# Tailor-made Project Management: A redefined approach towards unique projects for Koninklijke Niestern Sander

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This paper describes the development of a theoretical framework that enables to determine an optimal project organisation towards large conversion projects. The development occurred through integrating a current state analysis of both organisations through a systems approach, in conjunction with literature review. The established framework is validated through the assessment of case studies. The framework is a part of a proposed method that enables establishment of a tailor-made project organisation for in particular, but not limited to, large conversion projects. Organisational changes are however required in order to achieve this state and subsequently, a strategic roadmap for implementation is proposed.

Categories and Subject Descriptors:

General Terms: Project Management, Maritime Industry

Additional Key Words and Phrases: Project Management Maturity Models, DSA-framework, Front End Development, Shipbuilding, Repair, Conversions, Systems approach

## 1. INTRODUCTION

Conversion projects are considered as a growing market within the new build and in particular the repair market within the maritime industry, due to ever more demanding environmental regulations, according to [SEA Market Forecast WG 2017]. A development that the current organisation embraces and wants to exploit further. Although conversion projects are already being executed, currently the thought prevails that 'project efficiency could and should increase'.

The company (KNS) contains a new build yard as well as a ship repair yard. The new build market and repair/conversion market differ significantly, each is characterised by its unique specifics. In [Council working party on Shipbuilding 2008] the differences between shipyards and conversion/repair yards have been extensively described. A summary of the characteristics is depicted in Table I.

[Collyer and Warren 2009] have established a schematic that depicts the relation between the degree of (un)knowns and the type of projects. Project B resembles a straightforward new build project, whereas on the right-hand side, Project C resembles a Repair project. In between, a conversion project is situated. The more is shifted towards the right; the more unknowns exist within a project.

As Table I and Figure 1 indicate, different approaches are required in order to execute each type of project efficiently and effectively. A conversion project is expected to require a hybrid approach. The attribution of this paper lies in exploring this 'grey area'.

In order to retrieve insight in the current situation of the organisation, an 'as-is' analysis is performed. The chosen method for the assessment is The Delft Systems Approach (DSA), as *'this method supports the analysis of problems as well as designing a solution'*, and *'the systems approach further offers better insight, transparency and can lead to a higher level of abstraction of contemplation of concrete situations'*, according to [Veeke et al. 2008].

This paper is divided in six parts. Section 1 covers the introduction of the paper, section 2 covers the organisation analysis; each organisation individually is contemplated and subsequent these analysis are regarded on a higher abstraction level in order to identify root-causes for probable present differences and similarities.

Table I. Characteristics defined for new build and repair/refit projects.

| **Straightforward new build** | **Repair/refit** |
|---|---|
| Cost estimation | Pay per hour |
| Capital intensive | Relative low cost |
| Delivery date driven planning | Relative short scope (days to max. weeks) |
| Relative long scope (up to 2 years) | Strategic location of the yard is a precondition (with respect to vessel down-time) |
| Location yard relative unimportant | Overtime is almost structural |
| Work is planned within regular office-hours | High degree of uncertainties, regardless of amount of pre-planning (uncertainties about structure and systems) |
| High degree of detail planning | Due to high degree of uncertainties, but retain high flexibility, a high amount and variety of tasks is performed in-house and needs many skilled workers and workshop facilities |
| High degree of certainty | Few routine jobs which can be used for production measurement, the workload of given tasks is highly variable |
| High degree of planning enables high amount of outsourcing | Relative high inventory of spare parts in order to minimize down-time shipowner |

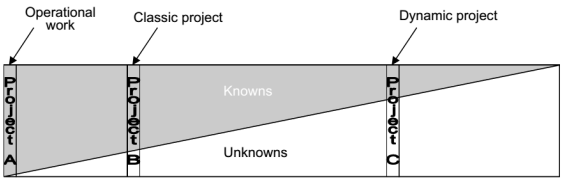


Fig. 1. Schematic of increasing unknowns within dynamic project environments, retrieved from [Collyer and Warren 2009].

Section 3 explores already present solutions within literature concerning the observed findings derived from the analysis, contributes to put the most important topics such as project management, organisation forms and how to cope with uncertainty and complexity within projects in a wider perspective. Moreover, a maturity assessment is performed as well, based on the performed organisation analysis and literature.

In section 4, the results of the research are discussed and case studies elaborated.

Section 0**??** displays recommendations through proposing a roadmap, based on the performed research.

