Towards a Public-Private-Citizens Collaboration Platform in Public e-Service Provision

THESIS

Submitted in partial fulfilment of the requirements for the degree of

MASTER OF SCIENCE in SYSTEMS ENGINEERING, POLICY ANALYSIS AND MANAGEMENT

by

Aulia Zulfa 4253175 auliazulfa@student.tudelft.nl

Graduation Committee:

Prof. dr.ir. Marijn Janssen Dr.ing. Bram Klievink Dr.ir. Mark de Reuver (Chairman) (First Supervisor) (Second Supervisor)

Faculty of Technology, Policy and Management Delft University of Technology April 2015



Abstract

Governments all over the world seek to increase the quality of public e-services offered to citizens. One way of doing this is through collaboration with private sectors and citizens in delivering the e-services. Yet, there is little discussion about their collaboration in stage models that provide a guide in public e-service development. Meanwhile, in the field of technological platform, collaboration among multi parties is discussed in the concept of platform as a medium to generate products or services. However, the concept of platform is still rarely incorporated into public e-service development. Hence, there is a lack of research in the platform development for public e-service provision.

This research explores the application of the concept of platform in public e-service development. To do so, a platform development model for governments, which consists of stages, is constructed by conducting three main steps. First, stage models that represent public e-service development and platform development are synthesised by following qualitative meta-synthesis methodology. Second, each stage of the model is analysed by employing platform business model components as the attributes. Third, case studies is conducted to evaluate the model.

In our findings, five stages of the platform development model are identified delineating the application of the concept of platform in delivering public e-services. Although evaluation cannot be carried out pertaining to the structure of the stages due to limited data, the five stages of the model describe alternatives for governments to collaborate with private sectors and/or citizens in improving the service provision quality. Moreover, description of the state of the art in platforms as a medium for multi parties collaboration in public e-service provision can be gained from the case studies. Yet, we suggest further research in order to refine the model. The analysis of the model can be improved through multiple-case studies for each stage of the model. In addition, circumstances under which a platform evolves from a stage into another could be identified, for example by taking into account the organization's capabilities and needs, through case studies with more reliable research data.

Keywords: platform, public e-service, collaboration, government, private sector, citizens

Acknowledgments

This thesis is the product of my graduation work for the Systems Engineering, Policy Analysis, and Management (SEPAM) MSc program at TU Delft. Working on this thesis is a very challenging task yet gives me lots of valuable experience and I will not be able to accomplish it without help of other people. Thus, I would like to thank them who contributed to this work.

First of all, I would like to thank my graduation committee, Prof. Marijn Janssen, Dr. Bram Klievink, and Dr. Mark de Reuver for all of the guidance, critical questions and feedback that are helpful to make the thesis report clearer and sharper. Special thanks to Bram as my first supervisor for all of your abundant help, words of wisdom, patience and care that often motivated me to get through this thesis project.

Secondly, I would like to thank the Ministry of Communication and Information Technology of the Republic of Indonesia (MCIT) that supports me in pursuing my master study through its scholarship program. I am also indebted to many people for their support and help, mbak Ochi, Riska, mbak Reni, friends in TPM and in Indoensia, and all of Indonesian communities in Delft. Thank you for all the great moments and necessary distraction during my thesis, especially with cooking or having lunch/dinner together. I am also grateful to Marja Brand and Sasja Voogel for all of the assistance during the hard time. Thank you all.

Finally, I would like to thank my beloved family in Indonesia, especially my parents, for their support and never ending prayers. And last but not least, I would like to thank God, Allah SWT, the Almighty, that it would have not been possible to accomplish my study in Delft without His blessings.

Delft, April 2015 Aulia Zulfa

Table of Contents

Abstract	i
Acknowledgments	ii
List of Figures	vi
List of Tables	vii
Introduction	1
1. 1 Research problem	1
1. 2 Research objective	2
1. 3 Research questions	3
1. 4 Research approach	4
1. 5 Thesis structure	5
Theoretical Background &_Research Approach Elaboration	7
2. 1 Platform streams and its components can be used to define the term "Platform"	
2.1. 1 Platform stream	
2.1. 2 Platform components and product family platforms in the service context	
2. 2 Platform openness affects the external parties' participation in the platform develop	pment
2. 3 Growth stage models delineate the development process	
2.4 Qualitative meta-synthesis methodology as the tool to relate different models	14
2.5 Platform business model components as the attributes to analyse the actors' particip	pation
2.5.1 Stakeholder management	15
2.5. 2 Technology use	10
2.5. 2 Public data ownership	10
2.5. 4 Return on public investment	10
2.5. 5 Public value creation	10
2.6 Case studies serve as a means for evaluation process	10
2.7 Conclusion	17
Z.7 Conclusion	10
2 1 Qualitative mate symplecie presedure	21
3. 1 Qualitative meta-synthesis procedure	21
3.1. 1 Getting started – identifying the research question	
3.1. 2 Deciding what is relevant to the initial interest – identifying literature relevant research question.	to the
3.1. 3 Reading the studies – reviewing the selected literature	23
3.1. 4 Determining how the studies are related	23

3.1. 5 Translating the studies into one another	24
3.1. 6 Synthesising translations	24
3.1. 7 Expressing the synthesis – presenting the findings	24
3.2 Results: qualitative meta-synthesis of e-government maturity models and platform development models	24
3.2. 1 Description of studies reviewed	24
3.2. 2 Comparing and contrasting features of stages	26
3.2. 3 Reciprocal translation: identifying underlying concepts	29
3.2. 4 Synthesis of translation: relating concepts and themes, revealing underlying metaphors	29
3.2. 5 The interpretation of the platform development model	32
3. 3 Conclusion	34
Model Analysis	35
4. 1 Stakeholder management	36
4.1. 1 Internal	36
4.1. 2 Citizen co-production	36
4.1. 3 Provider partnership	37
4.1. 4 Two-sided collaboration	38
4.1. 5 External innovation	38
4. 2 Technology use	40
4.2. 1 Internal	40
4.2. 2 Citizen co-production	41
4.2. 3 Provider partnership	41
4.2. 4 Two-sided collaboration	42
4.2. 5 External innovation	43
4. 3 Public data ownership	43
4.3 1 Internal	44
4.3 2 Citizen co-production	44
4.3 3 Provider partnership	45
4.3 4 Two-sided collaboration	45
4.3 5 External innovation	45
4. 4 Return on public investment	47
4.4. 1 Internal	47
4.4. 2 Citizen co-production	47
4.4. 3 Provider partnership	48
4.4. 4 Two-sided collaboration	48

4.4. 5 External innovation	
4. 5 Public value creation	
4.5. 1 Internal	
4.5. 2 Citizen co-production	
4.5. 3 Provider partnership	
4.5. 4 Two-sided collaboration	51
4.5. 5 External innovation	
4. 6 Conclusion	52
Model Evaluation	
5. 1 Case selection & data collection protocol	56
5. 2 Case analysis	
5.2. 1 Ushahidi	
5.2. 2 Open311	60
5.2. 3 DataSF	
5. 3 Cross-case conclusions and model refinement	64
5. 4 Conclusion	
Conclusion	71
6. 1 Research Findings	71
6. 2 Recommendation	75
6. 3 Reflection	
6. 4 Limitation & Further research	
References	
Appendix A: Article	
Appendix B: The Existing Development Models	
Appendix C: Capturing the Concepts of the Relevant Models	

List of Figures

Figure 1. The research approach to address the research sub-questions	4
Figure 2. Outline of the thesis shows the approach in addressing the research sub-question	ıs6
Figure 3. The outline of the research theoretical background	7
Figure 4. Seven steps of Noblit and Hare's meta-synthesis approach (Noblit and Hare 1988)14
Figure 5. Multiple Case Study Method (Yin 2009)	18
Figure 6. Chapter three elaborates the first step of the research approach	21
Figure 7. The Structure of stages of the platform development model for governments	32
Figure 8. Chapter four elaborates the second step of the research approach	35
Figure 9. Chapter five elaborates the third step of the research approach	55
Figure 10. The Ushahidi map for Japan's Earthquake (Meier 2011)	58
Figure 11. Information flow in Ushahidi Platform for Libya Crisis	59
Figure 12. SeeClickFix, an application built and work in connection with 311 services	61
Figure 13. Data use in DataSF (DataSF 2014)	62
Figure 14. Neighborhood Score, An example of applications built using DataSF	63
Figure 15. The three cases are classified as the fifth stage of the model	65

List of Tables

Table 1. Overview of Platform Streams adopted from (Thomas, Autio et al. 2014)10
Table 2. Public platform business model components adapted from (Walravens and Pieter
Ballon 2013)17
Table 3. The relevant models for the application of meta-synthesis methodology in this thesis.23
Table 4. Comparison of stages in the e-government maturity models and the platform
development model27
Table 5. Underlying metaphors and key attributes of the models
Table 6. Metaphors: the descriptions and key characteristics 32
Table 7. Analysis of stakeholder management
Table 8. Analysis of technology use
Table 9. Analysis of public data ownership
Table 10. Analysis of return in public investment
Table 11. Analysis of public value creation 52
Table 12. Overview of the case analysis 65
Table 13. The result of comparison between analysis in chapter 4 and case studies68
Table 14. Additional insights from case studies. 73
Table 15. Model analysis by employing platform business model components as the attributes 74

Chapter 1 Introduction

Governments all over the world seek to increase the quality of public e-services offered to citizens. One way of doing this is through a combination of efforts from public sectors, private sectors, and citizens in delivering the services (Brinkerhoff and Brinkerhoff 2011). In one of United Nations' report, they stated that it is critical for governments to develop institutions and processes that encourage private participation and people engagement as co-production (UN 2012). The governments could have advantages through their participation, for examples, expertise and established networks from private sectors; and a source of innovation from citizens' involvement as partners in design, production, and service delivery (OECD 2011).

However, although collaboration among multi parties has been a growing topic in journals and books, government institutions still apply the segregation models of public service delivery systems. Instead of using collaborative efforts, they still work in "silos" and address issues in a sectoral perspective (UN 2014). For this reason, development models which discuss the concept of collaboration among multi parties could be of help for governments, as a guide to move from their closed condition into a condition where they can work together with private sectors and citizens in delivering public e-services.

