



# ENGAGING 'PEOPLE IN TRANSIT'

## DESIGN OF A COLLABORATION HUB

### Master Graduation Thesis

Delft University of Technology  
MSc Strategic Product Design  
Faculty of Industrial Design Engineering

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# **ENGAGING ‘PEOPLE IN TRANSIT’**

## **DESIGN OF A COLLABORATION HUB**

for the stakeholders in the ‘People in Transit’ research theme  
for promoting innovation in the future

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# collaboration

/kəlabə'reɪʃn/

*noun*

the action of working with someone to produce something.



# Executive Summary

The concept of collaboration has been used as an effective strategy to achieve an intended result by numerous entities across various points of time in history. Beginning from the societal nature of human civilisations and medieval kingdoms to its modern uses in trade and politics, collaboration has shaped the world in its many forms by creating significant impacts in the society. The field of education and innovation are also impacted by the merits of collaboration in developing new knowledge and implementing a wide array of innovative solutions to the benefit of society.

In recent years, collaborative activities between universities and industries are regarded as a source of knowledge production and technological advancements by fostering the economic and innovative competitiveness of the involved stakeholders. Industries can benefit from the outcomes generated by scientific research at the universities. These outcomes include the fundamental understanding of a particular phenomenon, in the form of theories or principles that are channeled through scientific publications. Universities can benefit from the opportunity to explore the industrial context to generate knowledge and obtain additional sources of funding for research activities. Thus, the importance of University-Industry (U-I) collaborations is considered relevant for the primary operations of the stakeholders involved.

With factors that continually support the collaboration between universities and industries in the present and the foreseeable future, it becomes necessary for the context of collaboration to be explored further. Hence, a real-time collaboration between a university and several industry stakeholders is selected for further research using design thinking methodologies, and its underlying factors and future needs of the stakeholders of the collaboration are identified, and a future context is developed that defines the characteristics of the collaboration in the future.

Through the process of understanding the current context of the collaboration, it is understood that there are unfulfilled needs among the stakeholders that lessen the impact on the outcomes of the collaboration activities. To address these unmet needs and also to adapt to the future context of the collaboration, the future context is extrapolated to design future scenarios that can be used as an opportunity to add value to the collaboration by devising a Hub collaboration and evolving its activities across various points in the future.

Initially, the collaboration can be improved by creating a knowledge platform that acts as a modified repository for knowledge that is created by the collaborative activities and also as a social network that connects the stakeholders, thereby providing new opportunities for collaboration. Further, the concept of a collaborative laboratory that is functionally connected to other laboratories that offer new expertise and knowledge domain is proposed to develop and execute multi-stakeholder projects involving interdisciplinary research. Following this, an Innovation Transfer office is proposed for the collaboration to integrate the elements of the society into the collaboration thereby developing a system of infrastructures that enables the implementation and the integration of the innovation outcomes into a desirable, viable and feasible systems.

These solution concepts form as steps towards a vision for the stakeholders of the collaboration to create gainful impacts on knowledge, business and society by spearheading innovation through collaboration. Thus, a collaboration of this kind is not to be seen merely as a union of stakeholders trying to develop innovation but has the potential to improve people's lives by providing the best travel experiences without compromising on the operational factors of the collaboration.

# Acknowledgements

This project itself is a result of a collaboration of many people, whose contributions had made the development and the execution of this project successful.

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I owe this success to everyone and wish I would get the same guidance and support through my future endeavours.

Yours Sincerely

A handwritten signature in black ink, appearing to read 'R. Prashanth', written in a cursive style.

Prashanth Rajkumar

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# Glossary

<b>Abstraction</b>	the quality of dealing with ideas rather than events.		activity or knowledge.
<b>Artefact</b>	something observed in a scientific investigation or experiment that is not naturally present but occurs as a result of the preparative or investigative procedure.	<b>Ecosystem</b>	a complex network or interconnected system.
<b>Benchmark</b>	a standard or point of reference against which things may be compared.	<b>Expertise</b>	expert skill or knowledge in a particular field.
<b>Collaborators</b>	a person who works jointly on an activity or project; an associate.	<b>Feasibility</b>	the state or degree of being easily or conveniently done.
<b>Context</b>	the circumstances that form the setting for an event, statement, or idea, and in terms of which it can be fully understood.	<b>Fragment</b>	a small part broken off or separated from something.
<b>Consensus</b>	a general agreement.	<b>Horizon</b>	a distinct period or stage in a series of events or a process of change or development.
<b>Creative</b>	relating to or involving the use of the imagination or original ideas to create something.	<b>Hub</b>	the effective centre of an activity, region, or network.
<b>Dependence</b>	the state of relying on or being controlled by someone or something else.	<b>Hybrid</b>	a thing made by combining two different elements.
<b>Design Thinking</b>	refers to the cognitive, strategic and practical processes by which design concepts are developed.	<b>Incubator</b>	a place, especially with support staff and equipment, to new businesses.
<b>Desirability</b>	the quality of being desirable.	<b>Infrastructure</b>	the basic physical and organisational structures and facilities needed for the operation of a society or enterprise.
<b>Domain</b>	a specified sphere of	<b>Interaction</b>	communication or direct involvement with someone or something.
		<b>Involvement</b>	the fact or condition of being involved with or participating in something.
		<b>Knowledge</b>	facts, information, and skills acquired through

	experience or education; the theoretical or practical understanding of a subject.	<b>Spin-off</b>	a by-product or incidental result of a larger project.
<b>License</b>	authorize the use, performance, or release of (something)	<b>Stakeholders</b>	denoting a type of organisation or system in which all the members or participants are seen as having an interest in its success.
<b>Operations</b>	the action of functioning or the fact of being active or in effect.	<b>Strategy</b>	a plan of action designed to achieve a long-term or overall aim.
<b>Phenomenon</b>	a fact or situation that is observed to exist or happen, especially one whose cause or explanation is in question.	<b>Trend</b>	a general direction in which something is developing or changing.
<b>PiT</b>	People in Transit.	<b>TU Delft</b>	Technische Universiteit Delft (or) Delft University of Technology
<b>Pilot</b>	done as an experiment or test before being introduced more widely.	<b>Viability</b>	ability to work successfully.
<b>Potential</b>	having or showing the capacity to develop into something in the future.	<b>Vision</b>	the ability to think about or plan the future with imagination or wisdom.
<b>Probability</b>	the extent to which something is likely to happen or be the case.		
<b>Prototype</b>	a first or preliminary version of a device or vehicle from which other forms are developed.		
<b>Sector</b>	a distinct part or branch of economy or society or of a sphere of activity such as education.		
<b>Simulation</b>	imitation of a situation or process.		
<b>Solution</b>	a means of solving a problem or dealing with a difficult situation.		

1

# **INTRODUCTION**





# 1 Introduction

## 1.1 TU DELFT & THE FACULTY OF IDE

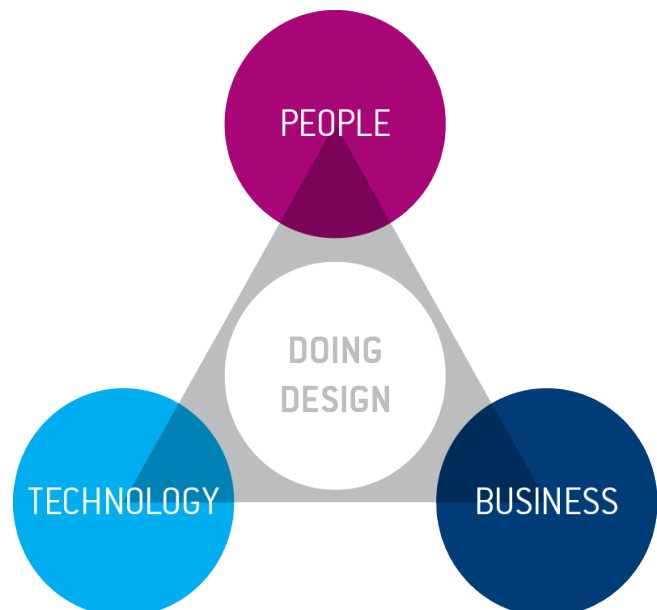
The TU Delft or the Delft University of Technology is the largest and the oldest public technological university in the Netherlands and is based in the municipality of Delft. The university, through academic excellence and with a focus for technological expertise, has been ranked as one of the top 20 best universities for engineering and technology in the world <sup>[1]</sup>. The academic infrastructure of the university is split into eight faculties and numerous research institutes, the university hosts over 19,000 students from all graduate levels, more than 2,900 scientists and over 2,100 management and support staff <sup>[1]</sup>. The university has associated itself with several Nobel laureates and is a key member in several

university federations across the European region and the world.

The faculty of Industrial Design Engineering (IDE) or Industrial Ontwerpen in Dutch, was established in 1969 and has recently completed its 50th year at the time of this publication <sup>[2]</sup>. The faculty itself has spun off from the Faculty of Architecture and established itself as an own engineering discipline. The faculty offers a bachelors program in industrial design engineering, and also a masters program that is further divided into three specialisations concentrating on the three pillars of design – People, Business and Technology.

**Figure 1.1**

An design exhibition at IDE faculty



**Figure 1.2**

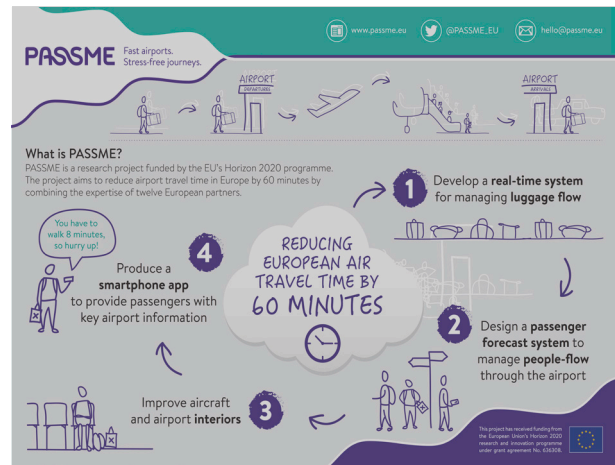
IDE Research Triangle

## 1.2 PEOPLE IN TRANSIT

“People in Transit” is a research theme of the Faculty of IDE that aims to provide the solutions for people in transit seamless across all underlying interlocking systems by including various stakeholders, new technologies and embracing the systems’ complexity thereby making the experience as the focus of the journey [3]. Several design projects partnering with industries in the mobility sector and have yielded research outcomes that can be commercialised for the fulfilment of stakeholder objectives.

The “People in Transit” research theme deals with any process and motivations that deals with an individual travelling from a point to another point. These processes, motivations and experiences of an individual travelling through various modes are studied and with the published knowledge, create solutions for the stakeholders involved that provide added value to their businesses and makes their operations simpler. The research theme follows the knowledge in five levels of abstraction – context of the travel, the actual travel itself, the data transactions involved between various stakeholders, the means of transport available to execute the travel and the infrastructure that is available for the transportation. Through these levels of abstraction, the stakeholders in the research theme perform their activities creating new knowledge and innovations for the industry thereby creating an impact in the society.

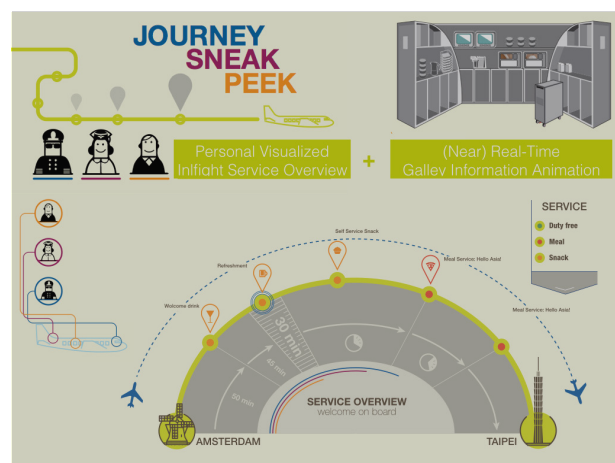
The stakeholders in the “People in Transit”, comprising of university researchers and industry experts, identify a problem that needs to be addressed. The stakeholders implement appropriate design thinking methodologies to understand the context of the problem area and execute creative ideation sessions to come up with a design solution to address the problem. The entire process is used as source material to develop new knowledge for the research community, whereas the industry stakeholders receive real-time solutions to their identified problems.



**Figure 1.3**  
People in Transit - PASSME Project



**Figure 1.4**  
People in Transit - Emotion aware car seat



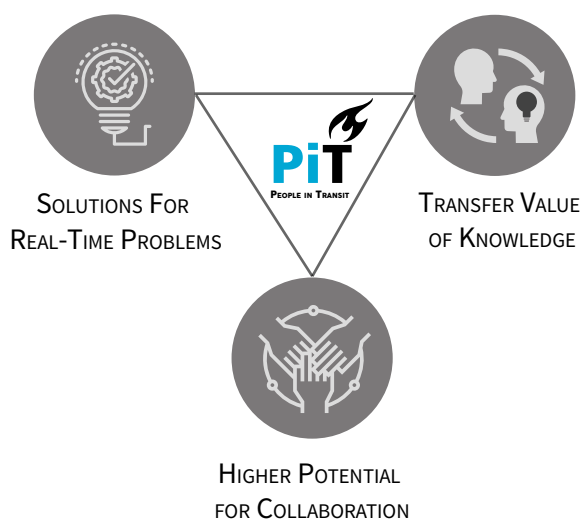
**Figure 1.5**  
People in Transit - Inflight Service Concept Design

## 1.3 ASSIGNMENT

At the moment, the “People in Transit” collaboration has been performing its intended activities with several stakeholders in the research theme and has been delivering solutions to address the problems identified by the stakeholders. However, there are several dependencies during these processes that affect the performance of the outcomes of the research theme. The context of a hub collaboration to address these problems is relatively under-explored and the stakeholders of the “People in Transit” have recognised the potential for a hub style collaboration in the “People in Transit” research theme that is to be designed through the course of this project.

### 1.3.1 BACKGROUND INTO COLLABORATION

The reasons for venturing into a hub style of collaboration for the “People in Transit” research theme are mainly attributed to three factors –



**Figure 1.6**  
Factors for Hub Collaboration in People in Transit

#### **Solutions to Real-Time Problems**

Industrial organisations seek universities as a knowledge partner to identify and understand a problem phenomenon and provide creative solutions in real-time scenarios in their operational context. A partnership thus created between the industry and the university results in creating new knowledge which will create added value and develop new skills for the industry and other stakeholders in the influence of the university. However, it is realised that by engaging additional partners into this partnership will yield outcomes

and results of better quality at a faster pace of innovation by transforming the partnership into a collaboration with broad expertise <sup>[4]</sup>.

#### **Transfer Value of Knowledge**

Universities create knowledge in a subject domain by understanding a phenomenon and generating theories, laws and principles that govern the phenomenon and communicating the outcomes to the community of research. However, the activity thus required to create this knowledge are often resource-intensive to the associated stakeholders and can be rendered viable if the knowledge generated through these activities are applied into solutions in as many cases as possible <sup>[5]</sup>. The viability for performing knowledge-creating activities can be achieved by effectively utilising the available potential for the knowledge to a greater audience thereby creating more probability for the knowledge to be adapted and also through the fringes of the influence of the collaboration <sup>[6]</sup>.

#### **Higher Potential for Collaboration**

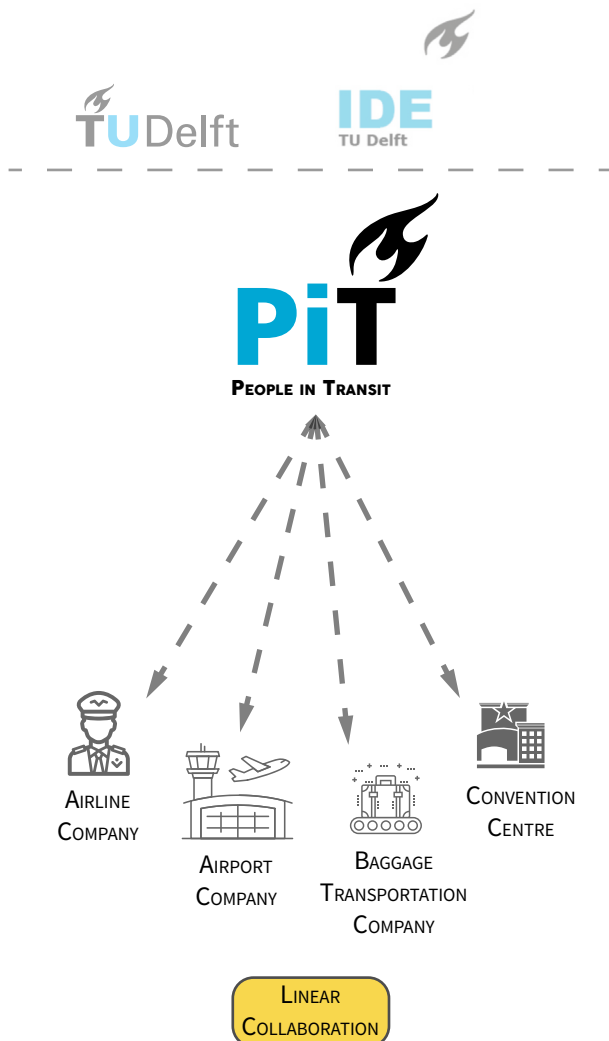
The collaboration between universities and industrial organisations can also yield several secondary benefits such as access to a skilled workforce, problem-solving tools, sources of funding and avenues for experimentation <sup>[7]</sup>. By creating new fields of knowledge and developing expertise and the impact of these activities and its benefits can be realised, if the involved stakeholders have better availability of shared resources from each stakeholder thereby increasing the potential for collaborative activities among the participants in the “People in Transit” research theme <sup>[8]</sup>.

### 1.3.2 CURRENT COLLABORATION STRUCTURES

The current collaboration system followed in the “People in Transit” research theme is similar to a linear style of collaboration where each stakeholder has an individual relationship with the university. In this model, the activities and the influences of the collaboration are dependants on the interactions only between the two stakeholders <sup>[9]</sup>. The outcomes of the linear collaboration require replication of the

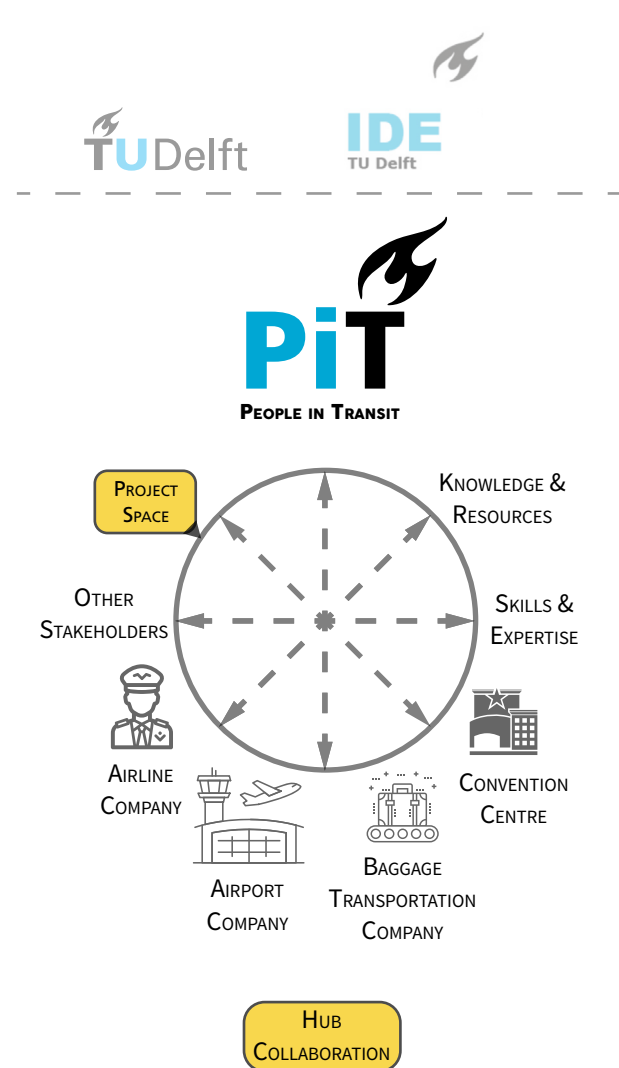
activities if required to be transferred to a second industry stakeholder. The resources and expertise available to execute the innovation activities are only from the two stakeholders involved in the partnership. Moreover, the different relationships formed between the university and each of the stakeholders are varied, thereby leading up to an unequal collaboration that elicits varying levels of involvement from the stakeholders. This approach requires the additional workforce and resources to cater to the individual stakeholders [10].

expertise pool available to execute the innovation activities are also vast and varied [9]. The outcomes of a hub collaboration are communicated simultaneously, across various stakeholders that the activities and the resources required for transfer of knowledge are minimised. A uniform style of collaboration is maintained across all stakeholders, eliciting an equal involvement from all stakeholders towards future innovation. Due to this equal collaboration, the approach does not require additional workforce and resources to cater to the stakeholders involved [10].



