf motivations' goals' actualPerceptions' env'

CHAPTER VII

CONCLUSIONS

In this chapter, first, we summarise the study's research findings, then outline contributions of the study, from the standpoints of knowledge and practice, with particular reference to a specification framework for an information system, utility value(s) of a 'distributed collaboration system', and guidelines for a virtual collaboration session.. We then make recommendations in terms of deployment of a distributed collaboration system and deployment of a process-based guideline for multilateral negotiation. Finally, suggestions are made for outlook for further research.

7.1 Summary

The findings of the study demonstrated that **virtual interactions** exercised by participants in the international relations context are identifiable as states-as-actors interactions or behaviour. The *existence* of states-as-actors behaviour on the electronic communication medium demonstrated that *virtual interactions can be deployed to fulfil the deliberations that normally take place in a conventional relations conference session.*

The study demonstrated, further, that virtual interactions in distributed collaboration, by virtue of the deployment of **distributed collaboration** sessions as opposed to conventional face-to-face, round- the-table sessions in an international relations conference, can be used to address the problems of operation, context, and strategy that frequently characterise the implementation of a conventional international relations conference. Specifically, the study demonstrated that the implementation of an international relations conference is more costly compared with the implementation of a virtual international relations conference. It is found that the disparity factor between the two costs of implementation can go as high as 20 – 30, depending on participant number and conference duration.

In addition, from the results of the study's *ex-post* evaluation questionnaire, it was demonstrated that in the deployment of a **distributed collaboration system** for the purpose of an international relations conference, USEFULNESS takes precedence relative to USAGE and USABILITY. Specifically, with reference to USEFULNESS, the first three factors of utility, in the order of rankings, relate to the following: Automated record generation, Process enablement, and Fit-for-Purpose characteristic. This is consistent with the observation that **automated record generation** eliminates the labour of rapporteur tasking, verbatim record writing, or audio recording, which are typical of conventional international relations conference proceedings; **process enablement** is deemed to keep the core business of the subject of discussion in focus; and **fit-for-purpose characteristic**, reinforces the perception by the respondents that the system is relevant for the purpose for which it was set up or is being used.

The research study concludes that a **distributed collaboration system** can be deployed as an alternative to the implementation of a conventional international relations conference. An approach is suggested for the adoption of a distributed collaboration system, which involves starting with small-size conferences, and progressively making transitions to fully-fledged virtual international relations conferences. Such a deployment, irrespective of conference size, has the effect of minimising the problems of operation, context and strategy that are

frequently associated with the implementation of a conventional international relations conference

7.2 Contributions to Knowledge and Practice

The research study's contribution are three-fold, relating to knowledge and to practice. These are outlined below.

Contribution 1 – Contribution to Knowledge: A Specification Framework to Enable the Implementation of an Information System for Multilateral Negotiations and Conferences

The prime contribution of this research is a framework – a specification framework - that describes virtual interactions in distributed collaboration in international relations conferences. This has the effect of contributing to our knowledge of understanding of the challenges of virtual interactions in distributed collaboration, and implications for improving international relations conferences. In particular, we have applied a multi-agent formal Z specification formalism which deploys the 'agent metaphor' under auspices which we perceive as agents, "live human beings interacting on the electronic communication medium in the international relations context". The result of this is the gaining of insights into states-as-actors behaviour, and how these insights can be deployed for improving international international relations conferences or effecting virtual workgroup dynamics in CSCW sessions.

As a formal specification framework which models a conceptual picture – in structure and process - of states-as-actors behaviour of the human actors in the international relations context, the Z framework provides a basic foundational framework which can be advanced to develop a *computer programme to enable the implementation of an information system that suits the needs of multilateral negotiations and conferences that take place on the electronic communication medium*.

Contribution 2 - Contribution to Practice: Utility Values of a 'Distributed Colaboration System'

Second, the research contributes to *the practical feasibility of a 'distributed collaboration system' as an implementable system on the electronic communication medium*. This is supported by a determination at the 5% level of significance that a 'distributed collaboration system' as perceived by actor-participants is, first and foremost, considerd *useful* (particularly with regard to automated record generation, process enablement, fit-for-purpose; followed by productivity, efficiency and effectiveness), with additional value accorded to *usage* (particularly with regard to access, availability, subject of discussion and affordability), followed, to a lesser extent, by *usability* (particularly with regard to human machine interface, and easy-to-effect usability). The contribution of this practical construct is significant for all nation-states worldwide, particularly with respect to the less resource-endowed developing nation-states. This is because as host to an international relations conference, implementation of a virtual conference as opposed to the conduct of a conventional international conference has been demonstrated to be more cost-effectice and hence to provide a cost-advantage to less resource-endowed developing nation-states.

Contribution 3 – Contribution to Practice: A Guideline on How to Run a Virtual Collaboration Session in the International Relations Context

Third, the study contributes to a *Guideline on How To Run a Virtual Collaboration Session in the International Relations Context*, which provides a 9-stage process-based strategy, which we depict in a tabular form in TABLE 7-1 and schematically in FIGURE 7-1. The Guideline can be deployed by conference secretariats in nation-states worldwide. The Guideline is a sequel to the realisation of an empirically derived multilateral negotiation framework derived in §5.6. as a specific demonstration that states-as-actors behaviour on the electronic communication medium is able to give insight onto how to run a CSCW session.

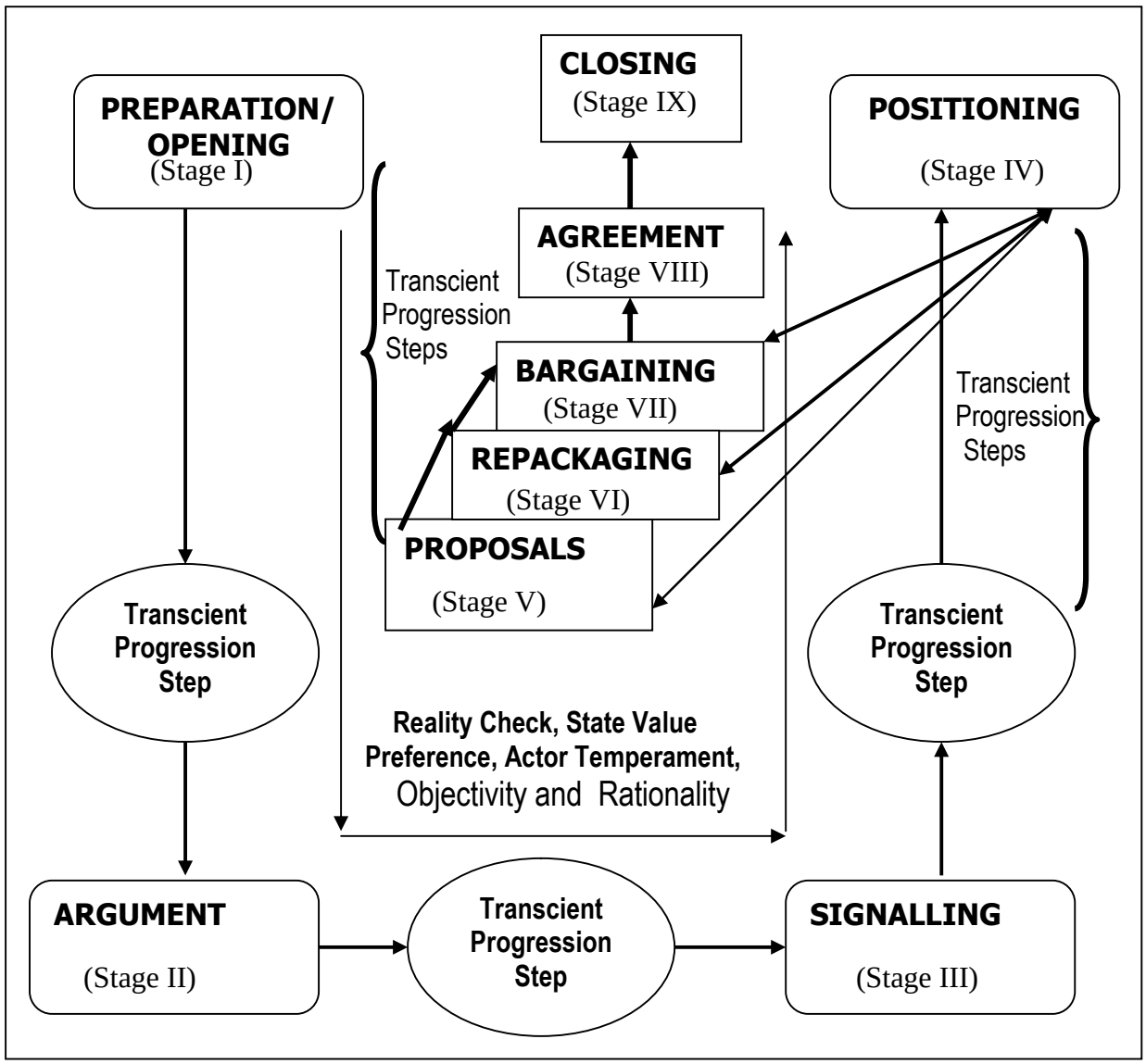
Progression from one stage to the next may be perceived as entailing a 'transitory' or 'transcient' change process represented as a '**transcient progression step**', which remains finite every time until the next stage takes a firm hold. It is at a transcient progression step, each time, where a **balancing act** is attempted to resolve existing differences in goals uniquely held by individual states-as-actors on behalf of the nation-states they represent. It is customary at a CSCW session in the international relations context to take cognisance at all times, particularly during the various transcient progression steps, of the following:

- **Objectivity**, aiming to drive the session to a desired goal or compromise, to the extent possible;
- **Rationality**, aiming to drive the session along a logical path to a desired goal or compromise;
- **State-Goal Preferences,** which must be kept in view in the course of a session;
- **Personal Temperament of States-as-Actors**, which must be kept to a minimum; and
- **Reality Check** with the with the rest of members designated as 'conference delegation', to confirm that transcient progression steps at any or some point in time is still within state-goal preferences.

TABLE 7-1: Guideline: A CSCW Session As 9-Stage Process-Based Strategy

Stage	Process	Definition
Stage I	**Preparation / Opening**	Characterised by making available, electronically, by conference secretariat, relevant information resource on conference / *Marking the start of conference* by conference Chair.
Stage II	**Argument**	Real-time opportunity in which actor-participants begin to *advance discussions around subject of discussion as proponent or opponent in a generic stance*, keeping in view their individual positions in the light of the goals of nation-states they represent as 'states-as-actors'.
Stage III	**Signalling**	Real-time opportunity in which actor-participants begin to *demonstrate and test their viewpoints for or against aspects of the domain of discussion*, keeping in view their individual positions in the light of the goals of nation-states they represent as 'states-as-actors'.
State IV	**Positioning**	Real-time opportunity in which actor-participants begin *formulate and present their actual individual positions* in the light of the goals of the nation-states they represent as 'states-as-actors'.
Stage V	**Proposals**	*Propositions formulated in generic terms â priori or synthesised on the basis of salient points of ongoing dialogue/discourse* (in argument, signalling and positioning) by conference secretariat as a basis for discussion downstream into the conference.
Stage VI	**Repackaging**	Real-time opportunity in which actor-participants *attempt to re-formulate the proposals in alternative, parallel or synergistic terms*, drawing from their own individual circumstances with respect to goals of the nation-states they represent as 'states-as-actors'
Stage VII	**Bargaining**	Real-time opportunity for actor-participants to give and take, or effect trade-offs among discussing parties.
Stage VIII	**Agreement** (Unanimity, Consensus, Compromise, Declaration, Resolution, Trade-Off, etc)	*Conference outcome*, which can take one or other or combinations of the forms stated. It is the *culmination of the immediate conference deliverable. All nation-states recognise that in the international system there are **gains** to be made and **pains** to be endured, **compromises** to be reached, and **conflicts** and **threats** to be faced.* The relations of states must therefore be seen as *a complex of **conflicts** and **co-operations** embracing hundreds of different kinds of situations in some of which power is apparently at stake and others of which mutual convenience is the real issue*' Central to seeking to progress this line of discussion is the observation that *the goals of actors in the international relations context will, in general, be dissimilar owing to the diverse historical, cultural and social backgrounds. No state can expect only `gains for its own position on all values, at all times and in all places'.* Arrival at an **agreement** is a critical reqirement.
Stage IX	**Closing / Concluding**	*Marking the end of conference / conclusion*

FIGURE 7-1: Guideline: A CSCW Session As 9-Stage Process-Based Strategy



7.3 Recommendations

Recommendation 1

The research study recommends that governments of nation-states worldwide strive to deploy a distributed collaboration system as a practical alternative to the implementation of a conventional international relations conference, starting with small-size conferences, with the aim of progressively making transitions to fully-fledged virtual international relations conferences. Such a deployment has the effect of minimising the problems of operation, context and strategy that are frequently associated with the implementation of a conventional international relations conference.

Recommendation 2

The research study recommends that nation-states undertake multilateral negotiations, whether in a conventional, physical, face-to-face round-the-table mode, or in a virtual distributed collaboration mode, to test, validate or adjust as borne out by practice, the following 9-stage process-based sequence of strategies, articulated in this study, with respect to multilateral negotiation in the international relations context: Stage I: Preparation, Stage II: Argument, Stage III: Signalling, Stage IV: Positioning, Stage V: Proposals, Stage VI: Repackaging, Stage VII: Bargaining, Stage VIII: Agreement, Stage IX: Closing / Conclusion

7.4 Further Research

States-as-actors behaviour in the international relations context as presented in this study is modelled as a "*Multi-Agent Z Specification Framework"*, which takes cognisance of the 'agent metaphor' which perceives as agents "live human beings interacting on the electronic communications medium in the international relations context". The outlook for further investigation should aim to research into a broader class of behaviour modes than investigated in this research study, namely, well beyond passivity, interactive agency (social ability), goal-oriented agency (proactiveness) and autonomous agency (autonomy), to *include* or incorporate *reactiveness*, and *adaptiveness.* Such future research should aim to introduce the *time variable*, in order to allow for a possible '*temporal continuity behaviour*', to allow for multi-agent behaviour in a time continuum, as opposed to conditions pertaining in this research, which relies on 'one-shot', discrete or discontinuous 'milestones' in the context of a time-continuum roadmap that characterises group sessions on the electronic communication medium. This would facilitate deployment of *causal links* or cause-and-effect frameworks as opposed to sole dependence on *inference links*.

Further research is recommended into transforming the specifications stipulated in the study's *Multi-Agent Z Specification Framework* into a computer programming language, to enable the implementation of information systems aimed at the realisation and delivery of the needs of international relations multilateral negotiations and conferences that are designed be implemented in *e*SocialSpace, namely, on the electronic communication medium.

In addition, it is recommended that 'action research' be deployed to investigate the pragmatics of real-world face-to-face bilateral/multilateral negotiations in the international relations context, and seek to validate or otherwise modify the model "*Multilateral Negotiation Framework: Embodying a 9-Stage Process-Based Strategy*" applied over a selected number of negotiations, multilateral or otherwise, in such areas as technology transfer (possibly involving a government and a transnational corporation), peace negotiation between warring factions or countries, etc. Furthermore, there is merit in investigating possible correlations between Information Exchange Behaviour, Interpersonal Level Group Interaction and Knowledge Exchange Behaviour in relation to artefacts, skills, heuristics, experience, natural talent, and social networks (ASHENS) in knowledge management practice

In this study, quotes and instantiations are outlined as tools of analysis, particularly with regard to a need for justification of phenomena in the themes or domains of discourse of the investigation. This was not progressed extensively in the research study, as the study's mode

of approach did not warrant justifications to great depth. There is, however, a window of opportunity, particularly in relation to application of the conceptual 'lens' to instantiations in content-based behaviour or theme primitives. This has implications for deployment in knowledge-based systems including knowledge analysis and design systems (KADS).