We begin this chapter by presenting a research problem in subchapter 1.1. It is aimed to describe a research gap that drives the necessity of conducting the research which is presented in this thesis. In the light of addressing the research problem, subchapter 1.2 presents the objective of the thesis. Subsequently, the main research question and related sub questions are presented in subchapter 1.3 in order to achieve the objective. Finally, this chapter ends with the elaboration of the research approach and the structure of this thesis which are consecutively given in subchapter 1.4 and 1.5.

1.1 Research problem

In literature about e-service development by governments, there are some development models that serve as a guide for governments to improve their services in terms of e-government maturity models or growth stage models (Appendix B). However, there is only little discussion about collaboration between governments with private sectors and citizens as partners in delivering the public e-service. Instead, the models mostly focus on the evolution of the functions in e-government.

Meanwhile, the concept of technological platform, despite the varied contexts in which are applied, offers opportunities to be employed as a medium for multi parties to work together in generating products or services. A platform can serve as a foundation for the platform participants to leverage the available assets in the platform in order to improve the performance (Thomas, Autio et al. 2014). Furthermore, a platform can also act as an intermediary where multiple groups from different sides of the platform interact and transact. In this way, the concept of platform, to relate it to public service provision, can

be leveraged to encourage collaboration among multi actors, including the governments, private sectors, and citizens.

However, the concept of platform is still rarely incorporated into public e-service development. In her article, Gawer (2010) explains that the concept of product platform have traditionally focussed on products in the context of manufacturing organizations. Although, the concept can be usefully applied to service contexts, its application is considered a vastly unchartered territory. Moreover, platform as an intermediary is still predominantly discussed in industrial economics context (Thomas, Autio et al. 2014). This leads to a gap between platform development from industry contexts and its application in public e-service provision.

To relate it to public e-service improvement, the gap could lead to the limitation on the knowledge which might hinder the governments in optimizing the application of the concept of platform as a means for collaboration among the governments with private sectors and citizens. Hence, addressing the gap becomes the challenge of this study that needs further investigation. This leads to the problem of how to put the development of public e-service provision and the development of technological platform together so that they are related and suitable for each other. In other words, how to synthesise the models that represent the development of public e-service provision and the development of technological platform.

For this problem, e-government maturity models and platform development models, are employed to represent the development of public e-service provision and technological platform respectively. Furthermore, the concept of platform is employed to relate and compare the models, discover the underlying metaphors, and combine them. As a result, a platform development model for governments in delivering public e-service is constructed. The rest of this thesis will discuss how the stages of the model are constructed, how the model is analysed, and evaluated. The more detail elaboration of the approach is given in subchapter 1.3.

1.2 Research objective

Based on the problem research which is outlined in subchapter 1.1, this thesis is intended to deal with the gap between the models representing the development of public e-service provision by governments and the platform development which is predominantly discussed in the industry context. In order to address the gap, in this thesis a platform development model for governments is built and evaluated. The model adopts the concept of growth stage model which can be used to describe the growth of organizations through sequential stages towards the desired condition (King and Teo 1997; Bente, Bombosch et al. 2012).

Furthermore, the focus of the development model is the participation of the private sector and citizens in the public electronic service (e-service) provision by governments. Thus, the model is aimed to support the governments in improving their understanding and providing a guide in utilizing the concept of platform in public e-service provision. To be more specific, the model is expected to serve as a guide for the governments to move from the "government only" condition to the "public-private-citizens collaboration" condition. Through the model, the governments could gain information about the evolvement of the concept of platform to support the service provision as more external actors, which are the private sector and citizens, getting involved in the e-service provision in terms of their roles and the value of the services that can be delivered to citizens.

1.3 Research questions

In subchapter 1.2, the purpose of this thesis which is constructing a platform development model for governments has been outlined. Moreover, the model is constructed by synthesising the existing models representing the development of public e-service provision and platform development. In order to achieve the objective, this research seeks to answer the following main research question:

How can the models representing the development of public e-service provision and platform development be synthesised ?

Related to this main research question, we define the sub-questions in order to gather detailed and scientific arguments for the research as follows:

- 1. What are the concept of platform, development model, and methods that can be used for synthesising the models?
- 2. What are the stages of the model (that are used as a guide to move from closed condition towards the collaboration of the government, private sectors, and citizens in e-service provision)?
- 3. What are the distinctions of the stages with regard to the participation of the government, private sectors, and citizens in public e-service provision?
- 4. What is the lesson that can be learned from the implementation of the concept of platform in the field in order to evaluate the model?

In conjunction with the research problem which is described in subchapter 1.1, the first sub-question is presented in order to explore the theoretical background of platforms and the existing development models representing the development of platforms and public e-service provision by governments. Furthermore, the answer is aimed at providing general understanding of the flow of the research approach and as the preparation to support the discussion in the rest of the research.

Furthermore, sub-question 2 is presented to structure the stages of the model that is built in this research. In order to answer this question, meta synthesis methodology is employed to synthesis the existing e-government maturity models and platform development models. The answer towards this question provides the foundation of the model which delineates the growth stages of the organization as more external actors get involved in the platform implementation. The stages then serve as a guide for governments to move from closed condition towards the collaboration of the government, private sectors, and citizens in e-service provision

Using the answer of the second sub-question, the participation of the actors in creating and delivering the public e-service is analysed for each stage to answer sub-question 3. It is conducted to distinguish one stage to another by employing a set of attributes which represent public e-service provision context. Lastly, three cases representing the implementation of the concept of platforms in the field are studied to evaluate the model. The information and insights are gained through document analysis and used to refine the model as well as answer the fourth sub-question. In order to address those 4 sub-questions, the research approach is described in the next subchapter.

1.4 Research approach

In this subchapter, the research approach is described in addressing the research subquestions that are outlined in the previous subchapter. The approach can be divided into three interrelated steps which are shown in Figure 1.

Question 1 is located in the biggest square. It indicates that in order to answer the first question, the theoretical background of the research is discussed. Furthermore, each concept that is used in conducting the methods is discussed along the research flow so that it provides general understanding of how the research will be conducted and preparation for the rest of the research approach.

Question 2 is addressed through the first step of the research approach, where we match the platform development models with the public e-service provision development models by employing the qualitative meta-synthesis method (Britten, Campbell et al. 2002; Siau and Long 2005). To do so, we employ the existing e-government maturity models to represent the development of e-service provision by the governments and platform development models to capture the development of platform implementation.



Figure 1. The research approach to address the research sub-questions

The qualitative meta-synthesis method consists of seven steps (Noblit and Hare 1988). The first three steps involve identifying the research question, identifying the relevant literatures and reviewing the selected literature. Thus, in this step extensive literature review is conducted for the existing e-government maturity models and platform development models.

Furthermore, the process continues with determining how the studies are related and translated into each other. To conduct these two steps, we employ key attributes which are platform stream (Thomas, Autio et al. 2014) and platform openness (Eisenmann,

Parker et al. 2009) in order to compare and contrast each stage of the models. The concept of platform is captured for each stage of those models by using the theory of platform stream. In addition the level of external parties' participation in the service creation of each stage of the models is identified by employing the theory of platform openness. In this way, all stages of those models are compared and contrasted so that the relation and translation can be made. Furthermore, the result of the translation is translated and expressed in the last two steps. The elaboration of the qualitative meta-synthesis method will be described in more detail in subchapter 2.4. The first step of the research approach results in the sequential stages that delineate the evolvement of the platform in the basis of the private sectors' and citizens' involvement.

In the second step of the research, question 3 is addressed. By utilizing the result of the first step as the foundation of the model, step 2 is aimed at analysing the participation of the actors in each stage of the model in the context of public service provision. As the attributes for analysing the stages, we employ platform business model components which takes public actor participation into account (Walravens and Pieter Ballon 2013). The components consist of stakeholder management, public value creation, return on public investment and public data ownership. In addition, a brief analysis of technology use in performing functions or features in each stage is also provided. As the result of this step, the model presents the difference between each stage in relation with the actors' participation in the service provision and the service's values.

The last step of the approach is aimed at evaluating the model in order to address question 4. This approach is carried out by conducting case studies for three cases that are selected in the basis of a set of criteria. The criteria represent the concept of platforms delineated in the highest stage of the model in the light of the desired condition that want to be achieved. To do so, documents including the official websites, journals and electronic articles are collected and analysed. Information and insights that are gained with regard to the attributes used in the step 2 is then employed to complete and refine the model. Moreover, the cases are also reviewed to obtain insights into the evolution of the platforms in order to evaluate the structure of the stages of the model.

1.5 Thesis structure

In subchapter 1.4, the overall approach which is meant to address the research subquestions has been elaborated. In this subchapter, the outline of the thesis is presented in conjunction with the sub-questions that are covered as shown in the Figure 2. The blue boxes represent the main topics which are discussed in each chapter in order to address the research sub-questions. In total, there are five boxes which represent five chapters within this thesis report after the first chapter of introduction.

The first block represents chapter 2, in which the theoretical background that underlies the research is discussed along the flow of the research approach. This part is aimed at answering the first sub-question (Q1) by elaborating the concept of platform in general and the key attributes used in the first step. Next, the platform development and public eservice provision in form of the models representing their current state are discussed prior the elaboration of the qualitative meta-synthesis method. Moreover, the platform

business model components used in the step 2 is presented, followed by the explanation of case studies as the method to evaluate the model conducted in step 3.

After the discussion of the theoretical background, the next block is presented in the chapter 3 to answer sub-question two (Q2). This chapter aims at structuring the stages of the platform development model as a guide towards the collaboration of the government, private sectors, and citizens in e-service provision by following the qualitative meta-synthesis methodology. We start the chapter with the discussion of meta-synthesis procedure that will be applied for the research in this thesis in detail. Furthermore, the results of synthesising the existing development models are presented in the subsequent subchapter.

After the stages is structured as a result of chapter 3, the analysis of the actors' participation in creating and delivering the public e-services is presented in chapter 4. This block answers sub-question three (Q3) in which the platform business model components are employed as the attributes. Based on the attributes, each stage is analysed to see the collaboration among governments, citizens, and private sectors. In the next chapter, sub-question 4 (Q4) is addressed by conducting case studies. Cases are selected and related documents are reviewed to obtain more understanding from their implementation in the field. The information is then used to evaluate the model. In the end of this thesis, chapter 6 is presented to provide a conclusion and recommendations from the research. Moreover, thesis reflection and discussion for further research are also presented in this chapter.