**Figure 1.7**  
Current Linear Collaboration Model of PiT

The outcome of this project is to transform these multiple linear style collaborations into a single hub style collaboration where the interactions between the university and the industry stakeholders are unified on a single collaboration platform. In this model, the activities and the influences of the collaboration dependencies are mitigated among several stakeholders, thereby making the resources and

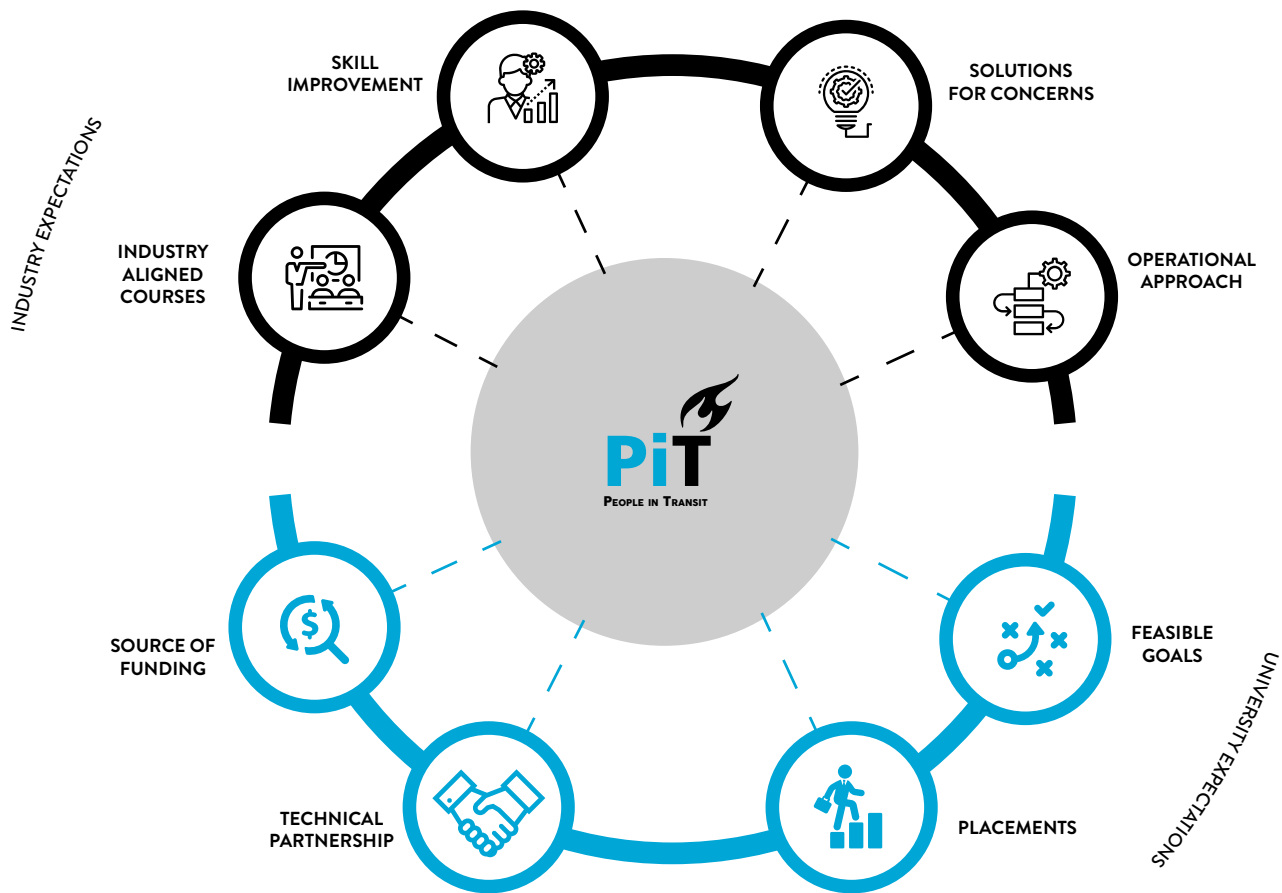


**Figure 1.8**  
Expected Hub Collaboration Model of PiT

### 1.3.3 PERCEIVED BENEFITS OF COLLABORATION

Through the Hub style of collaboration, there are perceived benefits available for the expectations of the university and the industry stakeholders that justifies the pursuit for the "People in Transit" research theme to form the hub style of collaboration.

**Figure 1.9**  
Perceived benefits of Hub Collaboration for 'People in Transit'



For the industry stakeholders, it becomes possible to build courses at the university that are aligned to develop the skills and expertise that are required for the operation of new value propositions. Moreover, with the increase in interactions through the hub collaboration, the industry can build skill improvement programs for the existing workforce to perform their activities efficiently and provide outcomes with better quality. Through the interactions in the hub collaboration, the industry stakeholders can seek solutions for problems that are concerned with providing a quality outcome to the end-user. Moreover, the hub collaboration can provide an operational approach for the university to engage with the industry stakeholder that provides greater depth in the identification of the problem and devise a solution that fits with the operational culture of the organisation <sup>[11]</sup>.

For the university, it becomes possible to obtain additional sources of funding to generate knowledge creation and development further into the context of the "People in Transit" research theme. The hub collaboration also provides opportunities for the university to form technical

partnerships with the industry stakeholders on the developed outcomes, thereby increasing the impact and the role of the university in bringing innovation to the society. The hub collaboration will also enable the university to place students into careers in the industry stakeholders in the "People in Transit" research theme, thereby leading to the pollination of work cultures among the stakeholders. The Hub collaboration can also influence the university in identifying feasible goals for academic programmes by understanding the industrial context of the stakeholders and aligning education methodologies and topics to the context <sup>[11]</sup>.

#### 1.3.4 OBJECTIVES OF THIS DESIGN PROJECT

The objectives of this design project are to create a conceptual design for a collaborative hub for the stakeholders of the "People in Transit" research theme. The concept of hub collaboration is to be designed to satisfy the purposes of the hub collaboration model and to obtain the perceived benefits as discussed. In order to devise the concept, the future context of the collaboration is to be explored, and a roadmap is to be developed to conceptualise the

future scenarios and the solution formats for each scenario. A prototype of the concept solution is planned to be developed and is to be tested with the stakeholders for validation. Thus, through the execution of this project, an early understanding of the hub collaboration for the “People in Transit” is developed and the future context is derived leading up to the creation of future scenarios for which solutions are proposed and developed into a minimum viable prototype to test the concept with the users and propose strategic scope for further development. The outcomes are delivered to the stakeholders in the form of a design report and poster, and a presentation is to be made to the relevant stakeholders for the communication of the outcomes for further development.

### 1.3.5 SCOPE – STAKEHOLDERS AND PROCESSES

For the successful execution of the design project within the available time of 20 weeks, it is proposed to perform the design research and ideation components of the project focussed on a limited sample of stakeholders who can collectively represent the larger sample space of the current and future potential stakeholders of the “People in Transit” research theme. The project is devised with the perspective of the university stakeholder, which in this case, would be the Delft University of Technology. Four industry stakeholders are selected for contextual exploration and are selected based on the business relationship with each other to form a network chain of value propositions. The

university component is further narrowed down to the teams and individual researchers that are associated with the innovation activities for the selected four industry stakeholders.

#### **Stakeholder 1 – Airport Company**

The first industry stakeholder selected for this collaboration is an airport company based on one of the major international airports in the European region. The airport selected is one of the busiest airports in the world and handles around 71 million passengers and 500,000 aircraft movements a year. The airport company has been in an official individual collaboration with the “People in Transit” research theme for a period less than one year and therefore forms a suitable stakeholder to receive inputs for collaborative development. The Airport company acts as the hub for the Airline company, which becomes a customer for the airport company and acts as the customer for the Baggage Transportation company by purchasing their value propositions. The airport is also connected to the convention centre in proximity and through transport connections and acts as a feeder to the convention centre.

#### **Stakeholder 2 – Airline Company**

The second industry stakeholder selected for this collaboration is an airline company, which operates as one of the major passenger airline and

**Figure 1.10**  
Project Stakeholders



air cargo services in the world. The airport caters to around 145 destinations across the globe and serves as a national flag carrier for a European nation. The airline company has been in frequent collaboration with the "People in Transit" research theme and hence provides a platform for the cross-adaptation of the collaboration experiences with the other stakeholders. The Airline company operates out of the airport company as its base of operations and the ground handling division of the airline makes use of the systems developed by the Baggage Transportation company for executing airline baggage services. The airline also acts as a feeder in bringing travellers to the convention centre as their destination.

travel, thereby encouraging the use of the services offered by the airport and the airline companies to reach the convention centre.

### ***Stakeholder 3 – Baggage Transportation Company***

The third industry stakeholder selected for this collaboration is a baggage transportation company in the context of aviation travel but has a broader value proposition as a material handling and logistics automation company. The company has catered baggage handling solutions to 17 of the 25 busiest airports in the world and has operations at various global operations. The baggage transportation company currently has a limited collaboration with the university, but the potential for higher collaboration are foreseen that makes including the stakeholder as a part of the scope of this project add greater value to this project. The baggage transportation company has a customer relationship with the airport company, which buys the baggage transportation system and also with the airline company, whose employees execute baggage handling services using the system.

### ***Stakeholder 4 – Convention Centre***

The fourth industry stakeholder selected for this collaboration is a convention centre and is considered as a complex of conference and exhibition halls in the business district of a major European city. The convention centre is a preferred location for a variety of large trade shows and events and has an enclosed space of 112,200 square metres. The convention centre has a relatively young collaboration with the university that provides reception towards collaborative input but also adds a distinct value proposition when compared to the rest of the stakeholders. The convention centre creates purposes for

## 1.4 DESIGN PROCESS

The Vision in Product Design (VIP) approach has been chosen for this project as the approach provides a way to come up with solution outcomes that give the stakeholders in the collaboration a purpose and a value [12]. By breaking down the current context, it is possible to derive the building blocks for the future context on which scenarios and solutions can be devised. The selection of the VIP approach is suitable for this project as it enables deep-diving into the current context to determine its underlying factors that make the collaboration operational in its current context. With the stakeholder needs identified, the Context Factors for Future context are identified that provides a comprehensive understanding of the future context of the collaboration and design solutions that fulfil the needs and expectations of the stakeholders on a longer-term,

The VIP approach involves four major stages, which forms as a guide to executing this project and also to present the insights and solutions in this report.

### **Stage 1 – Deconstruction**

Deconstructing the current scenario through the current tools and platform available for collaboration and understanding the current context using context mapping tools and techniques. The output of this deconstruction process is to create an understanding of the current context so that the factors required to build a future context are identified.

### **Stage 2 – Future Context**

Developing a future context by identifying the domain for the solution design and setting the Design clocks for future scaling of solution. Through the Context Factors, a Context Structure is developed that symbolises the purpose, scope and means to design a future scenario. The trends associated with the context structure parameters are identified, and its evolution scoped to add more detail into the future scenario. A vision statement is devised to present the big-picture purpose of this project that is formed with the

associative analysis of the Future Context. The outcomes of this stage are used to design future scenarios through the understanding of the future context.

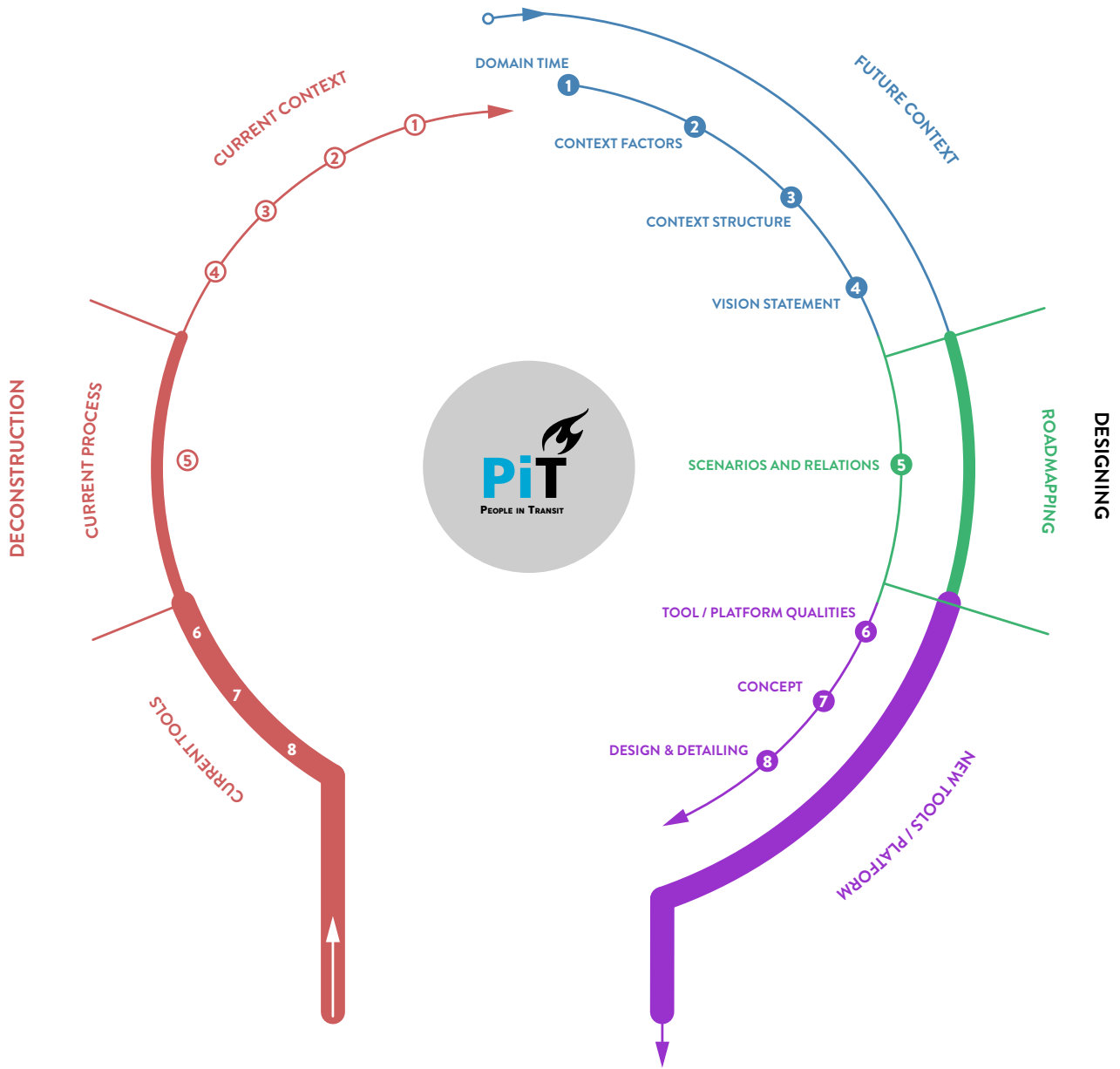
### **Stage 3 – Roadmapping**

Designing future scenarios based on the evolution of trends in the future context and developing solutions for the collaboration to provide value to the stakeholders in future scenarios. The activities and the resources required for the development of the solutions are identified at this stage to provide a platform for strategic planning for the development of the outcomes and its execution. The outcomes at this stage are the solution concepts for the future horizons of the collaboration.

### **Stage 4 – Prototyping and Testing**

Developing the solution concepts further into tangible prototypes that can be conceptually tested among the stakeholders and validate the concept based on design hypotheses. The outcome at this stage provides the validation of the concept and provides further recommendations in developing the prototype into a realistic solution.





**Figure 1.11**  
 Vision in Product Design Methodology - adapted for this project

2

**DECONSTRUCTION**

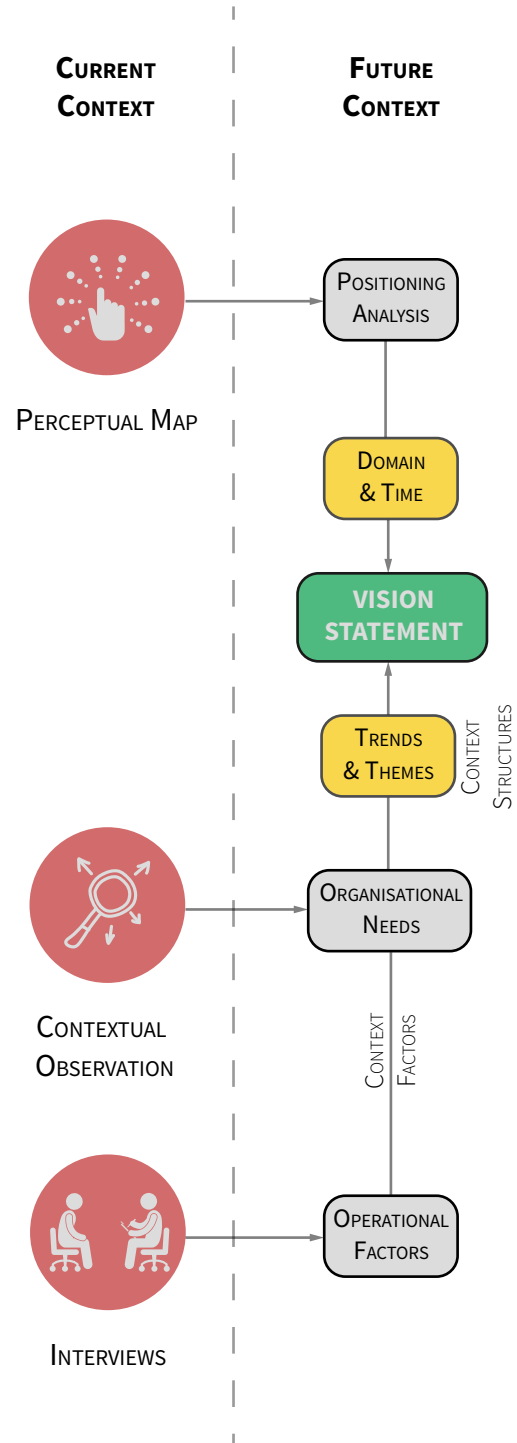


## 2 Deconstruction

The context of Collaboration between the university and the industries in the 'People in Transit' is extensive, comprising of a wide array of activities and interactions. To understand the underlying factors of this collaboration and to identify the qualities of the interaction, the Deconstruction of the current context is required [12]. The outcomes of this Deconstruction will guide the Designing process in determining not only the future context but also provides us with rich data about the needs of the end-users which can be used to develop the required solutions during the Prototyping process [12].

### 2.1 METHODOLOGY

The Deconstruction activity for this project involves the collection and analysis of the context data through three different methods – Perceptual Mapping, Contextual Observations and Stakeholder Interviews. The three methods are carried out in parallel and are independent in its focus to cover a different aspect of the context. Through the Perceptual Mapping method, it was possible to perform a deep dive into the existing collaboration based on recorded information and identify current positioning of the collaboration and also to determine the Domains for the development of the future context. Through the Contextual Observations, the stakeholders were able to be observed performing their activities related to the collaboration, and their needs and value drivers are understood, which can be used as Context Factors in developing the future context [12]. In the same way, through the Stakeholder Interviews, the factors related to the back end operations of the collaborations are identified and clustering these factors with the Context factors identified earlier, will help in identifying the Context Structure during the later stages of Design activities.



**Figure 2.1**  
Deconstruction Process Methodology

## 2.2 PERCEPTUAL MAPPING

The Perceptual Mapping method is useful for diagrammatically representing the available information to create an overview centred around a theme. Using this overview, it becomes easier to identify opportunities for ideation with an understanding of its primary and secondary effects [13]. In this project, the Perceptual Mapping is used to display the information obtained through the deep dive of recorded information and identify central themes that can serve as areas of focus for the Design process.

From the results of the Deep Dive through recorded information about the 'People in Transit' research theme through secondary sources such as stakeholder websites and press releases, information from executed projects and published conference articles, two central themes emerged that can serve as the Domain for the project.

### 2.2.1 PASSENGER JOURNEY INNOVATION

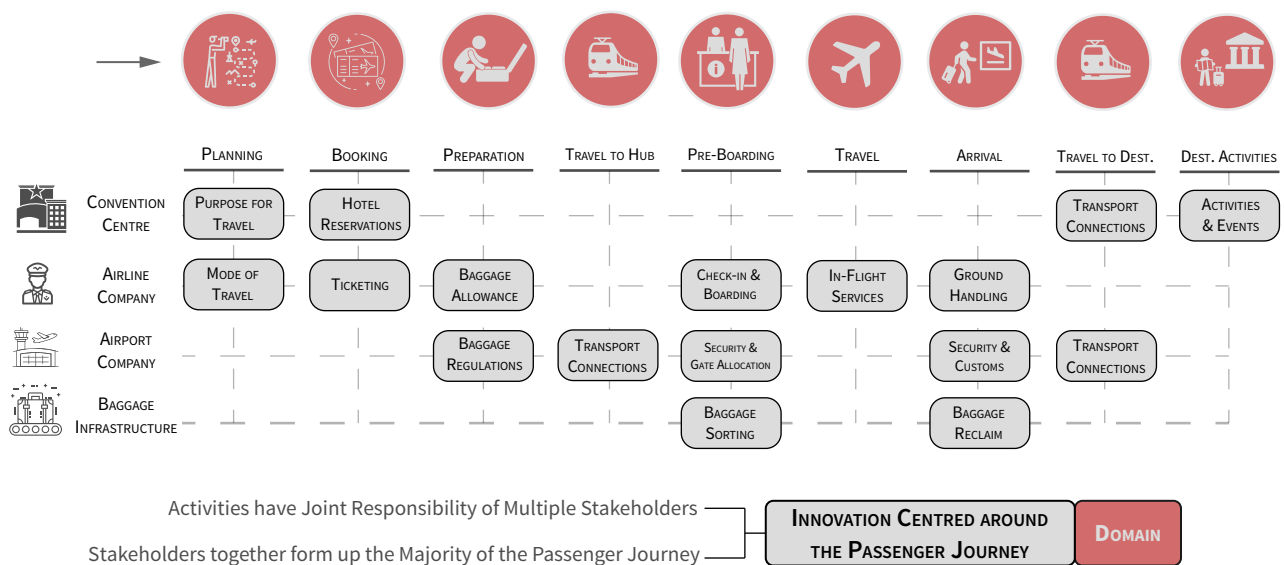
One of the significant focus on the 'People in Transit' research theme is to improve the experience of the travelling end-user seamlessly across various systems and modes of travel [3]. This focus on the experience is supported through the execution and publication of several projects that are aimed at improving the experience of

the travelling end-user at various points in a passenger journey. The execution of these projects itself is possible only with the necessary support from the industry stakeholders who can provide a research sandbox with adequate data and service operations. Hence, the nature of services offered by the industry stakeholders plays an essential role in determining the scope for innovation projects that will aid further research.

A Perceptual Map is created with the typical Passenger Journey in the horizontal axis and the value propositions or the services offered by the current project stakeholders in the vertical axis. It can be observed in the Perceptual Map that the services offered by the current project stakeholders themselves form the entirety of the processes involved in the typical passenger journey. This observation validates the selection of the current stakeholder companies for the evolution of the project as it covers the focus of the 'People in transit' research theme. The observation also infers that the outcomes of this project can be catered to the current stakeholders in its initial stages and can be scaled to other stakeholders to fill in the remaining spaces in the Passenger Journey.

A second observation can be made with this perceptual map that most of the processes

**Figure 2.2**  
Typical Passenger Journey with the Stakeholders



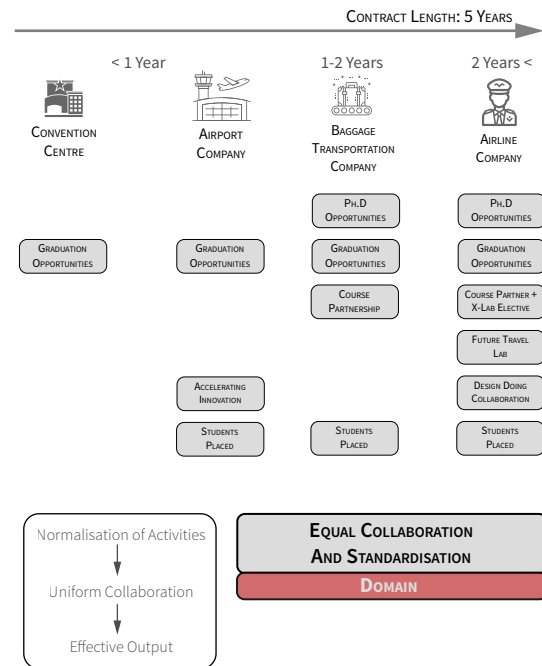
in the typical Passenger Journey have an interlinked service responsibility of two or more stakeholders. That is for a process to be executed in the passenger journey it takes the combined functioning and efficiencies of two or more stakeholders involved in the process. Hence, for an innovation that is intended to improve the experience of a process in the Passenger Journey, it is only feasible when the multiple stakeholders involved in the process are collaborating in the development process. The identification of such stakeholders can be done when the innovation is targeted at a process in the passenger journey.