Last, but not least, this study considers it in order to reflect on improvements of the distributed collaboration system and support tools to better support virtual international relations conferences. This predicates the need for further research into selected aspects of the combined collaborative work infrastructure and collaborative work infostructure. The reason for this relies on the observation that domains of discourse in international relations conferences (such as at the United Nations or the Commonwealth) are often matters of high-level or critical importance to participating nation-states and as such it would be imperative for the full content of the discussions to become public only at some appropriate time. It is re commended that future research seek to investigate the incorporation of the following three aspects in relation to both the collaborative work infrastructure and the collaborative work infostructure:

- *Security on the electronic communication medium*, to provide a baseline for the security of data, networks and communication forming part of the distributed collaboration system (*e*Security);
- *A suitable legal framework*, to provide for admissibility of *e*Records, *e*Documents, *e*Messages, and *e*Signatures in jurisdictions of nation-states of actors participating at a virtual international relations conference session; and *valid laws of evidence*, to provide a suite of laws on the electronic communication medium, including electronic evidence law (*e*Evidence), for according legal validity, effect and force to *e*Records, *e*Documents, *e*Messages, and *e*Signatures; electronic privacy law (*e*Privacy), to safeguard personal information of the actors on the electronic communication medium; and electronic intellectual property law (*e*Intellect), to safeguard intellectual property of the information and knowledge generated by the actors on the electronic communication medium; and
- The *psycho-technical framework*, to provide the requisite environment for the building of *Trust* and *Confidence*, among the actors, on the distributed collaborative system (*a trusted business environment*).

Curriculum Vitae

Rogers wod'Olobo OKOT-UMA was born on 31st August 1947 in Kampala, Uganda. He graduated in 1972 with BSc Hons (First Class) in Physics, following which he undertook a postgraduate programme of research in microwave physics, under the auspices of a *sur place* scholarship at Makerere University, funded by the German Academic Exchange Programme. He obtained his Masters Degree (Solid State Physics) from makerere University in 1976. He was appointed Assistant Lecturer in Physics at Makerere University's Department of Physics in 1973, and in 1976 was promoted to Lecturer in Physics. During the period 1977 – 1980 he left Uganda and sought asylum in Kenya, escaping from Uganda's much troubled political years. In early 1977, Rogers wod'Olobo OKOT-UMA was appointed Lecturer in Physics/Mathematics at Kenya Science Teachers' College (KSTC) in Nairobi, where he served as Head of Mathematics Department through 1980. In late 1980, following the 'liberation' of Uganda from a dictatorial regime, he returned to Makerere University, where he was re-appointed as Lecturer in Physics. . In 1982, he was promoted to Senior Lecturer in Physics. The following year, he left Makerere University, on secondment, to join the Commonwealth Science Council at the Commonwealth Secretariat in London. The initial secondment, however, turned out to be a long-term tenure with the Commonwealth Secretariat, under whose auspices he worked until 2004. In the period from 1983 through 2004, Rogers W'O Okot-Uma worked, at various times, as Project Officer, Chief Project Officer, Chief Programme Officer, and Adviser in various areas of development including science and technology innovation (STI), global environmental issues, and public sector informatics, bearing the responsibility to assist developing Commonwealth governments worldwide to implement, among others, *e*Government masterplans (*e*GMP) and Change Management strategies, *e*Preparedness strategies, ICT Policies, and Trustworthy Computing.

Rogers W'O Okot-Uma has a number of Post-Graduate Certifications in Computing and Commerce (Project Management, Software Engineering, Computer Architecture, Intelligent Systems Analysis & Design, Formal System Specification, Digital Communications), from The Open University United Kingdom; and a number of Practitioner/Professional Certifications obtained as part of Continuing Professional Development in Web Development, TCP/IP. Relational Databases, Implementing and Securing Wi-Fi, and User Requirements Analysis, from accredited professional training organisation in the United Kingdom.

Rogers W'O Okot-Uma has to date designed, launched and directed the implementation of a Masters programme in computer science at the National University of Science & Technology, Zimbabwe. He has undertaken several consultancy assignments, on *e*Governance and Change Management, under Canada's Government Information & Telecommunications Services (GITS) (Nov/Dec 2001) , and under Australia's Marcus Evans e-Australia Summit (Oct/Nov 2002); on "Building *e*Governance Capacity for Africa" under the auspices of NePAD e-Africa Initiative (October/November 2002.).; and on Building Capacity for *e*Governance, under the auspices of Victoria University, New Zealand (Oct/Nov 2004). He has authored, co-authored, edited, co-edited, published, co-published over 10 books, in areas of public sector informatics, and environmental studies, among others. Rogers W'O Okot-Uma currently works as Consultant, Writer and Publisher under the auspices of Studies Forum International (SFI), in the United Kingdom.

BIBLIOGRAPHY

A

[ALAVI and LEIDNER 2001]: Alavi, M and Leidner, D (March 2001), "Knowledge Management and Knowledge Management Systems: Conceptual Foundation and An Agenda for Research", MIS Quarterly (25:1), pp107-136

[ALAVI and YOO 1997]: Alavi, M., and Yoo (1997), "Is Leaving in Virtual Teams Real?", Working Paper, Havrad Business School, Boston, Masachussetts

[AANESTAD and HANSETH 2000]: Aanestrtad, M, and Hanseth, O, "Implementing Open Network Technologies in Complex Work Practices: A Case from Telemedicine – Organisational and Social Perspectives on Information Technology", Kluwer Academic Publishers, 355-369, (2000)

[AYLETT and LUCK 2000]: Aylett, R. and Luck, M. (2000) Applying Artificial Intelligence to Virtual Reality: Intelligent Virtual Environments. *Appl. Artificial Intell.,14,* 3-32.

B

[BACKWEB 1999]: BACKWEB (1999), '*Overview of Knowledge Management*', 4/04/99 http//www.backweb.com.km.overview.html

[BLANCHE and DURRHEIM 1999]: Blanche, M. T., and Durrheim, K, (Eds) (1999). *Research in Practice: Applied Methods for the Social Sciences,* University of Cape Town Press.

[BOWEN 1996]: Bowen, J (1996) *Formal Specification and Documentation Using Z: A Case Study Approach.* International Thomson Computer Press, London.

[BOWEN, FETT and HINCHEY 1998]: Bowen, J, Fett, S, and Hinchey, M (eds) (1998) *ZUM'98: The Z Formal Specification Notation, 11th International Conference of Z Users. Lecture Notes in Computer Science, 1493.* Springer-Verlag, Berlin.

[BOWEN and HALL 1994]; Bowen, J. and Hall, J. (eds) (1994) *Z User Workshop: Proc. 8th Z User Meeting,* June, Cambridge. Springer-Verlag, London.

[BOWEN, HINCHEY and TILL 1997]: Bowen, J., Hinchey, M. and Till, D. (eds) (1997) *ZUM'97: The Z Formal Specification Notation, 10th Int. Conf. Z Users. Lecture Notes in Computer Science, 1212.* Springer-Verlag, Berlin.

[BURT 1983]: Burt, R S, *Applied Network Analysis: A Methodological Introduction*, London: Sage, 1983.

[BURTON 1967:5]: Burton, J W, *International Relations: A General Theory*, Cambridge University Press, Cambridge, 1997.

C

[CHUN WEI CHOO 1998] Chun Wei Choo (1998), "The Knowing Organisation: How Organisations Use Information to Construct Meaning, Create Knowledge and make Decisions", Oxford University Press, 1998.

[CHUDOBA 1993]: Chudoba, K, (1993). *Use of an Electronic Meeting System over Ttime: An Empirical Investigation.* (Doctoral Dissertation, University of Arizona, 1993) UMI, Ann Arbor, Michigan.

[COHEN and BAILEY 1997]: Cohen, S.G., and Bailey, D.E. (1997), " What Makes Teams Work: Group Effectiveness Research from the Shop Floor to the Executive Suite", Journal of Management, Vol 23, No 3, pp 239-290.

FISHER et al 1997]: Fisher, S.G., Hunter, T.A., and Ketin Macrosson, W.D. (1997), "Team or Group? Managers' Perceptionof the Differences", Journal of Managerial Psychology, Vol 12, No 4, pp 232-243.

[CONSTANT *et al* 1996]: Constant, D., Sproull, L., and Kiesler, S., (1996). "The Kindness of Strangers: The Usefulness of Electronic Weak Ties for Technical Advice", Organisation Science, Vol 7, No 2, pp119-135.

[**CALLON 1991]:** Callon, M, "Techno-Economic Networks and Irreversibility", A Sociology of Monsters: Essays on Power, Technology and Dominion, London: Routledge, 132-161, 1991

[CHESS, GROSOF, HARRISON, LEVIN, PARIS and TSUDIK 1995; WONG, PACIOREK and MOORE 1995]: Chess, D., Grosof, B., Harrison, C., Levine, D., Parris, C. and Tsudik, G. (1995), Itinerant Agents for Mobile Computing.,*IEEE Personal Commun., 2,* 34-49;

[CHUDOBA 1993]: Chudoba, K, (1993). *Use of an Electronic Meeting System over Ttime: An Empirical Investigation.* (Doctoral Dissertation, University of Arizona, 1993) UMI, Ann Arbor, Michigan.

[CIBORRA 1999]: Cibbora, C. "Notes on Improvisations and Time in Organisations", *Accounting and, Management and Infpormation Technologies,* 9(2)77-94, 1999.

[CONLDIN and BEGEMAN 1988]: Conklin, J, and Begeman, M, (1988), gIBIS: A Hypertext Tool for Exploratory Policy Discussion", *Proceedings of the Conference on CSCW, pp.* 140-152, New York, ACM

[CRAIG 1991]: Craig, I (1991) . *The Formal Specification of Advanced AI Architectures.* Ellis Horwood, Chichester

D

[DAVIS and DELCAMBRE 1991]: Davis, K C, and Delcambre, L M L, (1991), "Foundations for Object-Oriented Query Processing", *Computer Standards and Interfaces, 13,* 207-212

[DeSANCTIS and POOLE 1994]: DeSanctis, G. and Poole, M.S. (1994). Capturing the Complexity in Advanced Technology Use: Adaptive Structuration Theory, Organization Science 5,(2): 121-147.

[DeSANCTIS and POOLE 1997]: DeSanctis, G., and Poole, M.S. (1997), "Transistions in eamwork in New Organisation Forms", Advances in Group Processes,", Vol 14, pp 157-176

[DIX 1992]: Dix, A (1992). Pace and Interaction. In *People and Computers VII*: *Proc. HCI '92 Conf.*, pp 193-207. Cambridge University Press, Cambridge.

[DRUCKER 1988]: Drucker, P, (1988). "The Coming of the New Organisation", *Harvard Business Review,* January-February *1988):1988.11-53*

[DRUCKER 1988]: Drucker, P F, (988), "The Coming of the New Organisation", *Harvard Business Review,* Vol. 1, pp. 45-53.

[DRUCKER 1991]: Drucker, P F, (1991). "The New Productivity Challenge", *Harvard Business Review,* 69:6, pp. 69-79, Nov.-Dec. 1991.

[DUKE and HARRISON 1994]: Duke, D, and Harrison, M, (1994). From *Formal Models to Formal Methods*. In *Proc. Software Engineering and Human-Computer Interaction: ICSE '94 Workshop on SE-HCI: Joint Research Issues. Lecture Notes in Computer Science*, 896, 159-173. Springer, New York

E

[EDEN 1995]: Eden, C, "On Evaluating the Performamnce of 'Wide-Band' Group Decision Support

[EL-SHINNAWY and VINZE 1995]: El-Shinnawy, M, and Vinze, A, "Understanding Group Polarisation" in GDSS Settings: A Theoretical Framework", *Proceedings of the informs 1995 Sessions on GDSS as Support for Designing Organisations & Information Systems*, G J de Vreede, H G Sol (Editors) 199**5**

[ETZIONI and WELD 1995]: Etzioni, O. and Weld, D. (1995), Intelligent Agents on the Internet: fact, fiction and forecast. *IEEE Expert, 10,* 44-49.

[ETZIONI, LEVY, SEGAL and THEKKATH 1995]: Etzioni, O., Levy, H., Segal, R. and Thekkath, C. (1995),

The Softbot Approach to OS Interfaces, . *IEEE Software,* 12, 1-11

[EVANS, G, and NEWNHAM, J, 1998]: Evans, G, Newnham, J, *The Penguin Dictionary of International Relations*, Penguin Books, 1998]

F

[FOX, 1959: ix]: Fox, T R William (ed), *Theoretical Aspects of International Relations,* Notre Dame, University of Notre Dame Press (1959).

G

[GENESERETH and KETCHPEL 1994] : Geneseret, M. and Ketchpel, S. (1994) Software Agents. *Commun. ACM, 37,* 48-53.

[GILBERT 1994]: Gilbert, M J (1994), Understanding Quality Management Standards, The Institute of Management

[GOODWIN 1995]: Goodwin, R. (1995). A formal specification of agent properties. *J. Logic Comput., 5,* 763-781.

[GRAND and CLIFF 1998]: Grand, S. and Cliff, D. (1998) Creatures: Entertainment Software Agents with Artificial Life. *Autonomous Agents MultiAgent Syst.,* 1, 39-57.

[GUTTMAN, MOUKAS and MAES 1998]: Guttman, R., Moukas, A. and Maes, P (1998) Agentmediated Electronic Commerce: A survey, *Knowledge Eng. Rev.,* 13, 147-159

H

[HUBER 1991]: Huber, G.P. (1991), "Organisation Learning: An Examination of the Contributing Processes and the Literatures", Organisation Science 2, 88-115

[HAMMER 1990]: Hammer, M., Reengineering Work: Don't Automate, Obliterate, *Harvard Business Review,* 68:4, pp. 104-112, July-Aug. 1990

[HARASIM 1993]: Harasim, L M, "Networlds: Networks as Social Space", in: L M Harasim (Ed), *Global Networks*, pp: 15-34, LONDON; THE mit PRESS, 1993.

[HAREL and NAAMAD 1997]: Harel, D, and Naamad, A, (1997). The STATEMATE Semantics of Statecharts. *ACM Trans Soft Eng Methodol*., 5, 293-333.

[HARRISON and TORRES 1997]: Harrison, M, and Torres, J (eds) (1997) . In *Proc. Design, Specification and Verification of Interactive Systems '97*, Granada, Spain, June 4-6. Springer, Heidelberg**.**

[HARTMANN, 1967: 4]: Hartman, H F (ed), World in 'Crisis: Readings in International relations', 3rd Edition, Mackmillan, London (1967)

[HAYES 1993] Hayes, I. (ed.) (1993) *Specification Case Studies* (2nd edn).,Prentice-Hall, Hemel Hempstead, UK.

[HEDLUND 1994]: Hedlund, G (1994), "A Model of Knowledge Management and the N-th Form Corporation", Strategic Management Journal (15), pp 73-90

[HELQUIST, KRUSE and ADKINS 2006]: Helquist, J.H.; Kruse, J. and Adkins, M. (2006). Participant-Driven Group Support Systems to Support Large Distributed Group Facilitation, International Conference on Group Decision and Negotiation, Karlsruhe, Universtatsverlag Karlsruhe.