Section 6 concludes this paper.

## 2. ANALYSIS

Both the ship repair and new build organisations are subjected to an analysis in order to establish an overview of current practices, thereby identifying processes that are executed in each individual company and subsequently, assessing present analogies and root causes for probable differences between both companies. By assessing the organisations through the lenses of DSA, a top-down approach is used. Emphasis is put upon the following essential functions:

—Project control.

—Sales.

—Design/ engineering.

—Procurement.

—Production.

In addition, the mutual relationships between aforementioned functions in terms of information flow is regarded as well.

### 2.1 New build yard

First the new build yard (NSS) its organisation is assessed. For retrieving a proper insight, several aspects are of particular interest; project management, budgeting and planning. It is expected that the biggest differences and challenges can be found within these aspects. NSS focuses mainly on new build ships, excluding the (super)yachts, large cruise ships and naval vessels segments. NSS's portfolio is however not limited to only building new ships. It also may produce block sections for other shipyards, or (part of) sections for the repair yard (NSR). The order of magnitude of large projects that are executed by NSS, is 2 to 3 projects annually.

### 2.2 Repair yard

As opposed to NSS, this company focuses on operational ships and the following market segments in specific:

—*Conversions*. For NSR, these are large-scale projects where a vessel is physically and functional transformed to suit the redetermined mission.

—*Regular maintenance*. Annual, intermediate maintenance and special surveys (every five years). This comprises of standard activities that are well known by the yard and normally included in the repair list that is drafted by the respective owner of the vessel, in close collaboration with classification societies. Dependent on the age of the vessel, the scope of regular planned work-activities could increase.

—*Repairs*. Size and exact nature of the activities are in general not known beforehand. Every type of corrective maintenance or repair that may occur due to a break down or damage, is unplanned and unaccounted for.

The market segments NSR operates in, are fundamental other types of business. The organization required for successful operating within these markets is therefore different as well. The order of magnitude of the amount of repair projects NSR handles is 200 to 300 projects annually; a hundredfold in conjunction with the amount of project NSS executes annually. Of these 200 to 300 repair projects 2 to 3 may be considered as large conversion projects.

### 2.3 Interim findings

Based on the performed analysis, distinctions between NSS and NSR were identified and summarised in Table II. These identified differences are actual related to the type of contract that is acquired, the amount of to perform activities that is known versus unknown and the scope (size) of a project, which therefore form the main axis along which projects should be classified and the ideal (project) organisation should be moulded, allowing KNS to take full benefit of the available combination of new-building and repair at the same location within the same company.

Table II. Organisation specific characteristics summarised.

| | **NSS** | **NSR** |
|---|---|---|
| **Projects** | Long throughput time for new builds. Approximately 3 projects annually. | Short throughput time for straightforward repairs. Approximately 250 to 300 projects annually. |
| **Project control** | Concentrates upon planning and preparation, with diffuse responsibility. Is of anticipatory character. Planning part can be executed more systematic. | Concentrates upon project execution. Project (i.e. financial) administration is subordinate to effective execution. Is of reactive character. |
| **Production** | Is mostly planning and preparation oriented with a high amount of process control in order to produce as efficient as possible. Uses consistently the 'deviation procedure'. | Has a high reactive character due to high amount of re-planning and re-allocating of resources. Is mainly output steered. |
| **Engineering** | Receives assignments for both NSS and NSR. As the amount of projects from NSR increases, the more dynamic the portfolio becomes, the higher the 'disturbance' effect. | Generally occurs on the spot and if more attention/ effort is required, there is escalated towards Engineering from NSS. |

Summarising: by assessing each corresponding process and functions of each organisation mutually, root-causes were identified that provided insight in the current existing differences within approaches. These key elements are:

—Type of contract.

—The amount of (un)certainty in a given project in combination with a dynamic environment.

—Project size

Although these key elements are strongly mutual related, where the type of contract in general is a succeeding consequence of the amount of (uncertainty), it is the dictating party that eventually determines the type of contract (for a certain project this could be the shipyard, but for another project it could be just as easily the client). The amount of uncertainty of a project directly determines the amount of detailed pre-planning that can be performed. In general, it also determines the used type of contract. The type of contract and project size on its turn, primarily determines the required amount of control during the execution of a project.

Next, literature is consulted to explore existing solutions concerning the identified aspects and to provide context for the current as-is situation in both the repair and new build organisation.