Figure 2. Outline of the thesis shows the approach in addressing the research sub-questions

Chapter 2

Theoretical Background & Research Approach Elaboration

The research presented in this thesis is aimed at constructing a platform development model for governments in public e-service provision. To do so, the model is constructed by synthesising the existing models representing the development of public e-service provision and platform development. In this chapter, we explore the research foundation in the basis of literature that are related to the research topic in order to answer the first sub-question of this thesis, which is:

Q1. What are the concept of platform, development model, and methods that can be used for synthesising the models?

To answer the question, the concept of platform in terms of platform stream and platform openness are elaborated. In addition, we also briefly explore the qualitative meta-synthesis method that is used to match the existing models and discuss case studies as the method used to gather information which will be applied in order to evaluate the model constructed in this thesis. All concepts that are used in this research are presented along with the flow of the research approach to give a better understanding of the research approach.

The discussion of this chapter is outlined in Figure 3 which is adapted from the research approach presented in Figure 1 in subchapter 1.4. At first, the definition of the term platform is elaborated by employing the platform streams in subchapter 2.1. This is aimed to provide a clear understanding of the term despite the variety of contexts to which it is applied. Moreover, the components of a platform are presented in the service context to see the application of the concept of product platform in the service context. Next, in subchapter 2.2 the platform openness is discussed. Together with the concept of platform stream, platform openness is employed as the key attribute for synthesising the existing e-government maturity models and platform development models which are explained in subchapter 2.3. The method used to synthesise the models is discussed briefly in subchapter 2.4. Those first four subchapters constitute the foundation for the first step of the research approach shown in Figure 1 which results in the stages of the platform development model designed for governments.



Figure 3. The outline of the research theoretical background

Furthermore, in subchapter 2.5 the platform business model components are elaborated as they are used to analyse each stage of the model. The components constitute the attributes to indicate the difference between each stage of the model in public e-service provision context. Next, in subsection 2.6, discussion about case studies as the method to evaluate the model is presented. Lastly, this chapter ends with a conclusion in sub-section 2.7.

2. 1 Platform streams and its components can be used to define the term "Platform"

Due to the wide application of the term "platform" (Tiwana, Konsynski et al. 2010), people may find it difficult to understand its meaning (Gawer 2009; Cusumano 2010). Some might even wonder if they have the same understanding when talking about a platform. For example some talk about platforms for product development and design (Muffatto 1999; Krishnan and Gupta 2001; Simpson, Siddique et al. 2006) while the others describe platforms as market intermediaries (Armstrong 2006; Hagiu 2006). Therefore, before continuing with further discussion about platforms, it is important to understand the definition of platforms and their related contexts.

In order to have a clear understanding of the platform definition, in this subchapter we shall employ platform streams to categorize them and understand the meaning based on the streams. The elaboration of platform streams is presented in subchapter 2.1.1. Furthermore, despite the diverse contexts in which platforms are utilized, we explore the main components of platforms in order to gain a deeper understanding of them in subchapter 2.1.2. The components are thus used to translate the concept of product platforms into the context of services.

2.1. 1 Platform stream

Platform categorization or platform typology has been provided by a number of reviewers (Ballon and Walravens 2009; Gawer 2010; Gawer and Cusumano 2012). Ballon and Walravens categorized platforms on the basis of the platform owner's control over assets and customers, while Gawer and Cusumano provided a high level division of platforms as internal and external platforms. In another paper, Gawer categorized platforms on the basis of a manufacturing locus. In the research presented in this thesis, we adopt the platform streams provided by (Thomas, Autio et al. 2014) in the light of the broader variants of platforms covered in their work. They observed the variety of platforms which have existed for the last twenty years and categorized them into four main streams.

a. Organizational Platforms

In this stream, a platform is defined as a structure that carries organizational resources and capabilities including core competence, organizational knowledge, and dynamic capability. It can thus be recombined in order to seize emerging opportunities and address demands in more flexible ways.

For example, the sharing and transfer of knowledge possessed by individuals and internal groups, which consists of information and know-how, contribute to supporting a firm and helping it to perform better (Kogut and Zander 1992). A platform can also be represented on the delineation of how the core

competencies of a firm are organized in order to generate core products and fulfil business markets (Prahalad and Hamel 1990).

b. Product family platforms

The platforms seen in this stream represent the technical architecture of the product which can be leveraged to enhance the flexibility and efficiency of operation. It aims at creating product variants for different market niches so that mass customization and operational efficiency can be achieved.

Derivative products can be produced by means of modifications such as addition, substitution, and removal of features. The most dominant way to introduce modification is by adopting the modular approach where product family is created by interchanging modules. Such modular designs, for example, were used by *Nippondenso Co. Ltd* to produce 288 different types of panel motors by assembling 17 standardized sub-assemblings, and by *Sony* when it introduced 250+ models of walkman (Simpson, Siddique et al. 2006).

c. Market intermediary platforms

This type of platforms enables a marketplace to be created by acting as a link or facilitator between multiple markets. In this way, the platform owner can gain a profit from product or service architecture which leverage one or more markets such as by charging more in one side of the market and giving subsidy to one side paid by another side.

One of the early examples of this platform was provided by (Rochet and Tirole 2002) in their article about payment card transactions. In this platform, the consumer's bank and the merchant's bank cooperate to help the card holders make their transactions. Recently, one type of this platform stream, which is also known as a multi-sided platform, has been growing fast and there have been a variety of examples such as eBay, Amazon, and Google (Hagiu and Yoffie 2009).

d. Platform ecosystems

The literature on platform ecosystems was initially inspired by the product family stream which was incorporated into the market intermediary stream. In this way, this type of platform constitutes a group of components or subsystems which act as an intermediary between multiple groups from both the supply and demand sides.

The platform consists of a set of shared core components to which complementary assets are attached. The important notion of this platform ecosystem is that the platform owner relinquishes ownership and control over the components and modules so that the ecosystem participants can leverage complementary assets in order to improve performance. This notion also shows how the innovation is facilitated through the existence of platform. The wellknown Apple's iPhone and Android exemplify this type of platform in which a large number of application developers are able to develop complementary technologies, products, and services (Gawer 2010).

To conclude the elaboration of the platform definition in the basis of its streams, the overview of four streams is presented in Table 1.

	Organizational	Product family	Market intermediary	Platform ecosystems		
Description	Platform as organizational capabilities that enable superior performance	Platform as the stable centre of a platform family leading to derivative products	Platform as an intermediary between two or more market participants	Platform as a system or architecture that supports a collection of complementary assets		
Key concepts	Core competencies; real options; dynamic capabilities	Product family; architecture; modularity; commonality	Network externalities; standards; Multisided markets	Network externalities; innovation; standards; modularity		
Value creation	Flexibility; superior adaptation	Flexibility; cost savings; innovation	Market efficiency; pricing structure; market power	Flexibility; cost savings; innovation; externalities; innovation; learning; market power		

Table 1. Overview of Platform Streams adopted from (Thomas, Autio et al. 2014)

2.1. 2 Platform components and product family platforms in the service context

In the previous subchapter, platforms have been defined in the basis of the contexts to which they are applied. It gives the explanation of the application of diverse platforms and the values that they offer. In addition, among the variety of platform streams, we can see that there is a platform type that mostly focuses on products in manufacturing firms which is product family platforms. In order to employ the overall platform streams in the public e-service provision context, the translation of product family platforms into the service context is thus required. It is purposed to see how the concept of product family platforms are applied to service design and creation.

To do so, we employ the main platform components including architecture, interfaces and modularity (Meyer and DeTore 2001; Winter 2003; Gawer 2010; Tiwana, Konsynski et al. 2010). In this subchapter, we shall outline those three main components and use them to explore the adoption of product family platforms for services.

a. Architecture

In the product context, architecture can be defined as how the product's functionalities are decomposed into a number of individual functional physical components and the arrangement of their interaction to provide the overall functionalities (Voss and Hsuan 2009). Aligned with this definition, Fixson in his paper (p. 346-347) described product architecture as "a comprehensive description of a bundle of product characteristics, including number and type of components, and number and type of components" so that the fundamental structure of the product is identified (Fixson 2005).

Adopting that concept, service architecture could be defined as the decomposition of a service system's functionalities into a number of individual functional components so that the system can deliver overall services. In other words, the service architecture can be viewed as a service system from diverse levels of decomposition which can be either in an integral or modular form (Voss and Hsuan 2009). Furthermore, while the final product can be considered as the top level of product architecture, the services produced in an industry scope can

be seen as the top level of service architecture. Thus, service can be decomposed down into different levels, for examples, processes within an organization as one level of service and individual services, as a another lower level service, into which the former level is broken down.

b. Modularity

Modularity in product architecture refers to the standardization of product components' interfaces which can lead to better reusability and commonality of the components. In this way, new modules can be added and/or resequenced to address changes in product requirements. The concept of modularity is also equally applicable to services where each module can be constituted by turning on its component systems and processes (Voss and Hsuan 2009).

In the service context, a service can be seen as a system in which diverse building blocks or modules are combined to deliver a service (Salvador 2007). Thus, a group of individual services can be viewed as a set of modules in an organization's context. An example of the modular approach is given by Doran et al. in health services provision for the elderly in which three kinds of modules are identified: the basic module for all services, configured modules for each segment, and customized modules for an individual user (Doran, de Blok et al. 2010).

c. Interfaces

In conjunction with the elaboration of product decomposition into individual modules in the architecture, interfaces can be seen as the linkage between the modules which describe how they will fit together, interact and connect to each other (Baldwin and Clark 1997). In the service context, each level of service has interfaces which often consist of rules, standards, and technological specification governing people interaction in delivering the service (Jacobides and Augier 2006). Hence, service architecture can be seen as nodes which can be service components or modules; and linkages in the form of interfaces.

In conclusion, the product family stream of platforms in the service context function as a management method to structure resources and activities in delivering the service (Meyer and DeTore 2001). It consists of subsystems and interfaces which have both human and technological components. The subsystems can be represented by components, processes, knowledge, people and relationships (Robertson and Ulrich 1998); and all are interrelated through the interfaces.

In this subchapter, we have seen the definition of platforms and how the concept of product platforms are meant in the service context. The platform streams, together with the concept of platform openness, will be used as key characteristics in matching the existing e-government maturity and platform development models. Further elaboration about platform openness will be discussed in the next subchapter.

2. 2 Platform openness affects the external parties' participation in the platform development

After discussing about platforms definition in general and briefly in service context in subchapter 2.1, we continue to elaborate the theoretical foundation by discussing the concept of platform openness in this subchapter. This is purposed to explore to what extent platform openness bring impact on the participation of external parties in the platform development.