[HOFFMANN, 1960:6]: Hoffmann, Stanley (1960), *Contemporary Theory in International Relations*, Prentice-

Hall, New Jersey.

[HOLSTI 1967:6]: Holst*i, J K (1967), International Politics,* Prentice-Hall, NJ

[HOPKINS and MANSBACH 1973:4]: Hopkins, R F and Mansbach, R W (1973) Structures and Processes in International Theory, Haper and Row, New York

HVATUM *et al* 2005]: Hvatum, L.B.; Simien, T.; Cretoiu, A. and Hliot, D. (2005). Patterns and Advice for Managing Distributed Product Development Teams, Euro Plop, Irsee, Germany, EuroPlop.

J

[JAVENPAA and IVES 1994]: Jarvenpaa, S., and Ives, B (1994). YThe Global Network Organisation of the Future: Information Management Opportunities and Challenges", Journal of Management Infoermation Systems, Vol 10, No 4, pp25-57.

[JARVENPAA and LEIDNER 1999]: Jarvenpaa, S.L., Leidner, D.E., (1999). "Communication and Trust in Global Virtual Teams", Organisation Science 10(6), 791-815.

[JARVANPAA et al 1998]: Jarvanpaa, S, Knoll, K, and Leidner, D (1998). "Antecedants of Trust in Global Teams in Global Teams ", *Journal of MIS*, 14(4).

[JERVIS 1976] : Jervis, R (1976), *Perception and Misperception in International Politics*, Princeton University Press, Princeton)

[**JENNINGS, FARATIN, JOHNSON, O'BRIEN and WIEGAND 1996]:** Jennings, N., Faratin, P., Johnson, M., O'Brien, P. and Wiegand, M. (1996) Agent-based BusinessPprocess Management. *Int. J. Coop. Inf. Syst.,* 5*,* 105-130

[JENNINGS and WITTIG 1992]: Jennings, N. and Wittig, T. (1992) ARCHON: Theory and Practice. In *Distributed Artificial Intelligence: Theory and Praxis,* pp. 179-195. Kluwer Academic Press, Dordrecht, The Netherlands

[JOHNSON 1995]: Johnson, C, (1995) Time and the Web: Representing and Reasoning about Temporal Properties of Intercation with Distributed Systems. In Kirby, M, Dix, A, J, and FINLAY, J E, (eds), *Proc. HCI '95 Conf: People and Computers X*, Huddersfield, UK, August, pp 39-50. Cambridge University Press, Cambridge.

[JOHNSON 1996]: Johnson, C, (1996). Literate Specification: Using Design Rationale to Support Formal Merhods in the Development of Human-Computer Interfaces. *Human-Computer Interaction* J, 11, 208-222.

[JOHNSON and HAYES-ROTH 1977]: Johnson, L. and Hayes-Roth, B. (eds) (1997) *Proc. 1st Int. Conf. on Autonomous Agents,* Marina del Rey, CA. ACM, New York.

K

[KAYWORTH and LEIDNER 2000]: Kayworth, T., and Leidner, D (2000). "The Global Virtual Manager: A Prescription for Success", European Management Journal, Vol 18, No 2, pp 183-184

KHAZANCHI and ZIGURS 2007]: Khazanchi, D. and Zigurs, I. (2007). An Assessment Framework for Discovering and Using Patterns in Virtual Project Management, Hawaii International Conference on System Science, Waikoloa, IEEE Computer Society Press.

[KIRKPATRICK 1997: 23, 64]: Kirkpatrick, E M (1977), "From Past to Present". In D??? M Freeman (ed) *Foundations of Political Science*, The Free Press, New York**.**

KOTLARSKI and OSHRI 2005]: Kotlarsky, J. and Oshri, I. (2005). Social Ties, Knowledge Sharing and Successful Collaboration in Globally Distributed System Development Projects, European Journal of Information Systems 14,(1): 37-48.

[KRISTOF et al 1995]: Kristo, A.L., Brown, K.G., Simps, H.P., and Smith, K.A (1995), "The Virtual Team: A Case

Study and Inductive Model", in Advances in Interdisciplinary Studies of Work Teams, M.M. Beyerlein, D.A Johnson, and S.T Beyerlein, 1995, pp 229-253.

[KUOKKA and HARADA 1995]; Kuokka, D. and Harada, L. (1995), Matchmaking for Information Agents. In *Proc. 14th Int. Joint Conf. on Artificial Intelligence (IJCAI-95), pp.* 672-679, Montreal, Quebec, Canada. Morgan Kaufmann, San Mateo, CA.

L

[LANGFRED 1998]: Langfred, C.W. (1998), "Is Group Cohesiveness a Double-edged Sword? An Investigation of the Effects of Cohesiveness on Performance", Small Group Research, Vol 29, pp 124-143

[LAVE and WENGER 1991]: Lave, E, and Wenger (1998), *Situated Learning, Legitimate Peripheral Participation,* Cambridge, MA: Cambridge Univ. Press

[LEONARD and SWAP 2004]: Leornard, D., and SWAP, W. ((2004). "Deep Smarts", Havrad Business Review, Boston 82(9), 88-98

[LOCKWOOD, LAVERY, and LACHAL 1993]: Lockwood, R, Lavery, M, and Lachal, L, (1993), *Groupware: Market Strategies.* Ovum Limited, London.

[LOWRY et al 2005]: Lowry, P.B.; Nunamaker, J.F. Jr.; Curtis, A. and Lowry, M.R. (2005). The Impact of Process Structure on Novice, Internet-based, Asynchronous-distributed Collaborative Writing Teams, IEEE Transactions on Professional Communication 48,(4): 341-364.

[LUCK and D'INVERNO 1995]: Luck, M and d'Inverno, M. (1995). A formal framework for agency and autonomy. In *Proc. 1st Int. Conf on Multi-Agent Systems, pp.* 254-260. AAAI Press/MIT Press, Menlo Park, CA.

[LUCK and D'INVERNO 2001]: Luck, M, and D'Inverno, M, (2001) A Conceptual Framework for Agent Definition and Development, The CputerJournal. Vol 44, No 1

M

MACAULAY, ALABDULKARIM and KOLSCHOTEN 2006]: Macaulay, L.A.; Alabdulkarim, A. and Kolfschoten, G.L. (2006). An Analysis of the Role of the Facilitator and Alternative Scenarios for Collaboration Support, First HICSS Symposium on Case and Field Studies of Collaboration, Kauai.

[MADKIN et al 1996]: Madkin, D., S. Cohen, and T. Bikson (1966). Teams and Technology. Cambridge: Havard University Press.

[MAJCHRZAK et al 2000]: Majchrzak, A., Rice, R.E., Malhotra, A., King, N., and Ba, S (2000), "Technology Adaptation: The Case of a Computer-Supported Inter-Organisational Virtual Team", MIS Quarterly (24:4), 2000, pp 569-600

[MARIANE & RODDEN 1996]: Mariane, J A, Rodden, T, "Co-operative Information Sharing: Developing a Shared Object Service", *The Computer Journal*, Vol 39, No 6, 1996.

[MARSEY et al 2001]: Marsey, A.P., Monyoya-Weiss, M., Hung, C., and Ramesh, V (2001), "Cultural Perceptions of Task-Technology Fit", Communications of the ACM (44:12), 2001, pp 83-84

MAZNEVSKI and CHUDOBA 2001] : Maznevski, M., and Chudoba, K (2001), "Bridging Space Over Time: Global Virtual Team Dynamics and Effectiveness", Organisation Science, Vol 11, No 5, pp473-492

[McLELLAND 161:24]: Mclelland, A Charles (1961), "The Social Sciences, History and the International Relations", in J R Rosenau (ed), *International Politics and Foreign Policy*, The Free Press, New York.

[MILNES 1992]: Milnes, B. (1992) A Specification of the Soar Architecture in Z. Technical Report CMU-CS-92-169, School of ComputerScience, Carnegie Mellon University.

[MULLER 1998] Muller, J P (1998), Architectures and Applications of intelligent Agents: A Survey. *Knowledge Eng. Rev.,* 13, 353-380

N

[NIEDERMAN, BEISE and BERANEK 1993]: Niederman, F.; Beise, C.M. and Beranek, P.M. (1993). Facilitation Issues in Distributed Group Support Systems, Conference on Computer personnel research, St. Louis, ACM Press.

[NONAKA 1991]: Nonaka, I (1991), '*The Knowledge Creating Company', Harvard Business Review*. November-December, pp 96-104.

[NONAKA and TAKEUCHI 1995]: Nonaka, I, Takeuchi, H (1995, '*The Knowledge Creating Company*: *How Japanese Companies Create the Dynamics of Innovation'*, Oxford University Press.

[NITZE 1959:1]: Nitze, H Paul (1959), "Necessary and Sufficient Elements of a General Theory of International Relations", In T R W Fox (ed), *Theoretical Aspectys of International Relations*, Notre Dame Press, Notre Dame.

[NUNAMAKER, et al 1997]: Nunamaker Jr, J F, Briggs, R.O, Mittleman, D.D., Vogel,D.R., and Balthazard, P.A., (1997) "Lessons from a Dozen Years of Group Support Systems research: A Discussion of Lab and Field Findings", Journal of Management Information Systems, Winter 1996-97, *Vol. 1*3, No. 3, pp. 163-207.

P

[PANKO 1992]: Panko, R. (1992). "Extending the Use of Time Studies", Nunamaker, J, and Sprague, R, *Proceedings of the 25th Annual Hawaii International Conference on Systems Sciences*, IEEE: Hawaii, (1992), Vol III, 60-69

[PAPADOPOULOS 2002]: Papadopoulos, C, (2002). An Extended Temporal Logic for CSCW, *The Computer Journal,* Vol 45, No 4, British Coputer Socity, London.

[PAUL et al 2004]: Paul, S., Seetharaman, P., MYKTYN, P.P. (2004). "Impact of heterogeneity and Collaborative Conflict Management Style on the Performance of Synchronous Global Virtual Teams", *Information and Management* 41(3), 303-321.

[PFALTZGRAF 1967: 1-2]: Pfaltzgraff, L Robert Jr (ed) (1967), *Politics and International Systems*, J B Lippmeott Co, Philadelphia.

[PENTLAND 1995]: Pentland, B (1995), "Information Systems and Organisational Learning: The Social Epistemology of Organisational Knowledge Systems", Accounting, Management and Information Technologies (5:1), pp 1-21

[PEPPARD and RYLANDER 2001]: Peppard, J., and Rylander, A. (2001), "Leveraging Intellectual Capital at ApiON", Journal of Intellectual Capital, pp 225-235

[PERVAN and ATKINSON 1992]: Pervan, G P, and Atkinson, D J, (1992), "Trends in GDSS Research: A Case for Plurality of Methodologies", *Proceedings of Second International Organisational Behaviour Teaching Conference,* Curtin University, Perth, Western Australia.

[POLANYI 1993]: Polanyi, M, (1983), '*The Tacit Dimension'*, Peter Smith Publications.

[POOLE and DeSANCTIS 1990]: Poole, M S, and DeSanctis, G, (1990) "Understanding the Use of Group Decision Support Systems: The Theory of Adaptive Structuration,", Fulk, J, and Steinfield, C, (Eds), *Organisation and Communication Technology,* Sage, Newbury Park, CA.

[POOLE and DeSANCTIS 2004]: Poole, M. S. and DeSanctis, G. (2004). "Structuration Theory in Information Systems Research: Methods and Controversies". Handbook of Information Systems Research. M. E. Whitman, M E,and Woszczynski A. B. Hershey, Idea Group: 206-249.

[POOLE and JACKSON 1993]: Poole, M S and Jackson, M H, "Communication Theory and Group Support Systems", in L M Jessup and J S Valacich (Eds), Group Support Systems: New Perspectives on Organisations and New Information Technology: Lond

[POWELL et al 2004]: Powell, A., Picolli, G., and Ives, B. (2004). "Virtual Teams: A Review of Current Literature and Directions for Future Research", The Database for Advances in Information Systems 35(1), 6-36.

Q

[QURESHI 1995a]: Qureshi, S, "Supporting Electronic Group Processes: A Social Perspective", in: L Hofman (Ed), *Supporting Teams, Groups and Learning Inside and Outsiude the IS Function*, SIGCPR/ACM, Nashville, 1995

[**QURESHI 1995b]:** Qureshi, S, *Organisations and Networks: Theoretical Considerations and a Case Study*, PhD Thesis, London School of Economics, 1995.

[QURESHI, BRIGGS and HLUPIC 2006]: Qureshi, S., Briggs, B., and Hlupic, V (2006), "Value Creation from Intellectual Capital: Convergence of Knowledge Management and Collaboration in the Intellectual Bandwidth". Group Decision and Negotiation, Vol 15, No 3, pp197-22.

[QURESHI, KEEN, P 2005]: Qureshi, S. and Keen, P (2005) "Activating Knowledge through Electronic Collaboration: Vanquishing the Knowledge Paradox". *IEEE Transactions in Professional Communication*. Vol 48, Issue 1. Pp: 40- 54.

[QURESHI and VOGEL 2001]: Qureshi, S., and Vogel, D. (2001) " Adaptiveness in Virtual Teams: Organisational Challenges and Research Directions". *Group Decisions and Negotiations*; Jan 2001; pp 27-46

[QURESHI and ZIGURS 2001]: Qureshi, S., and Zigurs, I, Paradoxes and prerogatives in Global Virtual Collaboration". *Communicationsof the ACM* special section on Global Applications of Groupware. 44(12). December 2001

R

[ROBEY et al 2002]: Robey, D.H., KHOO, and POWERS, C. (2002), "Situated Learning in Cross Functional Virtual Teams", IEEE Transactions on Professional Communication 42(1), 51-66

[ROMANO *et al* 1999]: Romano, Jr. N.C.; Nunamaker, Jr. J.F.; Briggs, R.O. and Mittleman, D.D. (1999). Distributed GSS Facilitation and Participation: Field Action Research, Hawaii International Conference on System Sciences, Los Alamitos, IEEE.

[RUTKOWSKI et al 2002]: Rutkowski, A.F., Vogel, D.R., van Genuchten, M., Bermelmans, and Favier, M, (2002), "E-Collaboration:The Reality of Virtuality", IEEE Transactions on Professional Communication, New York 45(4), pp 219

[RYLANDER, JACOBSEN and ROSS 2000]: Rylander, A., Jacobsen, K., and Ross, G. (2000)."Towards Improved Information Disclosure on Intellectual Capital", *International Journal of Technology Management* 715-741

[REYNOLDS 1971:10]: Reynolds, P A (1971), Introduction to International Relations, Schenkman Publishing Co, Cambridge, Mass

[RODDEN, MARIANI and BLAIR 1992]: Rodden, T, Mariani, J, and Blair, G, (1992), "Supporting Co-operative Applications: CSCW.- *An International Journal, 1,* 41-67

[ROSENAU 1961: 5 - 6]: Rosenau, N J (1961), International Politics and Foreign Policy, The Free Press, New York

[**RUBIN and GOLDBERG 1992]:** Rubin, K, and Goldberg, A, "Object Behaviour Analysis", *Communications of the ACM* 35(9): 48-62, 1992.

S

[SARKA, VALACICH 2003]: Sarker, S and Valacich, J.S. (2003). Virtual Team Trust: Instrument Development and Validation in an IS Educational Environment, *Information Resources Management Journal* 16,(2): 35-55.

[SCHRAGE 1990] Schrage, M. (1990), *Shared Minds: The New Technologies of Collaboration* , New York: Random House.