## 3. LITERATURE REVIEW

### 3.1 Project Management

Traditional project management is *'designed to make better use of existing resources by getting work to flow horizontally as well as vertically within the company'* as [Kerzner 2009] states, in order to smoothen internal processes within the company.

Project management has disentangled itself in the course of time of the credo 'does not contain added value' in the early years (1940-1960), to a acknowledged necessity during 1960-1985 and to a widespread acceptance and implementation in the years thereafter. Or, as [Garel 2013] puts it, from (beginning of) rationalisation, growing towards standardisation and thereon to institutionalisation and formalisation. Hence, nowadays it is not a matter of if any more, but how quick can a project management structure be obtained and integrated, according to [Kerzner 2014].

In order to accelerate implementation, best practises regarding Project Management were acquired from different industries and summarised by [Kerzner 2014]. These overall best practices contain:

(1) Changing project managers in midstream is bad even if the project is in trouble. Changing project managers inevitably elongates the project and can make it worse.
(2) Standardization yields excellent results. The more standardization placed in a project management methodology, usually the better the results are.
(3) Maximization of benefits occur with a methodology based upon templates, forms, guidelines, and check-lists rather than policies and procedures.
(4) Methodologies must be updated to include the results of discovering best practices. The more frequently the methodology is updated, the quicker the benefits are realized.

Project management as a whole introduced organisational changes when implemented in the organisation. These implications are discussed in the next section.

### 3.2 Organisation forms

A traditional organisation is characterised by a functional organisation, also known as a line organisation. Within this organisation tasks, communication and responsibilities are hierarchic determined and vertical oriented. On the other side of the organisation spectrum is the so-called Project Based Organisation (PBO) situated, where *'major projects will embody most, if not all, of the business functions normally carried out with departments of functional and matrix organisations*', according to [Hobday 2000]. In between these two 'extremes' is the matrix organisation situated, that can vary from a weak to a strong matrix organisation. It is a hybrid organisational form made possible by the introduction, i.e. appointment of project managers.

A weak matrix organisation is characterised as: *'maintains many of the characteristics of a functional organization, and the role of the project manager is more of a coordinator. Project coordinators have power to make some decisions, have some authority, and report to a higher-level manager'*, according to [Project Management Institute 2013].

A strong matrix organisation is described by [Project Management Institute 2013] as: *'having many of the characteristics of the projectised organization, and have full-time project managers with considerable authority and full-time project administrative staff'*.

The current existing imbalance between the different matrix organisations underlies to probable miscommunication and misunderstanding in case of a conversion project, where both organisations integrated execute a project. Each perspective of the organisations contains a different view regarding what to expect of and which responsibilities has a project manager, but more importantly, there exists a difference in accountability. This particular conclusion emphasises the need for converging certain work processes and methodologies. It requires a strategic approach which is introduced hereafter.

### 3.3 Project Management Maturity Model

A possible strategic view upon project management is a so-called Project Management Maturity Model (PMMM).*'Maturity models are created by practitioners and institutes to measure processes embodied in a certain level of the organisation that they need to possess to be able to meet requirements of a certain level of professionalism'*, according to [Alta 2016]. There is however not a common acceptance yet, as various performed literature studies emphasize the disadvantages of the Capability Maturity Model Integration (CMMI) (where PMMM originates from.) as *'it ignores the human aspect involved with processes'* [Von Scheel et al. 2014; Backlund et al. 2014], maturity models are *'more geared towards identifying problems and raising awareness than to solving problems'* and furthermore *'lack a level of details in order to be able to measure actual progress'* [Backlund et al. 2014].

Nonetheless, a powerful advantage of a maturity model as [Kwak et al. 2015] identified, is the incorporation of a self-assessment tool to determine the maturity of the organisation. [Alta 2016] has performed an exploratory research in maturity models and, although made custom for the Dutch Waterboards, his first established model is a useful questionnaire that can be applied to assess the current state of project management within both organisations.

The adapted maturity model is used in this study for a quick scan assessment to determine the current 'as-is' status. It deliberate is addressed as a quick-scan, as the performed study by [Alta 2016] linked additional Key Performance Indicators (KPI) to the established maturity model as a depth study. The latter is not performed in this study as it is too extensive for the current purpose. Moreover, it would require a complete revision of the template in order to be 100 % applicable to both organisations. That is currently not the case. For indication purposes however, the used template suffices.