The perceptual map thus provides the 'People of Transit' research team with the opportunity to approach the innovation process based on the Passenger Journey processes which will yield in easier identification, selection and collaboration activities of relevant industry stakeholders. It also provides an opportunity for the industry stakeholders to understand the passenger journey outside the influences of their value propositions and decide on appropriate partnerships with other stakeholders to scale their current business structures. Thus, citing the importance of the Passenger Journey, playing a central role in this context of collaboration in the 'People in Transit' program as explained until now, it is adequate to choose the innovation around the Passenger Journey as one of the Domains or the central themes for which the future context is to be designed.

**2.2.2 NATURE OF COLLABORATION ACTIVITIES**

The 'People in Transit' research theme has stakeholders who entered into the collaboration at different periods. Because of these stakeholders entering into collaboration at different periods, the activities involved with them are also significantly varied. For efficient operations of collaboration, it is recommended to have a collaboration of equal involvement among these stakeholders to encourage trust and co-operation among stakeholders and also to use the higher potential of the available resources [14]. Bringing an equal collaboration can be achieved by standardising the collaboration activities and attaining normalisation of the activities [15]. This normalising activity will also help the involved stakeholders in effectively scale the activities of the collaboration to future research fields and additional stakeholders.

**Figure 2.3**  
Current Activities with the Stakeholders



A second Perceptual Map is created with the time elapsed in the current collaboration of each stakeholder in the horizontal axis and the current activities involving the stakeholders in the vertical axis. From this perceptual map, it can be observed that the collaboration activities of each stakeholder are varied significantly to the time elapsed in the collaboration. This variation can be attributed to the non-availability of time and immediate resources to effect the missing activities. This observation raises a concern about the availability of resources when different stakeholders join independently at various periods. Hence, for future operations, the availability of resources without the dependency on time needs to be considered. Also, when the activities are normalised, it is more accessible to scale the activities to subsequent collaborators and research fields, thereby improving the efficiency of the collaboration. This scenario will also pave for subsequent involvement from the stakeholders since every stakeholder has the opportunity to contribute in an equal manner. From this perceptual map, it can hence conclude that Equal Collaboration among the stakeholders is a Domain or a central theme to be considered for future design activities in this project.

## 2.3 CONTEXTUAL OBSERVATION

The method of Contextual Observation involves the participation of a designer in the context of the project itself to observe and understand the phenomenon when not much data is available from other sources. The method is used to study the actions and the activities of the intended stakeholders in specific situations. The observations made enables the understanding of the phenomenon and to identify influential variables or other elementary interrelations in real-life situations <sup>[16]</sup>.

The contextual observation method was used in this project to understand the nature of collaboration and the needs of the industry organisations from the 'People in Transit' collaboration. The method was applied in six creative workshop sessions spanning across various stakeholders. Each creative session comprised of approximately 10-15 participants from both the university and the industry, and with the entire session lasting for about 3 hours with intermittent breaks after each stage.

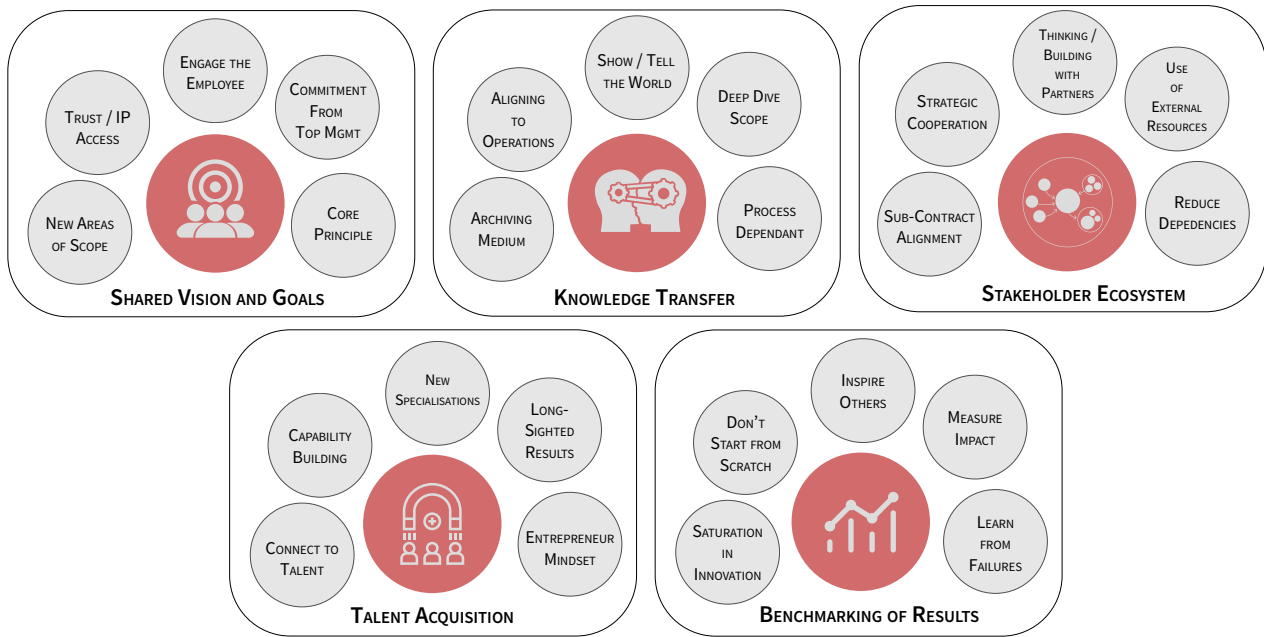
In the beginning, the participants were made to envision the future of the collaboration and share to the rest of the group in the form of post-it notes on a canvas. Clusters are formed and labelled with the ideas pooled in, and the overlying themes are identified. From this stage, the stakeholders are made to list the activities and resources required from the current time frame to achieve the future vision formed earlier. The participants were made to explain their list of actions and cite its importance to the future of the collaboration.

Observations were made throughout the session, and the insights are codified and clustered according to a specific need expressed by the stakeholder during the creative session. The results of these sessions are collated together using a qualitative research software tool, and five significant needs that require action for better collaboration are identified.



**Figure 2.4**  
Contextual Observation Sessions





**Figure 2.5**  
Context Factors - Organisational Needs

### 2.3.1 SHARED VISION AND GOALS

For effective collaboration between multiple stakeholders, a shared vision can create a sense of trust and commitment from the stakeholders [17]. There are many examples of innovation and collaboration hubs that have been formed in the past that have failed to deliver its intended outcome because of a lack of vision and goals. Hence, communicating a clear set of goals and vision for the collaboration is required to elicit involvement from the stakeholders.

With a vision and goals for the collaboration in place, the stakeholders can be brought together as a unified entity and can be empowered with the appropriate use of knowledge and expertise. At this stage, the stakeholders are encouraged to participate in creative discussions and pro-actively undertake actions through shared responsibility [17]. With a platform that allows this creative discussions and initiation for action, trust is improved among the stakeholders through the network. Trust between stakeholders will carry the collaboration ahead through the development of co-created solutions that affect multiple processes in the Passenger Journey.

Thus, it is a requirement for the Hub to serve as a platform where multiple stakeholders are brought together under a shared vision for future innovation across the passenger journey.

### 2.3.2 KNOWLEDGE TRANSFER

The Stakeholders in the “People in Transit” program have generated a vast amount of knowledge and expertise that are both academic and industrial. This knowledge-creating activity is a resource-intensive process, and its purpose can be justified when the created knowledge can be transferred or shared for fellow stakeholders to learn and follow.

There exists a situation in the current context where industrial stakeholders find it difficult to access and understand the knowledge from mainstream sources of knowledge. Coupling this situation with the limited availability of time and resources for innovation activities, it becomes a tedious task for stakeholders to understand the knowledge and devise a plan of action based on them. This situation thus creates an opportunity for a Knowledge Transfer Process that can improve the efficiency of stakeholders by having access to the right information at the right place and at the right time [18]. It is also desired that the process that is to be established also has to free from dependencies such as people and time.

Thus, it is desirable for the Hub to create value to the stakeholders by serving as a useful communication tool among them to transfer knowledge and provide expertise to them.

### 2.3.3 STAKEHOLDER ECOSYSTEM

Many innovative projects that arise out of the current collaboration fail to clear the “Valley of Death” – a situation where projects that have been conceptualised fail to be developed into tangible outcomes. Although the presence of the “Valley of Death” situation can be attributed to several factors that are both internal and external to the stakeholders, the key factors often have a link to lack of availability of resources within a single organisation who need to serve as the actor for development of the innovation <sup>[19]</sup>.

By creating a Stakeholder Ecosystem, the responsibilities of action of both conceptualisation and development into a prototype can be shared among multiple stakeholders where the dependency on a single actor to develop the solution further is reduced. The ability to call upon for expertise and resources among a larger pool of stakeholders helps in activities that lead to faster innovation <sup>[7]</sup>. The ecosystem can bring the stakeholders greater control over the information and the resource supply chains, which leads to better forecasting of innovation activities within the stakeholders <sup>[20]</sup>.

Thus, housing this stakeholder ecosystem within the Hub environment can empower organisations to form partnerships to drive innovation forward within the context of the Passenger Journey and in turn develop the innovation capabilities of the organisation by the sharing of expertise.

### 2.3.4 TALENT ACQUISITION

Innovation projects are often undertaken on a long-term basis and hence needs to hold onto the resources required by the project. One of the critical resources for these innovation projects is the people working on them. When the right people are equipped with the right skill and knowledge, the project can be shaped better yielding better operations and outcomes. However, for the people to provide such commitment to these projects undertaken by the stakeholders, it is required for the organisations to acquire them and invest in them to train them further and fitting them into their respective roles <sup>[21]</sup>.

In order for the organisation to find the right people for the innovation activities, the stakeholders need to have access to a greater pool of candidates to choose from at various stages in the innovation process. These pool of candidates can also be extended across the university environment, which has a steady flow of PhD and Master graduates seeking project and research opportunities. Through the placement program, the graduates can be offered full-time and part-time employment in the stakeholder organisations to develop the project further. This process, in turn, will create a culture of design thinking and innovation within the organisation which is beneficial in the longer run.

Thus, the Hub can cater as a facilitating medium in connecting the organisations to candidates in the same field of innovation and can conveniently execute innovation projects within the organisation.

### 2.3.5 BENCHMARKING OF RESULTS

Stakeholders often tend to act as information silos when they are unable to communicate ideas and outcomes to other stakeholders. These lack of available information from other stakeholders leads to one stakeholder duplicating the efforts and outcomes of another stakeholder which incurs unneeded expenditure and thereby slowing down the pace of innovation <sup>[14]</sup>.

However, when outcomes of a stakeholder are presented to other stakeholders, and such information is thereby made available, stakeholders can use those outcomes as an existing benchmark and build further from that benchmark. By this activity, duplication of efforts is avoided and thereby accelerating the pace of innovation. This benchmarking activity will also serve as a library of results through which the continuous journey of innovation can be traced and the impact of the innovation measured.

Thus the Hub can serve as a library where stakeholders can store results of innovation activities. These results, in turn, can be reviewed, organised and made available for further development by the stakeholders.

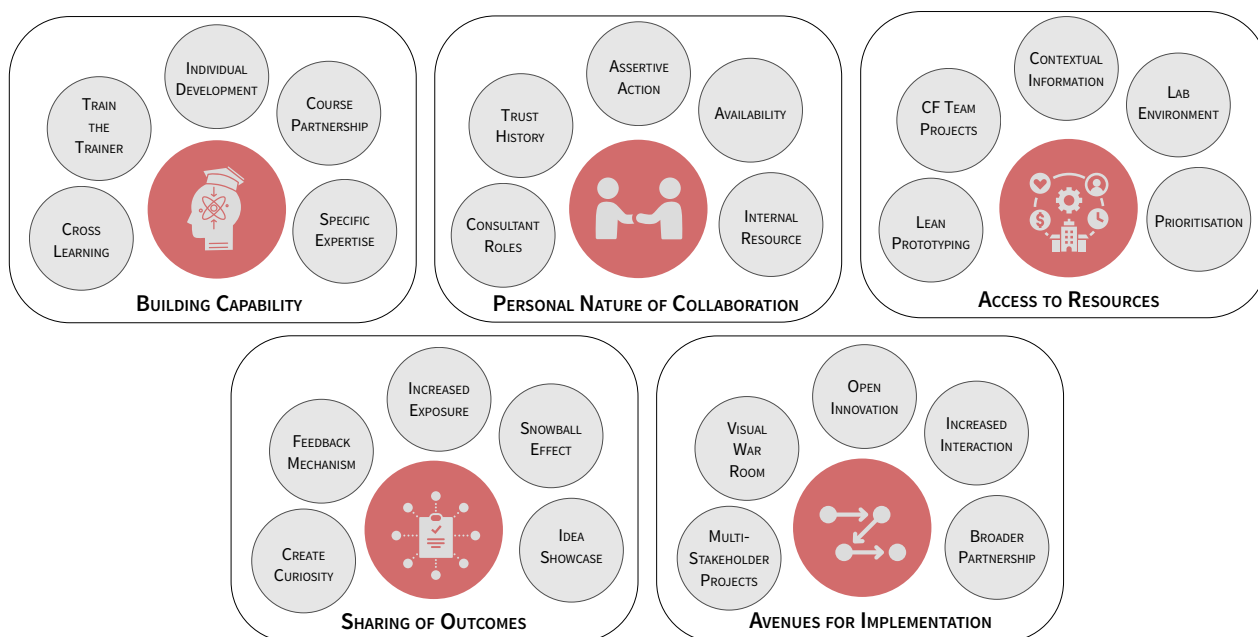
## 2.4 STAKEHOLDER INTERVIEWS

The Stakeholder Interviews are used as a consulting medium to obtain contextual data that are useful for understanding stakeholder perceptions, opinions, motivation and behaviour concerning the operational activities of a process and also to gather information from experts in the field [22]. The outcome of these interviews is to elicit knowledge arising from the tacit and latent spectrum of the context that are not easily obtained from explicit and observable sources of information.

The Stakeholder Interviews is to obtain a significant understanding of the activities and the processes involved in this collaboration and to obtain further Context Factors required for further development of solutions. An interview guide is prepared to outline the questions that arose from Deep Dive and observations into the field. These questions were created to open the participant to a conversation about the activities and processes involved within the context of the collaboration. Preplanned Probes in the form of follow-up questions were included in the interview guide to investigate the context further and to obtain the tacit and latent information from the stakeholders.

Eight semi-structured interviews were conducted with stakeholders belonging to various organisations performing a different role within the context of the collaboration with each interview lasting around 40-45 minutes. The responses from the participants were recorded and transcribed using online transcription software. The interview transcripts are fed into the qualitative research tool and are coded. The codes are clustered together to form five significant operational factors that provide an understanding of the operational nature prevalent in the activities of the collaboration.

**Figure 2.6**  
Context Factors - Operational Factors



### 2.4.1 BUILDING CAPABILITY

The travel industry is very dynamic, with innovations coming up regularly. The way people travel and the business models change now and then with the advent of new technologies and services. At the same time, specific segments of the travel industry are conservative in its approach towards innovation due to the complexity of operations. With a contrarian nature of the travel industry, stakeholder industries have to prepare for both types of innovative approaches to be successful in its operations. For industries to possess such flexibility, the stakeholder industries need to develop their strategic capabilities through their work culture<sup>[7]</sup>.

Within the collaboration, each of the stakeholders has a distinct value proposition through their operation and services and thereby possessing a unique capability that can be transferred to the other stakeholders. The best practices of each stakeholder are recognised, and cross-pollination of processes can ensure that the stakeholders learn from each other and develop new capabilities within their organisations.

Thus, the Hub can serve as a training ground for developing new capabilities and stakeholders can impart the desired capabilities into their organisations.

### 2.4.2 PERSONAL NATURE OF COLLABORATION

Trust between stakeholders is considered an essential quality for collaboration. Managing an innovation project involves much tumult. The presence of trust between stakeholders generates a willingness to overcome organisational differences, to work through difficult situations during the project and encourages openness in exchanging ideas and innovation<sup>[17]</sup>.

For developing trust between collaborators, it is suggested to have a more personal approach when performing activities for the collaboration. This personal approach creates awareness of the qualities of the team members working together in a collaboration. When such awareness is created among the stakeholders, the adoption of a knowledge philosophy becomes effective. Stakeholders can trust each other and therefore make a platform to transfer ideas and knowledge without any negative connotations.

Thus, the Hub can serve as the working space where collaborators can meet and get to know each other and develop trust for each other. This working space will create an opportunity for better collaboration and creates a buffer for tumultuous times during the phases of innovation. In this approach, it also becomes easier for stakeholders to impart ideas and knowledge to each other with a positive mindset for further action.

### 2.4.3 ACCESS TO RESOURCES

One of the key objectives of the collaboration is to provide access to resources to the involved stakeholders. Stakeholders often do not proceed further in innovation activities due to lack of resources which were not planned earlier. Stakeholders seek expertise to convert ideas into tangible solutions and are willing to partner with other stakeholders in developing them. By pooling in available resources from each stakeholder available to others who might require it, the process of developing and testing new solutions either through a product or a service prototype becomes simplified.

By creating awareness among the stakeholders to the resource potential that is available through the collaboration, stakeholders are empowered to set their innovation agenda in line with the innovation agenda of the collaboration itself. This situation creates an opportunity for the stakeholders to allocate their resources effectively within their organisation that can focus on improving their existing capabilities and value propositions within their influence of operations<sup>[11]</sup>. With the shared resource approach, the stakeholders are also inclined to execute multi-disciplinary projects that can scale up innovation activities in the collaboration to the next level.

Thus, the Hub can be designed to serve as a provider of resources that can aid and execute multi-disciplinary projects of a more substantial scale.

#### 2.4.4 SHARING OF OUTCOMES

The impact of innovation activities can only be realised when its intended outcomes are provided with more extensive outreach. The process of reaching a wider audience will benefit the existing knowledge and solutions as more thoughts and ideas may be developed further to support the existing knowledge.

By increasing the size of the audience to whom the knowledge is shared, the probability of establishing the knowledge philosophy in their work cultures is increased. This increased adoption of the knowledge philosophy leads to better innovation through the implementation and development of ideas. This renewed work culture due to the adoption of a similar knowledge philosophy among the stakeholders will create a base for the existing knowledge to gather additional information from other stakeholders, and in time the knowledge will evolve to cater to a wide range of applications useful for future operations. By this evolution of ideas and increased adoption and implementation, the realisation of the potential of the knowledge is increased and thereby leads to effective operations through collaboration.

Thus, the Hub can be made to be the space where the collective outcomes of innovation activities are shared among stakeholders which can gather traction and attention with them to learn and build further upon to evolve the knowledge to be relevant for future scenarios.

#### 2.4.5 AVENUES FOR IMPLEMENTATION

Typically, organisations are subjected to a variety of opposing forces that are operational in nature when performing innovation activities. The Stakeholders in the collaboration are also affected by the same opposing forces that hinder innovation. Organisations often look forward to overcoming these opposing forces through various approaches for innovation.

It is to be observed that most of these opposing forces are internal to the organisation itself and has a reduced effect when the innovation activities are brought outside the direct influences of these forces. Hence, stakeholders can transfer the development of promising ideas and solutions outside through the sharing of outcomes and

have the combined effect of the collaboration to carry the development and implementation of the outcomes. This transfer to the unmet will also gather subsequent knowledge and applications imparted into the solution, thereby adding more value to the initial solution. This activity will also create an environment of open innovation where ideas are empowered and brought as tangible outcomes which can lead to faster development cycles.

Thus, the Hub can act as the buffer between the knowledge and development stages in innovation and can hence assist in overcoming the "Valley of Death" of ideas. The Stakeholders also have an opportunity to learn and involve in much of the development that assists in the more straightforward implementation of the developed solutions into their respective organisations.

## CONCLUSION

The outcome of the Contextual Observation activity has yielded five significant needs which act as Context Factors for further development in this project. These needs express additional insights which can be used for ideation during the prototyping stage.

The outcome of the Interviews has yielded five significant operational factors which act as Context Factors for further development in this project. These operational factors also express additional insights into the type of interactions that the Stakeholders can perform in the collaboration, thereby leading to better impact through joint innovation activities.

Thus, with the Deconstruction of the current context and processes, the underlying factors and needs of the Stakeholders in the collaboration were identified and chosen for representing the Future Context. The insights gathered from various methods used for Deconstruction will guide us during further ideation and will be used when developing solutions to improve the collaboration for the stakeholders.

3

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**FUTURE CONTEXT**





## 3 Future Context and Vision

In the previous chapter, the paradigm of the current context of collaboration between the university and the industries in the 'People in Transit' has been deconstructed and the factors that can serve as the building blocks for the future are identified. In this chapter, these building blocks will be used to construct the future context over which the PiT Collaboration Hub will operate. Building the Future Context helps us to forecast the future in terms of scenarios and use cases and pro-actively plan the activities and resources that are required for the evolution of the Hub.

In order to build the Future Context, it is required to identify the Domains, Time for which the future is to be forecasted and the Context Factors identified through various methodologies in the Deconstruction process. Clustering similar insights to identify strong links between the Context Factors with respective to the influences of the Domain and the Time will yield the Context Structures <sup>[12]</sup>. The combination of the Context Structures will help us build the Future Context represented by scenarios and use cases.

The domains for this project – Innovation around the Passenger Journey and Equal Collaboration have been already identified. These domains are inter-related with links between them. The first domain represents the area where the collaboration should focus, and the second domain represents the mode on how the to collaborate should function as an entity. There are no contradicting factors between the domains which enables us to combine them into a single broader domain – Innovation around the Passenger Journey through Equal Collaboration. Combining the two domains gives us a more prominent sample space from which data can be obtained, and solutions can be implemented without losing the individual purposes from each of the domains.

The Context Factors are identified from the methods implemented in the Deconstruction process are representative of the needs of the stakeholders and the operational factors that defines the purpose and functioning of the

collaboration. The building of a Future Context is to carry these factors to another abstract level higher than the current level they are currently in the current context. The Context Structures that are formed using this process will guide in defining the scenarios and use cases that lower the level of abstraction so that it can be brought to a general understanding among the stakeholders to plan and take necessary action.