[SENGE 1990]: Senge, P.M. (1990), *The Fifth Discipline: The Age and Practice of the Learning Organisation.* London: Century Business

[SHULTZE and LEIDNER 2002]: Shultz, U., and Leidner, D.E., (2002), "Studying Knowledge in Information Systems Research: Discourses and Theoretical Assumptions", MIS Quarterly, 26(3), 213-242.

[**SNOWDEN 1998]:** Snowden, D J, " 'I only know what I know when I need to know it' – Embracing the active Management of Tacit Knowledge', *Knowledge Management* , Arkgroup, March, 1998.

[SNOWDEN 2000a]: Snowden, D J, Organic Knowledge Management: The ASHEN Model: An Enabler of Action, *Knowledge Management*, Arkgroup, April 2000, Vol 3 Issue 7, p14 - 17

[SNOWDEN 2000b]: [SNOWDEN 2000b: Snowden, D J, Organic Knowledge Management: Knowledge Elicitation: indirect knowledge discovery, *Knowledge Management,* Arkgroup, June 2000, Vol 3 Issue 9, p11 – 14]

[SHAW and ZDONIK 1990]: Shaw, G. M. and Zdonik, S. B. (1990) A Query Algebra for Object-Oriented Databases. *Proceedings Sixth International Conference on Data Engineering,.* IEEE Comput. Soc. Press, pp. 154-162.

[SONDERMAN and OLSEN 1966]: Sonderman, A Fred, and Olson, William C, (eds) (1966), *The Theory and Practice of International Relations*, 2nd ed, Prentice-Hall, N J

[SPANIER 1972:4, 9]: Spanier, John (1972), *Games nations Play: Analysing International Politics,* Praeger, Ne York

[SPIVEY 1988]: Spivey, J. (1988) *Understanding Z: A Specification Languageand its Formal Semantics.* Cambridge University Press.Cambridge, UK.

[SVEIBY 1997]: Sveiby, K.E. (1997). The New Organisational Wealth: Managing and Measuring Knowledge-based Assets, San Fransisco CA, USA: Berrett-Koehler Publishers

[SVEIBY and ERIK 1997]: Sveiby, Karl Erik, (1997), '*The New Organisational Wealth, Managing & Measuring Knowledge-Based Assets', Berrett-Koehler Publishers Inc., 1997.*

T

[TARMIZI *et al* 2006]: Tarmizi, H.; Payne, M.; Noteboom, C.; Zhang, C.; Steinhauser, L.; Vreede, G.J. de and Zigurs, I. (2006). Technical and Environmental Challenges of Collaboration Engineering in Distributed Environments, CRIWG LNCS, Medina del Campo, Spain, Springer-Verlag Heidelberg Berlin

[TELFORD nd JOHNSON 1996]: Telford, A J, and Johnson, C, (1996). Viewpoints for Accident Analysis. *Formal Aspects of Comput*., 3, 306-327.

TER BUSH and MITTLEMAN 2006]: Ter Bush, R. and Mittleman, D.D. (2006). Silence, Attribution Accuracy and Virtual Environments: Implications for developers and facilitators, Hawaii International Conference on System Sciences, Kauai, IEEE Computer Society Press.

[TOOMEYand MARK 1995]; Toomey, C. and Mark, W. (1995), Satellite Image Dissemination via Software

Agents. *IEEE Expert,* 10*,* 44-51

U

[UOL 1999]: University of London (1999), *Mathematical Formulae including Statistical Formulae and Tables***, Thanet Press, Margate**

V

[VENKATRAMAN and HENDERSON 1998]: Venkatraman, N., and Henderson, J.C. (1998), "Real Strategies for Virtual Organising", *Sloan Management Review*, 34(2), 73-87.

W

[WALSHAM 1997]: Walsham, G. (1993), "Actor-Network Theory and IS Research: Current Status and Future Prospects", in: Janke, I, (1997), *Information Systems and Qualitative Research*, Degross Chapman & Hall, London, pp:466-480

[WALSHAM 2001]: Walsham, G, "Computers at Work: Introduction, Making a World of Difference, IT in a Global Context", *Wiley Series in Information Systems* (1)35-62, 2001

[WENGER 1998] : Wenger, E. (1998), Communities of Practice: Learning, Meaning, and Identity. Cambridge, MA: Cambridge University Press, 1998.

[WOOLDRDGE AND JENNINGS 1995]: Wooldridge, M, and Jennings, N, (1995) Intelligent Agents: Theory and practice. *Knowledge Eng. Rev*., 10*,* 115-152**.**

[WRIGHT, 1955: 3-8]: *The Study of International Relations,* Appleton-Century Crift, New York

Y

[YIN 1994]: Yin, R K, (1994). Case Study Research: Design and Methods (Vol 6), Newbury Park, CA:Sage

[YU and OSBORN 1991]: Yu, L. and Osborn, S. L. (1991) An Evaluation Frame work for Algebraic Object-Oriented Query Models. *Proceedings Seventh International Conference on Data Engineering,* IEEE Comput. Soc. Press, pp. 670-677.

Z

[ZIGURS and QURESHI 2001]: Zigurs, I, and Qureshi, S (2001). "Managing the Extended Enterprise, Creating Value from Virtual Space", in Dickson, G W, and De Sanctis, G (eds), Information Technology and the Future Enterprise: Ne Modes for Managers, New York: Prentice-Hall.

[ZIEGLAER, DIEHL and ZIJLSTRA 2000]: Ziegler, R.; Diehl, M. and Zijlstra, G. (2000). Idea Production in Nominal and Virtual Groups: Does computer-mediated communication improve group brainstorming?, Group Processes and Intergroup Relations 3,(2): 141-158.

APPENDIX I

International Relations Conferences: Problems of Operation, Context and Strategy – Schedules Data

TABLE 2-1.1: A Scheduling of Virtual Embassy, Internet Governance and Terrorism as a Multi-Thematic Three-Tier Conference (Prior to Year 2000)

	AM 1	**AM 2**		**PM 1**	**PM 2**
DAY 1	OPENING	Virtual Embassy	Lunch	Virtual Embassy	Virtual Embassy
DAY 2	Internet Governance	Internet Governance	Lunch	Internet Governance	Internet Governance
DAY 3	Internet Governance	Internet Governance	Lunch	Terrorism	Terrorism
DAY 4	Terrorism	Terrorism	Lunch	Terrorism	Terrorism
DAY 5	Terrorism	Terrorism	Lunch	Terrorism	CLOSING

TABLE 2-1.2: A Scheduling of Virtual Embassy, Internet Governance and Terrorism as Monothematic Individual Conferences (Prior to Year 2000)
- Duration + Travel Time Adjustments

Physical Face-to-Face, Round- the-Table Conferences	**Number of Participants**	**Minimum Total Duration (Conference Duration + 1 Day Travel Time Adjustments)**
Virtual Embassy	08	2 Days
Internet Governance	11	3 Days
Terrorism	15	4 Days

TABLE 2-1.3: A Scheduling of Virtual Embassy, Internet Governance and Terrorism as Monothematic Individual Virtual Conferences (Years 2000, 2001)

Virtual Sessions	**Number of Participants (maximum)**	**Total Duration**
Virtual Embassy	08	1.5 Hours (1 CSC W session)
Internet Governance	11	4.5 Hours (3 CSCW Sessions)
Terrorism	15	6.0 Hours (4 CSCW Sessions)

TABLE 2-1.4: A Scheduling of Unit Costings of Participation and Logistics in a Basic International Relations Conference (Adapted from CFTC Records - Years 2000, 2001)

DELEGATE PARTICIPATION	
Item	**Costings**
Airfares	30 @ £1,750 = £52,500
Accommodation	30 @ £125 for 6 nights = £22,500
Daily Out of Pocket Allowances	30 @ £50 for 6 nights = £9,000
Delegate Participation (sub-total costing)	**£84,000**
LOGISTICS (6 Days Total)	
Reprographics	£2,500
Telecommunications	£3,500
Equipment Hire	£5,000
Reception	£1,500
Local Travel and Transport (LTT)	£3,500
Rapporteur	£2,500
Health Insurance	£4,500
Security	£4,500
Administration	£5,000
Logistics (sub-total costing)	**£32,500**
Conventional International Relations Conference Costing	**£116,500**

APPENDIX II

A Record of Number of Occurrences of Interaction Primitives in CSCW Sessions on Virtual Embassy, Terrorism, and Internet Governance (Information Exchange Interactions, Intepersonal Group Interaction, Knowledge Exchange Interaction and States-as-Actors Behaviour)

CSCW 01: Session on Virtual Embassy: Diplomatic Representation in the Era of the Internet

TABLE 5-1.1: Number of Occurrences, and Percentage, of Interaction Primitives in CSCW Session on Virtual Embassy: Diplomatic Representation in the Era of the Internet (31 October 2000)

ID / Behaviour	<ELA>	<EST>	<EUC>	<JOV>	<KIS>	<RAC>	<TRI>	<LOI>	TOTAL	PROPORTION OF TOTAL
IP	02	01	04	42	10	01	21	01	83	**17.9%**
IS	01	-	-	15	04	-	12	-	32	**6.9%**
RA/RR	-	-	01	05	01	-	06	-	-13	**2.8%**
CA/CR	-	-	-	-	-	-	01		01	**0.2%**
CI		-	03	10	03	-	06	-	22	**4.7%**
RP	-	-	-	-	-	-	-	-	-	**-**
CP	-	-	-	-	-	-	-	-	-	**-**
SC	-	-	-	04	-	-	01	-	05	**1.1%**
CC	-	-	-	-	-	-	-	-	-	
IXB	**03**	**01**	**08**	**76**	**18**	**01**	**47**	**01**	**155**	**33.5%**
INIT/PROP	01			22	04		07	-	34	**7.3%**
GUID/SEQU	-	-	-	01	-	-	-	-	01	**0.2%**
INST	01	-	01	13	01	-	10	-	26	
SUBS				01					01	**0.2%**
BUIL	-	-	01	21	05		18	-	45	**9.7%**
CLAR	-	-	-	12	05	-	15		32	**6.9%**
SEEK	01	-	-	10	02	-	11	01	27	**5.8%**
ALTS	-	-	-	-	-	-	-	-	-	**-**
AGRE/SUPP	-	01	04	05	03	01	01	-	15	**3.2%**
DISA/OPPO			01	01	01		02		05	**1.1%**
EVAL/TEST	-	-	-	-	02	-	-	-	02	**0.4%**
SUMM/RECA	-	-	-	01	-	-	-	-	01	**0.2%**
IGI(1)	**03**	**01**	**07**	**87**	**23**	**01**	**66**	**01**	**189**	**40.8%**
OPEN	-	-	-	02	-	-	-	-	02	**0.4**
ENCO	01	-	-	12	03	-	11	-	27	**5.8%**
CAUT/PTOO	-	-	-	-	-	-	-	-	-	**-**

REDT/PCKG/	-	-	-	-	-	-	-	-	-	-				
ACKN/APOL	-	-	-	-	-	-	-	-	-	-				
FDBK	-	-	-	02	-	-	01	-	03	0.6%				
CLOS	-	-	-	01	-	-	02	-	03	0.5%				
IGI(2)	**01**	**-**	**-**	**17**	**03**	**-**	**14**	**-**	**35**					
ATTK/DFNG	-	-	-	-	-	-	-	-	-	-				
BLKG/HLTG	-	-	-	-	-	-	-	-	-	-				
DVTG	-	-	-	-	-	-	-	-	-	-				
SREC	-	-	-	-	-	-	-	-	-	-				
WDRW	-	-	-	-	-	-	-	-	-	-				
PTSC	-	-	-	-	-	-	-	-	-	-				
OVER	-	-	-	-	-	-	-	-	-	-				
TRIV	-	-	01	-	-	-	01		02	0.4				
IGI(3)			**01**				**01**		**02**	**0.4**				
IGI	04	01	08	94	26	01	81	01	216	46.7%				
KGen	01	-	01	20	03	-	10	-	35	7.6%				
KShar	-	-	01	14	03	-	10	-	28	6.0%				
KApp	01	01	03	13	04	01	06		29	6.2%				
KXB	**02**	**01**	**05**	**47**	**10**	**01**	**26**	**-**	**92**	**19.8%**				
TOTAL	**09** 1.9%	**03** 0.6%	**21** 4.5%	**217** 46.9%	**54** 11.7%	**03** 0.6%	**154** 33.3%	**02** 0.4%	**463** 100%	100%				
ID / Behaviour	<ELA>	<EST>	<EUC>	<JOV>	<KIS>	<RAC>	<TRI>	<LOI>	TOTAL	PROPORTION OF TOTAL				
TOTAL														
		SUBJECT: VIRTUAL EMBASSY DISCOURSE – DIPLOMATIC REPRESENTATION												END

CSCW 02: Session on Terrorism - Conceptualisation

TABLE 5-2.1: Number of Occurrences, and Percentage, of Interaction Primitives in CSCW Session I on Terrorism: Part I- A Conceptualisation of Terrorism (27 September 2001)

ID / Behaviour	<CEL> 1	<EMA> 2	<JEL> 3	<JOV> 4	<KAP> 5	<KAR> 6	<SAI> 7	<SAL> 8	<SIB> 9	<TEB> 10	<TRA> 11	<VAL>	TOTAL	PROP of TOTAL
IP	07	08	-	38	14	-	04	26	03	07	-	08	115	**15.9%**
IS	03	-	-	12	03		02	19	03	01	01	03	47	**6.5%**
RA/RR	01	-	-	03	-	-	-	03	-	-	-	02	09	**1.2%**
CA/CR														
CI		01	-	01	02	-	02	05	-	02	01	04	18	**2.5%**
RP														
CP														
SC		-	-	01	01	01	-	-	01	-	-	-	04	**0.6%**
CC														
IXB	**11**	**09**	**-**	**55**	**20**	**01**	**08**	**53**	**07**	**10**	**02**	**17**	**193**	**26.7%**
INIT/PROP	03	05	-	24	05		02	09	03	02	02	04	59	**6.2%**
GUID/SEQU	01	-	-	15	01	-	-	03	-	-	-	-	30	**2.8%**
INST	01	02		04	01		01	03	01	04	02	02	21	**2.9%**
SUBS	01	-	-	04	01		01	10	02	01	02	02	24	**3.3%**
BUIL	01	01	01	16	06		03	22	06	01	03	04	64	**8.9%**
CLAR		01	-	07	01		01	05	01	-	-	01	17	**2.4%**
SEEK*	04	-	-	11	01	-	-	14	03	01	-	06	40	**5.5%**
ALTS	-	-	-	03	-	-	-	01	-	-	-	-	04	**0.6%**
AGRE/SUPP	04	02	01	07			01	08	02	01	-	02	28	**3.9%**
DISA/OPPO	-	02	-	01	01	-	-	-	01	-	-	01	06	**0.8%**
EVAL/TEST				02	02			06					10	**1.4%**
SUMM/RECA				03									03	**0.4%**
IGI(1)	**133**	**13**	**02**	**97**	**19**	**-**	**09**	**81**	**19**	**10**	**09**	**22**	**296**	
OPEN	-	-	-	05	-	-	-	-	-	-	-	-	05	**0.7%**