With respect to the assessment, project management is regarded upon five aspects:

—The amount of standardised project management processes.

—Degree of incorporation of lessons learned.

—Amount of interrelationship within the organisation.

—The degree of paid attention towards development of the project manager.

—In what way are the responsibility and success celebrated.

Each of these aspects can score from level 1 to level 5. The higher the score, the further matured an aspect is. Although NSR is categorised as a 'strong matrix organisation' and NSS as 'weak matrix organisation', it seems that NSS is overall further matured. The level of standard processes and interrelationship in the organisation score higher. The levels of maturity of lessons learned, development of the project manager, responsibility and success are on an equivalent level.

On detail level, the outcome of the assessment can be debated, as it is a highly subjective score and not based on metrics, or KPI for that matter. It does however perfectly illustrate that the current state of project management is situated somewhere in between level 1 and level 2, but unmistakeably does not surpasses level 2. From the perspective of repair and new build individually, in conjunction with their associated projects, this is perfectly explicable and is discussed more in depth in the following sections.

However, the necessity to strive towards level 3, to a singular methodology is apparent in case of large conversion projects where the organisations are to be combined into one, best fit, project organisation

## 3.4 Coping with project uncertainty

Another root-cause that was identified by the performed analysis, is the amount of uncertainty a project at hand has. Uncertainty is often associated with negativity. However, according to the definition of uncertainty in [Perminova et al. 2008], where *'uncertainty is a context for risks as events having a negative impact on the project's outcomes, or opportunities, as events that have beneficial impact on project performance'*, it can be very well be beneficiary for a project.

[Pich et al. 2002] propose two fundamental strategies to overcome inadequate project information: either by *learning*, scanning to identify potential problems and problem solving to modify policies or by *selectionism*, pursuing multiple approaches and choose the best one ex post (i.e. based on actual results). In addition, [Perminova et al. 2008] identified *'reflective learning and sensemaking as enablers of flexibility and rapidness in decision-making regarding the choice of alternative actions in response to the situation, where standardized and modularised processes and procedures constitute a necessary basis for supporting reflective processes.'* This suggests that embedding the evaluation function within the work routines (as a matter of standardisation) in order to keep learning, supports the speed of decision making.

[Collyer and Warren 2009] proposed three options to determine which type of control could be applied best in case of a given environment, outlining the need for diversification in control functions:

(1) *Process control* itself is applicable in a certain environment where little unknowns reside; emphasis is put on standardisation. An important disadvantage is however that it is associated with behaviour control and if executed improperly, can result in quite unexpected behaviour, as [Collyer and Warren 2009] identified.
(2) *Output control* can then be more appropriate by guiding the project on milestones and deliverables.
(3) If both approaches are not applicable, because it is not possible to measure outcome or the process properly, *input control* can be an alternative, thereby focussing on the qualities and skills of employees.

## 3.5 Contractforms

One of the key elements that was concluded from the analysis, is that the contract form is one of the key pivoting elements that characterize among others the amount of risk and required amount of control. Generally, the type of contract is a direct result from the amount of unknowns a project contains, the complexity and amount of involved risk. This aspect becomes relevant in particular for large conversion projects as a mechanism to mitigate involved potential risks. Based on the definitions provided in [Project Management Institute 2013] three main types of contract are identified and used for further analysis:

(1) Fixed Price Contracts or lump sum
(2) Costs+ Contracts
(3) and the hybrid Time & Material Contracts.

The Fixed Price, or lump sum variants basically coerce the shipyard to initially focus all the efforts within defining and planning of the actual project in order to come up with a proper estimation and therefore a 'realistic' price. Adequate maintaining administration during the execution of a project is primarily of internal value.

The cost+ contracts comprise made, explicit costs (where as the definition of 'costs' clearly needs to be defined, leaving no room for (mis-)interpretation) with an additional mutual agreed fee for profit.

The Time and Material (T&M) contracts define hourly rates and often 'unit prices' for materials. Within these prices, a profit component is already incorporated, including additional costs (for instance overhead costs) and as such, have a implicit disposition.

These latter two type of contracts are quite ambiguous and when zoomed in enough on pricing aspects, easily resemble. The Costs+ and T&M contracts require a substantial amount of trust between client and shipyard as potential risks are divided amongst them and probably lean more towards the client than towards the shipyard.