### 3.1 TIME PACING - FUTURE CONTEXT

When designing for the future, it is imperative to define the context of the time in the future for which the future context is defined. For this purpose, the Three Horizons model has been chosen to define three parallel scenarios that evolve from the previous scenario through continuous development. Design Clocks are used to define each horizon that is based on Industry synergy and timing for each phase of how Context Structures are evolved.

The first horizon usually deals with enhancing the value of the value propositions in the current context <sup>[23]</sup>. Value enhancement is often achieved by offering extra features that enhance the value of the current product or service. This type of design innovation thrives on the incremental changes in a product or service family positioned with the current context with existing technologies. The time pacing is usually fast to accommodate the speed of innovation by adding value.

The second horizon is dedicated to insights and desires of the stakeholders, and newer insights on the emotional and functional values will allow creating new segments through which the collaboration can operate <sup>[23]</sup>. The purpose of this horizon is to create differentiation for the collaboration by discovering the new value for the activities in the collaboration. The time pacing is moderate as it involves the solution design of next-generation and the application of evolutionary practices.

The third horizon encompasses solutions to a broader impact, including the new organisational design on the value chain [23]. Creating a new value proposition usually requires a change in the business model that integrates new technologies, process and stakeholders. The time pacing, therefore, is much longer than the Design Clocks of the other horizons for new process development.

For this project, the Design Clock for the first horizon is set to a period of one year which is adequate to bring an immediate value enhancement to the stakeholders. The second horizon is set up to 3 years based on the observation from the second perceptual map, where a usual collaboration with a stakeholder achieves saturation in the number and type of activities in the collaboration within the period. The third horizon is kept open-ended for the current positioning in the roadmap as it is a long-term solution, but it is recommended to target the completion of the activities and begin rolling out the new value propositions by the end of the typical contract end period, which is five years. Based on these Design Clocks, the Context Structures can be formed and its evolution defined for five years.

## 3.2 CONTEXT STRUCTURES

A set of fine ingredients does not yet make for a good meal, or a set of eleven skilled players does not automatically make a good team. Analogously, a set of Context Factors by themselves, as related to the user needs and operational factors, may not define the Future Context. These set of factors must be combined to a unified whole, a coherent structure that can define the characteristics of the Future Context and explains how these factors are interconnected [12].

The Context Factors that were identified during the Deconstruction phase are to be clustered qualitatively by using an affinity diagram. Based on the affinity diagram, combining the characteristics of an Organisational need with an Operational factor that is closely associated with the need gives rise to an Emergent-quality cluster – a cluster that brings the characteristics of both factors emerging into a new factor that can represent the pattern or storyline of the Future Context [12]. With the use of the affinity

diagram, five organisational needs are paired up with five operational factors that are closely associated with each other to give five emergent-quality factors that can serve as the qualities of the context at any point of time.

The five emergent-qualities of the future context are clustered together to depict a pattern or a storyline. Each of the emergent qualities is independent of the rest and depicts a specific quality of a scenario. The evolution of these emergent qualities is to be investigated further and will be used to define scenarios and use cases for each horizon.

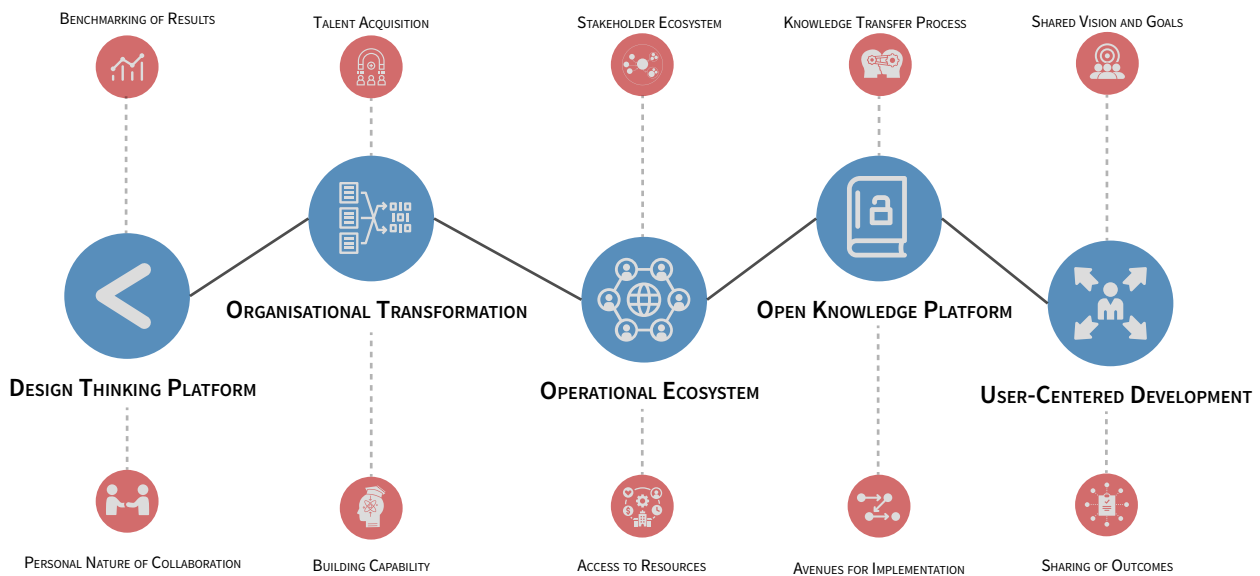
### 3.2.1 DESIGN THINKING PLATFORM

The Design Thinking Platform as an Emerging-quality factor is derived from the organisational need for Benchmarking of Results and the operational factor of personal nature of collaboration. This factor symbolises that by using Design Thinking approaches through the activities of the collaboration, benchmarking of the results and personal nature of collaboration can be maintained that can further develop the philosophy of Design Thinking into the stakeholders.

Experiments and simulations of ideas can be executed with the various possibilities offered by the Design Thinking philosophy. Design Thinking will also help stakeholders to use innovation outcomes effectively in terms of time and resources. The results and outcomes through Design Thinking approaches can be reviewed by the stakeholders and recorded so that further implementation and testing methods can be built upon existing results rather than duplication of activities. Due to the personal nature style used in Design Thinking approaches, the probability of adoption of Design Thinking philosophies is increased due to trust and credibility offered by each stakeholder in the collaboration.

### 3.2.2 ORGANISATIONAL TRANSFORMATION

The Organisational Transformation as an Emerging-quality factor is derived from the organisational need for Talent Acquisition and the operational factor of Building Capability. This factor represents that bringing in new talents with various skill sets and developing new capabilities to adapt to the future context will lead to transforming existing organisation structures



**Figure 3.1**  
Context Structures

to bring new approaches and processes to innovation.

For the active intake of ideas and solutions and developing them to tangible process outcomes, organisations have to realign their current hierarchies to bring out the best practices. The hiring of new candidates into the organisation possessing different skill sets on innovation will bring a progressive change in the organisation's work culture towards innovation activities. This influx of new and varied skillsets will develop diverse capabilities within the organisation in line with the organisation's development. With a proper organisational transformation plan in place, the stakeholders can adopt new knowledge philosophies that can boost innovation and in turn, develop new processes to support innovation. Stakeholders can also adapt to inter-organisational partnerships in developing and adopting novel innovation processes and outcomes when the activities of the stakeholders are in tune with the trends of Organisational Transformation.

### 3.2.3 OPERATIONAL ECOSYSTEM

The Operational Ecosystem as an Emerging-quality factor is derived from the organisational need for a Stakeholder Ecosystem and the operational factor of Access to Resources. This factor represents creating a stakeholder ecosystem to utilising the potential of the ecosystem to call for resources and expertise can transform the ecosystem from a simple network of collaboration into an operational ecosystem where these networks can be used as a tangible channel through which stakeholders can source ideas and resources to implement an idea.

For creating an impact through innovation, the associated stakeholders within the supply chain of a stakeholder should also follow the best practices for innovation so that the quality of the end-user outcome is kept uniform at the highest standard. The presence of the Stakeholder Ecosystem makes it much simpler for bringing the innovation network onboard on a single focus for innovation. A broader perspective of idea development and solution deployment is obtained through the ecosystem, and individual stakeholder expertise from various parts of the innovation network can be leveraged upon to improve the quality of the output. The presence of the ecosystem will also serve as an effective counter to the challenges leading up to the implementation of solutions, thereby increasing the impact of innovation activities.

### 3.2.4 OPEN KNOWLEDGE PLATFORM

The Open Knowledge Platform as an Emerging-quality factor is derived from the organisational need for Knowledge transfer Process and the operational factor of Avenues for Implementation. This factor represents creating a culture of open innovation between the stakeholders can develop a sense of trust and openness in forthcoming to approach newer avenues for implementation of solutions.

For faster and transparent innovation, the creation of trust and openness between the stakeholders is essential. By making knowledge available to the stakeholders, the collaboration can attract compelling interest and opportunities towards the knowledge that was made available. This attraction towards the knowledge will encourage multi-stakeholder projects that encourage large scale development of solutions that offer new avenues for development and implementation. These activities will also increase the rate of adoption of the knowledge philosophy created among the stakeholders. Eventually, the creation of an Open Knowledge Platform will lead to faster innovation cycles and adds significant knowledge and expertise depth to the field by a vast association of stakeholders regarding quantity and quality of content in the collaboration.

a shared purpose to meet the needs and desires of the end-users, the roles and responsibilities of the stakeholders within the collaboration can be redefined periodically to achieve greater control over the collaborative outcomes. This unification and redefinition of roles within the stakeholders will result in better innovation and desaturates the fields for innovation by making way for novel user-centred approaches that involve multiple stakeholders towards a shared development.

### 3.2.5 USER-CENTRED DEVELOPMENT

The User-Centred Development as an Emerging-quality factor is derived from the organisational need for Shared Vision and Goals and the operational factor of Sharing of Outcomes. This factor represents creating a shared vision and goals for the collaboration and sharing of outcomes of innovation through user-centred development as a central focus. This unification under a shared vision and outcomes strategy will present the collaboration as a singular entity in its journey towards fulfilling the needs and desires of the end-users.

To achieve uniform quality and impact through the innovation activities in the collaboration for all stakeholders, standardisation of activities and outcomes should be created through the unification of the innovation activities across stakeholders. By treating and presenting the network of stakeholders as a single entity with

### 3.3 EVOLUTION OF TRENDS

By treating the Context Structure as specific trend topics, the future state of development that these trend topics are heading towards can be effectively forecasted through trend research. Trends are often described as an analysis of observed data or information about the topic and intuitively identifying patterns or logical directions that the trend may manifest [23]. The establishment of the trends is often supported by various sources including but not limited to literature, business articles and from organisational expertise.

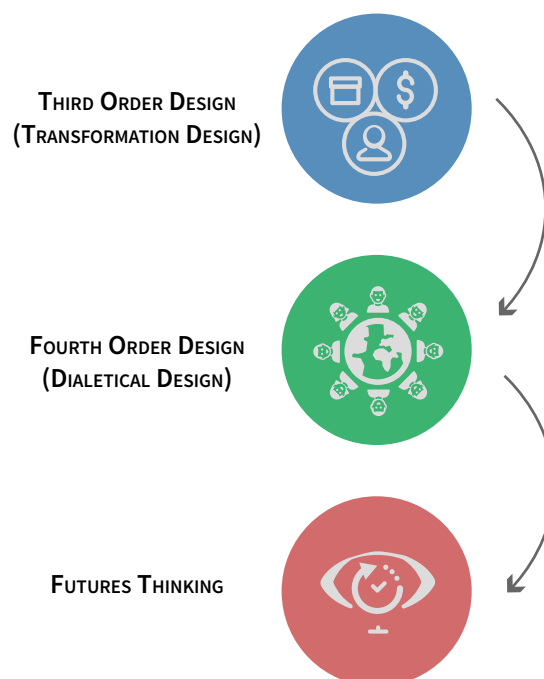
The trend topics identified from the Context Structures are investigated further by executing a deep dive of the topic and understanding the value factors that support the existence of the trend. Based on these factors, a trend evolution can be evolved using the insights from Deconstruction activities and stated across the timeline of various horizons. The nature of the combination of trends will be useful in describing the scenarios for the particular horizon further in the Designing process.

#### 3.3.1 DESIGN THINKING PLATFORM - TREND EVOLUTION

##### *Third-Order Design (Transformation Design)*

Third-order design or Transformation Design is the philosophy of design thinking that deals with using the perspective of the end-user [24]. Designers using the transformation design philosophy spend a great deal of time to understand and learn on how end-users currently experience the system. From this, they also learn how the end-users want to experience the system and develop solutions to satisfy them, with sometimes even co-creating with them. When compared with traditional design philosophies where the focus of the design is on either a product or an interaction, Transformation Design counts in the experiences of the user and their emotions during interactions that “transforms” their behaviour and experience towards a better reciprocation.

Transformation Design has been a current benchmark for most design consultancies as an operational medium for and universities as



**Figure 3.2**  
Evolution of Design Thinking Platform

a research medium. With the current skills and knowledge expertise that the “People in Transit” collaboration members possess, the focus of the collaboration in the first horizon is to advocate this philosophy to all stakeholders and build a platform where innovation can pursue with the Transformation Design philosophy.

##### *Fourth-Order Design (Dialectical Design)*

Fourth-order Design or Dialectical Design is an emerging philosophy of design thinking that deals with using multiple perspectives during an innovation process [25]. It is a form of analytical thinking where designers collaborate with other experts and form multiple perspectives of an idea or hypotheses. The outcome of a Dialectical Design approach would be a solution where all involved stakeholders of the solution agree with operational factors within each stakeholder has been addressed in the solution. This approach also paves the way to the creation of alternate and novel innovations.

Fourth-order design philosophies can lead to account in external forces affecting innovation such as political, social, environmental and economic factors. The approach is used to devise solutions and processes that can impact

and change cultures with the stakeholders and society. Thus, new systems are created as a result that can better support innovation in terms of accommodating new processes and services. Designing in the system level beyond the conventional product and service level will also provide opportunities for multiple stakeholders supporting a system-level innovation and developing them further.

### **Futures Thinking**

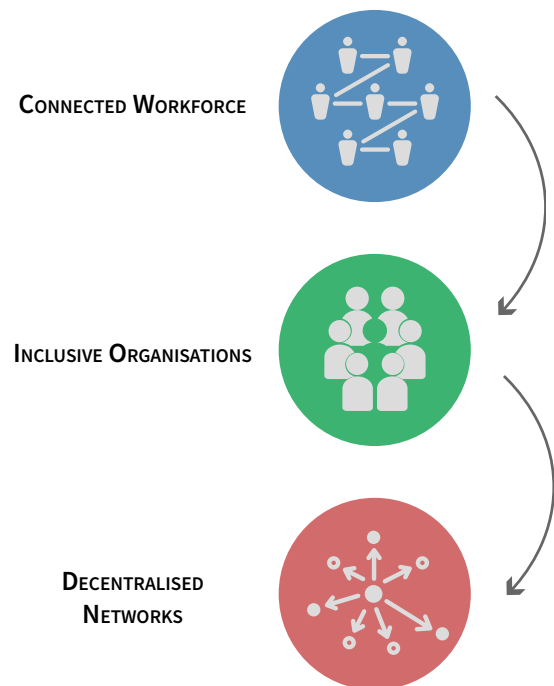
Futures Thinking in the form of an innovation philosophy that offers ways of addressing, even helping to shape the future. Using this philosophy can bring new knowledge and expertise about the various ways and methods through which policies, strategies and actions can aid in creating a desirable future and also to prevent the occurrence of undesirable ones [26]. The Future Thinking philosophy stimulates strategic dialogue, widens the understanding of the possibilities of factors, strengthens leadership and prompts for decision-making.

The philosophy of Futures Thinking will be used to continue innovation further when current innovation practices have reached an unactionable saturation. Futures thinking involves envisioning a set of all possible scenarios for the future and devising a strategy to achieve the most desirable scenarios and avoiding the undesirable ones. In the context of the collaboration, Future thinking will result in developing the solutions further into the future to maintain activity within the stakeholders and innovate continuously for the long term.

### **3.3.2 ORGANISATIONAL TRANSFORMATION - TREND EVOLUTION**

#### **Connected Workforce**

Connected Workforce is the trend associated with connecting the right people with the right information anytime, anywhere and across any platform [27]. The purpose is to empower a blend of people collaborating on an innovation activity with the necessary tools and knowledge adequate to carry out the activity. Communication between the stakeholders forms a critical factor in this trend which leads to transparent operations developing trust during the process.



**Figure 3.3**  
Evolution of Organisational Transformation

The “People in Transit” has a large number of stakeholders who collaborate on various innovative activities. With the adoption of the Connected Workforce trend, it is possible to connect these stakeholders on a single platform where the valuable information can be shared leading to the formation of new partnerships and optimisation of systems and process can take place.

#### **Inclusive Organisations**

The connected workforce trends end with creating a network of stakeholders and empowering them with the necessary knowledge, skills and expertise and enabling communication between them. This trend later evolves into a new trend Inclusive Organisations, where organisations become forthcoming in acquiring and utilising a variety of skill sets with lesser changes in its current workforce. One of the primary outcomes from the Inclusive Organisations in the development of Dual-life individuals where individuals cease to be an expert in a single field but develop a second competency and the amalgamation of these competencies will yield to better innovation regarding both quality and quantity [28].

The “People in Transit” collaboration following this trend will attract various individuals belonging to different stakeholders involved in

an innovation activity towards a shared goal of developing a solution. Individuals involved in the innovation activities will have an opportunity to develop additional skills and expertise through the collaboration and become Dual-life Individuals with knowledge and expertise on two distinct fields that can increase the potential of the stakeholders to be more inclusive in its capabilities and are adaptive to the changing trends in their businesses.

### **Decentralised Networks**

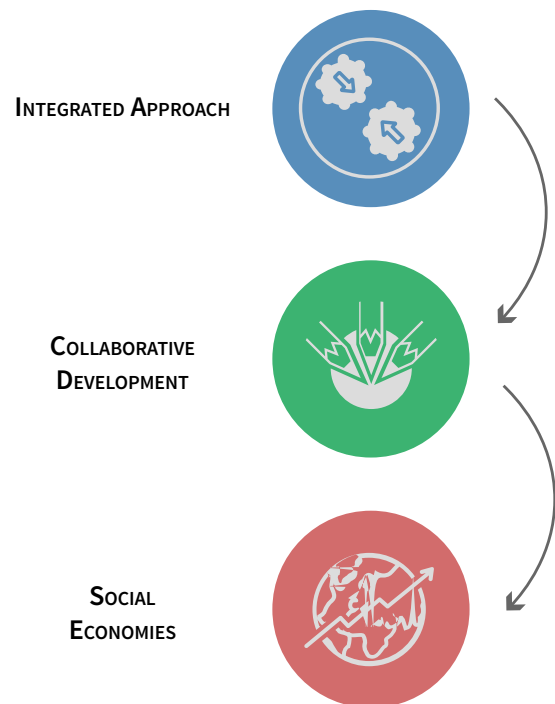
When stakeholder organisations have reached developing Dual-life individuals covering expertise in varied fields associated with their business, the Inclusive organisation trend evolves into Decentralised Networks trend. The 'Decentralised Networks' trend is characterised by the formation of independent stakeholder teams with the purpose of developing a large scale solution that goes beyond the hierarchies of the individual organisations. These independent stakeholder teams are similar to a startup incubation, where a promising solution is developed further avoiding the conventional hierarchies and multi-stage decision-making activities usually involved with collaborative innovation <sup>[29]</sup>.

The "People in Transit" collaboration following this trend will follow the Triple helix Innovation model, where several stakeholders jointly commission independent teams to develop large scale innovation that impacts multiple stakeholders. The absence of conventional organisational hierarchies and other opposing forces internal to the organisation structure are avoided to speed up cycles of innovation and achieve higher standards of innovation.

### **3.3.3 OPERATIONAL ECOSYSTEM - TREND EVOLUTION**

#### **Integrated Approach**

Integrated Approach trend within the context of Operational Ecosystem is associated with developing innovation activities on the distinct capabilities and expertise within each stakeholder organisation so that these capabilities can be shared or taught to other stakeholders. Awareness about what each stakeholder can bring into the ecosystem is required to accurately gauge



**Figure 3.4**  
Evolution of Operational Ecosystem

the available resources, and thereby the type of activities that each stakeholder can participate in within the context of the collaboration. The next step in the Integrated Approach is to further improve these capabilities so that the stakeholders are prepared to execute innovation activities that are of uniform in operation <sup>[30]</sup>.

The mastering activities of existing value propositions and capabilities help the stakeholders in "People in Transit" program to leverage their current market to gain more resources for collaboration activities. The integration of various skills and expertise within the collaboration ecosystem from a large number of stakeholders create sufficient expertise to undertake large scale innovation.

#### **Collaborative Development**

Once the stakeholder organisations achieve mastery over their current capabilities and value propositions that protects their current business, the trend of collaborative development will enable the stakeholder organisations to seek other capabilities and resources beyond the influences of their organisation. This approach gives rise to co-created solutions for which resources for development and implementation are realised between multiple stakeholders who also will reap the benefits of the collaborative

solutions <sup>[11]</sup>.

For the “People in Transit” collaboration, the Collaborative Development trend will promote the combining of several projects to form a large scale project that will involve the participation of multiple stakeholders benefiting from the solution. During the development of the solution, the ecosystem will provide greater access to resources from the multiple stakeholders, thereby increasing the investment and involvement from the stakeholders on a longer-term. Thus, with collaborative development trend, stakeholders can realise innovations beyond their operations that determine a systemic behaviour with the end-users.

### Social Economies

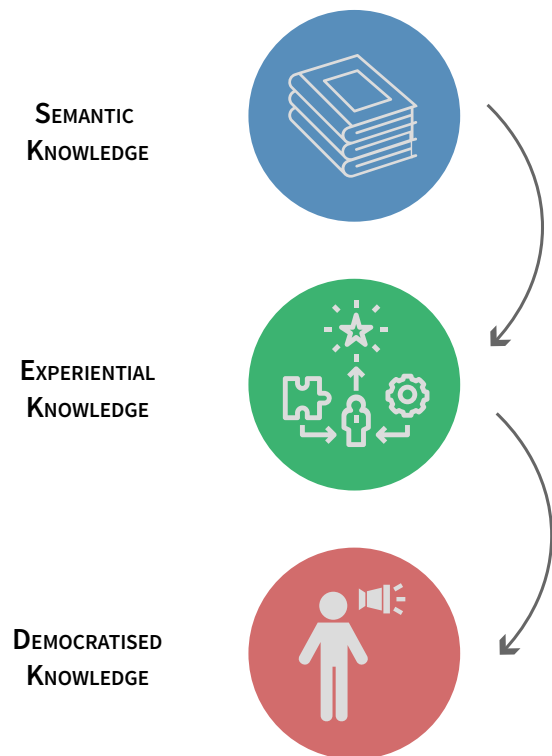
On the course of time and development in innovation activities and attracting attention from various sections of the society, the collaborative ecosystem will evolve to follow the Social Economies trend. Social Economies are characterised by pooling in and utilising the resource potential of all involved stakeholders of the society. With the Social Economies trend, the solution outcomes from innovation activities will target a broader spectrum of the society, and these solutions can be empowered and further developed by various methodologies provided by the societal infrastructure <sup>[31]</sup>.