ENCO	04	-	-	18	02	-	-	24	01	03	02	08	63	**8.7%**
CAUT/PTOO	-	-	-	-	-	-	-	-	-	-	-	-	-	-
REDT/PCKG/	-	-	-	03	-	-	01	03	-	-	01	-	08	1.1
ACKN/APOL	-	-	-	-	-									
FDBK	-	-	-	-	-	-	03	-	01	-	-	-	04	0.6
CLOS	-	-	-	03	-	-	-	-	-	-	01	-	04	
IGI(2)	**04**	**-**	**-**	**29**	**02**	**-**	**04**	**27**	**02**	**03**	**04**	**08**	**83**	**11.5%**
ATTK/DFNG	01	-	-	-	-	-	-	02	-	-	-	-	03	0.4%
BLKG/HLTG	-	-	-	02	-	-	-	01	-	-	-	-	03	0.4%
DVTG	-	-	-	-	-	-	-	01	-	-	-	02	03	0.4%
SREC													-	-
WDRW													-	-
PTSC	-	-	-	-	-	-	-	04	-	-	-	-	04	0.4%
OVER													-	-
TRIV	-	-	-	-	-	-	-	04	-	-	-	-	04	0.4%
IGI(3)	**01**	**-**	**-**	**02**	**-**	**-**	**-**	**12**	**-**	**-**	**-**	**02**	**17**	**2.4%**
IGI	138	13	02	128	21	0	13	120	21	13	13	32	396	54.8%
KGen	03	04		24	05		02	06	05	02	-	01	52	7.2%
KShare	02	04		09	04		02	10	01	04	02	04	42	5.8%
KApp	02			10	06		01	11	01`	02	03	04	40	5.5%
KXB	**07**	**08**	**-**	**43**	**15**	**-**	**05**	**27**	**07**	**08**	**95**	**09**	**134**	**18.6%**
TOTAL	37 5.1%	30 4.2%	02 0.2%	226 31.3%	56 7.8%	01 0.1%	26 3.6%	200 27.7%	35 4.8%	31 4.3%	110 20.0%	58 8.0%	722 100%	
ID / Behaviour	<CEL> 1	<EMA> 2	<JEL> 3	<JOV> 4	<KAP> 5	<KAR> 6	<SAI> 7	<SAL> 8	<SIB> 9	<TEB> 10	<TRA> 11	<VAL>		
	END	SUBJECT: TERRORISM – PART I --- CONCEPTUALISATION											END	

CSCW 03: Session on Terrorism – Addressing the UN General Assembly

TABLE 5-2.2: Number of Occurrences, and Percentage, of Interaction Primitives in CSCW Session II on Terrorism: Part II – Addressing the UN General Assembly (A Simulation) September 2001)

ID / Behaviour	CHAIR 1	FINLAND 2	USA 3	CANADA 4	SAFRICA 5	P'STAN 6	CARICOM 7	<JOV> 8	<KAR> 9	<VAL> 10	<KAP> 11	TOTAL	PROP of TOTAL
IP	02	08	20	-	-	-	02	30	04	02	-	68	**1.8%**
IS	01	01	01	01	01	-	02	05	02	-	-	14	**3.7%**
RA/RR	02	01	-	-	01	-	-	04	01	-	-	09	**2.4%**
CA/CR	-	-	01	02		01		06	-	01	-	**11**	**2.9%**
CI	-	-	01	01	-	-	-	07	01	-	01	**11**	**2.9%**
RP	-	01	03			-	01	-	-	-	-	**05**	**1.3%**
CP	04	-	-	-	-	-	-	-	-	-	-	**04**	**1.0%**
SC	01	01	-	-	-	-	-	-	01	-	-	**03**	**0.8%**
CC						-							
IXB	**10**	**12**	**26**	**04**	**02**	**01**	**05**	**52**	**09**	**03**	**01**	**125**	**32.8%**
INIT/PROP	03	05	03	-	-		-	11	-	02	-	**24**	**6.3%**
GUID/SEQU	05	-	-	-	-		-	10	-	-		**15**	**3.9%**
INST	-	-	05	-	-		02	07	02	-	-	**16**	**4.2%**
SUBS	-	02	04	-	-		-	03	-	-	-	**09**	**2.4%**
BUIL	03	06	12	01			03	17	01	-	-	43	**11.3%**
CLAR	-	-	01		01		01	04	01	-	01	09	**2.4%**
SEEK				01								01	**0.3%**
ALTS	02	-	-	-	-		-	-	-	-	-	02	**0.5%**
AGRE/SUPP	-	-	01	-	-		-	02	-	-	-	03	**0.8%**
DISA/OPPO	-	-	01	-	-		-	-	-	-	-	01	**0.3%**
EVAL/TEST	-	01	02	-	-		-	03		01	-	07	**1.8%**
SUMM/RECA	-	-	-	-	-		-	01	-	-	-	**01**	**0.3%**
IGI(1)	**13**	**14**	**29**	**02**	**01**	**-**	**06**	**58**	**04**	**03**	**01**	**131**	**34.4%**

OPEN	02	-	-	-	-	-	-	02	-	-	-	04	1.0%	
ENCO			01	01	02	01`	01	09	02	-	-	**17**	**4.5%**	
CAUT/PTOO	01	-	-	-	01	-	-	-	-	-	-	**02**	**0.5%**	
REDT/PCKG/	-	-	02	-	-	-	-	-	-	-	-	**02**	**0.5%**	
ACKN/APOL	05	02	-	01	-	01	-	03	-	-	-	**12**	**3.1%**	
FDBK												-	-	
CLOS	03	-	-	-	-	-	-	02				05	1.3%	
IGI(2)	**11**	**02**	**03**	**02**	**03**	**02**	**01**	**16**	**02**	**-**	**-**	**42**	**11.0%**	
ATTK/DFNG		01	01		01	-	-	-	-	-		03	0.8%	
BLKG/HLTG	-	-	-	-	-	-	-	-	-	-	-	**-**		
DVTG	-	-	-	-	01							01	0.3%	
SREC	-	-	-	-	-	-	-	-	-	-	-	**-**		
WDRW	-	-	-	-	-	-	-	-	-	-	-	**-**		
PTSC	-	-	-	-	-	-	-	-	-	-	-	**-**		
OVER	-	-	-	-	-	-	-	-	-	-	-	**-**		
TRIV	-	-	-	-	-	-	-	01	-	-	-	01	0.3%	
IGI(3)		**01**	**01**		**02**	**-**	**-**	**01**	**-**	**-**	**-**	**05**	**1.3%**	
IGI	24	17	33	04	06	02	07	75	06	03	01	178	46.7%	
KGen	02	04	03	-	-	-	-	11	01	01	-	22	5.8%	
KShare	-	03	10	01	-	02		12	02	01	-	**31**	**8.1%**	
KApp	-	02	08	01	-	-	-	09	02	01	01	**22**	**5.8%**	
KXB	**02**	**10**	**21**	**02**	**-**	**02**	**-**	**33**	**05**	**03**	**01**	**75**	**19.7%**	
TOTAL	**36** **9.4%**	**39** **10.2%**	**80** **21.0%**	**10** 2.6%	**08** **2.1%**	**05** **1.3%**	**12** **3.1%**	**160** **42.0%**	**20** **5.2%**	**09** **2.4%**	**03** **0.8%**	**381** **100%**	**100%**	
ID / Behaviour	CHAIR 1	FINLAND 2	USA 3	**CANADA** **4**	**SAFRICA** **5**	**P'STAN** **6**	CARICOM **7**	<JOV> 8	**<KAR>** **9**	<VAL> 10	<KAP> **11**			
	END	SUBJECT: TERRORISM – PART II- ADDRESSING THE UN GENERAL ASSEMBLY												END

CSCW 04: Session on Terrorism – A Special Session on Terrorism

TABLE 5-2.3: Number of Occurrences, and Percentage, of Interaction Primitives in CSCW Session III on Terrorism: Part III – A Special Session on Terrorism (09 October 2001)

ID / Behaviour	CHAIR 1	USA 2	FINLAND 3	EGYPT 4	SAFRICA 5	IRAN 6	RUSSIA 7		<JOV> 8	<KAP> 9	<KAR> 10	<CEL> 11	TOTAL	PROP of TOTAL
IP	14	09	03	04	02	02	02		05	03	-	-	44	**20.6%**
IS	-	-	-	-	-	-	-		-	01	-	-	01	**0.5%**
RA/RR	07	-	-	-	-	-	-		01	-	-	-	08	**3.7%**
CA/CR	-	-	-	-	-	-	-		-	-	-	-	-	-
CI													-	-
RP	01	04	03	-	01	01	01		-	-	-	-	**11**	**5.1%**
CP	14	-	-	-	-	-	-		-	-	-	-	**14**	**6.5%**
SC	01	-	-	-	-	-	-		-	-	-	-	**01**	**0.5%**
CC	01	-	-	-	-	-	-		-	-	-	-	**01**	**0.5%**
IXI	**38**	**13**	**06**	**04**	**03**	**03**	**03**	**-**	**06**	**04**	**-**	**-**	**80**	**37.4%**
INIT/PROP	06	03	02	02	01	01	01		-	-	-	-	**16**	**7.5%**
GUID/SEQU	01	-	-	-	-	-	-		-	01	-	-	**02**	**0.9%**
INST	02	02	-	01	01	-	-		01	01	-	-	**08**	**3.7%**
SUBS	-	04	-	01	-	-	01						**06**	**2.8%**
BUIL	07	07	02	02	01	-	01		01	01			22	**10.3%**
CLAR	-	-	-	-	-	-	-		-	01			01	**0.5%**
SEEK	-	-	-	-	-	-	-		-	01	-	-	01	**0.5%**
ALTS	04	-	-	-	-	-			-	01	-		05	**2.3%**
AGRE/SUPP	-	-	01			01	-		-	-	-	-	02	**0.9%**
DISA/OPPO		01	01	-	-	-	-		-	-	-	-	02	**0.9%**
EVAL/TEST	**01**	**01**	**01**	**-**	**-**	**-**	-		**02**	-	**-**		05	**2.3%**
SUMM/RECA	**01**	**-**	**-**	**-**	**-**	**-**	**-**		**01**				**02**	**0.9%**
IGI(1)	**22**	**18**	**07**	**06**	**03**	**02**	**03**	**-**	**05**	**06**	**-**	**-**	**72**	**33.6%**
OPEN	-	-	-	-	-	-	-	-	-	-	--	-	-	

ENCO	01									**01**			02	**0.9%**
CAUT/PTOO	**-**	-	-	-	-	-	-	-	-	-	--		-	-
REDT/PCKG/													-	-
ACKN/APOL	**-**	-	01	-	-	01	**01**		**-**	**-**	**01**	**02**	06	**2,8%**
FDBK													-	-
CLOS	01	-	-	-	-	-	-		**01**	-	-	-	02	**0.9%**
IGI(2)	**02**	**-**	**01**	**-**	**-**	**01**	**01**	**-**	**01**	**01**	**01**	**02**	**10**	**4.7%**
ATTK/DFNG	-	-	-	-	-	-	-	-	-	-	--	-	-	
BLKG/HLTG	-	-	-	-	-	-	-	-	-	-	--	-	-	
DVTG	-	01	-	-	-	-	-		-	-	-	-	01	**0,5%**
SREC													-	
WDRW	01	-	-	02	-	-	-		-	-	-	-	03	**-1.4%**
PTSC													-	
OVER	-	-	-	-	-	-	-	-	-	-	-	-	-	
TRIV	-	-	-	-	-	-	-	-	-	-	-	-	-	
IGI(3)	**01**	**01**	**-**	**02**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**04**	**1.9%**
IGI	25	19	18	08	03	03	04	-	06	07	01	02	86	40.1%
KGen	06	03	02	02	01	01	01		03	02	-	-	21	9.8%
KShar	08	01	01	-	01	-	-		04	01	-	-	16	**7.5%**
KApp	-	05	01	02	-	02	-		01	-	-	-	11	**5.1%**
KXI	**14**	**09**	**04**	**04**	**02**	**03**	**01**	**-**	**08**	**03**	**-**	**-**	**48**	**22.4%**
TOTAL	77 36.0%	**41** **19.2%**	**18** **8.4 %**	**16** **7.5%**	**08** **3.7%**	**09** **4.2%**	**08** **3.7%**	**-**	**20** **9.3%**	**14** **6.5%**	**01** **0.5%**	02 0.9%	**214** **100%**	**100%**
ID / Behaviour	CHAIR **1**	USA 2	FINLAND 3	**EGYPT** **4**	SAFRICA 5	IRAN 6	RUSSIA 7	**-**	<JOV> 8	**<KAP>** **9**	**<KAR>** **10**	<CEL> 11	TOTAL	
	SUBJECT: TERRORISM – PART III - SPECIAL SESSION ON TERRORISM													

CSCW 05: Session on Terrorism – Further Conceptualisation on Terrorism

TABLE 5-2.4: Number of Occurrences, and Percentage, of Interaction Primitives in CSCW Session IV on Terrorism: Part IV – Further Conceptualisation on Terrorism (16 October 2001)

ID Behaviour	<KAR> 1	<KAP> 2	<SAI> 3	<SAL> 4	<SIB> 5	<TEB> 6	<TRA> 7	<CEL> 8	<SLA> 9	< TOTAL > 10	PROP of TOTAL
IP	08	21	06	15	04	06	10	-	02	75	**18.6%**
IS	03	08	-	03	-	-	-	02	-	16	**4.0%**
RA/RR	02	06	-	01	-	-	-	-	-	09	**2.2%**
CA/CR	02	05	-	02	-	-	01	-	-	10	**2,5%**
CI	-	-	-	02	-	03	-	-	-	05	**1,2%**
RP	-	01	-	-	-	-	-	-	-	01	**0.2%**
CP	-	-	-	-	-	-	-	-	-	-	
SC	-	-	-	-	-	-	-	-	-	-	
CC	01	01		02				01	-	05	**1.2%**
IXI	**16**	**45**	**06**	**25**	**04**	**09**	**11**	**03**	**02**	**121**	**30.0%**
INIT/PROP	03	12	01	08	01	04	09	-	-	38	**9.4%**
GUID/SEQU	-	09	-	-	-	-	-	-	-	09	**2.2%**
INST	01	05	-	05	-	01	02	-	-	14	**3.5%**
SUBS	-	03	-	01	-	-	-	-		04	**1.0%**
BUIL	04	25	02	15	-	02	02	01	-	51	**12.7%**
CLAR	01	01	-	02	-	01	-	-		05	**1.2%**
SEEK	03	08	-	03	-	-	-	02	-	16	**4.0%**
ALTS	-	-	-	-	-	-	-	-	-	-	
AGRE/SUPP	03	02	-	02	01	-	02	-	01	11	**2.7%**
DISA/OPPO	02	-	01	01	-	-	-	-	01	05	**1.2%**
EVAL/TEST	-	03	-	-	01	-	-	-	-	04	**1.0%**
SUMM/RECA	-	01	-	-	-	-	-	-	-	01	**0.2%**