Conversion projects typically are situated between a newbuild and straightforward maintenance and repair projects. This also yields for mutually agreed contracts with respect to conversion projects; the main scope is as clear defined as at that moment (drafting of the contract) is known. Unknown, or subconscious known aspects are covered by various ways. This could be through a Time and Material clause where additional man-hours have a fixed rate, accompanied with unit material prices with respect to partially expected activities with unknown scope size or through a variant of costs-plus-fee.

Although during acquisition the type of contract ideally should follow 'automatically' from the amount of (un)certainty and project size, by mitigating potential risks through the contract type, in practice this is not always the case due to various reasons. It may for instance be that an undesired variant is acquired (at least from a shipyard's perspective), because the market circumstances are such that a client has the luxury to do so.

## 3.6 Project complexity

Project size is another important aspect that influences the organisation and is inextricably bound up with project complexity.[Huijgens 2016] identified the underlying causes contributing to project complexity that is incorporated within the research of [Bosch-Rekveldt 2011], through establishment of a 'project complexity assessment model'. In order to quantify project complexity an assessment could be to performed based on the 'TOE'-framework, established by [Bosch-Rekveldt 2011]. It consists of 47 elements that are clustered in Technical, Organisational and Environmental (TOE) com-

plexity. By means of this check list internal project requirements can be determined in order to enhance the absorptive capacity and better adapt Front End Development (FED) to the specific complexities for a given project.

Project complexity however, as [Obdam 2016] concluded in his research in measuring project complexity, *'is difficult to objectively describe'* and *'an objective and quantifiable project complexity model might never be complete due to the contextual dependency of project complexity aspects and the variety of definitions and approaches of project complexity in specific'*. It is for that reason that project size is considered as main parameter, instead of complexity itself, as project size has more interrelations with adjacent aspects.

[Zhu and Mostafavi 2017] developed a framework that established a relationship between three different capacities within project systems to cope with project complexity; the higher the level of congruence, the higher the likelihood of attaining project performance goals.

(1) *Absorptive capacity*, that has a preventive character. The most important contribution to this capacity is planning for complexity. Other significant factors are: team building and early involvement of the stakeholders.

(2) *Adaptive capacity*, the 'quickness' of a project to adapt to new situations. The main contributors identified were: information sharing, collaboration, timely decision making, less bureaucracy, ability in proposing alternative solutions and flexibility in work arrangement. The key lies in as soon as possible information sharing in combination with close collaboration, supported by timely decision making and less bureaucracy.

(3) *Restorative capacity*. Project team ability to recover from disruptions due to complexity. Timely reaction and stakeholder relationship are essential. Timely reaction includes working overtime, increasing manpower or bring in additional help. When stakeholder relationships are good, involvement and willingness to help out increases.

The link with current proceedings of both organisations is evident; a large new build project performed at NSS has a high as possible absorptive character, thereby preventing required actions during and after a possible disruption. A typical repair project has a high restorative capacity, it is practically the modus operandi due to the often high amount of uncertainty. Moreover, for small projects, the adaptive capacity is visibly present as well, by minimising bureaucracy and flexibility in work arrangement.

### 3.7 Front End Development

Whether FED is seen from the product-development perspective or the process-development perspective, studies show that *'it is critical to ultimate success'* [Kurkkio et al. 2011]. Another study *'clarifies the importance of up-front planning to improve program performance'* [Lucae et al. 2014], while [Flyvbjerg 2013] goes even further, by being bold enough to state that *'the front-end has been singled out as the perhaps most important stage in the overall project cycle in securing the success of projects, or avoiding failure'*. FED is a phase where maximum project influence is established against minimum expenses, as opposed to a project execution phase. Hence, the more complex and larger a project becomes, the more important becomes FED for successful project execution and completion.

In addition, adding value elements can be applied. These adding value elements for specific the shipbuilding industry, or Value Improving Practices (VIP), a synonym for best practices, were introduced by [Shlopak and Oterhals 2014]. It is an adaptation of the established VIP, defined by [Bosch-Rekveldt 2011].

Currently, FED within NSR for small projects is virtually non-existent and comprise at most of a rudimentary scope definition, cost assessment and assigning the project team. Larger projects contain a fair amount of FED, albeit mostly limited to a cost estimation, scope definition, basic engineering, project and production planning.

Within NSS, more effort is put in FED, inherent to the nature of the projects (large scaled, with a high degree of certainty), although little is still written down or captured in standards.