A platform is considered "open" under condition when restrictions are not placed on participation in its development, commercialization or use and any restrictions are reasonable and non-discriminatory (Eisenmann, Parker et al. 2009). In other words, in an open platform there will be participants who are involved in the development, commercialization or use of the platform other than the platform owner. Depending on its restrictions then there are diverse levels of platform openness which can be seen through its architectures (Thomas, Autio et al. 2014).

An example is given by Thomas et al. who identified three types of platform with regard to its openness to the supply side and the demand side:

- *A closed platform* where there is no third-party involvement.
- *A many-to-one platform* where the supply side of the platform is opened to the external parties.
- *A many-to-many platform* where third party participations have been opened in both supply and demand sides.

From the elaboration above, we can see that participation from external parties can be achieved when restriction is eliminated either in supply or demand side; or in both sides. In conjunction with the main topic of this thesis, which is platform development for public e-service provision, the supply side then refers to the service providers while the demand side refers to the customer or the user of the services.

In the platform development model, each stage can be analysed to see how a platform develops as the restriction is eliminated either in supply or demand side and thus external parties can be involved in the platform as the concept used to deliver public e-services. Furthermore, platform openness, in addition to the platform stream, will be used as the key characteristics in analysing and synthesising the existing e-government maturity and platform development models which will be elaborated in the next subchapter.

2. 3 Growth stage models delineate the development process

In conjunction with the purpose of this thesis which is constructing a platform development model for governments, in this subchapter we briefly discuss the concept of development model that will be used in the rest of this report. According to Oxford Dictionaries, "development" refers to the process of developing or being developed, (Oxford 2014). Furthermore, in another dictionary "development model" is defined as a conceptual framework devised to be used as a guide in understanding a developmental process for continued development" (Farlex 2014). In this thesis, the development model

is expected to be a guide for governments in employing the concept of platform for enhancing the quality of public e-service provision

In the light of gradual development process that is intended to show from the model, we adopt the concept of stages that is offered by growth stages models (King and Teo 1997) and maturity models (Bente, Bombosch et al. 2012). The models have been used to describe the growth of organizations through stages or levels that are sequential in nature, occur as a hierarchical progression and involve a broad range of organization activities and structures. The use of the models can indicate where the organization currently stands and the gaps that it must address in order to achieve the desired level. In this manner, the concept of development models can be utilized to show the stages that the governments could take to move from the "government only" condition to the "collaboration with the private sector and citizens" state.

To do so, in the first step of the research approach in this thesis, the existing egovernment maturity and platform development models will be synthesised. The existing e-Government maturity models are taken into account in order to represent e-service development provided by the governments for citizens. Meanwhile, the development of the platform with regard to various perspectives is captured from the existing platform development models.

E-Government maturity models have been discussed to address the concern on the development of e-government since the year 2000 (Lee 2010). A number of stage models have been suggested by international organizations (e.g. United Nations 2001, Gartner Group 2001) and personal researchers (e.g. Layne and Lee 2001, Hiller and Belanger 2001 and Andersen et al. 2006). While some of those models are used to characterize the e-government development to support the analysis and development strategy, the others are proposed as part of the evaluation method of e-government implementation (Dias and Costa 2013). The elaboration of the existing e-government models can be seen further in appendix B.1.

Meanwhile, although the concept of platform has been a rising discussion topic in journal articles (Thomas, Autio et al. 2014), there are only few articles that discuss the platform development models. Gawer (2010) took the platform emergence perspective in describing the platform evolution and categorized it into three different stages. In another paper, Yamakami (2010) discussed the mobile services platform development by using the viewpoint of community evolution and business model evolution points. In addition, Basole and Karla (2010) also explained the mobile service platform evolution based on its structure and strategies over the past years. The more detail explanation about these models is given in appendix B.2.

In constructing the platform development model for the governments, the e-government maturity models and the platform development models serve as the "input" for the synthesis process. These models will be filtered, compared and contrasted to each other by following the qualitative meta-synthesis methodology which will be explored further in the next subchapter.

2.4 Qualitative meta-synthesis methodology as the tool to relate different models

As the main process of the first step of this thesis approach, the synthesis methodology will be briefly outlined in this subchapter while the application of the methodology for this thesis is elaborated in detail in Chapter 3.

Meta-synthesis (P. 448) is "a research method used to produce interpretive translations, ground narratives or theories by integrating, and comparing the findings or metaphors of different qualitative studies" (Siau and Long 2005). Different research frameworks from qualitative studies, which do not necessarily involve a large literature base, can be used to generate interpretive synthesis. Furthermore, it enables the researcher to simultaneously understand the relations of the various studies because it considers the difference and the uniqueness of the studies during the translation process. In this manner, the method is suitable for building or extracting a common frame of reference from qualitative research results, including stage models which are mostly developed qualitatively (Lee 2010).

Some examples of the use of the meta-synthesis methodology are given by Lee and by Siau and Long in their researches to synthesise e-government stage models (Siau and Long 2005; Lee 2010), by Maranny in synthesising m-Government models (Maranny 2010) and by Britten et al., in their research of medicine's effect to patients (Britten, Campbell et al. 2002). In this thesis project, the meta-synthesis method is employed to synthesise the e-government maturity models and the platform development models which have been described in subchapter 2.3.



Figure 4. Seven steps of Noblit and Hare's meta-synthesis approach (Noblit and Hare 1988)

In their article, Noblit and Hare outlined the steps to conduct meta-synthesis approach which consist of seven steps (Noblit and Hare 1988). Meanwhile, adopting the same steps, Siau and Long categorized them into three major steps which are selecting studies, synthesising translations, and presenting the synthesis (Siau and Long 2005). In this thesis, we follow the seven steps presented by Noblit and Hare that are shown in Figure 4.

The first step of the method constitutes the starting point where an appropriate research question is identified to frame the qualitative meta-synthesis. Afterwards, the method continues with identifying the scope of the synthesis. In this step, the articles that are closely related to the initial interest are selected. The selected articles are then analysed and studied repeatedly particularly to interpret the stages of the models in detail in the third stage. The information collected in this step serves the foundation for further exploration of the metaphors of all the stage models.

In the step four, the main concept of each model will be compared and contrasted to each other at the stage level to see the similarity and the difference through the juxtaposition process. It is aimed to find out the relationship between the studies that have been described in previous step. Furthermore, in the step five, the concepts are put into a reciprocal translation process in order to reveal the metaphors that are used across and among different stages. The translated and juxtaposed metaphors are then synthesised in the sixth step to elaborate the concept underlying the new common frame of reference. In this way, the contradictions and overlap that are identified in the reciprocal translation can be accommodated. In the last step, the method ends with presenting the finding.

As the result of the use of the meta-analysis methodology in the research presented in this thesis, the stages of the platform development model is structured. It also constitutes the result of the first step in this thesis approach. Furthermore, each stage will be elaborated in public e-service provision context by employing platform business model components that are discussed in the next subchapter.

2.5 Platform business model components as the attributes to analyse the actors' participation in service creation

In the basic sense, business model is defined as the method of how a company doing business and generating revenue to sustain itself (Rappa 2002). It can represent an organization's architecture and its network of partners in creating and delivering value (Dubosson-Torbay, Osterwalder et al. 2002) and is often used to outline the key components of the given business (Hedman and Kalling 2003).

In this thesis, in order to analyse the collaboration among the actors in delivering the public e-service, the second step of the research approach is conducted by analysing the participation of the government, private sector, and citizens in the platform. To do so, each stage that is resulted from the first step of the thesis approach is analysed by using the platform business model components as the attributes.

To relate it with public e-service, the difference between private and public sector organizations thus needs to be taken into account. While private sectors aim at profit, public parties serve the purpose of public values achievement (Klievink and Janssen 2012). The framework presented by (Walravens and Pieter Ballon 2013) is aimed for the analysis of platform business models that involve public actors and governments in particular and thus is considered suitable to be employed.

Taking into account the shifting of the focus of business modelling from a single organization to networks of organizations, the framework captures the complexity of a platform business model which takes into account public sectors' involvement by proposing governance and public values as two fundamental parameters. To be more specific, in this framework four different aspects are elaborated: the value network, the functional architecture, the financial model, and the eventual value proposition that are made for the user (Ballon 2009).

The value network describes how roles and actors are distributed in the network while the functional architecture shows how the technical elements play a role in the value creation process. These both aspects are aligned with the governance parameters. Furthermore, the financial model explains how revenue streams run between the involved actors and how the sharing of the existence revenue. The value proposition, as the last aspect, describes the service that is offered to the end users. The last two aspects are aligned with the public value parameters.

In this thesis, we employ components representing the four public business model aspects to analyse the platform development model, which are shown in Table 2, as follows:

2.5. 1 Stakeholder management

Representing the value aspect, this parameter describes the related actors that are selected to be involved or invited to participate in the process of delivering the services to the end users. Furthermore, it also outlines the roles of the actors which are involved in the network.

2.5. 2 Technology use

As the focus of this research is the provision of electronic services (e-services) by governments, the use of information and communication technology (ICT) plays an important role in delivering the services. This parameter, which represents the functional architecture aspect, discusses the technology used to perform the main functions of the platform.

2.5. 3 Public data ownership

This parameter, which also represents the functional architecture aspect, concerns on the use of open data through ICT implementation. If the government information is made available to public, then this parameter describes its further information, for example, to which actors and under what terms the public data is opened up.

2.5. 4 Return on public investment

It refers to the financial model aspect by describing the value that is expected to be generated from the public investment and the justification of the choice. With regard to the two earlier parameters, the value may be purely financial, public, direct, indirect, or combinations of them.

2.5. 5 Public value creation

The public value proposition aspect is examined through this component. It outlines the public value from the perspective of the end user. Particularly for this thesis, the value is analysed from the citizens' point of view.

Gove	ernance paramet	Public value parameters			
(Value Network)	(Technical A	Architecture)	(Financial Architecture)	(Value Proposition)	
Stakeholder management	Technology use	Public data ownership	Return on public investment	Public value creation	
Choices in actor involvement	ICT used to perform functionalities	How and with whom the data is shared	Expectation on financial return	The public value from end user perspectives	

Table 2. Public platform business model components adapted from (Walravens and Pieter Ballon 2013)

The five components described in this subchapter are used to analyse each stage of the development model in order to see the difference between each other and how it evolves towards the collaboration among governments, private sectors and citizens. This step represents the second step of the thesis approach which will be continued with an evaluation through case studies. Through document analysis information from the field is collected from which additional insight are extracted to complete and refine the model. The case studies as the evaluation method is briefly discussed in the next subchapter.