The “People in Transit” collaboration once achieving an optimum collaboration within the industry stakeholders will be able to branch out further by adding the societal stakeholders within the ecosystem that can provide additional vital resources for development and implementation of the solutions from the collaboration. The social economies can shape the innovation activities to target a broader paradigm in the society for which innovative solutions can be developed.

### 3.3.4 OPEN KNOWLEDGE PLATFORM - TREND EVOLUTION

#### Semantic Knowledge

The trend of Semantic Knowledge is represented through the activities where knowledge is gained and propagated through the establishment of facts, concepts, ideas and



**Figure 3.5**  
Evolution of Open Knowledge Platform

beliefs. The Semantic Knowledge trend will give rise to the development of existing theories and principles, and occasionally new theories and principles are also established <sup>[18]</sup>. The learning medium of Semantic Knowledge is through lectures, seminars and other plenary styles of teaching. The significant advantage of Semantic Knowledge is that knowledge can be made available to a larger number of stakeholders.

The “People in Transit” collaboration can adopt Semantic knowledge in its initial stages to communicate the theories and principles to Design Thinking and other topical information. The goal of this approach is to attract a larger audience to this theoretical knowledge which can serve as a foundation for planning and execution of innovation activities in the future.

#### Experiential Knowledge

Once stakeholders are used to the Semantic Knowledge approach of learning new knowledge, the adoption of the next trend of Experiential knowledge will begin. This trend is represented through the activities where knowledge is gained and propagated through practical methods through a hands-on approach <sup>[18]</sup>. The learning medium of Experiential knowledge



is through innovative activities performed in a lab environment and workshops. The perceived outcome of Experiential Knowledge is that more in-depth understanding of the knowledge is propagated to the stakeholders.

The “People in Transit” collaboration can adopt Experiential Knowledge during the second horizon to enable stakeholders to learn skills and expertise through hands-on experience in developing solutions. The deep understanding gained by the stakeholders through Experiential learning can be useful when deploying developed solutions into their organisations.

### **Democratised Knowledge**

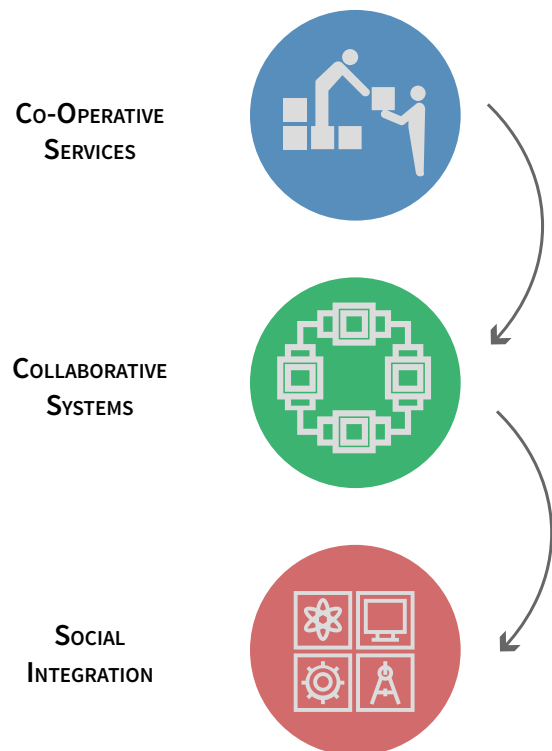
The trends leading up to Democratised Knowledge are characterised by a knowledge-creating stakeholder propagating to the other stakeholders. Whereas when the collaboration enters into the trend of Democratised Knowledge, the propagation activities of the knowledge are decentralised and any stakeholder organisation or individual that has sufficient expertise with the knowledge field will serve as the propagator of knowledge and as more stakeholders become experts, the propagation of a knowledge philosophy is rapid thereby increasing the knowledge adoption rate and leading to faster innovation cycles <sup>[32]</sup>.

For the “People in Transit” collaboration, the propagation of knowledge, skills and expertise occurs to benefit stakeholders on a longer-term. Moreover, as stakeholders become sufficiently adept, they, in turn, become as ambassadors of the knowledge philosophy, thereby creating a space for acceptance of relevant innovation practices and processes.

## **3.3.5 USER-CENTRED DEVELOPMENT - TREND EVOLUTION**

### **Co-operative Services**

The trend of Co-operative services in the context of User-Centred development is characterised by the development of end-user solutions through co-operation between two or more stakeholders <sup>[33]</sup>. The stakeholders enter into a limited partnership where typically products and the services associated with a value proposition are created that improves the experiences of the



**Figure 3.6**  
Evolution of User-Centred Development

end-user. This development of service solutions through multiple stakeholders encompasses a greater role in the passenger journey and thereby improves the experience of the end-user on an overall approach.

For the “People in Transit” collaboration, the Co-operative services trend can be utilised to partner with multiple stakeholders to co-operate with each other on a partnership to develop products and services targeted at the end-user level. This combined involvement between stakeholders will develop trust and encourages openness in innovation beyond the influences of the organisation. This approach will also result in hybrid outcomes that offer additional value to the end-users through the cooperation of the stakeholders.

### **Collaborative Systems**

The travel industry operates over a complicated system interlinked with value propositions that connect each stakeholder to a system. With the completion of the Co-operative Services trend, stakeholders combine to create hybrid services for end-users. With the deployment of these hybrid services, the collaboration should embrace the Collaborative

system trend where these hybrid services pollinate to form systems in which the process and activities from the stakeholders undergo the same hybridisation <sup>[34]</sup>. The systems are formed due to the collaborative nature of the stakeholders in bringing up unconventional solutions as a result of hybridisation.

For the 'People in transit' collaboration, the Collaborative Systems trend will be utilised to redefine existing systems through innovation activities between the stakeholders. The partnership between the stakeholders would be more intimate, thereby reflecting the same qualities in the outcome of the innovation activities. The end-user will be exposed to the new orders of the system, thereby leading up to newer and better experiences for the end-users.

#### *Social Integration*

Once the collaboration has reached a state of consensus through the Collaborative System trend, the Social integration trend should be adapted for the collaboration. The Social Integration trend is characterised by the near-ideal situation where the behaviour of the end-users are impacted positively through the outcomes of the innovative activities through the collaboration <sup>[31]</sup>. This impact to the end-user is to be realised through the development of large scale solutions that sets a behaviour pattern with the end-user as the new social norm.

For the "People in Transit" collaboration, the value propositions targeted at specific demographics within the society will be broadened to multiple market segments and the followers of a system in the earlier trend horizons. In this horizon, while following the social integration trend, the focus of the solutions is to bring a societal impact that redefines their existing process of fulfilling their needs. Solutions of this nature have to be targeted at society as a whole and will need to gain the acceptance of society. Solutions of these nature, once deployed successfully, will become a new norm and will integrate into the lives of the end-users.

### 3.4 VISION FOR THE FUTURE CONTEXT

A vision statement is used to imagine a desired future scenario for the collaboration in the longer-term and expressing them to set a strategic reference point for actionable innovations <sup>[12]</sup>. The Vision statement is created with the consideration of the Context Structures and their trend evolutions that were explained earlier. For the "People in Transit" collaboration, within the scope of this Hub project, the vision statement is as follows,

**"Through the PiTHub Collaboration, stakeholders can be the forerunners of innovation around the Passenger Journey, by integrating complex solutions and systems to create gainful impacts for knowledge, business and society."**

The stakeholders involved in the PiTHub Collaboration can be the forerunners of innovation by streamlining and optimising their innovation activities towards the passenger journey, by sharing associated knowledge, resources and expertise with other stakeholders. This shared knowledge and resources can be accessed by the ecosystem of collaborators for their innovation activities and develop larger-scale innovation projects that require the collaboration of multiple stakeholders. When developed, tested and validated within the influences of the ecosystem of the collaboration, the outcomes of these innovation activities can be utilised by the involved stakeholders thereby redefining the complex system of the processes associated with the Passenger Journey through collaboration.

This vision can be executed through the development of mutual trust and responsible co-operation between the stakeholders of the collaboration that are enabled by the PiTHub collaboration setup, thereby creating productive and gainful impacts within the influences of the university in terms of knowledge, the industry stakeholders in terms of business value propositions and revenue channels and the society in terms of benefits to the demographic, economic and ecological solutions.

## CONCLUSION

With the five Context Structures identified, the trends relating to these emerging-quality factors were further explored across the three horizons achieved through time pacing. These trends identified across each horizon will define the scenario for each horizon for which the collaboration can plan their activities and add value effectively to each horizon.

By forecasting the evolution of the Context Structures, the evolution of various trends have been identified. These trends positioned for each of the horizons will guide in designing the scenarios for which solutions need to be ideated. By understanding these trends, it has become possible to forecast the developments required for the "People in Transit" collaboration regarding the scope and scale of the innovation activities.

Thus, with the development of the future context using the Context Factors from the Deconstruction process, it was possible to identify links between the context factors to determine Context Structures. By investigating these context structures further through trend analysis, the trends prevailing during each of the horizons were established. These trends will be used to design a future scenario for which the "People in Transit" collaboration should plan their activities and obtain necessary resources during the Roadmapping process. Using these trends, it was possible to set a vision statement for the project to improve the context of collaboration among the PiT stakeholders for which the roadmap will be developed to realise this vision.

4

# ROADMAPPING



## 4 Future Collaboration and Roadmapping

In the previous chapter, the trends associated with each horizon are derived from the Context Structures that will define the nature of the scenarios in each horizon. In this chapter, these scenarios will be defined for each horizon and the solutions to add value to the “People in Transit” collaboration will be defined, and the necessary activities and resources required for implementing these solutions will be discussed. This information will also be visually represented in the form of a Strategic Roadmap that can be used to communicate the outcomes of the project to the relevant stakeholders.

A strategic roadmap is a link between the strategical component such as trends and scenarios derived from the user needs and practices in collaboration, to the execution component of the activities and resources required to achieve specific objectives within a time frame <sup>[23]</sup>. The strategic roadmap provides a long-term guideline for the actors in the collaboration to plan and execute activities and reach milestones through outcomes of these activities. The end goal of the Strategic Roadmap is to move closer towards a planned vision in realising the vision.

With the vision for the PiTHub Collaboration derived through the trend evolutions and context structures to become a forerunner in innovation around the passenger journey, an ideation session was conducted among the stakeholders to define the scenarios in the horizon. The results of this ideation session were collected to understand the building blocks that will define the scenario and these factors in relation to the trend evolution at each horizon were used to develop the scenario for each horizon. Once the scenarios were developed for each horizon, a second ideation session was conducted with a different set of stakeholders pertaining to the collaboration and solutions to these scenarios were devised. Several factors that were desirable to the stakeholders were combined to reflect as added features to the solution. An individual strategy theme was identified in each

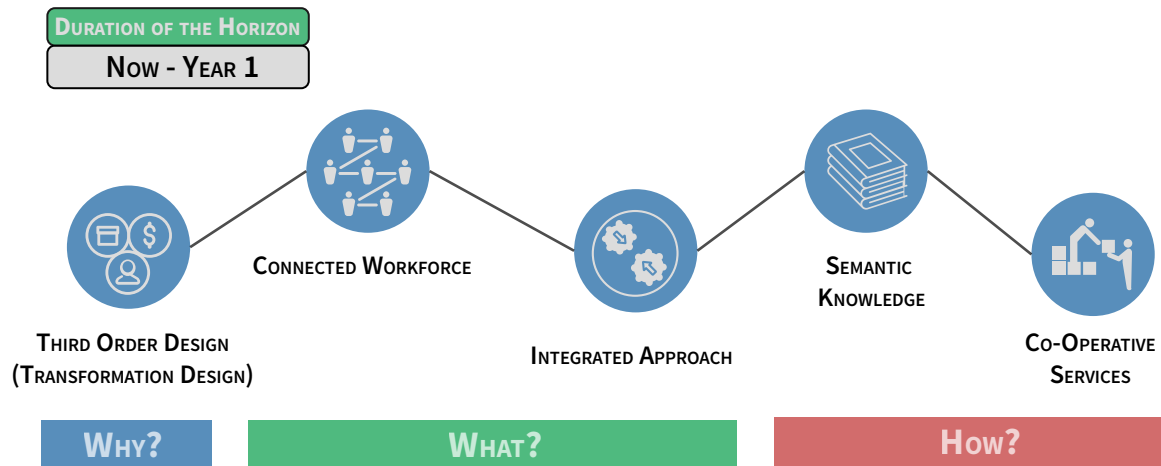
horizon and used to further iterate the scenarios and the solutions for each of the horizons.

With the scenarios and solutions for each horizon defined through ideation, the activities and resources required from the “People in Transit” collaboration has been identified and discussed for further development in this collaboration.

## 4.1 HORIZON 1 – CREATION OF KNOWLEDGE SPACE

Figure 4.1

Context Structure in Horizon 1



The first horizon deals with the creation of knowledge space for the PiT Collaboration. The focus of this horizon to create a knowledge space involves focussing on the **“problems of thoughts”** between stakeholders. By bringing collaborators and knowledge on a single network, the collaborators will be empowered to share and access knowledge over the network which can develop capabilities for the stakeholders for developing and executing innovation activities and sets the path for early multi-stakeholder collaborations.

### Trend Scenario

The stakeholders in the “People in Transit” collaboration currently have a linear style of collaboration where there is almost no interaction between the industry stakeholders. This lack of interactions between industry stakeholders results in a setup where stakeholders function individually without a shared purpose or vision towards a collaborative style of innovation that can yield benefits in terms of resources and knowledge. Moreover, the capabilities within these stakeholders are scattered, which requires more effort and resources to develop in a linear style of collaboration with the university. There is less awareness of the activities of the other stakeholders in the same innovation system that results in conflicting approaches to the outcomes of the innovation activities at each stakeholder.

With the current practices of collaboration, innovation activities are executed over a more extended period, and the outcomes of these innovation activities are mostly documented at the end stages of idea development. The valuable insights and breakthroughs that are attained during the innovative activities are often missed or diluted during these documentation activities emphasising on the result. These insights, when shared with a network of stakeholders, can result in better awareness of the innovation activities and can invite external feedback by utilising these insights in a different form.

For most collaborators in the development phase, the activity of finding relevant research articles and learning from them has been an arduous and time-consuming task. With the pressures of faster innovation, the ability to refer to a multitude of articles to gather relevant information about a phenomenon has been rendered with lesser efficiencies. Moreover, most research articles are written and published with a focus for providing knowledge and to instigate further research that there lies a gap in understanding for the industry stakeholders to perceive that knowledge and convert that into practices for industrial applications.

The importance of trust and openness between the stakeholders have been discussed in the previous chapters and is considered as a starting approach for any collaboration. Currently,



the stakeholders have less awareness about their collaborators in other industry stakeholders who can provide their skills and expertise for developing solutions. Physical meetings and correspondence between these collaborators are rare and infrequent, and hence a mode of communication has to be established between these collaborators that can lead to an increase in their interactions and therefore develop trust.

### Horizon Solution

The scenario in this horizon can be addressed by creating and developing a **“Knowledge Platform”** where collaborators can network with each other and share their thoughts and insights towards their topic in the context of innovation and receive comments and feedback over them. The setup of this platform will be similar to that of a social network platform where the users are limited to the collaborators in the “People in Transit” collaboration. Using the interface similar to that of a social media platform, collaborators can interact with each other and follow innovation activities about the followed collaborators. Through this process, collaborators are aware of the potential and expertise of their fellow collaborators and are more forthcoming towards partnering up to engage in future activities for innovation. This value can be further extended by linking up various tools and resources required for executing collaborative activities within the stakeholders.

**Figure 4.2**  
Solution for First Horizon



The “Knowledge Platform” can also serve as a repository for published works of literature that were the outcomes of past innovation activities. The distinction between regular repositories and the knowledge portal in the PiTHub collaboration will be the categorisation of articles that will aid in simpler processes to find and understand the knowledge in these works of literature. Based on the domain established in the previous chapters, the categorisation of the articles can be based on the activities and the processes involved in the passenger journey that will lead to the creation of additional knowledge with the passenger journey as the central focus. This classification will also help the collaborators in understanding the links between various processes and solutions, thereby creating a complete awareness of the impact of the solution and to better understand the nature of the solution itself. The second mode of classification is also proposed based on the user needs and trends in the passenger journey that will provide an alternative process for collaborators to seek the literature required.

Additional resources to support the literature can be provided in the knowledge portal that can increase the understanding of the knowledge philosophy at a much shorter time. A fragmented version of the scientific research article is also attached to the full article that contains the key highlights of the article that can give a condensed version of the knowledge. This fragmented version provides the industry

collaborators with a more relaxed approach in digesting the information presented, which can be retained as knowledge and can be utilised to inspire and develop subsequent ideas. A presentation of the knowledge in the form of an instructional video can also add value to the collaborators for quick reference and learning the concepts. This addition of other elements to the existing research papers will increase the number of channels that knowledge can be transferred and propagated among the collaborators effectively.

### **Activities**

The activities involved in this horizon are focussed in setting up the “knowledge platform” for the collaborators and bringing the collaborators onboard to adapt their innovation activities with the use of the knowledge platform. Initially, a plan is required to be made for the collection of the existing articles and categorising them according to the process in the passenger journey and also according to the trends or the user needs the article is focussed. Then, the fragmented versions of these articles and the other forms of media related to the particular article need to be gathered and organised in the form of a database. Once the knowledge articles and their associated artefacts are collected and organised, a website hosted on a secured platform is created with an option for collaborators to create personalised profiles to access these knowledge artefacts. Then, the database needs to be uploaded on the secured platform, and access information needs to be shared among the collaborators. With the future activities in the collaboration, the article and its associated artefacts are created simultaneously and are uploaded together to the web platform. From this point onwards, the website is allowed to grow organically by utilising the features of the web platform to execute innovation processes.

### **Resources**

The primary resource required for setting up the platform is the web infrastructure itself. The web infrastructure can be achieved by partnering with one among the various cloud-based web hosting solution providers such as Facebook, Google, Microsoft or Amazon. Based on the insights obtained during the deconstruction process, most

of the collaborators use the Microsoft platform for their organisational activities. Hence, it is preferred to form a partnership with Microsoft in creating a custom website that can serve as the web platform.

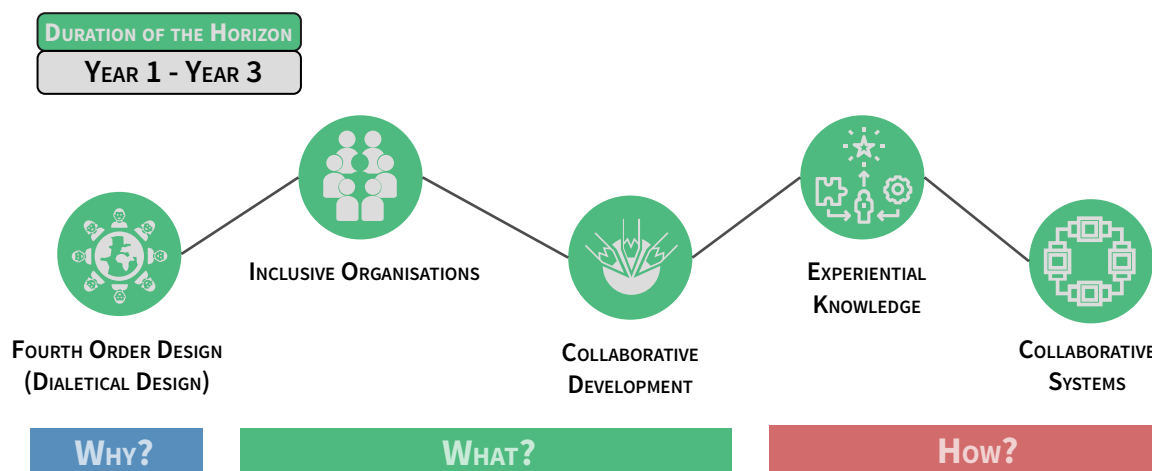
Azure is the cloud-based web solution provided by Microsoft and can seamlessly integrate and operate between various Microsoft applications that are in-built with the operating system. The social media experience and function feature can be realised by integrating LinkedIn, which is also owned by Microsoft, as a plug-in into the PiTHub website. The other collaborative tools offered by Microsoft, such as Teams and Sharepoint, will also be useful in organising and executing collaborative activities.

Outside the context of the web infrastructure, resources of time and workforce are also required to collect and categorise the existing articles and artefacts for “People in Transit” collaborators and also for creating the fragmented versions of the articles. The resources for these activities can be derived from leveraging on part-time employees through the student assistantship programs.

The awareness of the platform can be attained by conducting a launch ceremony with the existing collaborators and inviting all collaborators to take their innovation activities in the “People in Transit” collaboration over to the cloud using the web platform. Stakeholder organisations also need to dedicate their time and workforce to collect and categorise their existing knowledge and upload them to the web platform.

## 4.2 HORIZON 2 – CREATION OF CONSENSUS SPACE

**Figure 4.3**  
Context Structure in Horizon 2



The second horizon deals with the creation of consensus space for the PiT Collaboration. The focus of this horizon to create a consensus space involves focussing on the **“problems of actions”** between stakeholders. By combining similar solutions and innovation projects into a single large-scale innovation project involving multiple stakeholders, the collaborators will be able to realise their intended solutions on a more hands-on approach. The combination of different collaborators with varied skills and expertise will be able to provide multiple perspectives on the solution idea that improves knowledge among the stakeholders. This approach also creates a more straightforward approach towards implementation of the solution at the stakeholder industry as the collaborators from the stakeholder industries can impart the knowledge from the collaboration activities into the organisation work culture necessary for solution deployment.

### Trend Scenario

With the first horizon creating and building a knowledge space where knowledge and people are brought together, the following scenario will be characterised by people willing to collaborate towards developing promising ideas and implementing these developments in their respective organisations. However, the challenges to these scenarios still exist in the form of differences in organisational cultures among the stakeholders that leads to unequal

natures of collaboration. In this scenario, there is less awareness among stakeholders on how to execute collaborative activities together that can yield effective innovation outcomes.

It is already discussed in the previous chapters through the first perceptual map that, the processes involved around the passenger journey are interconnected between several value propositions offered by multiple stakeholders. To develop impactful solutions that improve the operations of the stakeholders and the experiences for the end-user, the stakeholders involved in these processes have to come together to offer a shared solution that has benefits for all the stakeholders involved in the process. The absence of this approach in the current scenario has resulted in organisations forming different visions for the future development of these processes, resulting in diverging away from the focus of the current process system.