Further gains in added value and project management efficiency could be achieved by putting (even) more effort in the FED by clearly defining and incorporating standard FED activities. Combining the TOE-framework with correlated associated VIP, as identified by [Bosch-Rekveldt 2011], results in Table III where the most important correlations between the type of complexity and VIP that were concluded from the study are presented.

Table III. Overview of the perceived type of project complexity and strongly correlated VIP as identified by [Bosch-Rekveldt 2011].

| **Emphasized type of complexity** | **Associated Value Improving Practices** |
|---|---|
| **Technical** | Goal setting and alignment.<br>More thorough application of lessons learned.<br>Active goal monitoring.<br>Prevent late entry of parties.<br>Application of Risk management. |
| **Organisational** | Goal setting and alignment.<br>Late entry of parties ->negative influence on project team.<br>Lack of team cohesion ->more teambuilding.<br>Proper project team.<br>Selecting the best fit Project Manager. |
| **Environmental** | Application of Risk Management.<br>Enhance co-operation Project Manager and steering committee.<br>Application of teambuilding of the project team. |

## 4. RESEARCH RESULTS

Large conversion projects combine new build with repair elements. Currently both organisations are predominantly specialised in each respective discipline, but combining the disciplines into one ideal framework requires incorporation of the identified deemed relevant aspects:

(1) All three capacities to cope with project complexity; absorptive, adaptive and restorative capacity.

(2) A mix of types of project specific control in order to cope with present uncertainty.

(3) A singular project management methodology as it is the centre (heart) of each project, expanding possibilities to assign the best fit project manager and establishing an increasing degree of standardisation. It furthermore aligns expectations towards, responsibilities and accountability of a project manager.
(4) Embedding the inter-project learning function within organisational routines (further defining evaluation functions), as foundation for reflective learning and continuous improvement.
(5) A singular, re-structured change order and deviation process flow.
(6) Diversification in the material flow within production, distinguishing the three main type of projects; straightforward repair, new build and conversion projects.

To sum up: the to be implemented aspects not only consider required adaptations concerning mere conversion projects, but also contain improvements for current processes regarding the new build and repair organisation.

The input for the theoretical perspective is the DSA-theory and the performed literature review. The outcome is an ideal framework that contains all functionalities of both organisations, optimised in one integrated model; functions are rearranged and explicitly mentioned. The ideal framework is depicted in Figure 2.

Although [Wiskerke et al. 2017] already defined a generic framework for handling complex projects (that in particular refers to ship conversions), the ideal framework that is proposed here differs. It is geared to the specific characteristics of KNS as a company; the framework has not only to cope with conversion projects, but also integrate complete new build projects and straightforward repair projects. Both established frameworks are single shipyard transcending and the functions described in Figure 2 are therefore not per definition bound by one organisation.

## 4.1 Case study results

Although in 2016 'just' 3 large projects were performed, they accounted for half of the total turnover and almost 60% of the total man-hours. 7 medium sized projects were executed, accounting for roughly 20% of total turnover, but just 15% of the total amount of man-hours. 463 small projects were executed that provided one third of the total turnover and 28% of the total amount man-hours. The definition of 'project' is rather stretched as even the smallest amount is taken into account. The large projects are comparatively more labour intensive than small and medium sized projects, probably due to a higher amount of required internal production capacity; i.e. it is expected that the outsourcing ratio is higher for small and medium sized projects.

4.1.1 *Assessment of small and medium sized projects.* For NSR these type of projects are common practice and it appears that in practice no actual distinction is made with respect to the established project organisation and used management approach. The latter is mostly input control driven to cope with uncertainty (thereby relying on the qualities and skills of production personnel), in combination with primarily a restorative capacity as a mechanism to cope with complexity.

Effective project execution prevails over administrative activities in order to serve the client as well (i.e. quick) as possible. The large amount of small projects enable this possibility; an eventual mishap has less impact, making the risk substantial lower and more acceptable.

4.1.2 *Assessment of large sized new build projects.* The substantial amount of FED that has to take place to translate the requirements into detailed engineering and construction drawings to enable the production becoming 'standard operations'. It furthermore enables the organisation to apply process control for production. On a project control level, during the project definition phase, mostly process control is applied, where during project execution this shifts towards output control driven (steering on milestones and deliverables). Furthermore, the applied strategy to cope with project complexity is predominantly of absorptive character, emphasising planning, thereby providing an additional argument for applying FED substantial more. It is a fundamental other approach compared to NSR and explains the underlying cause for the tendency towards a functional organisation.