2.6 Case studies serve as a means for evaluation process

A case study is one of several ways of doing social science research other than experiments, surveys, histories, etc. This method is applicable to understand a real life phenomenon which encompasses important contextual conditions in a depth (Yin 2009). Furthermore, he argued that case studies have a distinctive place in evaluation research. One of its several applications as an evaluation method is that a case study can illustrate certain topics within an evaluation in a descriptive mode.

In his book, four types of designs for case studies are described including single and multiple case studies with unitary or multiple units of analysis within these two variants. Being considered like multiple experiments by following a "replication" design, the result of multiple-case study is regarded as being more robust. In this type of case study, each case is selected and employed in order to predict similar results (a literal replication) or contrasting results with reasons that have been anticipated (a theoretical replication). Each case is deemed as the individual subject of the study, but on the whole the study covers several cases. The design for this replication approach is shown in Figure 5.

As the starting point, development of a theoretical framework is required. The theory contains the conditions or information that want to be evaluated through the cases. Hence, the cases are selected in the basis of a set of criteria that is aligned with the conditions in the theory. Furthermore, the way the data of each case is collected also need to be prepared. After a case is analysed and individual conclusion is drawn, the "replication" is then carried out by doing the same analysis for the other cases so that convergent evidence is obtained and cross-case conclusions can be made. Just as with experimental science, modification to the theory is made if some empirical cases do not work as predicted. In this way, the theoretical framework is completed and refined.

For the research in this thesis, the case studies are conducted to evaluate the platform development model that is resulted from chapter 3 and 4. Platforms are selected in the basis of criteria that represent the last stage of the model as the condition that want to be achieved. Moreover, the data about the platforms are collected through analysis of documents including the official websites, academic journals, and electronic articles. The more detail about the case selection and data collection are given in Chapter 5 which elaborates the report of case studies conducted in this research



Figure 5. Multiple Case Study Method (Yin 2009)

2.7 Conclusion

This chapter aims to introduce the concepts that will be used in the research approach of this thesis. For the first step of the approach, which is synthesising diverse development models, four concepts have been discussed in subchapters 2.1-2.4. The elaboration of the meta-synthesis methodology is given in subchapter 2.4 which consists of seven steps. This method is employed to produce interpretive translations by integrating and comparing the metaphors of different qualitative studies. In this thesis, the translations are used to structure the stages of the platform development model for governments that is built in this thesis.

Furthermore, the qualitative studies that are synthesised in this research refer to egovernment maturity models and platform development models that are outlined in subchapter 2.3. The e-government maturity models represent public e-service development provided by the governments while the platform development models represent the development in general from diverse perspectives. In order to synthesise those models, the models are reviewed and related to each other by utilizing the concept of platform stream and platform openness which are described in subchapter 2.1 and 2.2 respectively. In subchapter 2.1 the definition of the term platform is discussed which can be categorized into four streams which are organizational, product family, market intermediary, and platform ecosystem. In addition, in this subchapter, the product platform family platform is interpreted in conjunction with the service context. Next, in subchapter 2.2 the definition of platform openness is discussed by considering the restrictions for the participants to get involved in the implementation of the concept of platform in e-service provision. A platform then can have different architecture with the others in the basis of either the restrictions are placed in the supply side, demand side, or both. As the result of the first step, the stages of the platform development model are identified.

In the second step of the research approach, each stage of the model will be elaborated in the basis of platform business components, which are stakeholder management, technology use, public data ownership, return on public investment, and value proposition, that is described in subchapter 2.5. It is aimed to understand how the stages differ from one another with regard to the actors' participation in e-service provision and the values of the platforms. In the last step, the model is evaluated through case studies by analysing cases representing the latest stage of the model. Document analysis is chosen as the method to collect data and obtain information of the platform implementation in the field. The elaboration of case studies as the evaluation method is given in subchapter 2.6. In the next chapter, we will discuss the implementation of the first step of the research approach in this thesis. This page intentionally left blank

Chapter 3

The Stages Construction

The platform development model that is constructed in this thesis consists of a number of stages or levels. The stages are expected to delineate how a platform evolves from the initial condition towards the desired condition. Thus, the stages need to be structured in order to serve as a guide for the users. In the previous chapter, we have discussed the related concepts that can be used to support the construction of the model including the meta-synthesis methodology. In this chapter, we present the application of the methodology in order to answer the second sub-question of this thesis, which is:

Q2. What are the stages of the model (that are used as a guide to move from closed condition towards the collaboration of the government, private sectors, and citizens in *e-service provision*)?

Representing the first step of the research approach (shown by the grey area of Figure 6), this chapter elaborates the synthesis process conducted by following the meta-synthesis methodology. The existing models including e-government maturity models and platform development models are employed as the input of the process while the platform stream and the platform openness are utilized as the key attributes. The process results the stages that show how the concept of platform evolves from the "government only" condition towards the collaboration between the government, private sectors, and citizens.



Figure 6. Chapter three elaborates the first step of the research approach

This chapter starts with the elaboration of the meta-synthesis methodology and its application for the research in this thesis which is presented in chapter 3.1. Following the elaboration of the process, the result is presented in subchapter 3.2. Furthermore, the conclusion is given in subchapter 3.3.

3.1 Qualitative meta-synthesis procedure

As shown in Figure 4 in subchapter 2.4, the qualitative meta-synthesis methodology encompasses seven steps. In this subchapter, we go through those seven steps in order to structure the stages of the platform development model that is built in this thesis.

3.1. 1 Getting started – identifying the research question.

As the starting point of the synthesis process, the research question is identified to represent the intended objective of the use of the methodology. In this thesis, we identify the question as the interrogation of underlying metaphors in e-government stage models and the platform development models that are currently available in the literature. The existing e-government maturity models are used to represent the development in e-service provision by governments while the existing platform development models are employed to represent the technological platform development.

3.1. 2 Deciding what is relevant to the initial interest – identifying literature relevant to the research question.

The platform development model which is constructed in this thesis is intended to be a guide for governments to move from the "closed" condition to the "collaboration" condition where external parties other than the government, which are the private sector and the citizens, are getting involved in the platform design and use. Therefore, in selecting the models, it is taken into consideration whether or not the e-government maturity models and the platform development models include the involvement of the actors other than the government (in the e-government maturity models) and the platform development models).

For this step, initially an electronic database search is conducted through the search engines such as Scopus, Google Scholar, Science Direct, TU Delft Library, and Google. Key words including "stage model" and "maturity" are used in the combination with key words "platform", "e-government" and "service". This step results in 210 articles from all databases. It continues with the first stage of the screening where the abstracts are reviewed and the articles that are not directly related to e-government and platform development stages are removed. The removed articles include those that discuss the development without the explicit delineation of the development stages and that describe the technical architecture. As a result, 19 e-government maturity models and 3 platform development models remain from this step as shown in appendix B.

In the second screening, comprehensive reading is carried out to the remaining articles and those that do not include external parties' participation in the growth stage models are removed. Among the e-government maturity models, there are only few models that discuss the involvement of the private sector in the service provision. However, many of those models discuss the citizen's participation with many perspectives. Hence, in order to filter the suitable models that can be used further, we refer to the concept of citizen coproduction where the citizens do not only perform a role of a customer but also a role of a partner in the public service delivery (Linders 2012). In this way, the citizens can have more active participation than just, for examples, asking questions, making simple request or personalizing the portal interface; which beyond simple interaction and ordinary transactions (Lee 2010).

Furthermore, for the platform development models, the focus is placed on the evolution of the platform based on the augment of the actor variety along the stages and not only on the number of the same type of actors. For example, the model which discusses the increase of the number of mobile platform providers (MPPs) aligned with the number of mobile application developers (MADs) is considered not suitable to be employed in this thesis because it only focuses on one type of actor which is mobile platform providers. The more detail explanation of step 2 is provided in appendix B.

As the result, nine (9) e-government maturity models and one (1) platform development model are identified as listed in Table 3. In addition, noting that this study does not address the question of appraisal of the qualitative research, this thesis limits itself through the assumption that those models are of acceptable quality.

No	Authors	Stages													
1	(Hiller and Bélanger 2001; Moon 2002)	Information (1)	Two-way communication (2)			Transa	ction (3)	Integration (4)			Participation (5)				
2	ADB (Wescott 2001)	Email system and internal network (1)	Inter- 2 organizati com onal (2) io		er- 2-way Exchange of Digital nizati communicat value (4) Democrac (2) ion (3) (5)		-way Exchange municat value (4 on (3)		-way Exchange municat value (4 on (3)		ge of Digital (4) Democra (5)		ge of Digital (4) Democrac (5)		Joined-up government (6)
3	United Nations (Ronaghan 2002)	Emerging (1)	Enhanced (2)			Interact	tive (3)	Tra	nsactional	(4)	Seamless (5)				
4	(West 2004)	Billboard stage	(1)	Par deliv	tial-se ery st	ervice age (2)	Por	tal stage (3)			Interactive democracy (4)				
5	(Siau and Long 2005)	Web presence (1)	In	teraction	(2)	Transac	tion (3)	Transformation (4)			e-Democracy (5)				
6	(Lee 2010)	Presenting (1)	Ass	similating	(2)	Reforming (3)			lorphing (4	e-Governance (5)					
7	(Kubo, Akebe et al. 2011)	Preparation (1)	Or	ganizing	(2)	Ingenuity in practice (3)		Ev	valuation (4	ŀ)	Value generation (5)				
8	(Lee and Kwak 2012)	Initial (1)	Data transparency (2)			Open participation (3)		Open collaboratior (4)		tion	Ubiquitous engagement (5)				
9	(Dias and Costa 2013)	Complaint/ Suggestion (1)	Opinion pol discussion		l/free 1 (2)	Proced disc	lure for public cussion (3)		1	Participatory budgeting (4)				
10	(Gawer 2010)	Internal Pla	tforn	n (1)	Su	pply Chaiı	n Platform (2) Industr				ry Platform (3)				

Table 3. The relevant models for the application of meta-synthesis methodology in this thesis

3.1. 3 Reading the studies - reviewing the selected literature

After the relevant models are selected, in this step the 10 models are studied with special attention paid to understand the stages of the model. Considering that the information gathered through this step will be used to explore further the metaphors for those stages, the stages thus are analysed particularly with regard to the participation of the external parties and to what extent the platform concept is represented by the models.