Further, when individual solutions are developed for solving individual problem areas, an operational silo is created at the problem area where only the intended problem is solved neglecting the broader impacts of the associated processes outside the problem area. This condition weakens the impact of the individual solution concerning the processes of the system as a whole. To counter this condition, stakeholders need to understand the system as a whole and cluster similar knowledge and ideas together

to create a larger-scale project that targets the system of processes as a whole. When the system is targeted as the focus for innovation activities, it is possible to achieve a more significant impact on the operations of the stakeholders and the experience of the end-users on a longer-term.

Another focus of the stakeholders in this scenario will be to create hybrid skills and expertise required to adapt to innovation criteria and expectations of the time. When approaching innovation across the entire collaborative system, collaborators need to possess expertise on multiple skills and knowledge to effectively translate solutions from one process to the others in the system. This focus will result in the creation of **Dual-life individuals** in the collaborative ecosystem who can use their expertise in multiple associated fields within the development, yielding a systemic impact on the solutions <sup>[31]</sup>.

### Horizon Solution

The scenario in this horizon can be addressed by creating and developing a **“Collaborative Laboratory”** where collaborators can plan and execute their innovation activities towards developing a combined large-scale solution. The setup of the laboratory will be similar to that of a design studio in the physical construction where collaborators can have spaces and tools to ideate together, make and test prototypes, but also with individual workstations where collaborators can take time to review their developments and access required knowledge.

However, with the operational context of the laboratory, the distinction can be achieved for this collaborative laboratory when compared with other design studios and innovation laboratories.

The Collaborative laboratory is a connected workspace which is available to be accessed by the stakeholders in the “People in Transit” collaboration. The Collaborative laboratory is connected in process context to other laboratories in the collaborative ecosystem that offers technical and experimental expertise to the development of the solutions. Thereby, an ecosystem of laboratories is created where any required resource and expertise can be called for the extensive development of the solution. Thus, the solution is developed through multiple disciplines offering broad perspectives that enable the solution to be developed to target a process system as a whole.

The Collaborative laboratory can provide the sandbox for developing innovative outcomes which can result in additional knowledge to the stakeholders through the hands-on experience in developing the solution. An opportunity is created for the stakeholders, who belong to multiple disciplines bringing in different perspectives that can add value to the development of the solution to learn additional skills and expertise thereby making them as “Dual-life individuals” on the longer term. These additional skills learned through experience from the collaborative activities in the laboratory can be propagated to other individuals in the stakeholder organisations

**Figure 4.4**  
Solution for Second Horizon



thereby infusing a multitude of skills and expertise within the organisation which leads to aligning the organisational culture supportive towards collaborative innovation.

The process of innovation in the Collaborative laboratory will involve similar clustering of projects targeting individual problem areas to target an entire process system. A collaboration team will be formed that includes collaborators from the involved stakeholder organisations of the system who are traditionally the process owners and belong to multiple stakeholder organisations. The composition of the team will be formed based on the division of the labour and activities required to execute the developmental activities of the project. During the execution, stakeholders can add value to the development process by providing inputs based on implementation activities and also offer perspectives that the solutions need to fulfil so that the solution can realise its intended purpose. During these activities, all collaborators are involved in the development activity, and when the development is completed via an appropriate prototyping and evaluation methodology, it becomes simpler for the stakeholders to transfer the solution and implement them in their respective organisations.

### **Activities**

The activities involved in this horizon are focussed in setting up the “Collaborative laboratory” for the collaborators and bringing the collaborators to use the collaborative laboratory for their development of innovation outcomes. For this horizon, a plan is required to identify and cluster outcomes of innovation activities based on the system of processes. Once these clusters are formed, the involved stakeholders need to be brought together for the development of system solutions. A physical space needs to be assigned as a collaborative laboratory, and the necessary equipment for ideation and prototyping needs to be procured and deployed in these laboratories. Similarly, the other associated laboratories within the different departments need to be connected in operations to the collaborative laboratory so that the channels for obtaining technical and topical resources and expertise are established. The legal framework for collaborative stakeholders needs to be developed for conflict-free operations

regarding ownership and use of the developed solutions.

### **Resources**

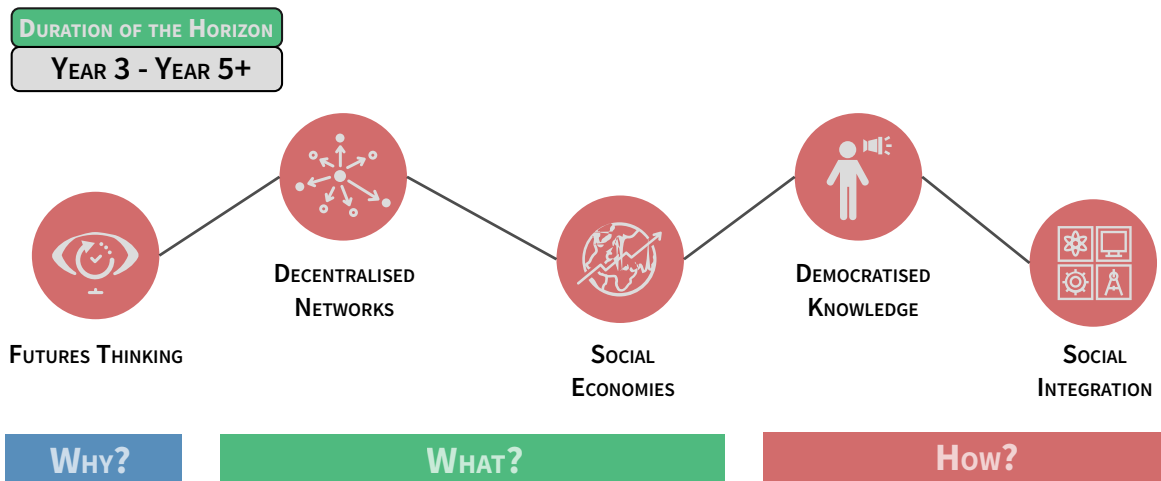
The primary resource required for setting up the laboratory is the physical space itself. This physical space should be in proximity to the collaborating organisations or at least in proximity to the point where most resources are available. Using this reasoning, the campus of TU Delft would serve as a first option by which the collaborative laboratory can access resources from other disciplines and their associated laboratories. However, with testing and evaluation of an entire system may require an actual context of the organisation, it can be suggested to set up the base of operations at the TU Delft and have industry stakeholders connect their innovation laboratories and testing resources as satellite locations for the Collaborative laboratory.

With the physical space, three kinds of resources are required to convert the physical space into a collaborative laboratory – resources for collaboration, resources for prototyping, resources for focussed working. The resources for collaboration can be provided by procuring tools and products required for ideation such as touch screens, white-boards, projector with screen, flip charts, writing materials, post-its and other similar tools. The resources for prototyping can be provided by either connecting the collaborative laboratory with the existing prototyping labs of the TU Delft or procuring prototyping tools and materials exclusively for the collaborative laboratory. The resources for focussed working can be provided by providing spaces for computer workstations to access the knowledge platform where collaborators can use their workstations and work on individual tasks.

Outside the context of the physical laboratory, the necessary infrastructure for funding the developing activities need to be developed regarding all stakeholders in the “People in Transit” collaboration. Similarly, the development of legal infrastructure for intellectual property rights and ownership is required for the start of every development project. These activities will require the presence of a legal firm in place to notarise these agreements.

### 4.3 HORIZON 3 – CREATION OF INCUBATION SPACE

**Figure 4.5**  
Context Structure in Horizon 3



The second horizon deals with the creation of incubation space for the PiT Collaboration. The focus of this horizon to create an incubation space involves focussing on the **“problems of integration”** between stakeholders and society. By integrating the factors and elements of society into the collaboration, the outcomes of the innovation can be scaled outside the collaboration to impact the society. As both university and industries as stakeholders can develop and scale only up to a point in the collaboration, it is necessary to expand the collaboration to include other stakeholders such as the society to support innovation by opening up new opportunities and environments for gaining knowledge and implementing solutions. With the elements of the society on board with the collaboration network, it becomes simpler for stakeholders to integrate their innovative outcomes in practice for utilisation by society as end-users.

#### **Trend Scenario**

By the second horizon, a knowledge space is created for stakeholders to learn and develop new skills and network with potential collaborators and a consensus space is created where collaborators can understand each other towards a shared vision for innovation and developing large-scale solutions that cater to the system as a whole. The third horizon will be characterised by the elements of society, such as

the civic communities and media engagement with the stakeholders of the collaboration in developing the infrastructure necessary for the implementation of the solutions. This focus will help the society in matching up to the pace of innovation of the collaboration and provide the necessary channels for implementation and scaling of the innovation in the normal behaviour of the end-users. In this scenario, there is a lack of awareness in society on how to integrate the innovative solutions developed within the collaboration.

When the passenger journey is further extended to include all possible forms of processes and systems, the stakeholders within the current context of the “People in Transit” collaboration have fewer influences on the society to keep up with the pace of innovation. A situation is created that the collaborators develop an innovation and deploy the solution in the current system to satisfy immediate and futuristic needs of the end-user, but due to the lack of understanding of the innovation leading to failure in taking necessary action to provide a platform where the innovation can be deployed and scaled up. As a result of this situation, several innovations with higher potential for the future, fail to realise its intended impacts which create a waste of resources and effort for the stakeholders in the collaboration and a missed opportunity for the society to benefit from the values of the innovative solution.

Moreover, organisational divisions within the “People in Transit” collaborations are focussed towards operational efficiencies with not much scope and expertise available to carry out innovations activities on their own. With the decentralisation of the information supply chain gaining momentum in the current context due to breakthroughs in technologies such as Artificial Intelligence and Blockchain, the scenario at this horizon will be characterised by decentralising innovation activities outside the conventional organisational structures. In other words, organisations in the third horizon will create spin-off organisations that will serve as an incubator for innovation activities for the parent organisations. This situation will create a culture of innovation outsourcing, where large organisations that cannot support innovation activities on its own will look towards these innovation incubators to cater to innovation outcomes and guidance to the organisations.

Another characteristic of the scenario in the third horizon is the availability of capital resources in both public and private venturing where innovation can be supported with the potential of the society. With the ideologies of venture capitalism, gaining necessary traction on how innovation incubators are formed and operated, the outcomes of innovation can be further scaled globally for stakeholders outside the collaboration. Expanding the collaboration

to include other stakeholders such as universities and industries in the passenger journey domain, the quantum of knowledge and resources available for innovation is significantly increased. Satellite communities for the “People in Transit” collaboration can be set up globally with the support of other universities and the industries around the regions thereby increasing the scope of innovation where impact can be rendered on a global scale.

**Horizon Solution**

The scenario in this horizon can be addressed by creating and developing an “**Innovation Transfer Office**” where collaborators can scale their outcomes of innovation activities to various segments of the society and also showcase the potential innovations so that the society can develop the necessary infrastructure regarding physical, legislative and finance with the support of the “People in Transit” collaboration. The objective of this Innovation Transfer Office is to achieve integration of the outcomes of innovation from the stakeholders of the collaboration to the more significant parts of the society.

The Innovation Transfer Office is an operating body of the “People in Transit” collaboration, functioning independently to the innovative activities of the collaboration, primarily to support the collaboration by connecting

**Figure 4.6**  
Solution for Third Horizon



the innovation outcomes to the segments of the society where it can be utilised. Thus, the ecosystem is expanded to the society where more opportunities are presented to the collaborators for planning continuous innovation using the “People in Transit” collaboration.

The Innovation Transfer Office can provide licensing of developed solutions with the collaboration which can provide more avenues for implementation of the solution on a global scale, Organisations outside the “People in Transit” collaboration can purchase a license to use the innovation outcome developed within the collaboration and on positive effect of the use of innovation can attract organisations and societies to involve themselves as a collaborating partner with the “People in Transit” collaboration. Through the licensing of innovation, the outcomes are scaled up for use to the society generating additional revenue to the involved stakeholders in the collaboration.

Further, the Innovation Transfer Office will function as the media liaison for the “People in Transit” collaboration, thereby showcasing potential large-scale innovation to the society during the developmental stage. This function will create an awareness of the utilisation potential of the innovation to society so that society can develop the necessary infrastructure to support the integration of the solution. The development of such infrastructure will be advised and assisted by the Innovation Transfer Office, which creates a new role and value proposition for the “People in Transit” in the third horizon.

Additionally the Innovation Transfer Office will function as a facilitator for industry stakeholders to spin-off their innovative solutions that have future potential for improving the Passenger Journey but are adjacent to the value propositions and operational capabilities of the industry stakeholders, into a startup environment that can primarily cater to the parent organisation but also generate additional revenue in catering to other stakeholders in the collaboration. This function will help in sustaining innovation outcomes and improve the economy of the society.

### **Activities**

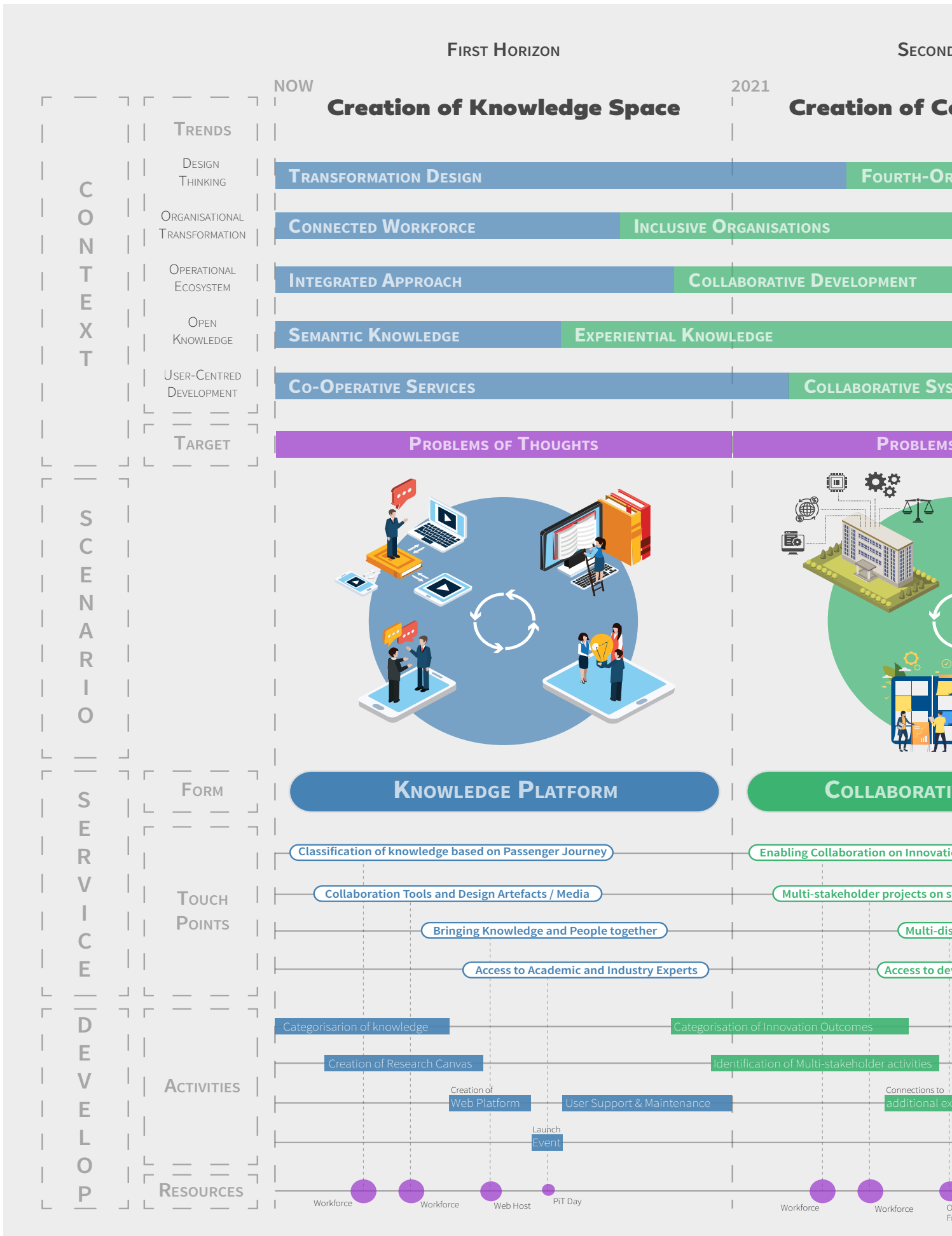
The activities involved in this horizon are focussed in setting up the “Innovation Transfer Office” for the “People in Transit” collaboration. For the operations of the innovation Transfer Office, a governing body appropriately representing all the stakeholders in the “People in Transit” collaboration is to be formed that will plan and develop strategies for the operations of the Innovation Transfer Office. A dedicated workforce with a balanced mix of full-time and part-time employees are required for carrying out the necessary functions of the Innovation Transfer Office. Physical space is required to function as an office to accommodate the workforce and can be connected to the Collaborative laboratory developed in the second horizon. Once the Innovation Transfer Office is set up, stakeholders of the collaboration can promote and showcase the potential outcomes for innovation with society.

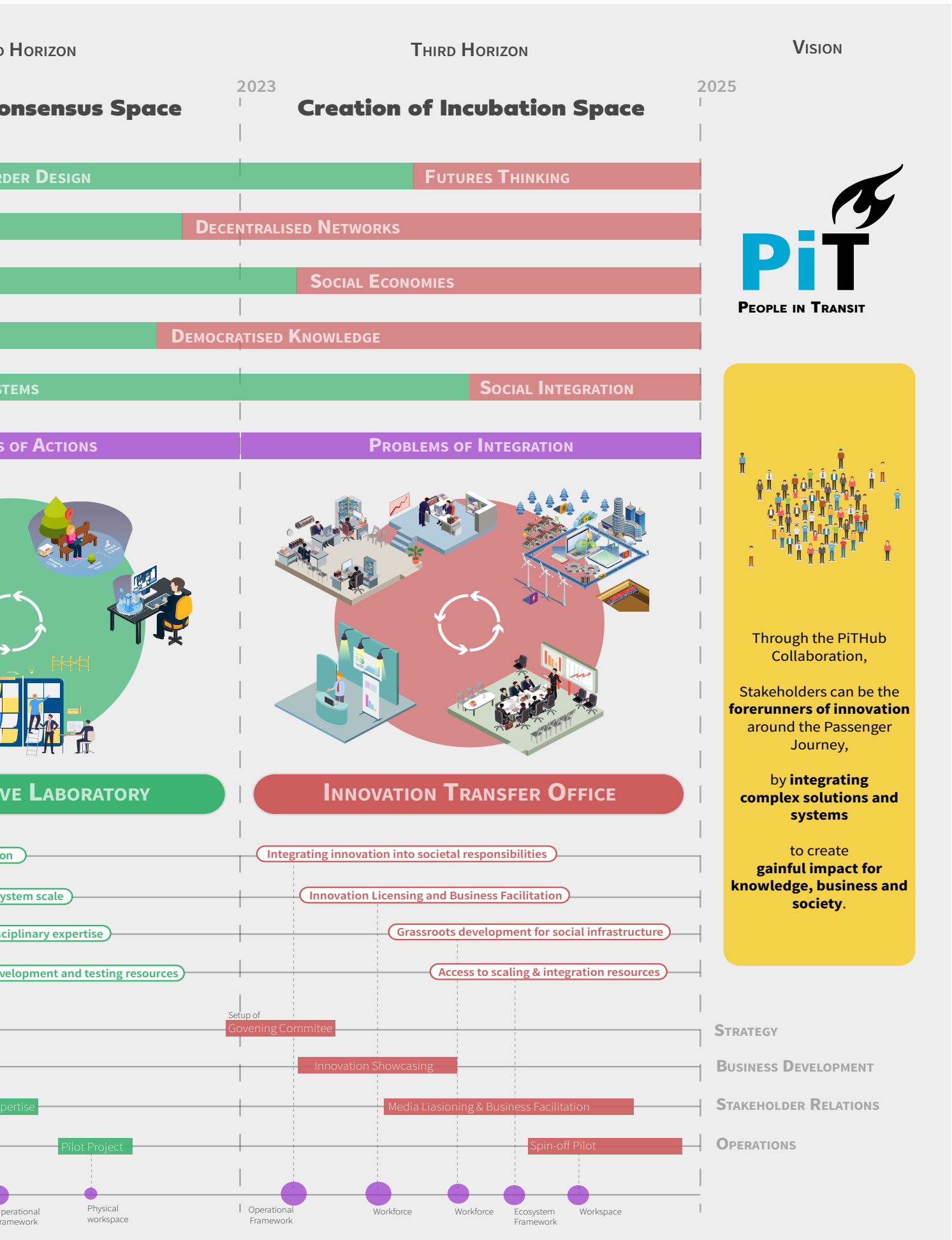
### **Resources**

The primary resource required for setting up the Innovation Transfer Office is the creation and maintenance of public relations with various sections of the society and stakeholder relations with the “People in Transit” collaboration. This activity requires a workforce that have the necessary skills and expertise in handling relations with the media and society. Additional expertise is required in venturing processes and business models to facilitate the incubation of spin-offs solutions from the stakeholders of the collaboration. Developing a hands-on approach over this expertise and with the availability of knowledge and industry experts with the collaboration, the Innovation Transfer Office can serve as an advisory body to various sections of the society to attract investments and development in the physical, legislative and finance infrastructure required for integrating the outcomes into the society. The legal infrastructure developed in the second horizon can be expanded further to cater to licensing of innovation to other organisations outside the collaboration. These workforces can be expanded further as per requirement when deploying innovation outcomes on a global scale.



# Tactical Roadmap





## 4.5 BEYOND THE ROADMAP

### 4.5.1 THE "PEOPLE IN TRANSIT" JOURNAL AND CONFERENCE



**Figure 4.7**  
The 'PiT' Journal of Collaboration

The "People in Transit" Collaboration can review their articles and publish them in their own "People in Transit" journals. The concept of creating this Journal is to increase the academic and scientific audience provided to the knowledge article. This journal creates a system of open knowledge through semantic methodologies and can be used as an internationally recognised tool for academic reviewing. This Journal can provide the collaborators in "People in Transit" to periodically measure the impact of their innovation activities through citations and reviews of their outcomes.

Through the 'People in Transit' conference, outcomes of innovation activities can be presented periodically by the collaborators to an audience of interest. This conference can aid in maintaining interactions within the "People of Transit" collaboration and also to develop new interactions for new partners willing to enter into this collaboration. Showcasing innovation outcomes can be done through the conference, thereby engaging the stakeholders through new knowledge and call for subsequent action towards developing the outcome.