Due to the long throughput times of a project, the established communication and organisational lines, both official and unofficial, have become 'fixed habits', resulting in organisational routines. This particular effect is twofold: possibly locking the organisation into inflexible, unchanging patterns of action, and simultaneously having the potential for efficiency and legitimacy, as [Feldman and Pentland 2003] state. As a consequence of that, it becomes harder to be and remain flexible, an issue that surfaces in case when small(er) new build projects need to be executed.

Currently, everything is solved 'in line'; regardless of project size, every line manager is (partial) responsible and is used for possible escalation. Present function (and process) controls intensify with smaller projects; intervals become shorter, ultimately potential leading to 'issues of the day' policy where the projects of shorter duration require the most attention.

Both aforementioned identifications emphasize the need to embed continuous improvement within the organisational routines to enable the company its adaptability and flexibility.

4.1.3 *Assessment of large sized conversion projects* . During the definition phase of the project it was acknowledged that an additional project manager was required for support and coordination on board. It was not so much a matter of reviewing the technical scope and conclude additional technical knowledge was necessary, but a mere lack of project management capacity. Although, in hindsight, it was a justified choice; every additional functionality within the project organisation that requires information flow, required additional control.

In order to assure a proper operating and decisive project organisation, project accountability should shift too; providing such a solid mandate for the project manager that he is given the tools and resources to achieve the project goals within the given restraints.

Currently personnel from both companies is brought together in a project organisation, thereby each using their own procedures. This emphasises the necessity towards a singular methodology and on the other hand a clear project plan that explains the roles of each 'module'.

4.1.4 *Results.* Linking the ideal situation to actual performed projects reveals the following insights;

(1) The NSR project organisations for small and medium projects contain all required project functionalities, but for the sake of efficiency in execution a deliberate choice is made to give a lower priority to satisfying the administrative project settlement. This work method resonances within large conversion projects, albeit in softened form. Nevertheless, it results in challenges within the quality and timely providing required information concerning project progress and in reports towards clients. By defining this in the project plan beforehand, making clear requirements and demands with respect to which project variables are to be monitored and provided, this issue can be

obviated. The project plan obviously still needs to be communicated properly throughout the project team.

(2) Within the project organisation of a large new build project, responsibilities are functionally divided over two line managers and a project coordinator. In other words, the project organisation tends more towards a functional organisation. When a project plan is established, it merely serves as meeting client's requirements. Internally, little use is made of it, other than the planning. As a consequence, responsibilities (or to put it rather irreverently, 'problem ownership') and framing of aspects within the project are not actual declared and, hence, remain neglected, until the issue surfaces. In the current situation this is superseded by a combination of long(er) throughput times and within realised work routines.

(3) Regarding the project organisation of a conversion project; as functional 'modules' are added to the organisation, giving account should be shifted accordingly.

(4) Standards and project organisational forms should be kept intact for the duration of a project. Possible adaptations should be revealed by means of an evaluation and 'officially' implemented thereafter. Unofficial organisational structures result in additional obscurity, complexity and information does not flow not through the established lines, thereby negatively impacting project execution.

## 5. SOLUTION PROPOSAL

Requirements are identified and organisational changes proposed in order to be able to establish an efficient and effective project organisation for large conversion projects in particular:

(1) Both organisations need to converge to a singular project management methodology. This provides a solid foundation for future learning, as only one methodology needs to be maintained and developed. Furthermore, it enables both organisations to be more flexible in assigning the best fit project manager to a certain project.

(2) The NSS-organisation should shift towards a strong matrix organisation. On the one hand in order to overcome differences in expectations, responsibilities and authority of project managers, thereby supporting the above mentioned issue. On the other hand, it allows more easily downscaling of the new build organisation, by mandating responsibilities in analogy with the work method NSR practices for straightforward small repair projects.

(3) Through using the proposed check list, a structured template is provided for determining project requirements, functions and subsequently a best fit project organisation for executing large conversion projects.

## 6. CONCLUSION

In this paper, a method is proposed for establishing a tailor-made project organisation, that is capable to execute in particular large conversion projects efficiently. This method required establishment of an ideal framework, allowing the organisation to assess required project functions based on the project scope. In addition, the TOE-framework is adapted and incorporated as an assessment to help putting emphasis upon the 'right' VIP, given a certain project complexity.