3.1. 4 Determining how the studies are related

Following the in-depth reading of each article, in this step each model is compared and contrasted to each other in order to understand the relationship between them. This step is a descriptive and interpretive process (Lee 2010), where can be divided into two main sub-processes which are capturing the concepts of the models and relating them through the juxtaposition process (Jensen and Allen 1994).

To capture the concepts of the ten models, the concept of platform openness is employed to see how the external parties are involved for each stage. Furthermore, to understand to what extent the stages of the model represent the concept of a platform, the concept of platform stream is used. The concept of platform stream and platform openness are described in subchapter 2.1 and 2.2 respectively.

After understanding the stages of the models, they are juxtaposed and put in a table. In this way, the homogeneity and heterogeneity among the models can be seen with regard to the concept of the platform openness and the platform stream that are used as the key attributes. The metaphors of all the models thus can be identified through this step.

3.1. 5 Translating the studies into one another

In the next step, a reciprocal translation process is conducted to reveal the metaphors used across and among different stages. The metaphors are identified by linking the platform openness and the platform stream as the key attributes. Furthermore, the identified metaphors and the key attributes are compared repetitively among the stage models leading this process considered reciprocal.

For the same stage models, the reciprocal translation is done relatively straightforward, especially when the concepts of the stages, which regard to the key attributes, are homogeneous. In other cases, the stages may overlap each other without being sufficiently replaceable

3.1. 6 Synthesising translations

This step refers to the translation of the finding by synthesising the translated and juxtaposed metaphors and concepts of the key attributes into a common frame of reference. This synthesis is expected to accommodate the contradictions and the overlaps that are identified in the previous step.

3.1.7 Expressing the synthesis - presenting the findings

In the last step, the overall findings are presented in forms of tables and elaboration of the four main steps that are given in the following section.

3.2 Results: qualitative meta-synthesis of e-government maturity models and platform development models

In subchapter 3.1 the elaboration of the meta-synthesis procedure which is followed for this thesis has been provided. Furthermore, in this subchapter the synthesised model is described in detail covering the description of the relevant studies, the comparison, the reciprocal translation, and the synthesis of the translation. At the end, an elaboration of how to interpret the platform development model resulted from the meta-synthesis method is given.

3.2. 1 Description of studies reviewed

After the two screening is conducted to select the relevant articles, ten models are identified which nine of them represent the e-government maturity while one model delineates the platform development. The e-government models describe how e-government develops from diverse perspectives. Nevertheless, instead of focus on the detail of how the e-service functionalities get improved throughout the stages, in this step we mainly pay attention to the actors other than the government who are involved in the stages of the models.

It should be noted here that among the nine e-government models identified in this thesis, model 5 by Siau and Long (2005) and model 6 by Lee (2010) use the same synthesis methodology that is used in this thesis. Particularly in Lee's article, 12 e-government maturity models have been synthesised into a five-stage model. The last two stages in this model discuss the citizen's participation and involvement which are derived from the stages of five other models (model 1 to model 5 shown in Table 4). The stages are participation in model 1, digital democracy in model 2, seamless in model 3, interactive democracy in model 4, and e-democracy in model 5.

The participation in Lee's model refers to the public consultation while the involvement refers to the citizens' virtual active involvement in decision making. The fourth stage of Lee's model, which is called "morphing", focuses on planning and developing new services by engaging the citizens to participate actively beyond the simple interaction and transaction. Furthermore, in the fifth stage that is called "e-governance", the citizens are able to get involved in and influence the political and administrative decision making.

Citizens' participation in public discussion is also discussed by Dias and Costa (model 9 shown in Table 4) in their four-stage model. In the third stage of this model, the citizens are involved in the public discussion where the response by the government agencies is mandatory. They can even have more influential participation that is enabled in the next stage (stage 5) of this model where the citizens can contribute to decision making on public budgets.

Meanwhile, besides discussing the citizens' participation, model 7 and model 8 in Table 4 also outline the private sector's participation in e-government. Kubo et al. (model 7 shown in Table 4), in their paper, discuss the partnership between the government agencies and the private sector in order to achieve the good public management quality. In addition, the collaboration between various stakeholders can also be done in order to achieve the mutual purposes of the government, citizens, and other organizations which is explained in the last stage of the model. In another model by Lee and Kwak (2012), open participation is introduced to show the public feedback, conversation, voting, and ideation by the citizens. Moreover, they also describe the term open collaboration where public and private sectors are collaborated in co-creating value-added services to public in addition to the collaboration between the government and citizens.

While the first nine models are the representative of the e-government development, model 10 by Gawer (2010) describes the platform development from general perspective. However, we can also see the engagement of external parties other than the platform owner in this model. The first stage (internal) shows no external parties that are involved in the platform. In the next stage (supply chain), the platform owner as the product provider collaborates with external product providers in order to create more variant of the products. Furthermore, in the last stage (industry), the platform serves as an intermediary for various actors whose products or services that can function together.

In this way, the value from external parties can be captured and complementary innovation can be addressed.

3.2. 2 Comparing and contrasting features of stages

Following the review of the models, in this step the concept of the stages of the models are captured. Furthermore, the concept is related to the key attributes in order to gain more detail understanding of each stage. For example, the first three stages described in Lee's model (2010) represent the concept of an organization platform and a product family platform in service context with no external parties' participation.

The concept of an organization platform is exhibited from the way the government organize their resources in delivering particular services. For example, in order to provide online interactions with the citizens, scattered information and the applications are integrated. An adjustment on the personnel tasks is also required, for example, to allocate people who are responsible for giving response to the citizens.

The condition delineated in the stages can also be seen as a product family platform in the service context with regard to the decomposition of the service components, for example, into applications (functions), information, business process, and ICT tools that are required to provide particular services to the citizens. In this way, enhancement on one or some components can result in a better service quality or lead to another variant of service. For instance, the addition of a new type of information that will be integrated with the existing one can add value in information dissemination service.

In delivering the services, the government structure their resources and capabilities with no involvement of the citizens. Furthermore, although there is an opportunity that the private sector can collaborate with the government in performing the services described in those three stages, in this model there is no description of the private sector's involvement and thus the three stages of this model are considered as a closed platform.

Adopting the same measures, all stages of the selected models are reviewed to capture their concepts. The process of capturing the concepts is presented in more detail in appendix C. Furthermore, in the basis of the homogeneity and heterogeneity among the models with regard to the key attributes, the stages are put together as shown in Table 4. The elaboration of the comparison and contrast process along with the identified metaphors, that are written italicized, is presented below.

• Stage 1

Stage 1 concerns *internal* activities and structures in delivering services or products as a platform that can be found in all selected models. To be more specific, there are various core concepts of the activities conducted by the governments shown in this step including presenting information, interaction with the customers, facilitating transaction, and integrating the resources and activities. In addition, Kubo et al. and Wescott (2011) also discuss the provision of the basic infrastructure to support the information provision as the initial stage of their models. To relate it with the openness of the platform, there is no participation and involvement other than the government agencies in performing the activities or features.

No	Authors	Year	# of stages			1					2	3		4										
1	Hiller and Belanger	2001	5	Information	nation Two-way communication		Transaction ion		nsaction Integration		Transaction Integration		icipation											
2	ADB (Wescott)	2001	6	Email system and internal network	Inter- organiza tional	2-wa commu tion	2-way Exchange nmunica of value tion		iy Exchange inica of value inica		nge Joined-up Dig lue governme nt		Digital Democracy											
3	UN (Ronaghan)	2002	5	Emerging	Enł	anced Interactiv		Enhanced		Enhanced		Enhanced		Enhanced Interactiv		Interactive Transactional		Se	amless					
4	West	2004	4	Billboard		Partial-service delivery		Partial-se delive		ce Portal stage		Interactiv	ve democracy											
5	Siau and Long	2005	5	Web presence	Inte	raction	n Transaction		Transfor mation	e-Democracy														
6	Lee	2010	5	Presentin	ıg	Assimila	ating R		Reforming	Morphing	e-Governance													
7	Kubo et al.	2011	5			Preparation				Org	anizing		Ingenuity in practice	Evalua on	ati	Value generation								
8	Lee and Kwak	2012	5]	Initial		Data transparency Open participation		ta transparency pai		Open participation		Open collaborat	tion	U er	biquitous 1gagement								
9	Dias et al.	2013	4	Co /su	mplaint ggestion	aint C stion /fr		olaint estion		plaint estion		aint (stion /fr		Opinion poll /free discussion		Opinion po /free discuss		Procedure for public discussion	Participatory budgeting					
10	Gawer	2010	3			Internal I	Platform					Supply Chain Platform	In	dustry P	latfo	orm								

Table 4. Comparison of stages in the e-government maturity models and the platform development model
• Stage 2

The participation and involvement of the customer can be seen in stage 2 which is shown through all models except the model by Gawer (2010). Despite different names that are used in the models, the condition in this stage suggests the *citizen coproduction* in designing and providing the services. Features and media are provided to facilitate the citizens in expressing their opinion or idea which then can be used to influence the government's e-service creation and decision making process. In conjunction with this effort, Dias' model (2013) elaborates the concept of mandatory response procedure where the government follow-up the submission to be used in the decision making process. The description of the platform in this stage represents the openness of the platform in the demand side.

• Stage 3

Instead of relaxing the restriction in the demand side, Gawer's model (2010) describes the openness of the platform in the supply side. It refers to the *providers' partnership* in creating the final product or service by complementing the product components. In addition, the concept of the product family platform shown in this model enables the mixture of product components so that high variety of the product and the flexibility in designing a new product can be achieved. As elaborated in subchapter 2.1.2, to relate it to service context, a service can also be decomposed into several components. In this type of platform it means that the government do not have to provide them all. Instead, the private sector can perform or provide the service components in addition to the government's services.

• Stage 4

The concept shown in this stage represents the openness of the platform in both the supply and the demand sides. In addition to the customer's involvement in the process of designing or improving the quality of the final product and service, the product and service's components providers also have contributions in order to complement the government's services. It is aimed to achieve the creation of the value-added service by utilizing the private sectors' involvement, for example through their expertise and advance technology, as well as taking into account the citizens' needs.

However, to relate it with the platform streams, the three models which discuss the openness in the both sides can be divided into two different concepts. The first is the organizational as well as the product family streams that are discussed in the model by Kubo et al. (2010). In this model, in addition to the citizens' participation, the government also create partnership with private sectors in providing the service that has been defined by the government in advance, which constitute the *two-sided collaboration* encompassing the supply side and the demand side. The form of the collaboration, for example as shown in the model, is sharing the resources and the responsibilities with the private sector to provide services that enable the citizens as customers to use the services more effectively in the basis of the citizens' input.