Both the "People in Transit" Journal and Conference can be treated as additional activities to the first horizon provided the availability of resources and organisational intent among the collaborators.

### 4.5.2 SOFTWARE SIMULATION AND VIRTUAL REALITY



**Figure 4.8**  
Virtual Reality Simulation

One of the essential purposes of the Collaborative Laboratory is to provide the collaborators with the necessary tools and resources for simulation and testing of innovation outcomes. This testing and simulation can be further aided to existing laboratory setup by introducing new tools and approaches to the testing platform. Through software that is developed to simulate scenarios of transit, the collaborators can test and alter variables of current operations thereby providing a platform to simulate processes and ideas. The presence of a software platform for testing can provide the collaborators with a visual medium of interpreting results and making iterations to their simulations to weed out bugs and errors in the outcomes. Gamification of innovation activities can also be achieved through the software approach towards testing.

Virtual Reality, in recent times, has been a preferred tool for technology companies to create detailed visualisations of abstract ideas. Employing Virtual Reality in the "Collaborative Laboratory", the collaborators can create visualisations for their ideas and present to fellow collaborators as a communication tool. The interaction element in Virtual Reality can yield detailed testing of outcomes and testing them for integration and use, thereby creating better

simulation experiences for the collaborators to understand the ideas and executing them.

These activities can be part of the Second Horizon once the development of a Collaborative Laboratory. With the right resources and availability of technology in the future, the simulation medium through software and virtual reality can catalyse the experience of collaboration, retaining the interest among the stakeholders towards the purpose of the collaboration.

### 4.5.3 EXPERT ADVISORY COMMITTEE

With the future of the collaboration tending towards seeking the support of the society in developing the necessary infrastructure, a reverse relationship can also be created with the society looking towards the collaboration for answers to societal problems. Through the "People in Transit" collaboration, the society can benefit in seeking expert opinions and consultations from the collaborators regarding a specific problem that can be approached through adapting the outcomes of innovation. An Expert Advisory Committee can be set up to represent the collaboration in terms of expertise and knowledge and can serve as consulting experts to solve problems associated with society. The elements of society can rely upon this expert advisory committee for planning the development of the relevant infrastructure for the society. During the execution stages, the committee can consult the elements of the society in following best approaches, thereby improving the quality of developmental activities undertaken by the society.

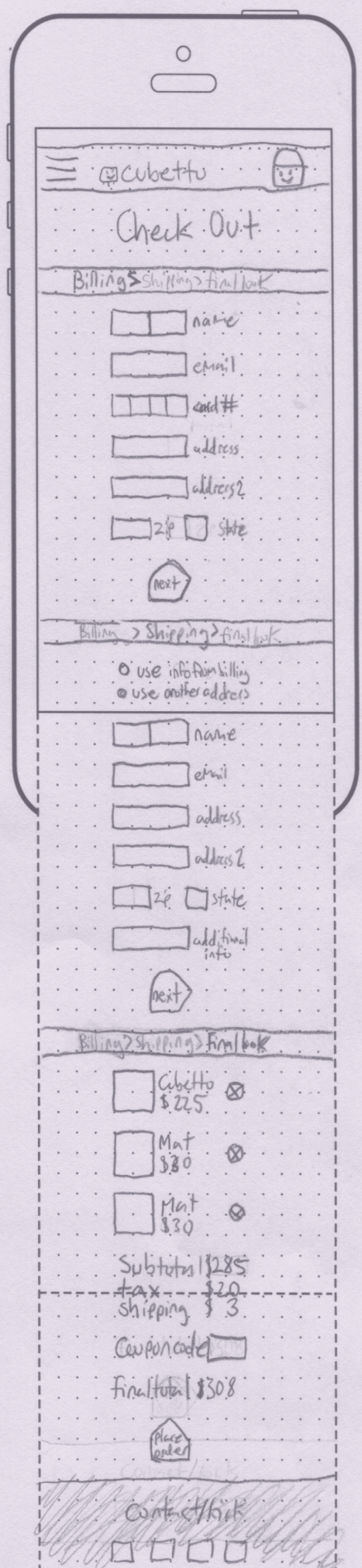
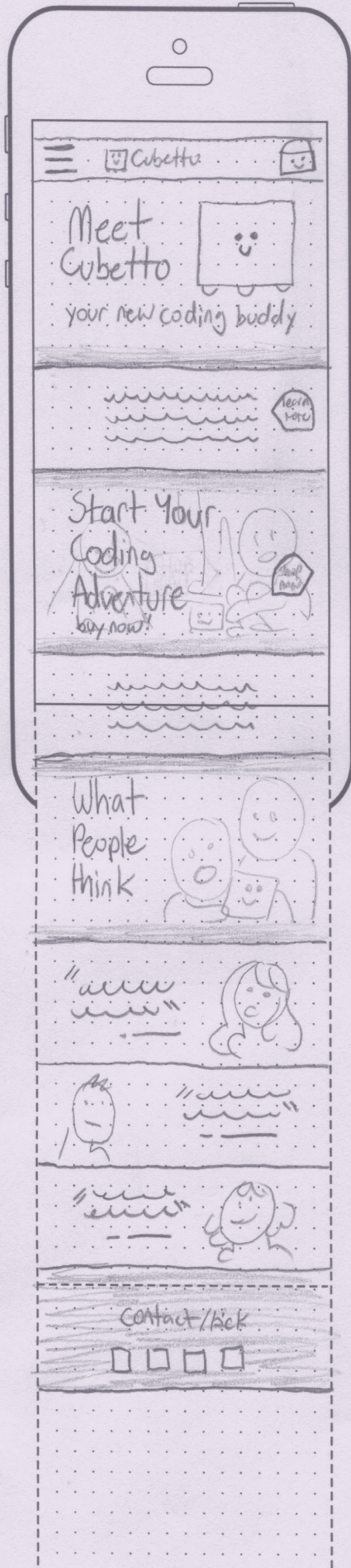
This committee can serve as a value addition to the 'People in Transit' collaboration during the Third Horizon to establish a significant presence in the community, which makes the integration of innovation easier during the third horizon.

## CONCLUSION

Thus, with the ideation of scenarios in each horizon, it was possible to understand the future context in lower levels of abstraction. From this point, it was possible to generate solutions for each horizon that can serve value to the collaboration in each of the horizons. Further, with the development of the solutions, the context of the collaboration in each of the horizons was explained along with the activities and resources required to achieve these milestones. These horizons are then visually represented in the form of a strategic roadmap which can be used to communicate the outcomes of the ideation sessions in terms of scenarios and solutions to various stakeholders in the "People in Transit" collaboration. Based on the results presented in the roadmap, further development of the solutions can be made, which can be represented by a prototype and tested with the stakeholders for validation.

**5**  
**|**

# PROTOTYPING





# 5 Prototyping and Testing

Through the previous chapters, the needs and operational factors of the stakeholders were clustered, and Context Structures were identified, using which the Future Context was derived. Future scenarios were formed by extrapolating and combining the trends of the future context and solutions addressing each of the horizons in the future scenario were ideated and described. In this chapter, we transform the solutions presented in the roadmap into a tangible prototype and test the prototype for usability among the stakeholders. The outcome of this prototyping process is to determine the perception of the stakeholders, who are the users of the solution, towards the proposed solution and use subsequent insights to develop the prototype further into a realistic solution.

The solution of providing a “Knowledge Platform” to the collaborators in the first horizon is selected to be prototyped for user testing. The selection of the “Knowledge Platform” as the prototype is attributed to the relevancy and the requirement of the solution in the immediate future. Moreover, this solution of “Knowledge Platform” creates the necessary foundation for the collaboration to develop prototypes for the other horizons when the relevancy and the requirement of the horizons are closer in time. Hence, for the scope of this project, the prototyping and user testing of the first horizon solution – “Knowledge Platform” is considered.

## 5.1 IDEATION

To develop the prototype further by adding features to the solution, an ideation session was conducted at a stakeholder organisation (a multinational travel and tourism company) that addresses most processes of the passenger journey. An agile process was used for the ideation activity to yield innovative outcomes within the timeframe of a single ideation session. Participants were chosen based on the role and purpose required for the development of the prototype.

The ideation session comprised of two facilitators – one from TU Delft and another from

the stakeholder organisation, to maintain the agile process and the roles played by each participant in the ideation session. An IT Consultant was chosen to participate in the stakeholder organisation to provide information on the software possibilities of the solution. Two participants were chosen from the Business Development to provide insights on the organisational collaboration and Four participants from Innovation were chosen to provide insights and solutions on the knowledge gathering activities in the organisation. The participants were briefed about the purpose and the background of the “Knowledge Platform” solution and were sensitised on the topic through a personal booklet that encourages them to share their purpose for their participation in the ideation session.

The Context Factors – the organisational needs and the operational factors are used as topics for ideations, and a “How To” question for each context factor was derived. E.g. Knowledge Transfer – How to enable collaborators to transfer knowledge to each other. The participants were made to perform brain-writing and brain-drawing of solution concepts which are related to the features to the prototype that is to be developed. At the end of the brainwriting and brain drawing session, the participants described the potential of the solution features, and selection of the most desirable, viable and feasible outcomes was performed by the participants. The results of the ideation session are compiled, and the prototype was developed to reflect the outcomes of this ideation session.

## 5.2 PROTOTYPE DEVELOPMENT

The results from the ideation were transformed into features for the prototype and are based on the needs of the stakeholders. The website medium is chosen for the prototype as it forms the best approach to store large quantities of data and is flexible enough to provide access to these data through a regulated manner. The features that are evolved from the needs of the stakeholder are explained through the development process.

### 5.2.1 NEED FOR REGULATED ACCESS – LOGIN SCREEN

The outcomes from the innovation activities of the collaborators are to be treated as sensitive information and should have access only to the collaborators involved in that particular outcome. On later developments, these outcomes can be converted into knowledge by anonymising the sensitive information and thereby eligible for sharing among the other stakeholders in the collaborators. So, access to information before the publishing of knowledge during the developmental stage has to be regulated to allow access only to specific collaborators. These can be achieved by adding a login system as the landing page of the web platform.

The users land on to the login page while trying to access the Knowledge web platform. The login page prompts the user to create an account to access the knowledge platform. The account creation process is moderated by the collaborators of the platform to review the profile and accept the profile into the knowledge platform. The presence of the sign-in as a process to access the knowledge platform allows personalisation of the knowledge platform to the user to exercise other relevant features of the platform, specific to the user's interests and lines of collaborative work.

### 5.2.2 NEED FOR CREDIBILITY – PROFILE SCREEN

Trust and Transparency of activities among the collaborators have been crucial for effective collaboration. Stakeholders need information on each other to understand the expertise and credentials of the stakeholders in the knowledge platform. By understanding this information on stakeholders in the knowledge platform, stakeholders can find participants for

their collaboration project and execute innovation projects as a result of this collaboration.

With the Profile page, the stakeholders of the collaboration can create a profile for themselves. Through the creation of a profile, stakeholders can communicate to other stakeholders their expertise through the role in their current organisation. The inclusion of the current domain they are working on will communicate additional information to the stakeholders to seek out for collaboration and follow them for knowledge updates. The contact information of the particular stakeholder is also provided to initiate contact outside the means of the knowledge platform. The profile page also contains further information about the experience and academic credentials of the stakeholder to lend more background information and also the projects and publications undertaken to communicate previous work standards and outcomes of innovation activities. Credibility is also provided to the stakeholder's profile with an option to view the current collaborators and followers so that the network links of that stakeholder is visible to understand associations of the stakeholder with other stakeholders in the platform.

### 5.2.3 NEED FOR PERSONALISATION – DASHBOARD SCREEN

Providing the stakeholders with an option to personalise their workspace increases their involvement in the work and improves the productivity of the individual stakeholder. Through personalisation, the stakeholders can organise their activities associated with the "People in Transit" collaboration. The stakeholders are enabled quicker access to the activities they are associated with and can perform their activities efficiently.

With the Dashboard page, stakeholders can add personalised items to their main landing page after login so that they are prompted to take necessary action or follow updates to their lines of work. Through the Feed, the stakeholders get a glimpse of what is happening in their circle of followers as it would happen on a social network platform. One of the repeated behaviours for

the collaborators in the “People in Transit” collaboration is that innovation activities are spread across on a longer time frame thereby missing “at the moment” inspirations and minor contextual information that is usually missed through publication. By capturing these insights and information through the dashboard’s feed, users can be informed of additional contextual information that can provide a complete understanding of a context and get inspired by following through its updates. The dashboard will also contain a news plugin where stakeholders can be informed of the current press releases from each of the stakeholders for secondary information. The addition of an events calendar and a personal calendar can aid in stakeholders organise their activities and get updated of any upcoming events in the collaboration. Through the updates, the stakeholders can receive updates from their collaboration specific to themselves. The updates can originate from someone posting a comment or a review of a particular knowledge article or through additions of activities to a particular collaboration project or through getting a question answered by a fellow stakeholder.

#### **5.2.4 NEED FOR COLLABORATION TOOLS – TEAMS SCREEN**

One of the essential requirements of the platform is to provide the tools for stakeholders to collaborate on innovation activities. The inclusion of this ability to collaborate on the platform brings stakeholders to plan and execute their activities on the resources available on the platform leading to further use of the web platform. Currently, stakeholders collaborate their activities internal to their organisation, but by providing the same feature on the “Knowledge Platform” from the “People in Transit” collaboration, the stakeholders can integrate their activities to the collaboration to their regular work behaviour and execute inter-organisational innovation activities.

With the Teams screen, stakeholders in the collaboration can form individual teams to work on a specific innovation project. Stakeholders tend to work on multiple projects depending on the roles played in each project, and thus the Team screen can help the stakeholder in organising innovation activities from multiple projects. By

accessing a Team project, the user is presented with a Team Board where the tasks are organised in several columns based on a topic. Each task is associated with a stakeholder in the team, and the tasks are moved around based on status or other parameters. Necessary documents and information can be sent through the Messaging feature that serves as a secure mode of transfer of information between the stakeholders. Thus, multiple teams and tasks between collaborators belonging to multiple organisations can be organised, accounted to a stakeholder and executed using the Teams screen.

#### **5.2.5 NEED FOR REAL-TIME CLARIFICATIONS – FORUMS SCREEN**

One possibility through the knowledge platform is to create a system where stakeholders can seek clarification and guidance from experts in the “People in Transit” collaboration. This approach for clarification creates a direct communication link between stakeholders and experts who can provide additional information and knowledge on a specific topic thereby getting answers to real-time problems as well as forming a foundation for future collaboration. The nature of the questions and answers in this approach will be the minute details which the published article cannot capture due to its broader scope and generalised approach towards a phenomenon.

Through the Forums screen, stakeholders can post questions on a particular topic to seek answers from the collaboration community. Through the credibility of the users in the collaboration, best answers in forms of facts, theories and opinions can be formed, reviewed and shared. Users can follow topics that are in line with their work and can receive updates to the questions and answers in the forum discussion on their dashboard. This Forum thus provides an alternative channel to obtain knowledge on questions that would typically not directly addressed through scientific knowledge. A sense of community is formed due to the Forum nature of the discussions, which can lead to future collaboration between stakeholders.

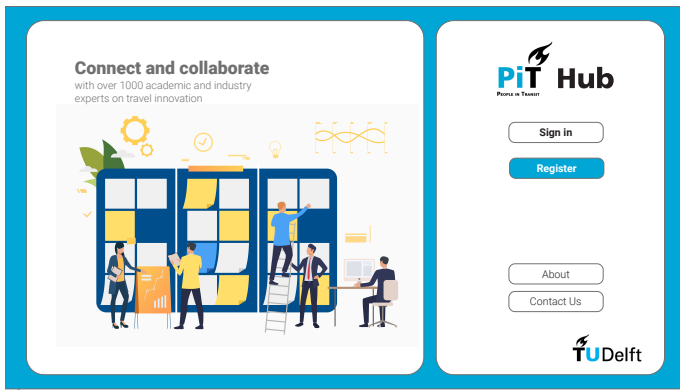


Figure 5.1  
Login Screen

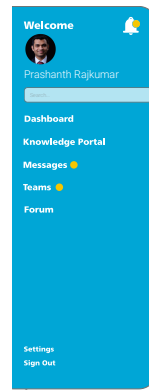


Figure 5.2  
Profile Screen

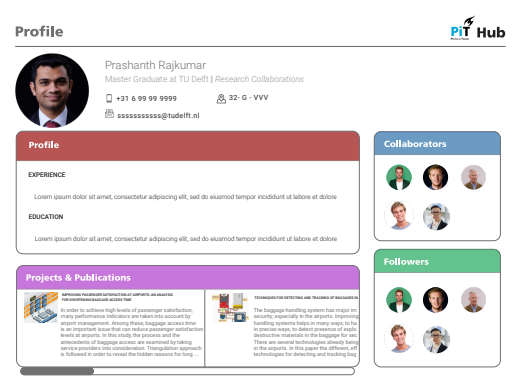


Figure 5.3  
Dashboard Screen

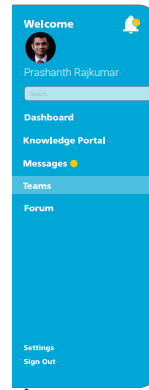


Figure 5.4  
Teams Screen

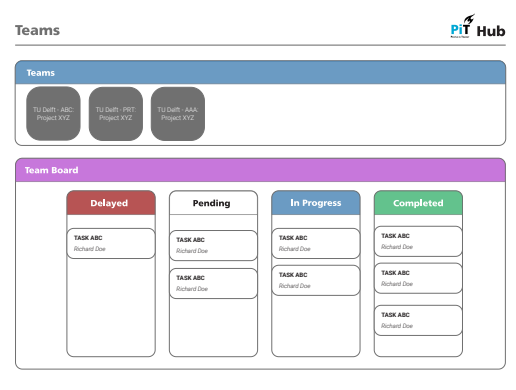


Figure 5.5  
Forums Screen

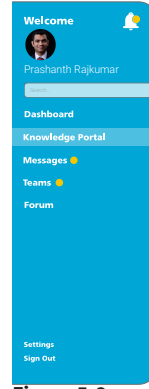


Figure 5.6  
Knowledge Portal Screen

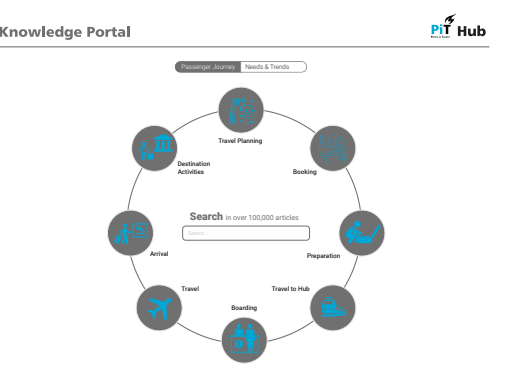


Figure 5.7  
Classification on Passenger Journey

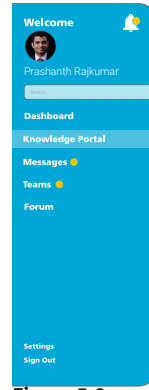
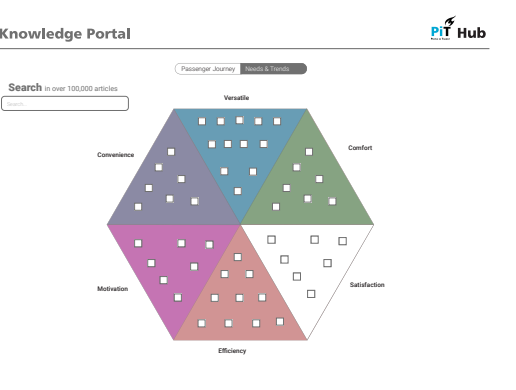


Figure 5.8  
Classification on Needs/Trends



PROTOTYPING



process, or category that is linked with their line of work. Additional details of the process are presented for an accurate understanding of the established process with the perception of the process by the user. This additional details can be made visible through the hovering of the mouse cursor over the process icon.

An additional mode of classification is also made available based on the needs and trends of the end-user to provide an alternate mode of seeking the intended information rather than the processes. The selection of the Needs and Trends as a classification system is based on the development of innovation with the end-user in perspective, which is a characteristic of Transformation Design philosophies in the first horizon. Thus, the users are provided multiple classification systems through the knowledge platform that makes it easier to narrow down the search focus and find the intended article in the web platform.

To narrow down the focus further, sub-classification of processes are provided to the primary processes in the passenger journey. Also, the relationships with the particular processes to other processes in the Passenger Journey are provided so that the user gains further understanding of how the processes are interlinked in the system so that the effects to the other processes are not ignored. This approach creates further understanding of the system among the stakeholders to the knowledge article thereby planning for outcomes in the associated processes to increase the effectiveness of knowledge across the system. Hence, through this classification system, the user can narrow down the focus of their search for knowledge and obtain accurate results to their search process thereby saving time and effort required to find knowledge through the knowledge platform. This classification system also provides the stakeholders to add new processes and activities to the passenger journey, thereby increasing expertise on a process level and focus on knowledge gaps to fill them with future collaboration and innovation activities.

### 5.2.7 NEED FOR EASIER COMPREHENSION – FRAGMENTED ARTICLES

Based on the selection of a process in the passenger journey, the user is taken to a landing page of the specific process where users can obtain information about the topic and the latest articles on the topic from the “People in Transit” collaboration are found.

The user is prompted to click on the ticker containing the latest articles or search for associations in the topic through search terms or find associated articles through the trends relevant to the process. From this stage, the users can be directed to the required articles in their intended search.

However, with the current approach towards reporting information and knowledge being extensive, stakeholders who wish to seek immediate reference and conclusions from a study find it difficult to comprehend the content provided in the articles. For daily innovation activities, there is less time and effort available from the stakeholders to seek and retrieve information from an article and hence look towards other channels to comprehend the same knowledge in a different form. This need can be fulfilled by providing the associated artefacts of innovations regarding pictures and videos where the knowledge from typical articles are presented for easier understanding by the stakeholders. These artefacts provide an alternate approach to comprehend knowledge which may not provide a complete understanding of a context through a wordy approach.

Through the “Research Canvas”, stakeholders can obtain a fragmented version of an article that presents the key highlights and conclusions from the article. The research canvas can be added as an appendage to the existing scientific article and also includes the links between various processes in the passenger journey. The associated needs and trends are also provided for further understanding by reviewing linked articles. The inclusion of the related processes, needs and trends provides the user with a quick overview of the nature of the content in the following article and prepares them for knowledge in those contexts and topics. The article, in its entirety, is distilled to its highlights

and conclusions that provides a quick and easier comprehension of the knowledge presented in the article. Users can add fragments of the article to their notes on the web platform, where notes can be stored and organised for further use. While adding these notes, the link between the fragmented knowledge and the source article is maintained, so that it becomes easier to refer back to the article during the comprehension process. With the reading through the research canvas, the users gain quick comprehension of articles when compared to the typical reading process. For further explanation of the fragmented information, the user can refer to the full article. Through this approach, the user saves time and effort to collect and corroborate knowledge on a specific topic from multiple articles.