IGI(1)	**17**	**69**	**04**	**37**	**03**	**08**	**15**	**03**	**02**	**158**	**39.1%**			
OPEN	-	02	-	-	-	-	-	-	-	02	0.55			
ENCO	06	09	-	01	-	-	-	02	-	18	4.5%			
CAUT/PTOO	-	-	-	-	-	-	-	-	-	-				
REDT/PCKG/	-	-	-	-	-	-	-	-	-	-				
ACKN/APOL	01	01	-	09	-	-	-	01	-	12	3.0%			
FDBK	-	-	-	-	-	-	-	-	-	-				
CLOS	-	03	-	-	-	-	-	-	-	03	0.7%			
IGI(2)	07	15	-	10	-	-	-	03	-	35	8.7%			
ATTK/DFNG	-	-	-	-	-	-	-	-	-	-	-			
BLKG/HLTG	-	02	-	-	-	-	-	-	-	02	0.5%			
DVTG	01	-	-	-	-	-	-	-	-	01	0.2%			
SREC	-	-	-	-	-	-	-	-	-	-	-			
WDRW	-	-	-	-	-	-	01	-	-	01	0.2%			
PTSC	-	-	-	-	-	-	-	-	-	-				
OVER	-	-	-	-	-	-	-	-	-	-	-			
TRIV	01	-	-	-	-	-	01	-	-	02	0.5%			
IGI(3)	02	02	-	-	-	-	02	-	-	06	1.5%			
IGI	**26**	**86**	**04**	**47**	**03**	**08**	**17**	**06**	**02**	**199**	**49.4%**			
KGen	02	12	01	09	01	04	08	-	-	37	9.2%			
KShar	03	07	-	03	01	01	03			18	4.5%			
KApp	03	07	01	10	02	02	01	-	02	27	6.9%			
KXI	08	26	02	22	04	07	12	-	02	83	20.6%			
TOTAL	**50** **12.4%**	**157** **39.0%**	**12** **3.0%**	**94** **23.3%**	**11** **2.7%**	**24** **6.0%**	**40** **10.0%**	**09** **2.2%**	**06** **1.5%**	**403** **100%**	**100%**			
ID / Behaviour	<KAR> 1	<KAP> 2	<SAI> **3**	**<SAL> 4**	<SIB> 5	<TEB> 6	<TRA> 7	**<CEL> 8**	<SLA> 9	**< > 10**				

CSCW 06: Session on Internet Governance and Standardisation – A Conceptualisation

TABLE 5-3.1: Number of Occurrences, and Percentage, of Interaction Primitives in CSCW Session I on Internet Governance and Standardisation: Part I – A Conceptualisation (13 March 2001)

ID / Behaviour	<ANN> 1	<CEL> 2	<DON> 3	<JEL> 4	<RIA> 5	<SAI> 6	<SAL> 7	<SIB> 8	<TEB> 9	<EMA> 10	<CHA> 11	<VAL> 12	<WTO> 13	<VES> 14	<JOV> 15	TOTAL (PROP)
IP	16	01	01		05	05	15	03	08	01	02	02	06	05	61	**131 (18.7%)**
IS	03	01	-	-	01	03	03	02	04	-	-	01	03	03	05	**29 (4.1%)**
RA/RR	-	-	-	-	-	-	-	01	-	-	01	-	01	02	06	**11 (1.6%)**
CA/CR	04	-	-	01	-	-	03	02	03	-		-	-	-	02	**15 (2.1%)**
CI	04	-	-	-	01	-	06	01	01	-	-	-	01	01	05	**20 (2.9%)**
RP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**-**
CP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**-**
SC	-	-	-	-	-	01	-	01	-	-	-	-	-	-	02	**04 (0.6%)**
CC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
IXI	**27**	**02**	**01**	**01**	**07**	**09**	**27**	**10**	**16**	**01**	**03**	**03**	**11**	**11**	**81**	**210 (30.0%)**
INIT/PROP	08	01	01	-	02	03	05	02	02	01	-	01	05	03	38	**72 (10.3%)**
GUID/SEQU	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19	**19 (2.7%)**
INST	04	-	-	-	01	01	06	01	03	-	01	01	-	-	12	**30 (4.3%)**
SUBS	-	-	-	-	02	-	01	-	-	-	-	-	01	-	05	**09 (1.3%)**
BUIL	05	-	-	-	03	-	04	02	01	-	-	01	01	-	27	**44 (6.3%)**
CLAR	-	-	-	-	-	-	01	-	-	-	-	-	-	-	05	**06 ((0.9%)**
SEEK	03	01	-	-	01	03	03	02	04	-	-	01	03	03	05	**29(4.1%)**
ALTS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**-**
AGRE/SUPP	02		02	01	-	-	05	01	04	-	01	-	04	02	13	**35 (5.0%)**
DISA/OPPO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**-**
EVAL/TEST	-	-	-	-	-	-	-	-	-	-	-	-	-	-	01	**01 (0.1%)**
SUMM/RECA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	07	**07 (1.0%)**
IGI(1)	**22**	**02**	**03**	**01**	**09**	**07**	**25**	**08**	**14**	**01**	**02**	**04**	**14**	**08**	**132**	**252 (6.0%)**

OPEN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	03	**03 (0.4%)**
ENCO	07	02	-	01	-	01	12	-	04	-	02	-	03	04	25	**61 (8.7%)**
CAUT/PTOO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
REDT/PCKG/	-	-	-	-	-	-	-	-	-	-	-	-				-
ACKN/APOL	-	-	-	-	-	-	01	-	-	-	-	-	-	-	07	**08 (1.2%)**
FDBK	-	-	-	-	-	-	-	-	-	-	-	-	-	-	02	**02 (0.2%)**
CLOS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	01	**01 (0.1%)**
IGI(2)	**07**	**02**	**-**	**01**	**-**	**01**	**13**	**-**	**04**	**-**	**02**	**-**	**02**	**05**	**38**	**75 (10.6%)**
ATTK/DFNG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BLKG/HLTG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DVTG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SREC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WDRW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PTSC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OVER	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TRIV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
IGI(3)																
IGI	29	04	03	02	09	08	38	08	18	01	04	04	16	13	170	**327 (46.8%)**
KGen	08	-	01	-	02	03	05	03	02	01	-	01	05	03	37	71 (10.2%()
KShar	04	-	-	-	01	02	06	01	03	-	01	01	00	-	13	32 (4.6%)
KApp	06	01	01	-	02	-	12	01	04	-	-	-	04	03	24	57 (8.1%)
KXI	**18**	**01**	**02**	**-**	**06**	**04**	**14**	**05**	**09**	**01**	**01**	**02**	**09**	**06**	**74**	**161 (23.0%)**
TOTAL	74 10.6%	07 1.0%	06 0.8%	03 0.4%	22 3.1%	21 3.0%	79 11.3%	23 3.3%	43 6.2%	03 0.4%	08 1.1%	09 1.3%	36 5.1%	40 5.7%	325 46.5%	**699 100%**
ID / Behaviour	<ANN> 1	<CEL> 2	<DON> 3	**<JEL> 4**	<RIA> 5	<SAI> 6	<SAL> 7	<SIB> 8	**<TEB> 9**	<EMA> 10	**<CHA> 11**	**<VAL> 12**	<WTO 13	<VES> 14	<JOV> 15	**TOTAL 100%**

CSCW 07: Session on Internet Governance– Positioning for Negotiation

TABLE 5-3.2: Number of Occurrences, and Percentage, of Interaction Primitives in CSCW Session II on Internet Governance and Standardisation: Part II – Positioning for Negotiation (15 March 2001)

ID / Behaviour	<ANN> 1	<CEL> 2	<DON> 3	<JEL> 4	<JOV> 5	<SIB> 6	<SON> 7	<RIA> 8	<TEB> 9	<SLA> 10	<SAL> 11	<WTO> 12	<CHA> 13	<SAI> 14	TOTAL ((PROP)
IP	08	07	02	02	55	03	01	02	08	02	06	02	01		**99 (20.5%)**
IS	05	02	01	-	06	-	-	-	02	-	03	-			**19 (3.9%)**
RA/RR	01	01	-	-	06	01	-	-	02	-	02	-			**13 (2.7%)**
CA/CR	-	-	-	-	-	-	-	-	02	-	-	01			**03 (0.6%)**
CI	-	01	-	-	08	-	-	01	02	-	01	-			**13 (2.7%)**
RP	-	-	-	-	-	-	-	-	-	-	-	-		-	**-**
CP	-	-	-	-	-	-	-	-	-	-	-	-		-	**-**
SC	-	-	-	-	-	-	-	-	-	-	-	-		-	**-**
CC	-	-	-	-	-	-	-	-	-	-	-	-		-	**-**
IXI	**14**	**12**	**03**	**02**	**75**	**04**	**01**	**03**	**16**	**02**	**12**	**03**	**01**		**147 30.4%**
INIT/PROP	-	04	01	02	41	01	01	03	05	02	04	02			**72 (14.9%)**
GUID/SEQU	-	-	-	-	27	-	-	-	-	-	-	-			**27 (5.6%)**
INST	-	-	-	-	05	-	-	-	01	-	-	-			**08 (1.7%)**
SUBS	-	-	-	-	03	-	-	-	01	-	-	-			**04 (0.8%)**
BUIL	-	01	-	01	13	-	-	-	03	-	03	-			**24 (5.0%)**
CLAR	-	-	-	-	02	-	-	-	01	-	01	-			**04 (0.8%)**
SEEK	05	02	01	-	06	-	-	-	02	-	03	-			**19 (3.9%)**
ALTS	-	-	-	-	01	-	-	-	-	-	-	-			**01 (0.2%)**
AGRE/SUPP	-	02	-	-	02	-	-	-	-	-	01	-	01	01	**07 (1.4%)**
DISA/OPPO	-	-	-	-	01	-	-	-	-	-	02	-			**03 (0.6%)**
EVAL/TEST	-	-	-	-	-	-	-	-	01	-	-	-			**01 (0.2%)**
SUMM/RECA	-	-	-	-	05	-	-	-	-	-	-	-			**05 (1.0%)**

IGI(1)	**16**	**09**	**02**	**03**	**106**	**01**	**01**	**03**	**14**	**02**	**14**	**02**	**01**	**01**	**175 (36.2%)**
OPEN	-	-	-	-	01	-	-	-	-	-	-	-			**01 (0.2%)**
ENCO	05	01	01	01	14	01	-	-	05	-	04	-			31 (6.4%)
CAUT/PTOO	-	-	-	-	-	-	-	-	-	-	-	-			-
REDT/PCKG/	-	-	-	-	-	-	-	-	-	-	-	-			-
ACKN/APOL	01	-	-	-	03	-	-	-	-	-	01	01			06 (1.2%)
FDBK	01	-	-	-	-	-	-	-	-	-	-	-			-
CLOS	-	-	-	-	01	-	-	-	-	-	-	-			02 (0.4%)
IGI(2)	**07**	**01**	**01**	**01**	**18**	**01**	**-**	**-**	**05**	**-**	**05**	**01**			**40 (8.3%)**
ATTK/DFNG	01	-	-	-	-	-	-	-	01	-	-	-			**02 (0.4%)**
BLKG/HLTG					01									01	02 (0.4%)
DVTG	-	-	-	-	01	-	-	-	-	-	-	-		01	02 (0.4%)
SREC	-	-	-	-	-	-	-	-	-	-	-	-			-
WDRW	-	-	-	-	-	-	-	-	-	-	01	-			01 (0.2%)
PTSC															-
OVER	-	-	-	-	-	-	-	-	-	-	-	-			-
TRIV	-	-	-	-	-	-	-	-	-	-	-	-			-
IGI(3)	**01**				**02**				**01**	**-**	**01**	**-**		**02**	**07 (1.4%)**
IGI	24	10	03	04	126	02	01	03	20	02	20	03	01	03	**222 46.1%**
KGen	-	03	-	02	42	01	01	-	04	02	04	-			**59 (12.2%)**
KShar	08	-	02	-	10	-	-	02	02	-	-	02			26 (5.4%)
KApp	01	03	01	-	15	02	-	01	02	-	02	-	01		28 (5.8%)
KXI	**09**	**06**	**03**	**02**	**67**	**03**	**01**	**03**	**08**	**02**	**06**	**02**	**01**		**113 (3.4%)**
TOTAL	47 9.7%	28 5.8%	09 1.9%	08 1.7%	268 55.4%	09 1.9%	03 0.6%	09 1.9%	44 9.1%	06 1.2%	38 7.9%	08 1.7%	03 0.6%	03 0.6%	**482 100%**
ID / Behaviour	<ANN> 1	<CEL> 2	<DON> 3	<JEL> 4	<JOV> 5	<SIB> 6	<SON> 7	<RIA> 8	<TEB> 9	<SLA> 10	<SAL> 11	<WTO> 12	<CH 13	<SAI> 14	TOTAL

CSCW 08: Session on Internet Governance and Standardisation – Positioning for Negotiation

TABLE 5-3.3: Number of Occurrences, and Percentage, of Interaction Primitives in CSCW Session III on Internet Governance and Standardisation: Part III – Multilateral Negotiation (22 March 2001)

ID / Behaviour	CHAIR 1	CANADA 2	CHINA 3	GERMANY 4	RUSSIA 5	S.AFRICA 6	S.ARABIA 7	TUVALU 8	USA 9	BSA 10	ITU 11	WIPO 12	
IP	15	02	-	02	-	02	-	01	05	01	02	01	**31 (12.3%)**
IS	02	-	-	01	-	-	03	03	02	-	-	-	**11 (4.3%)**
RA/RR	04	-	-	01	-	-	01	03	01	-	-	-	**10 (4.0%)**
CA/CR	-	01	01	01	01	-	-	01	01	01	01	01	**09 (3.6%)**
CI	-	-	-	-	-	-	-	-	-	-	-	-	
RP	-	01	-	01	-	02	02	03	03	01	01	01	**15 (5.9%)**
CP	-	-	-	-	-	-	-	-	-	-	-	-	**12 (4.7%)**
SC	-	-	-	-	-	-	-	-	-	-	-	-	**03 (1.2%)**
CC	01	01	01	01	01	-	-	01	-	01	01	01	**10 (4.0%)**
IXI	**38**	**05**	**02**	**07**	**02**	**04**	**06**	**12**	**12**	**04**	**05**	**04**	**101(39.9%)**
INIT/PROP	12	-	-	-	-	01	-	-	01	01	-	-	**15 (5.9%)**
GUID/SEQU	13	-	-	-	-	-	-	-	-	-	-	-	**13 (5.1%)**
INST	01	-	-	01	-	-	-	-	-	-	-	-	**02 (0.8%)**
SUBS	01	-	-	01	-	-	-	-	01	-	-	-	**03 (1.2%)**
BUIL	05	-	-	01	-	-	-	-	-	-	-	-	06 (2.4%)
CLAR	01	-	-	-	-	-	-	01	-	-	01	-	03 (1.2%)
SEEK	02	-	-	01	-	-	03	03	02	-	-	-	11 (4.3%)
ALTS	07	-	-	-	-	-	-	01	-	-	-	-	08 (3.2%)
AGRE/SUPP	01	02	-	-	-	-	-	01	02	-	01	01	08 (3.2%)
DISA/OPPO	01	-	-	-	-	01	-	-	-	-	-	-	02 (0.8%)
EVAL/TEST	01	-	-	-	-	-	-	-	-	-	-	-	01 (0.4%)
SUMM/RECA	01	-	-	-	-	01	-	-	-	-	-	-	**02 (0.8%)**
IGI(1)	**46**	**02**	**-**	**04**	**-**	**03**	**03**	**06**	**06**	**01**	**02**	**01**	**74 (29.2%)**
OPEN	03	-	-	-	-	-	-	-	-	-	-	-	**03 (1.2%)**
ENCO	06	-	-	-	-	02	-	01	01	-	-	-	**10 (4.0%)**