Meanwhile, in the Gawer's model (2010) and Lee and Kwak's model (2012), the platform serves as an intermediary to diverse actors that are involved in the platform. Moreover, the platform concerns the *innovation* from the complement services that are provided by the external actors. Thus, variety of the final services can be resulted

which may be different from the end-use that is defined in advance by the platform owner. An example is given in Lee and Kwak's model (2012) where public-private effort is performed to develop diverse applications for health sector by utilizing public data that is obtained from the network of health data suppliers and data appliers. In this way, although improving the health service performance is the ultimate goal, innovation is sought through the development of various applications with diverse functions.

3.2. 3 Reciprocal translation: identifying underlying concepts

In this step the key attributes and the stages are compared and contrasted against each other. The process is shown in Table 5 where the tick marks represent the conformity of the key attributes with the stages in the model.

Firstly, the internal platform is present as the initial stage in all models. It shows the concept of an organizational and a product family platform stream with the restriction for external parties' participation either in supply or demand side. Then, still adopting the same concept of organizational and product family stream, citizen co-production platform in which the restriction is relaxed for the demand side can be found in all models except the model by Gawer (2010). On the contrary, Gawers' model (2010) is the only model which shows the openness in the supply side without taken into account the openness in the demand side. This is shown in the third stage by describing the partnership between the product or service component providers.

Next, the openness towards the demand side and the supply side can be found in the models by Kubo (2011), Lee and Kwak (2012), and Gawer (2010). However, by taking into account the different platform streams that are adopted in the former model and the last two models, the metaphors of those three are separated into two stages. The fourth one, which can be found in Kubo's model, represents the collaboration between the government and the private sector in the supply side; and also with the citizens in the demand side in forms of organization and product family streams. Meanwhile, the last metaphor can be found in the models by Lee and Kwak (2012) and by Gawer (2010) where the concept of market intermediary stream and platform ecosystem stream are adopted.

3.2. 4 Synthesis of translation: relating concepts and themes, revealing underlying metaphors

This step represents the last step of the qualitative meta-synthesis method where the metaphors that underlie the key characteristics are explored. Based on the in-depth literature review and models comparison conducted in the previous steps, five metaphors are identified in the following paragraphs.

1. Internal

The internal metaphor refers to the organization of the capabilities, resources and service components as a platform which is conducted by the government internally in providing the service. The direction of the service development is decided by the internal organization because there is only limited way of gaining the understanding of the citizens' need. The main goal of this platform is increasing the productive

Metaphors	Key attributes	Concepts	Hiller and Belanger (2001)	ADB (Wescott) (2001)	UN (Ronaghan) (2002)	West (2004)	Siau and Long (2005)	Lee (2010)	Kubo et al. (2011)	Lee and Kwak (2012)	Dias et al. (2013)	Gawer (2010)
Internal	Openness Stream	Closed Organizational – Product family	4	1	1	V	V	V	V	V	V	٨
Citizen Co-production	Openness Stream	Open in demand side Organizational – Product family	V	V	V	V	1	V	V	V	V	
Providers' Partnership	Openness Stream	Open in supply side Organizational – Product family										V
Two-sided collaboration	Openness Stream	Open in demand & supply side Organizational – Product family							V			
External Innovation	Openness Stream	Open in demand & supply side Market intermediary – Platform ecosystem								\checkmark		4

Table 5. Underlying metaphors and key attributes of the models

efficiency and produce variety of the services with regard to the structure and modularization of the service components.

2. Citizen co-production

This metaphor refers to the involvement of the citizens as the customer as well as the partner in improving the quality of the public services. In order to improve the quality of the service, the expertise, the idea and the needs of the citizens are captured and utilized in the design and creation of the e-services. Thus, in this stage the tools that facilitate the citizens in accessing the data or interacting with the governments need to be provided. Moreover, the governments as the user of the citizens' input also require the media and mechanism in gathering and following-up the input so that the citizens can know that their contribution is taken into account.

3. Provider partnership

The concept of public-private partnership is represented in this metaphor where the governments engage the private sector in delivering the services. Value-added services are pursued by utilizing the expertise of the private sectors while the end-use of the final service or technology is defined in advance by the government as the integrator of the service components. Furthermore, conformation in the internal structure of the government may also need to be considered in adjusting the different characteristics of public and private organizations while pursuing the common objective.

4. Two-sided collaboration

This metaphor practically refers to the combination of the citizen co-production metaphor and the provider partnership metaphor. In order to achieve the citizens' satisfaction, the service quality is improved by employing the private sector's expertise in addressing the citizens' need obtained from their participation. In addition, other types of actors might get involved in the service provision with regard to their particular contributions. However, representing the concept of an organizational and a product family stream, the final use of the service resulted from this collaboration is defined by the governments as the platform owner and integrator of the service components.

5. External innovation

External innovation is the metaphor for the last stage of platform development for public e-services. In this stage, collaboration is conducted with multi actors including the private sectors and the citizens. Compared to the two-sided collaboration metaphor, this stage concerns the innovation that is obtained from the complementary service components provided by external parties other than the government. The complementary service components can be intended not only for the platform owner but also for any other actors involved in the platform. Thus, the end use of the final service in this stage may not be known in advance.

The overview of these five metaphors encompasses the description and their key characteristics are provided in Table 6.

Table 6. Metaphors: the descriptions and key characteristics

Metaphors	Description	Key Characteristics			
		Openness	Platform Stream		
Internal	The organization of the internal capabilities and resources in delivering the final services.	No external participation	Organizational, Product family		
Citizen Co-production	Utilizing the citizens' idea and opinion in improving the service quality in order to achieve the citizen satisfaction.	Open in demand side	Organizational, Product family		
Provider Partnership	Pursuing value-added services by partnering with private sectors in order to benefit from their expertise.	Open in supply side	Organizational, Product family		
Two-sided collaboration	Addressing the citizens' satisfaction, which are known from their inputs, by utilizing the expertise of the private sectors, citizens, and other organizations related to the service provision. The end use of the services is defined by the government.	Open in demand & supply sides	Organizational, Product family		
External Innovation	Pursuing the value-added services by utilizing the innovation derived from the complementary service components produced by the external parties. The end use of the services may not be known in advance.	Open in demand & supply sides	Market Intermediary, Platform Ecosystem		

3.2. 5 The interpretation of the platform development model

Five stages have been identified through the process of meta-synthesis elaborated in previous subchapters. The first four stages represent the organizational and product family streams, while the last one represents the market intermediary and platform ecosystem streams. In conjunction with the purpose of the platform development model that is built in this thesis, the stages start with the concept of an internal platform and expand to an external innovation platform where governments, private sectors, and citizens are collaborated in service provision. Thus, the five stages show how a concept of a platform evolves as more external parties, which are citizens and private sectors, get involved in the e-service provision. The five stages are delineated in Figure 7.



Figure 7. The Structure of stages of the platform development model for governments.

However, unlike what traditional stage models suggest that the stages are sequential in nature (Nolan 1979; Klievink and Janssen 2009), in this model it is not necessary to go through the whole five stages step by step. In other words, the government can skip one or more stages in order to achieve the desired collaboration they want to achieve.

To be more specific, citizen co-production stage is placed prior provider partnership stage with a motive that the private sector is utilized later to enhance the citizen's satisfaction by addressing their needs (Kubo, Akebe et al. 2011; Lee and Kwak 2012), however it does not necessarily mean that the opposite sequence cannot be taken. Partnership with the private sector can be done to provide the services while later on the citizens are involved to evaluate and improve it by sharing their opinions and idea (Hui and Hayllar 2010). Hence, these two stages serve more as an alternative on how a priority can be made by an organization in engaging the external parties. Practically, the two-sided collaboration stage is achieved by skipping one of the two previous stages as citizens or private sectors get involved in the platform afterwards. It may also the case when government skip citizen co-production and provider partnership stages and directly implement the concept of two-sided collaboration platform; that is when the government engage citizens and private sectors simultaneously.

As for the last stage, namely external innovation, the external participants that are involved are the same as the previous stage. However, in this stage the government take more active roles to stimulate innovation from external parties instead of designing the final functions of the services. Therefore, the government agencies are considered embracing the fifth stage when they opt to provide facilities that can encourage the external parties to get involved in service creation and expect to have final use of services beyond what they foresee in the initial phase of service design.

In their paper, Klievink and Janssen argued that there are some motivations when organizations skip one or more stages, for example when they have the right capabilities and resources to deal with the tasks and requirements of the higher stages (Klievink and Janssen 2009). It also might be the case when an organization does not have the resources or the need to achieve the highest stage of a growth stage model. Hence, it depends on the organization, in terms of their capabilities, resources, and clients' need, to choose the stages or path that want to be taken.

To relate it to the use of this platform development model for governments, the five stage model rather presents a development trend than a must-go-path. The governments can leverage the concept of any stage of the model in order to implement collaboration with external parties and improve the e-service quality, but not necessarily have to go through the whole five stages. In addition, the strategy of each government on what kind of platform concept that is necessary in providing the e-services might be different between each other. In this case the five stages could be alternatives for the government to choose the most suitable one in order to achieve their objectives. It, however, needs to be investigated in further research what capabilities and resources that are required for, or needs that motivate the government agencies to move from one stage to another or when they want to skip one or more stages.

3.3 Conclusion

This chapter describes the meta-synthesis process which is the first step of the research approach in this thesis. The idea of this method is delving into related qualitative studies and finding the metaphors behind the studies by comparing and contrasting into each other so that translations can be interpreted. This method encompasses seven steps which are identifying the research question, identifying relevant literature, reviewing the selected literature, determining how the studies are related, translating the studies into one another, synthesising translations, and presenting the findings. The seven steps are elaborated in subchapter 3.1

In conjunction with the research question of this thesis, the question that wants to be answered through the meta-synthesis methodology is to find the underlying metaphors between e-government stage models and the platform development models. As the criteria, the models need to show explicit growth stages in delineating the e-government or platform development. Moreover, in the stages, external participants other than the government as the service owner or the platform owner are also required to be seen. As the result of the searching step, there are 10 models fulfil the criteria and are reviewed in subchapter 3.2.1.