## ACKNOWLEDGMENTS

I am very grateful to the following people for resources, discussions and suggestions: Dr. ir. Jeroen Pruyn (TUDelft), ir. Jan Doorduin (KNS), ing. Jack Kuin (KNS), ing. Jules Blokhuis (KNS), Bart Volgers (KNS), Robert Bruin (KNS), Alfred Andreae (KNS), Alwin Huisman (KNS) and Ina de Bruijn-Borg (KNS).

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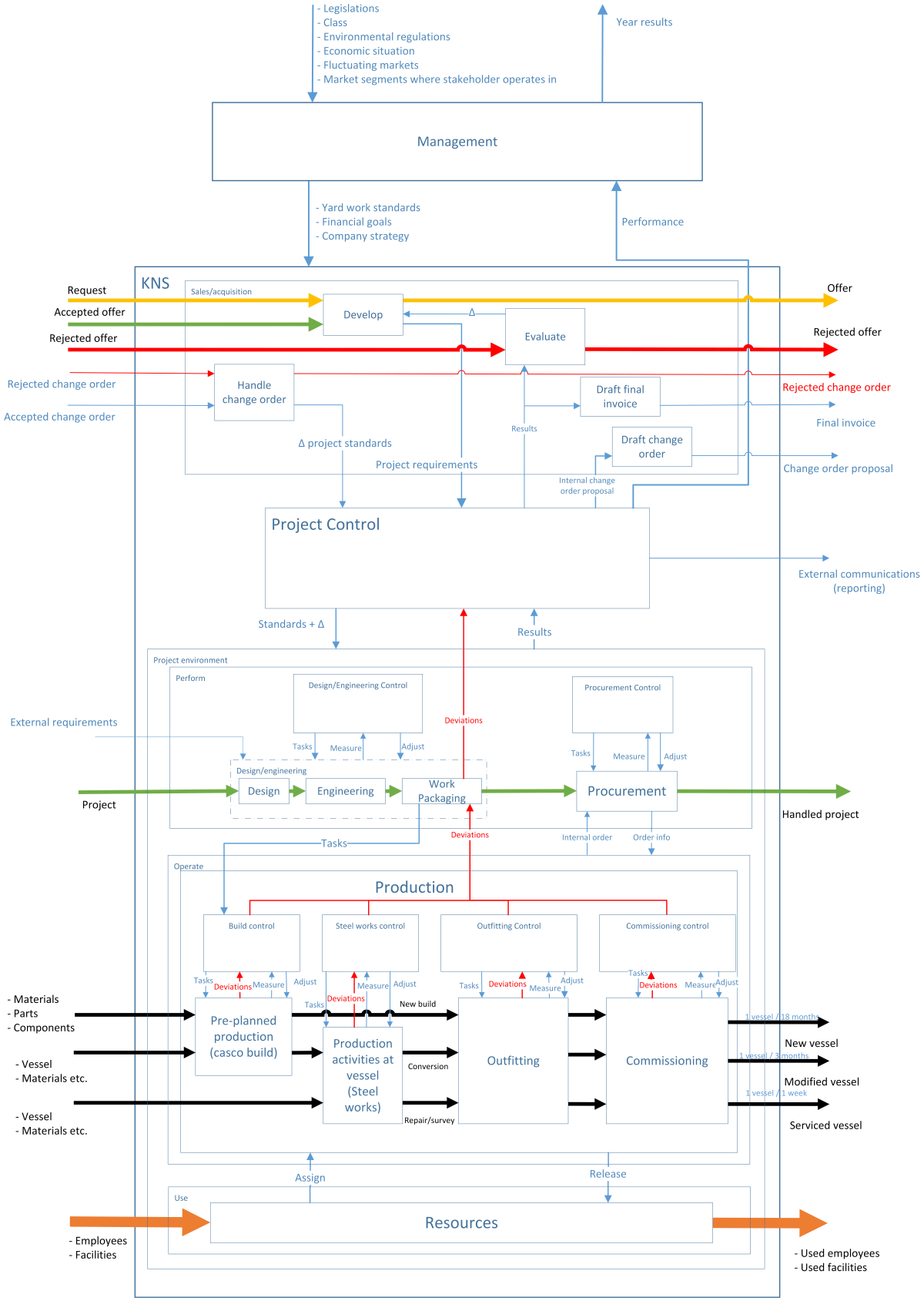


Fig. 2. Company processes in an ideal situation to effectively cope with all (to be) defined types of projects.