CAUT/PTOO	-	02	-	-	-	-	-	02	-	-	-	-	**04 (1.6%)**
REDT/PCKG/	-	-	-	-	-	-	-	01	-	-	-	-	**01 (0.4%)**
ACKN/APOL	18	01	-	-	-	-	03	03	02	-	01		**28 (11.1%)**
FDBK	-	-	-	-	-	-	-	01	-	-	-	-	**01 (0.4%)**
CLOS	01	-	-	-	-	-	-	-	-	-	-	-	**01 (0.4%)**
IGI(2)	**26**	**03**	**-**	**-**	**-**	**02**	**03**	**08**	**03**	**-**	**01**	**-**	**48 ( )**
ATTK/DFNG	-	-	-	-	-	-	-	-	-	-	-	-	-
BLKG/HLTG	-	-	-	-	-	-	-	-	-	-	-	-	-
DVTG	-	-	-	-	-	-	-	-	-	-	-	-	-
SREC	-	-	-	-	-	-	-	-	-	-	-	-	-
WDRW	-	-	-	-	-	-	-	01	-	-	-	-	01 (0.4%)
PTSC	-	-	-	-	-	-	-	-	-	-	-	-	-
OVER	-	-	-	-	-	-	-	-	-	-	-	-	-
TRIV	-	-	-	-	-	-	-	-	-	-	-	-	-
IGI(3)	-	-	-	-	-	-	-	01	-	-	-	-	01(0.4%)
IGI	**72**	**05**	**00**	**04**	**00**	**05**	**06**	**15**	**09**	**01**	**03**	**01**	**121(47.8%)**
KGen	11	-	-	-	-	01	-	-	01	01	-	-	14 (5.5%0
KShare	02	-	-	01	-	-	-	-	-	-	-	-	03 (1.2%)
KApp	04	02	-	-	-	02	-	01	02	-	02	01	14 (5.5%)
KXI	**17**	**02**	**-**	**01**	**-**	**03**	**-**	**01**	**03**	**01**	**02**	**01**	**31(12.3%)**
TOTAL	127 50.2%	12 4.7%	02 0.8%	12 4.7%	02 0.8%	12 4.7%	12 4.7%	28 11.1%	24 9.5%	06 2.4%	10 4.0%	06 2.4%	**253** **100%**
ID / Behaviour	CHAIR 1	CANADA 2	CHINA 3	GERMANY 4	RUSSIA 5	S.AFRICA 6	S.ARABIA **7**	TUVALU 8	**USA** **9**	BSA 10	ITU **11**	WIP 12	
SUBJECT: INTERNET GOVERNANCE & STANDARDISATION – PART III: NEGOTIATION													

TABLE 5-4.2: Number of Occurrences, and Percentage, of Interaction Primitives for Information Exchange Interactions (IXI), Interpersonal Group Level Interactions (IGI), and Knowledge Exchange Interactions (KXI) in CSCW Sessions of the Research Study

IXB, IGI & KXB Behaviours / Themes	Information Exchange Group Behaviours (IXI)	Interpersonal Group Level Interactions (IGI)			Knowledge Exchange Behaviour (KXI)	
		IGI-1	IGI-2	IGI-3		
Virtual Embassy	33.3%	40.8%	7.6%	0.4%	19.6%	
Terrorism- Conceptualisation	26.7%	41.0%	11.5%	2.4%	18.6%	
Terrorism – Addressing UNGA	16.8%	34.4%	11.0%	1.3%	19.7%	
Terrorism – Special Session	37.4%	33.6%	4.7%	1.9%	22.4%	
Terrorism – Further Conceptalisation	29.9%	39.1%	8.7%	1.5%	20.6%	
Internet Governance - Conceptualisation	30.2%	36.0%	10.6%		23.0%	
Internet Governance - Positioning	30.4%	36.2%	8.3%	1.4%	23.4%	
Internet Governance - Negotiation	40.4%	29.2%	19.0%		12.3%	

TABLE 5-5.1: Number of Occurrences, and Percentage, of Interaction Primitives for Information Exchange Group Interactions (IXI) in CSCW Sessions of the Research Study

IXB Behaviour / Theme	IP 1	IS 2	RA/RR 3	CA/CR 4	CI 5	RP 6	CP 7	SC 8	CC 9	TOTAL 10
Virtual Embassy	17.8%	6.9%	2.8&	0.2%	4.7%	-	-	1.1%	-	**33.3%**
Terrorism- Conceptualisation	15.9%	6.5%	1.2%	-	2.5%	-	-	0.6%	-	**26.7%**
Terrorism – Addressing UNGA	1.8%	3.7%	2.4%	2.9%	2.9%	1.3%	1.0%	0.8%	-	**16.8%**
Terrorism – Special Session	20.6%	0.5%	3.7%	-	-	5.1%	6.5%	0.5%	0.5%	**37.4%**
Terrorism – Further Conceptalisation	18.6%	4.0%	2.2%	2.5%	1.2%	0.2%	-	-	1.2%	**29.9%**
Internet Governance Conceptualisation	18.7%	4.1%	1.6%	2.1%	2.9%	-	-	0.6%	-	**30.2%**
Internet Governance Positioning	20.5%	3.9%	2.7%	0.6%	2.7%	-	-	-	-	**30.4%**
Internet Governance Negotiation	12.3%	4.3%	4.0%	3.6%	-	5.9%	4.7%	1.2%	4.0%	**40.4%**

TABLE 5-5.2A: Number of Occurrences, and Percentage, of Interaction Primitives for *Task-Oriented* Interpersonal Group Level Interaction Group Interactions ("IGI-1") in CSCW Sessions of Research Study

IGI-1 Behaviour / Theme	INIT/ PROP 1	IGUID/ SEQU 2	INST 3	SUBS 4	BUIL 5	CLAR 6	SEEK 7	ALTS 8	AGRE/ SUPP 9	DISA/ OPPO 10	EVAL/ TEST 11	SUMM/ RECA 12	TOTAL
Virtual Embassy Diplomatic Representation	7.3%	0.2%	-	0.2%	9.7%	6.9%	5.8%	-	3.2%	1.1%	0.4%	**0.2%**	**40.8%**
Terrorism- Conceptualisation	5.2%	2.8%	2.9%	3.3%	8.9%	2.4%	5.5%	0.6%	3.9%	0.8%	1.4%	**0.4%**	**41.0%**
Terrorism – Addressing UNGA	6.3%	3.9%	4.2%	2.4%	11.3%	2.4%	0.3%	0.5%	0.8%	0.3%	1.8%	**0.3%**	**34.4%**
Terrorism – Special Session	7.5%	0.9%	3.7%	2.8%	10.3%	0.5%	0.5%	2.3%	0.9%	0.9%	2.3%	**0.9%**	**33.6%**
Terrorism – Further Conceptalisation	9.4%	2.2%	3.5%	1.0%	12.7%	1.2%	4.0%	-	2.7%	1.2%	1.0%	**0.2%**	**39.1%**
Internet Governance Conceptualisation	10.3%	2.7%	4.3%	1.3%	6.3%	0.9%	4.1%	-	5.0%	-	0.1%	**1.0%**	**36.0%**
Internet Governance Positioning	14.9%	5.6%	1.7%	0.8%	5.0%	0.8%	3.9%	0.2%	1.4%	0.6%	0.2%	**1.0%**	**36.2%**
Internet Governance Negotiation	5.9%	5.1%	0.8%	1.2%	2.4%	1.2%	4.3%	3.2%	3.2%	0.8%	0.4%	**0.8%**	**29.2%**

TABLE 5-5.2B: Number of Occurrences, and Percentage, of Interaction Primitives for *Maintenance-Oriented* Interpersonal Group Level Interactions ("IGI-2") in CSCW Sessions of the Research Study

GI-2 Behaviour / Theme	OPEN 1	ENCO 2	CAUT/ PTOO 3	REDT/ PCKG 4	ACKN/ APOL 5	FDBK 6	CLOS 7	% of TOTAL
Virtual Embassy – Diplomatic Representation	0.4%	5.8%	-	-	-	0.6%	0.5%	**7.6%**
Terrorism – Conceptualisation	0.7%	8.7%	-	1.1%	-	0.6%	-	**11.5%**
Terrorism – Addressing UNGA	1.0%	4.5%	0.5%	0.5%	3.1%	-	1.3%	**11.0%**
Terrorism – Special Session	0.1%	0.9%	-	-	2.8%	-	0.9%	**4.7%**
Terrorism – Further Conceptalisation	0.6%	4.5%	-	-	3.0%	-	0.7%	**8.7%**
Internet Governance Conceptualisation	0.4%	8.7%	-	-	1.2%	0.2%	0.1%	**10.6%**
Internet Governance Positioning	0.2%	6.4%	-	-	1.2%	-	0.4%	**8.3%**
Internet Governance Negotiation	1.2%	4.0%	1.6%	0.4%	11.1%	0.4%	0.4%	**19.0%**

TABLE 5-5.2C: Number of Occurrences, and Percentage, of Interaction Primitives for *Self-Oriented* Interpersonal Group Level Interactions ("IGI-3") in CSCW Sessions of the Research Study

IGI-3 Behaviour / Theme	ATTK/ DFNG 1	BLKG/ HLTG 2	DVTG/ 3	SREC/ 4	WDRW/ 5	PTSC/ 6	OVER/ 7	TRIV/ 8	% of TOTAL
Vitual Embassy – Diplomatic Representation	-	-	-	-	-	-	-	0.4%	**0.4%**
Terrorism- Conceptualisation	0.4%	0.4%	0.4%	-	-	0.4%	-	0.4%	**2.4%**
Terrorism – Addressing UNGA	0.8%	-	0.3%	-	-	-	-	0.3%	**1.3%**
Terrorism – Special Session	-	-	0.5%	-	1.4%	-	-	-	1.9%
Terrorism – Further Conceptalisation	-	0.5%	0.2%	-	0.8%	-	-	0.5%	**1.5%**
Internet Governance Conceptualisation	-	-	-	-	-	-	-		
Internet Governance Positioning	0.4%	0.4%	0.4%	-	0.2%	-	-	-	**1.4%**
Internet Governance Negotiation	-	-	-	-	-	-	-		

TABLE 5-5.3: Number of Occurrences, and Percentage, of Interaction Primitives for Knowledge Exchange Interactions (KXI) in CSCW Sessions of the Research Study

IXI Behaviour / Theme	KGen 1	KShar 2	KApp 3	% of TOTAL
Virtual Embassy – Diplomatic Representation	7.6%	6.0%	6.2%	19.6%
Terrorism- Conceptualisation	7.2%	5.8%	5.5%	18.6%
Terrorism – Addressing UNGA	5.8%	8.1%	5.8%	19.7%
Terrorism – Special Session	9.8%	7.5%	5.1%	22.4%
Terrorism – Further Conceptalisation	9.2%	4.5%	6.9%	20.6%
Internet Governance Conceptualisation	10.2%	4.6%	8.1%	23.0%
Internet Governance Positioning	12.2%	5.4%	5.8%	23.4%
Internet Governance Negotiation	5.5%	1.2%	5.5%	12.3%

TABLE 5.7.1: 'States-as-Actors' Group Behaviour Analysis for CSCW Session(s) on Virtual Embassy – Diplomatic Representation in the Era of the Internet (3 October 2000)

'States –as-Actor' Behaviour → / Actor - Participant ↓	%age of Paras to First Intervention as measure of Relative Time to First Intervention ("RTTFI"): Initial Behaviour as ActENT	(Active, Generic) Coded: ActOBJ	(Active, Goal-Guided) Coded: ActGOAL	(Active, Goal-Guided, Self-Motivated) Coded: ActAUTO	Total (% of TOTAL)	Partial Inferences: Level 1 (Partial) Conclusions
<ELA>	7.1% (9th)	01	02	01	04 (2.1%)	
<EST>	39.7% (50th)	01	01	-	02 (1.0%)	• 'RTTFI' at 50% Level of 'active' actor-participant participation was realised at 28.6% of the duration of CSCW session;
<EUC>	33.3% (42nd)	03	05	01	09 (4.8%)	
<JOV>	0% (1st)	13	53	21	87 (46.3%)	
<KIS>	28.6% (36th)	04	16	04	24 (12.8%)	
<RAC>	42.9% (54th)	01	01	-	02 (1.0%)	• 'RTTFI' at 100% Level of 'active' actor-participant participation was realised at 67.5% of the duration of CSCW sessionDomiinant 'states-as-actors' behaviour was realised by ActGOAL, followed by ActAUTO and ActOBJ
<TRI>	3.2% (4th)	13	36	09	58 30.9%)	
<LOI>	67.5% (85th)	01	-	01	02 (1.0%)	
Total (percentage)		37 (19.7%)	114 (60.6%)	37 (19.7%)	150 (100%)	

TABLE 5-7.2: 'States-as-Actors' Group Behaviour Analysis for CSCW Session I on Terrorism: Part I – A Conceptualisation of Terrorism (27 September 2001)

'States-as-Actors' Behaviour / Actor-Participant	%age of Paras to First Intervention as measure of Relative Time to First Intervention ("RTTFI"): Initial Behaviour as ActENT	(Active, Generic) Coded: ActOBJ	(Active, Goal-Guided) Coded: ActGOAL	(Active, Goal-Guided, Self-Motivated) Coded: ActAUTO	Total (% of TOTAL)	Partial Inferences: Level 1 (Partial) Conclusions
<CEL>	27.4% (80th para)	08	18	05	31 (7.0%)	
<EMA>	(2.2%) 7th para	02	08	05	15 (3.4%)	• 'RTTFI' at 50% Level of 'active' actor-participant participation was realised at 10.3% of the duration of CSCW session;
<JEL>	9.2% (27th para)	01	03	01	05 (1.1%)	
<JOV>	0.5% (1st para)	35	59	22	116 (26.3%)	
<KAP>	0.7% (2nd para)	05	22	07	34 (7.7%)	
<KAR>	19.9% (58th para)	-	01	-	01 (0.2%)	• 'RTTFI' at 100% Level of 'active' actor-participant participation was realised at 59.2% of the duration of CSCW session
<SAI>	59.2% (173th para)	02	10	-	12 (2.7%)	
<SAL>	10.3% (30th para)	35	86	25	146 (33.1%)	
<SIB>	10.6% (31st para)	04	16	02	22 (5.0%)	
<TEB>	28.1% (82nd para)	04	09	02	15 (3.4%)	• Dominant 'states-as-actors' behaviour was realised by ActGOAL, followed by ActOBJ, ActAUTO.
<TRA>	13.0% (38th para)	02	05	01	08 (1.8%)	
<VAL>	4.5% (13th para)	10	22	04	36 (8.2%)	
Total (percentage)	292 paras (100%)	108 (24.5%)	259 (58.7%)	74 (16.8%)	441 (100%)	

TABLE 4-7.3: 'States-as-Actors' Group Behaviour Analysis for CSCW Session II on Terrorism: Part II – Addressing the UN General Assembly – A Simulation (09 Octiber 2001)

'States-as-Actos' Behaviour → / ↓ Actor-Participant	(Active, Generic) Coded: ActOBJ	%age of Paras to First Intervention as measure of Relative Time to First Intervention ("RTTFI"): Initial Behaviour as ActENT		(Active, Goal-Guided) Coded: ActGOAL	(Active, Goal-Guided, Self-Motivated) Coded: ActAUTO	Total (% of TOTAL)	Partial Inferences: Level 1 (Partial) Conclusions
		Secretariat Briefs/ Guidelines	States –as-Actors Positioning				
<CHAIR>	08	NI	2.7% (3rd para)	22	02	32 (15.2%)	
FINLAND	03	NI	14.4 (16th para)	13	05	21 (10.0%)	
USA	04	100% (39th para)	25.2% (28th para)	25	04	33 (15.7%)	• 'RTTFI' at 50% Level of 'active' actor-participant participation was realised at 18.0% of the duration of CSCW session;
CANADA	04	77.7% (30th para)	11.7% (13th para)	05	-	09 (4.3%)	
S.AFRICA	02	94.9% (37th para)	73.9% (82nd para)	04	01	07 (3.3%)	• 'RTTFI' at 100% Level of 'active' actor-participant participation was realised at 78.4% of the duration of CSCW session
PAKISTAN	01	NI	12.6% (14th para)	01	-	02 (1.0%)	
CARICOM	02	NI	18.0% (20th para)	08	-	10 (4.8%)	• Dominant 'states-as-actors' behaviour was realised by ActGOAL, followed by ActOBJ and ActAUTO.
<JOV>	15	2.6% (1st para)	0.9% (1st para)	51	11	77 (36.7%)	
<KAR>	02	10.3% (4th para)	102nd para	07	-	09 (4.3%)	