## 5.3 USER TESTING AND VALIDATION

With the results of the ideation translated into a tangible prototype, the features of the prototype need to be tested for usability among the stakeholders. The purpose of the user testing and validation process is to involve the stakeholders with the prototype and simulate the use cases with these stakeholders to obtain their insights, feedback and improvements for the subsequent development of the prototype. Through the user testing phase, it was possible to create a user persona through the available insights and information gathered through the execution of the project. The crucial assumptions that were originated from the ideation and the development of the prototype need to be tested with the users and based on user testing results, the user journey map through the knowledge portal is generated.

### 5.3.1 USER PERSONA CREATION

A user persona is the presentation of the abstract information and characteristics of a typical user of the knowledge platform using a fictional identity to represent a human user with real motivations and frustrations. The abstract data is obtained by the synthesis of the interviews and contextual observation sessions and clustered into different characteristics to represent different behaviours exhibited in using a tangible prototype <sup>[16]</sup>. A user persona is created for the stakeholders in the "People in Transit" and is represented visually.

From the User Persona, we can understand that the typical stakeholder in the "People in Transit" collaboration through the motivations, desires, frustrations and personality of the fictionalised individual. The primary motivations that drive the person are through Incentives, social, achievements and growth. The person wishes to obtain more knowledge and training in the field of work, wishes more information and explanation on why certain innovations do not meet the intended result and seek a network through which some doubts can be clarified and approached towards building future innovation. The frustrations of the person lie when the person cannot source the required pieces of knowledge to comprehend a phenomenon, finding opportunities to scale up innovation activities

with other stakeholders in the sector and in developing innovative solutions that transcend the current value propositions.

### 5.3.2 TESTING THE PROTOTYPE

The next part of the validation process involves testing assumptions and other hypotheses that were evolved through the development of the prototype by performing usability tests on the prototype. The most crucial assumptions were compiled and were tested with the stakeholders along with the various functions and features of the prototype. The selection of these crucial assumptions was based on clearing immediate bottlenecks and constraints to develop the prototype into a realistic solution and to obtain additional insights that were initially unknown during the design stage. Three hypotheses were formed and framed as questions that were to test among the stakeholders.

- 1. Do Stakeholders find the platform desirable for use?**
- 2. Do Stakeholders find it viable to perform collaborative innovation over the platform?**
- 3. Do Stakeholders find it feasible for integrating the platform into their organisational work cultures?**



**Figure 5.12**  
User Persona



Twenty participants were chosen for the purpose of user testing for the prototype, belonging to different stakeholders. The criterion for the selection of the participants of user testing is based on the various roles they would take part in the collaboration, and hence the participants were mostly chosen from the innovation and business development functions of the organisation. The participants were introduced to the prototype explaining the features and uses of the platform, and the participants were asked to find certain information on the knowledge platform to check the usability of the web platform. During this entire testing phase, semi-structured questions were asked to elicit the thoughts of the participant on the prototype, and the participants were made to provide detailed insights to the reactions that arose with the use of the prototype.



**Figure 5.13**  
User Testing

The results of the user testing activity indicate promising intent for use by the participants in the “People in Transit” collaboration.

By testing the hypotheses, **80% of the participants found the concept of the knowledge platform desirable** for use.

In addition to this, **75% of the participants find the classification system based on the Passenger Journey to lessen the time and effort required** during their deep dive activities.

The **Needs and Trends type classification system received a positive validation from 60% of the participants**, and **90% of the stakeholder responded positively to the option of having both classification systems** in place.

**95% of the participants found the opportunity to comprehend the highlights and the insights of an article through the research canvas and also through other channels such as the video and artefacts** created during the innovation process.

**65% of the participants found the collaborative innovation that could be resulted from the social network component of the knowledge platform viable** thereby, indicating available interest for the collaborators to participate in the network of the “People in Transit” collaboration.

**70% of the participants found the presence of collaborative tools such as Teams useful** for performing cross-organisational collaboration.

**85% of the participants found the option to clarify doubts on a personal level through the forum to be desirable.**

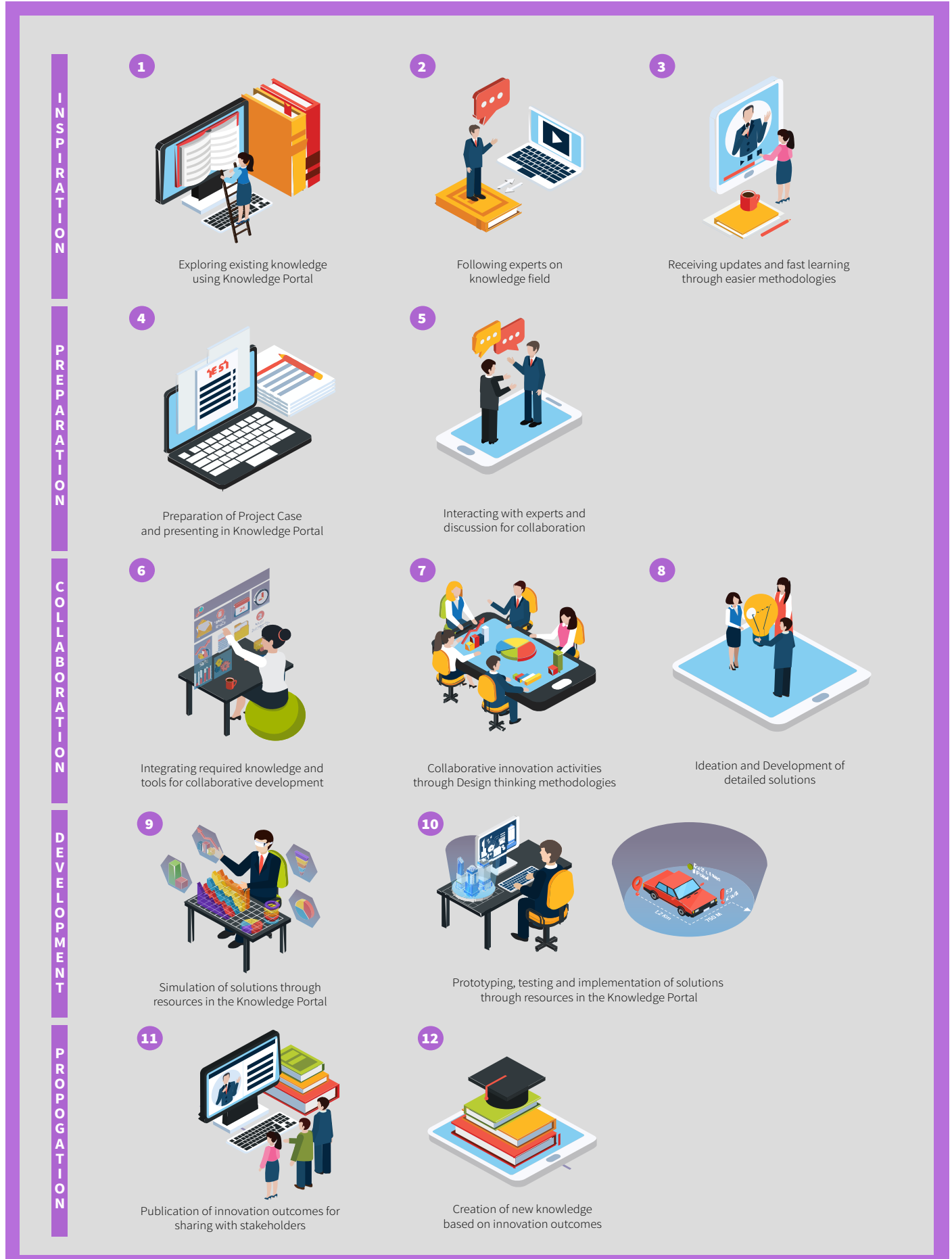
**70% of the participants found it feasible for integrating the platform into their organisational work cultures** and would continue to use the platform for performing innovation activities in their organisation.

Hence, with the results of the user testing providing positive results towards the adoption of the features and functions of the prototype, it can be recommended for the development for the prototype into a detailed and more realistic solution.

### 5.3.3 USER JOURNEY

From the results of the user testing, it can be understood that the concept has been validated by the stakeholders of the ‘People in Transit’ collaboration. Based on the usability behaviour and characteristics of the stakeholders observed through the persona and the user testing activities, the gathered insights can be visually represented employing a user journey map, that can serve as a use case scenario for better understanding the use of the prototype in the context of the “People in Transit” collaboration.

**Figure 5.13**  
User Journey



PROTOTYPING

**Stage of Journey**

**INSPIRATION**

**PREPARATION**

**Activity with Current Scenario**



Searches in "Google Scholar" and other sites for reading up knowledge and contacting experts



Creating Project Case and presenting to available stakeholders within the limited network

**Result**



Relevant results do not show up and time consumed to find



Time-consuming activity in finding project team comprising of required expertise



Difficulty to identify willing experts in the field and legitimacy of a profile is unchecked



Unable to plan for execution due to lack of resources for innovation



Unable to clarify doubts that arise during comprehension or approach the author legitimately



Difficulty to fulfill required expertise among team members



Difficult to comprehend an entire article and store insights due to time taken



Unable to set clear project goals and expectations from the project



**Activity with Knowledge Platform**

1



Exploring existing knowledge using Knowledge Portal

4



Preparation of Project Case and presenting in Knowledge Portal

2



Following experts on knowledge field

5



Interacting with experts and discussion for collaboration

3



Receiving updates and fast learning through easier methodologies

6

7

8

**Result**



Easier sourcing of industry experts and relevant articles with classification system



Access to collaborators for innovation resources and expertise



Clarification with experts and storing of insights for future comprehension



Easier sharing of project case to a larger network with safety of access



**COLLABORATION**

**DEVELOPMENT**

**PROPAGATION**



Collaboration to achieve results that may not account for system-level expertise

Limited collaboration tools and integration of knowledge is difficult

Saturation of creative ideas due to limited collaborators and expertise

Difficulty to access complete insights in the system level of operations

Time consumed to devise a solution and plan for development is high



Integrating required knowledge and tools for collaborative development



Collaborative innovation activities through Design thinking methodologies



Ideation and Development of detailed solutions

Access to additional insights and solution expertise at a shorter time

Access to collaborative tools that operates on inter-organisational level



Internal simulation and testing processes that may not account for real-time operations of the sector

Limited resources available for simulation and testing of outcomes

Limited knowledge of parameters that are used for validation

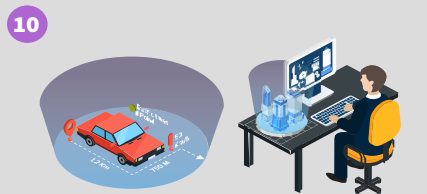
Development deviating away from the development of the sector

Time consumed for development and validation activities are high



9

Simulation of solutions through resources in the Knowledge Portal



10

Prototyping, testing and implementation of solutions through resources in the Knowledge Portal

Comprehensive simulation and testing activities with collaborative resources

Development of innovation is in line with the development of sector



Propagation through a marketing focus that may not promote further sector development

Further growth of the outcome is dependant on one organisation

Limited exposure of the innovation leading to lesser interest in sector

Lack of infrastructure support thereby affecting adoption of innovation

Saturation in innovation due to non-development of associated outcomes



11

Publication of innovation outcomes for sharing with stakeholders



12

Creation of new knowledge based on innovation outcomes

Creation of new knowledge thereby increasing probability of associated outcomes

Setting clear goals for societal infrastructure development

The User Journey shows the stakeholder in the form of the user persona uses the knowledge platform in the context of innovation. In the first phase, the person is starting a new innovation project and is obtaining the knowledge and required information through the knowledge platform. The doubts and the need for clarification that are risen in this stage are addressed through the knowledge platform in contacting the stakeholder directly. The environment that the person is operating is filled with updates and insights from fellow collaborators that adds more insights for the knowledge. The person realises that they need additional expertise from outside the organisation since the organisation also does not have the workforce and expertise available to pursue the explorative activities of the project. A project case is developed by the person and is shared with the relevant university stakeholder found on the platform, and the person then collaborates with the university stakeholders to explore the context and derive ideas and solutions from the explorative front end. The university invites additional collaborators from the knowledge platform to provide more resources and additional expertise on the project case. The person now collaborates with both the university and the other industry stakeholders and executes design methodologies together to obtain critical insights and solution ideas. The person learns from the expertise offered by various stakeholders through the activities in the design stages and now has an understanding of the context and the scope of the solution space and using the collaboration derives a solution that can be conceptually tested in its environment through the stakeholders of the collaboration. Once, the solution is tested and is validated positively, the person takes the ideas and solutions back to their organisation and develops it into a tangible solution. The activities and outcomes of this collaboration are documented and are added as artefacts to the knowledge generated through the innovation project.

## 5.4 FURTHER DEVELOPMENT

The prototype thus designed is made to test the user's interest in the concept and the validity of the concept with the user. The prototype can be developed into a real-time solution by following the activities represented in the first horizon — a plan for collection and categorisation of existing articles to the passenger journey. The fragmented versions of these articles are created for these existing articles, and the media artefacts are gathered and attached to the articles in the knowledge platform. A website platform hosted on the Microsoft server platform, and the plug-ins from the Microsoft platform such as Linked-in for the social platform, Teams, Outlook and Skype for collaboration are integrated into the web platform. Second testing for usability is recommended at this stage to ensure the interlinking of various features into the platform and to identify any bugs that may exist in the platform. The platform can be rolled out with the current stakeholders through a launch event, and the activities between TU Delft and the stakeholders are moved on with the use of the platform. A pilot project can be tried out with the full-fledged rollout of the web platform, and this may encourage the stakeholders to reassess the role of the platform and integrate the platform for future projects.



**Figure 5.14**  
Microsoft Azure

## What's included

**PREMIUM APPS**

Word Excel PowerPoint Outlook

**BUSINESS APPS**

Outlook Customer Manager Bookings MileIQ Invoicing

**BUSINESS SERVICES**

Exchange Teams SharePoint

**SERVICES**

OneDrive cloud storage

1TB Cloud Storage + Personal Vault

Security & support

Advanced Security Tech support

**INSTALL ON ALL YOUR FAVORITE DEVICES**

Windows, macOS & Chrome OS  
Android & iOS

**Figure 5.15**  
Integration with Microsoft Apps

## CONCLUSION

Thus, with the prototype development, it was possible to develop the concept into a tangible prototype by integrating the needs and expected functions into features of the prototype. Then, it was possible to user-testing of the prototype to validate the concept with the stakeholders. With the concept validated, a user journey was devised for the prototype to explain the use case scenarios for the prototype solution. Further, the future developments required for converting the prototype into a realistic solution were discussed and presented so that the prototype can be transformed into a realistic solution. With a realistic solution, the collaboration can be developed into a larger entity that can create gainful impacts on knowledge, business and society.

6



# CONCLUSIONS



## 6 Conclusions

This project began with exploring the opportunity to form the collaboration between the stakeholders of the “People in Transit” research theme. Through the course of the project, it was possible to deep dive into the context of the “People in Transit” and identify the needs and factors in the current context from the Deconstruction process. These factors led to deriving the context structures using which trends for the context structures are determined to shape up the Future Context. Using these future trends, it was possible to divide the future into three horizons, and the trends in each horizon are combined to design a scenario for each horizon. On further ideation, it was possible to design a solution to the scenarios in each horizon and add more details into the solution by exploring the necessary activities and resources required for developing and implementing the solution.

Further, it was possible to take the immediate requirement for the first horizon solution and develop the solution concept into a prototype that can be tested with the stakeholders and have the solution concept validated by them. With the solution concept validated with the use of the prototype, the testing insights are represented for further development and implementation of the solution concept. Through this project, it is understood that the collaboration would indeed prove valuable for the stakeholders involved, and the various activities undertaken by the collaborators can improve the roles of these stakeholders in creating gainful impacts for the community of knowledge, business and society.

## 6.1 LIMITATIONS OF THIS PROJECT

This project has been executed and presented using the most appropriate methodologies and best means available for research and development of the context and solutions, but there are individual influences outside the control of the research study that lead to specific limitations to this study. The choice of the stakeholders for this project though justified for their available network links between them in terms of value propositions, is limited to only four stakeholders from a vast possibility of stakeholders available to explore this collaboration context.

The “Vision in Product Design” methodology has been chosen to execute this project to derive a future context and solutions for catering to the future expectations for the user. The Vision in Product Design though having its own merits in able to explore the current context for factors to define the future context, but heavily relies on the merits of the researcher in deconstructing the current context, and to design a future context for the “People in Transit” collaboration.

In the process of selecting the stakeholder participants, the participants have been mostly selected from the innovation and its associated departments, and the data about the operations of the organisation have been derived from the accounts of the participants themselves and hence forms an indirect source of data. It can be argued that further research into the operations of the organisation can present a more accurate sense of these data.

The passenger journey developed for the Deconstruction phase is representative only for the value propositions offered by the four stakeholders in the scope of the project. To cater to other stakeholders, this passenger journey has to be developed in a more comprehensive manner to identify missed processes and details to the passenger journey.

During the development of the horizons and solutions, the solution methodology has deviated from the typical Vision in Product Design approach to explore the interactions of the research activity process rather than the relationships between a context and the user. In the same manner, prototype development and user testing methodologies have also been adapted from typical processes to provide a conclusive representation to the overall expectations of the project.

During the road mapping phase, the co-operation between stakeholders outside the current stakeholders of the project has been assumed to be positive, and the solutions have been designed in consideration to the co-operation between all future stakeholders available for collaboration. Future studies can test this assumption and indicate the availability of co-operation between the stakeholders outside the scope of the project.

The prototyping development had its focus on testing the concept and functionality of the concept itself with the stakeholders. The prototype does not contain elements of visual aesthetics considered in them and thus invites future studies to develop appropriate aesthetics to the prototype concerning its purpose and functionality. Also, further research is required into the merits and further usability of the fragmented versions of the research articles as this project tested only the prototype on a conceptual level not delving into the specifics of the fragmented versions or the research canvas.

## 6.2 RECOMMENDATIONS FOR FURTHER DEVELOPMENT

Through this project, it is validated that the concept of the Hub style collaboration between the stakeholders of the “People in Transit” research theme and charted its possible growth for the future. However, this project had a constraint of time to complete a study into the context, and this provides further recommendations for the “People in Transit” community to further explore the context and iterate the solutions based on new developments.

The first recommendation proposed by this study is to increase the scope of the collaboration by adding more stakeholders to the collaboration thereby creating a broad mix of interactions available that can be further researched and new elements can be added to the context of the collaboration. The possibility of the collaboration to extend beyond the functions related to innovation can be explored further to include other functions in the stakeholder organisations to enter into the context of the collaboration. This inclusion will also prompt the current stakeholders to develop new expertise to enable the smooth transition of these functions into the context of the collaboration.

The next recommendation is to explore the possibilities of building the knowledge portal to include knowledge from the stakeholder and to deploy the knowledge portal on a launch event to create greater awareness about the knowledge portal to the stakeholders. The operational nature of the solutions in each horizon can be exhibited to the stakeholders through a pilot project. A suitable project has to be identified and had to be executed using the approach offered by this study to validate the usability of the solutions beyond the conceptual level. The pilot projects can lead to an iteration of the current concepts and can yield a more practical and realistic way for operations in the collaboration.

The collaboration hub has been designed with the scope of “People in Transit” in place but can be further extended to other research themes of the university thereby including the potential and expertise of the academic community to support innovation to the stakeholder organisations. It is recommended to follow the approach offered by this study when exploring other domains.

It is also recommended for the collaboration to form partnerships with various stakeholders during the development process of the solutions to increase the involvement of the stakeholders into the solution thereby adapting the solution to their needs and operations that are relevant at the time of development. This partnership may also create a decentralised environment that can perform the innovation activities autonomously with the involvement of the stakeholders in the collaboration.

### 6.3 PERSONAL REFLECTION

The successful completion of this project has marked an accomplishment on a personal level in obtaining a Master of Science education in Strategic Product Design. Throughout the project, it was possible to use my skills as a strategic designer and develop an outcome that can be implemented by a group of stakeholders that creates a significant impact on the paradigms of knowledge, business and society.

Through this project, a valuable opportunity was provided to study the context of the "People in Transit" collaboration with the interactions between the university and its industry stakeholders. The Vision in Product Design approach used in this project was a new model for me regarding the application of the process. Continuously keeping up with the collaboration context and the context of the industry stakeholders had equipped me with different perspectives of the context and put theoretical knowledge about the context into practice. The addition of developing a future context and scenarios has increased my personal understanding of the subject of the university-industry collaboration and thereby develop solutions for improving the context.

At the beginning of the project, I could not have imagined myself breaking down a broader context such as the collaboration in the "People of Transit" and understand the factors that make it the success that it is in the current scenario. With the help of the stakeholders associated with the "People in Transit", I was able to communicate the purpose of the project and also develop managerial experience in taking decisions for the development and execution of this project. Using interpersonal communication skills, it was possible to get work executed and understand the operational nature of this collaboration.

The execution of this project demanded a lot of adaptability and flexibility from my end as a designer to continually improve and iterate the quality of the outcomes and also to plan for intermediate milestones and adapt the process further based on these intermediate outcomes. The context itself was mostly unexplored for master students and encompassed a variety of stakeholders rather than a single organisation.

By breaking down such a broad and unexplored context and understanding it further has provided a boost of confidence to me as a designer which I will carry forward with me for my future projects.

The path to developing the solution outcomes have provided me with new experiences, challenging myself with newer approaches and bringing myself outside my comfort zone in the pursuit for quality of the outcomes. With multiple ideation sessions with a different set of stakeholders and purpose for each session has developed my skill as a facilitator and analysis of the outcomes of these session has built more expertise in the field of strategic design and corporate innovation. The presentation of these results to many stakeholders representing TU Delft, during the end stages of the project and receiving positive feedback on these outcomes have been the highlight experience for me during the course of this project.

Compiling the work I have been doing for the past 20 weeks into this report might have been the hardest for me yet, but with the output done and ready for validation has given me a profound sense of satisfaction and motivation to study this context further provided the right opportunity. I am also confident of the skills I have used in the execution of the project will serve as a testament to my capabilities as a strategic designer and provide me future opportunities to further develop my skills and provide value to the stakeholders that are invested in me.

Last but not least, I am grateful for the freedom that my supervisors and the stakeholders have provided me in executing this project. As a result of this, I am very proud of the outcome that I have delivered and is more inclined to improve the context on a societal level through my future work. I look forward eagerly in communicating these outcomes to a bigger audience and create a positive impact to the society that influences me as a designer with a purpose.



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