<VAL>	**02**	64.1% (25th para)	NI	04	03	09 (4.3%)	
<KAP>	**-**	NI	78.4% (87th para)	01	-	01 (0.4%)	
Total (percentage)	**43 (20.5%)**	39 paras (100%)	111 paras (100%)	141 (67.1%)	26 (12.4%)	210 (100%)	

TABLE 5-7.4: 'States-as-Actors' Group Behaviour Analysis for CSCW Session III on Terrorism: Part III – Special Session on Terrorism (11 October 2001)

'States-as-Actors' Behaviour / Actor-Participant	%age of Paras to First Intervention as measure of Relative Time to First Intervention ("RTTFI"): Initial Behaviour as ActENT	(Active, Generic) Coded: ActOBJ	(Active, Goal-Guided) Coded: ActGOAL	(Active, Goal-Guided, Self-Motivated) Coded: ActAUTO	Total (% of TOTAL)	Partial Inferences: Level 1 (Partial) Conclusions
<CHAIR>	0.8% (1st para)	16	49	07	72 (39.6%)	
USA	9.9% (12th para)	06	19	03	28 (15.4%)	• 'RTTFI' at 50% Level of 'active' actor-participant participation was realised at 19.8% of the duration of CSCW session;
FINLAND	13.2% (16th para)	05	11	02	18 (9.9%)	
EGYPT	24.0% (29th para)	04	08	03	15 (8.2%)	
S.AFRICA	45.5% (55th para)	04	06	03	13 (7.1%)	
IRAN	72.7% (88th para)	02	03	01	06 (3.3%)	• 'RTTFI' at 100% Level of 'active' actor-participant participation was realised at 99.2% of the duration of CSCW session
RUSSIA	77.7% (94th para)	01	03	01	05 (2.8%)	
<JOV>	19.8% (24th para)	03	07	03	13 (7.1%)	
<KAP>	8.3% (10th para)	-	05	03	08 (4.4%)	
<KAR>	99.2% (120th para)	01	01	-	02 (1.1%)	• Dominant 'states-as-actors' behaviour was realised by ActGOAL, followed by ActOBJ and ActAUTO
<CEL>	19.0% (23rd para)	-	02	-	02 (1.1%)	
Total (percentage)	121 paras (100%)	42 (23.1%)	124 (62.6%)	26 (14.3%)	192 (100%)	

TABLE 5-7.5: 'States-as-Actors' Group Behaviour Analysis for CSCW Session IV on Terrorism: Part IV – Further Conceptualisation on Terrorism (16 October 2001)

'States-as-Actors' Behaviour → / Actor-Participant ↓	%age of Paras to First Intervention as measure of Relative Time to First Intervention ("RTTFI"): Initial Behaviour as ActENT	(Active, Generic) Coded: ActOBJ	(Active, Goal-Guided) Coded: ActGOAL	(Active, Goal-Guided, Self-Motivated) Coded: ActAUTO	Total (% of TOTAL)	Partial Inferences: Level 1 (Partial) Conclusions
<KAR>	3.1% (5th para)	12	19	04	35 (14.8%)	
<KAP>	0.6% (1st para)	23	65	12	100 (42.2%)	
<SAI>	9.9% (16th para)	-	04	01	05 (2.1%)	• 'RTTFI' at 50% Level of 'active' actor-participant participation was realised at 24.2% of the duration of CSCW session;
<SAL>	25.5% (41st para)	13	32	09	54 (22.8%)	
<SIB>	41.0% (66th para)	01	02	01	04 (1.7%)	
<TEB>	22.4% (36th para)	02	04	03	09 (3.8%)	
<TRA>	24.2% (39th para)	04	07	10	21 (8.9%)	• 'RTTFI' at 100% Level of 'active' actor-participant participation was realised at 59.0% of the duration of CSCW session
<CEL>	53.4% (86th para)	03	03	-	06 (2.5%)	
<SLA>	59.0% (95th para)	01	02	-	03 (1.3%)	
Total (percentage)	161 paras (100%)	59 (24.9%)	138 (58.2%)	40 (16.9%)	237 (100%)	• Dominant 'states-as-actors' behaviour was realised by ActGOAL, followed by ActOBJ and ActAUTO

TABLE 5-7.6: 'States-as-Actors' Group Behaviour Analysis for CSCW Session I on Internet Governance: Part I – A Conceptualisation on Internet Governance (13 March 2001)

'States-as-Actors' Behaviour / Actor-Participant	%age of Paras to First Intervention as measure of Relative Time to First Intervention ("RTTFI"): Initial Behaviour as ActENT	(Active, Generic) Coded: ActOBJ	(Active, Goal-Guided) Coded: ActGOAL	(Active, Goal-Guided, Self-Motivated) Coded: ActAUTO	Total (% of TOTAL)	Partial Inferences: Level 1 (Partial) Conclusions
<ANN>	11.7% (20th para)	10	15	14	39 (12.7%)	
<CEL>	26.3% (45th para)	01	01	01	03 (1.0%)	
<DON>	49.7% (65th para)	02	02	01	05 (1,6%)	• 'RTTFI' at 50% Level of 'active' actor-participant participation was realised at 26.3% of the duration of CSCW session;
<JEL>	23.4% (40th para)	01	02	-	03 (1.0%)	
<RIA>	28.7% (49th para)	01	04	03	08 (2.6%)	
<SAI>	2.9% (5th para)	03	08	02	13 (4.2%)	
<SAL>	20.5% (35th para)	12	16	06	34 (11.0%)	• 'RTTFI' at 100% Level of 'active' actor-participant participation was realised at 78.4% of the duration of CSCW session
<SIB>	3.5% (6th para)	04	06	03	13 (4.2%)	
<TEB>	1.8% (3rd para)	08	12	02	22 (7.1%)	
<EMA>	78.4% (134th para)	-	-	01	01 (0.3%)	
<CHA>	59.1% (101th) para	01	01	01	03 (1.0%)	• Dominant 'states-as-actors' behaviour was realised by ActGOAL, followed by ActOBJ and ActAUTO.
<VAL>	42.7% (73rd para)	-	03	01	04 (1.3%)	
<WTO>	39.2 (67th para)	05	06	05	16 (5.2%)	
<VES>	52.0% (89th para)	05	05	03	13 (4.2%)	
<JOV>	0.6% (1st para)	37	79	15	131 (42.5%)	
Total (percentage)	171 paras (100%)	90 (29.2%)	160 (51.9%)	58 (18.8%)	308 (100%)	

TABLE 5-7.7: 'States-as-Actors' Group Behaviour Analysis for CSCW Session II on Internet Governance: Part II – Positioning for Negotiation on Internet Governance (15 March 2001)

'States-as-Actors' Behaviour → / Actor-Participant ↓	%age of Paras to First Intervention as measure of Relative Time to First Intervention ("RTTFI"): Initial Behaviour as ActENT	(Active, Generic) Coded: ActOBJ	(Active, Goal-Guided) Coded: ActGOAL	(Active, Goal-Guided, Self-Motivated) Coded: ActAUTO	Total (% of TOTAL)	Partial Inferences: Level 1 (Partial) Conclusions
<ANN>	10.8% (18th para)	09	15	07	31 (11.7%)	
<CEL>	10.2% (17th para)	04	07	02	13 (4.9%)	
<DON>	14.4% (24th para)	02	02	02	06 (2.3%)	• 'RTTFI' at 50% Level of 'active' actor-participant participation was realised at 16.8% of the duration of CSCW session;
<JEL>	18.0% (30th para)	01	01	02	04 (1.5%)	
<JOV>	0.6% (1st para)	25	67	41	133 (50.2%)	
<SIB>	19.8% (33rd para)	01	04	-	05 (1.9%)	
<SON>	NI	-	-			• 'RTTFI' at 100% Level of 'active' actor-participant participation was realised at 73.7% of the duration of CSCW session
<RIA>	54.5% (91st para)	-	01	02	03 (1.1%)	
<TEB>	7.8% (13th para)	09	17	05	31 (11.7%)	
<SLA>	16.8% (28th para)	-	01	02	03 (1.1%)	
<SAL>	8.4% (14th para)	04	15	06	25 (9.4%)	• Dominant 'states-as-actors' behaviour was realised by ActGOAL, followed by ActAUTO and ActOBJ
<WTO>	22.8% (38th para)	02	02	02	06 (2.3%)	
<CHA>	29.9% (50th para)	-	01	-	01 (0.4%)	
<SAI>	73.7% (123rd para)	01	02	01	04 (1.5%)	
Total (percentage)	167 paras (100%)	58 (21.9%)	135 (50.9%)	72 (27.2%)	265 (100%)	

TABLE 5-7.8: 'States-as-Actors' Group Behaviour Analysis for CSCW Session III on Internet Governance: Part III – Multilateral Negotiation on Internet Governance (22 March 2001)

'States-as-Actors' Behaviour / Actor-Participant	%age of Paras to First Intervention as measure of Relative Time to First Intervention ("RTTFI"): Initial Behaviour as ActENT	(Active, Generic) Coded: ActOBJ	(Active, Goal-Guided) Coded: ActGOAL	(Active, Goal-Guided, Self-Motivated) Coded: ActAUTO	Total (% of TOTAL)	Partial Inferences: Level 1 (Partial) Conclusions
1st para	29	56	12		97 (53.5%)	
12.2% (14th para)	03	08	-		11 (6.0%)	
11.3% (13th para)	01	01	-		02 (1.1%)	
8.7% (10th para)	-	03	-		03 (1.7%)	
13.0% (15th para)	02	02	-		04 (2.2%)	
47.0% (54th para)	02	07	-		09 (5.0%)	
41.7% (48th para)	01	05	01		07 (3.9%)	
7.8% (9th para)	08	13	-		21 (11.6%)	
21.7% (25th para)	02	07	01		10 (5.5%)	
13.9% (16th para)	01	02	01		04 (2.2%)	
10.4% (12th para)	03	06	-		09 (5.0%)	

- 'RTTFI' at 50% Level of 'active' actor-participant participation was realised at 11.3% of the duration of CSCW session;
- 'RTTFI' at 100% Level of 'active' actor-participant participation was realised at 47.0% of the duration of CSCW session
- Dominant 'states-as-actors' behaviour was realised by ActGOAL, followed by ActOBJ and ActAUTO.

7.0% (8th para)	01	03	-		04 (2.2%)	
115 paras (100%)	53 (29. %)	113 (62.?%)	15 (9.?%)		181 (100%)	

APPENDIX III

Virtual International Relations Conferences: An *Ex-Post* Evaluation of the Deployment of a 'Distributed Collaboration Sytem'

TABLE 5-12.5: An *Ex-Post* Evaluation Questionnaire

Components of Utility (Usage, Usefulness and Usability)		**Given Factors of Utility (Please read the Glossary of Terms, tabulated below, first)**	**Indicate by a cross (X) your Choice of Likert 4-Point Scale (Please read the Guideline below first)**				**Indicate Your Ranking of the Factors of Utility (Please read the"Guideline below first)**
			1	**2**	**3**	**4**	**(1 to 17)**
USAGE Attributes that are generally perceived to be central to the frequency of use of the 'system' by 'states-as-actors' in international relations context or by other groups or communities of practice in other or similar contexts To what extent, on a Likert 4-point scale, do you consider **USAGE** central with respect to the **factors of utility** listed in the next column?	**1**	**Access**					
	2	**Availability**					
	3	**Affordability**					
	4	**Existence of Subject of Discussion**					
	5	**State of Timeliness of Discussion**					
USEFULNESS Value added to conventional international relations conferences To what extent , Likert 4-point scale do you consider **USEFULNESS** central with respect the **factors of uitlity** listed in the next column?	**6**	**Service**					
	7	**Process Enablement**					
	8	**People Enablement**					
	9	**System Enablement**					
	10	**Adequate Security**					
	11	**Outcome - Efficiency**					
	12	**Outcome - Effectiveness**					
	13	**Outcome - Productivity**					

	14	**Fit-for-Purpose Characteristic**					
	15	**Automatic Record Generation**					
USABILITY Degree of match or goodness-of-fit between users, technology and processes To what extent , on a Likert 4-point scale do you consider **USABILILITY** central with respect to the **factors of uitlity** listed in the next column?	**16**	**Easy-to-Use Human-Machine Interface**					
	17	**Easy-to-Effect Adaptability**					

GUIDELINE FOR THE ASSIGNING OF THE LIKERT 4-POINT SCALE (1-4) TO THE FACTORS OF UTILITY AND FOR THE RANKING OF THE FACTORS OF UTILITY (1-17)

A: Assigning of the Likert 4-Point Scale (1-4) to the Factors of Utility

Designated Level Importance of Given Factor of Utility	**Equivalent Nominal Likert 4-Point Scale Assignment**	
NOT Important	**1**	
WEAKLY Important	**2**	
IMPORTANT	**3**	
STRONGLY Important	**4**	

B: Nominal Ranking of the Factors of Utility (1-17)

Ranking the Factors of Utility

Please use the last column of the Questionnaire Table above to rank the factors of utility in the order in which you perceive them as important to you as actor-participant (or as state-as-actor), from MOST impotant (rank-order 1) to LEAST important (rank-order 17).

TABLE 5-12.6: An *Ex-Post* Evaluation Questionnaire (A Glossary of Terms Used in the Questionnaire)

Components of Utility (Usage, Usefulness and Usability)		Given Factors of Utility	Additional Information
USAGE Attributes that are generally perceived to be central to the frequency of use of the 'system' by 'states-as-actors' in international relations context or by other groups or communities of practice in other or similar contexts	**1**	**Access**	Available for use on a fair and equal basis
	2	**Availability**	Having potential for access
	3	**Affordability**	Within reach of one's financial means
	4	**State of Existence of Subject of Discussion**	That a subject of discussion exists or not
	5	**State of Timeliness of Discussion**	That an existing subject of discussion needs to be discussed urgently or not
USEFULNESS Value added to conventional international relations conferences	**6**	**Service**	Providing service that is beneficial to the users
	7	**Process Enablement**	Empowering the core processes of virtual interactions, among others
	8	**People Enablement**	Empowering the core actors in the international relations context
	9	**System Enablement**	Empowering the distributed collaboration system in the international relations context
	10	**Adequate Security**	Providing a degree of security that wins the trust of users of the system
	11	**Outcome - Efficiency**	Ability to enable the delivery of set outcome per unit time
	12	**Outcome - Effectiveness**	Ability to enable reealisation of set objectives
	13	**Outcome - Productivity**	Ability to enable realisation of set outputs, outcomes and impacts
	14	**Fit-for-Purpose Characteristic**	Ability to produce expected outputs, outcomes and impacts
	15	**Automatic Record Generation**	Rendering possible the recording virtual interactions, as fragments of transcript, in real-time

USABILITY Degree of match or goodness-of-fit between users, technology and processes			
	16	**Easy-to-Use Human-Machine Interface**	Presenting a human-machine interface which is makes usability of the system seamless
	17	**Easy-to-Effect Adaptability**	Ability [of system] to enable users adapt to a working routine with ease or seamlessly