Furthermore, the models are compared and contrasted to each other by utilizing the concept of platform openness and platform stream. In the basis of platform openness, the review divides the stages of the models into four types which are closed, open in supply side, open in demand side, and open in both sides. Furthermore, considering the platform streams, then the last type is distinguished into two types where the first one represents the organization and product family stream, while the latter represents the market intermediary and platform ecosystem stream. This process is elaborated in subchapter 3.2.2 and 3.2.3.

As the final stages for the platform development model resulted in this chapter, there are five stages which are described in subchapter 3.2.4: internal, citizen co-production, provider partnership, two-sided collaboration, and external innovation. These stages, instead of considered as a must-go-path, rather show a development trend where the governments can have alternatives on how the concept of platform can be implemented to improve their public e-services. The elaboration on how to interpret the platform development model is given in subchapter 3.2.5. In the next chapter, we will analyse the model and go into more detail about the actors' participation and the platforms' values in public e-service provision.

Chapter 4 Model Analysis

The stages of the platform development model built in this thesis have been identified in the previous chapter. The stages are structured by considering the concept of the platform openness and the platform streams. In the second step of the thesis approach, in order to elaborate more of the model, each of these stages will be analysed in order to delineate the collaboration among the actors involved in the public e-services provision. To do so, in this chapter, we employ platform business model components as the attributes in order to analyse the stages and answer the third sub-question of this thesis, which is:

Q3. What are the distinctions of the stages of the model with regard to the participation of the government, private sectors, and citizens in public e-service provision?

The analysis conducted in this chapter represents the second step of the research approach (shown by the grey area of Figure 8). The components, which have been elaborated briefly in subchapter 2.5, encompass stakeholder management, technology use, public data ownership, return on public investment, and public value creation which represent the governance parameter and public value parameter. Despite the discussion of the stages distinctions presented in this chapter is not meant to be exhaustive or definitive, it is expected that the analysis could outline how the collaboration among the actors evolve from one stage to the next ones, particularly with regard to their roles and the added values of the platforms.



Figure 8. Chapter four elaborates the second step of the research approach

In conjunction with the components of the platform business model that are employed in this thesis, this chapter consists of five subchapters and ends with a conclusion. At first, subchapter 4.1 presents the stakeholder management which elaborates the actors that are involved in each stage and what their roles in delivering the public e-services. Next, in subchapter 4.2, a brief elaboration on the information and communication technology (ICT) used to perform the main functionalities is presented. It continues with the outline of how government information and open data is used in supporting the service provision which is given in subchapter 4.3. The return on public investment is then discussed in subchapter 4.4. This subchapter particularly

aims to outline the value that is expected to be gained by the government from the application of the platform's concept represented by each stage of the model. Furthermore, as the last component, the value of the platform from the citizens' perspective is described in subchapter 4.4. For each of the components, the discussion starts from the internal platform as the simplest stage to the external innovation which represents the latest stage of the model. This chapter ends with a conclusion that is given in subchapter 4.6.

4.1 Stakeholder management

In outlining the stakeholder management of each stage of the model, this subchapter gives general delineation of the platform in advance to capture the roles of the involved actors. It is followed by some examples of the more specific roles in providing the services. The summary of the analysis of stakeholder management is given in Table 7.

4.1.1 Internal

The internal platform represents the initial stage of the way the government organize and structure their capabilities and resources in providing public e-services. In this type of platform, there is still limited partnership with external service component providers that is established (Gawer 2010). Furthermore, the service designs are mostly top-down and built with limited capacity to capture the preferences of a single citizen (Hui and Hayllar 2010). Thus, the government act as the sole service provider to the citizens and businesses as the mere customers.

In an internal platform, the processes that are involved in designing services are broken down into parts which can be integrated and customized later (Gawer 2010). Referring to the type of services that are generated in the early of e-government development such as digitization of government information and online interactions (Chun, Shulman et al. 2010), it thus could be done, for examples, through establishing the tools supporting an official government on-line presence, integrating data, defining the categories of information that will be published and assigning people who are responsible to routinely update it. Furthermore, in order to support online interactions with the citizens, the government could perform further activities such as integrating the scattered information and the applications, and adjusting the business processes to be suitable to the underlying ICT (Lee 2010) in order to improve the support seamless interaction.

However, in performing the aforementioned examples, where the government could perform as an internal platform, it does not necessarily mean that the collaboration with private sectors cannot be carried out for the same services. Further elaboration about it is given in the section 4.1.3 provider partnership.

4.1. 2 Citizen co-production

Taking into account the limitation on the previous stage, the government agencies in the second stage of the model expand the role of the citizens from merely passive customers of the public e-service to partners in tackling social problems and enhancing the service's quality. This implies that the citizens, instead of only be responsible for paying taxes, are expected to be more active to contribute to the productive actions of particular public services (Mattson 1986) in forms of time, will power, and expertise (Mathew Horne and Shirley 2009), for examples (Hiller and Bélanger 2001; Hui and Hayllar 2010):

- Monitoring the government's activities.
 Citizens as the web users see how government's economic stimulus plan is being spent in their local area through the government official website.
- Relaying public information from the government.
 Citizens are helping each other in online communities, and working towards the same goals as government on a range of issues.
- Contributing to the political decision making.
 The citizens' get involved in democratic process such as through voting and expressing opinion.
- Participating in service design.
 The citizens participate in creating and crafting web-based content and designing eservices.

On the other side, the government has some roles to respond to the citizens' involvement. In order to build the direct relationship with the citizens to improve the political participation, the government could develop tools to facilitate the citizens in voting or giving their opinion online (Hiller and Bélanger 2001). Moreover, the government could also utilize the established and emergent social media tools to engage the public in informal, flexible interactions (Lee and Kwak 2012) and crowd source the public's ideas, knowledge, expertise, and experience (Howe 2008). Another form of the government's response in this platform is transforming their business process in order to benefit more from the citizens' involvement. For example, by delegating routine services to ICT so that their tasks can be transformed and focus more into knowledge-based and service-oriented tasks in addressing the citizens' needs (Lee 2010).

4.1. 3 Provider partnership

Following the citizen co-production platform, in the third stage the government is collaborating with private sectors in delivering services to the public. Having the similar concept with the collaboration of component providers in a physical product development (Gawer 2010), in this type of platform the government acts not only as a service component provider but also as the service integrator while the private sectors enhance the values of the service. Thus, the service provider partnership is aimed to deliver value-added services to the citizens (Hui and Hayllar 2010; Lee and Kwak 2012). To relate it to the services mentioned in the internal platform, the government can also collaborates with the private sectors in providing those services, for examples:

- Governments make contractual relationship with private sectors to develop their portals and its features.
 - The government has a role in financing and payment a government portal while the service provision is managed by the private sectors (Brinkerhoff and Brinkerhoff 2011).
 - Technology partners provide the necessary hardware, software, and maintenance for the centers and transfer it to the government after the contract period completes (Bhatnagar 2005).
- Governments collaborate with private sectors to enhance features on the egovernment portals.
 - The state of Virginia collaborated with *Youtube* to provide all Virginia-related videos on their official website (Hui and Hayllar 2010).

 Collaborating with the private sector to extend the dissemination of information about their important activities through the private sector's medium (Veen 2009).

In this partnership, while the private sectors are responsible for service production in terms of functional capability for the government, the government is responsible towards the end user with regard to the conformity and effective service delivery. The contract that is made between them thus establishes conditions, remuneration, and penalties regarding the service delivery (Sandoz, Eudes et al. 2008).

4.1. 4 Two-sided collaboration

The fourth stage of the model involves the citizens and private sectors as the partners of the government in delivering public e-services. The roles of the actors are similar with the two previous stages. However, the government, in order to gain advantages of the citizens and public sectors' involvement, also serves as a connector. It is aimed to enhance the service quality aligned with the citizens' need as the customers. Some examples are given below (Hui and Hayllar 2010):

- Private sectors support the government to deliver value-added services to the customers.

While considering the citizens' preferences, inputs, and demands the government could collaborate with the private sectors to provide alternative services to the citizens as a complement to the governments' services.

- A public library in the City of Calgary, Alberta collaborates with *www.Amazon.com* and *www.Chapters.indigo.ca* to provide direct links that allow the users to purchase the book if they wish. Despite the customer centric service that can be achieved, it also gives benefit to the local library from the profit share if the users buy the book through the official library website.
- Several public libraries collaborate with private companies to provide search function operate more like *amazon.com*. The users can obtain helps to decide on which books to borrow or buy based on third party information.
- The governments collaborate with private sector to allow public engagement. The citizens can use the service while at the same time are encouraged to share their experiences and thus improve the service quality.
 - A UK network of patient's portal has been developed by the government and private companies to enable patients to share their experiences in using health and medical services. In this way, they help the health provider to improve the service quality based on the customers' need in general.

4.1. 5 External innovation

Adopting different streams, the platform in the last stage of the model encourages innovation from external parties either private sectors or citizens in delivering the services. Instead of representing a relationship where the government decides the final use of the services in advance, private sectors and citizens can serve as a complement by developing various ideas of applications as services that can be used by the citizens. Furthermore, the citizens can act not only as a user but also a contributor while using the applications, for example through the data they input or that is captured by the applications they use. The data then can be used to create, re-use, and distribute information in many ways to add maximum value (Hui and Hayllar 2010). As the characteristics of the platform ecosystem stream, there are still other roles that may get involved in this type of platform such as advertisers which could be played by private sectors or the processor of data gained from end users' applications by universities or NGO's.

To be more specific, there are several roles the government can have by taking into account the control over assets or over customer that they perform (Walravens and Ballon 2011). Having control over tangible and intangible assets means that the government is in control on how the services are created while having control over customers means the customer (i.e. end user) relationship is taken care.

- Providing a development and distribution environment for developers to develop the services.

The government can stimulate the service creation by providing technology support e.g. API's or an SDK where developers can create and disseminate the services. Mechanisms can also be provided to support the service creation for example by providing quality check on the services.

- Opening up data and statistical information.
 The government can decide which data to make public and which not, and stimulate the creation of services based on that. An example can be an online platform where anyone can apply and download raw information in order to create services on top of it. Developer community might also be stimulated to gain maximum value of the service creation.
- As the relationship between the customers and the platform is concerned, the government can play roles regarding a charging and billing relationship, security measures to make the citizens feel comfortable, and personal privacy issues.

Internal	Citizen co- production	Provider partnership	Two-sided collaboration	External innovation
The government organize internal assets and service components; act as the sole service provider, e.g. - Categorization of published information in the basis of data integration and personnel's' tasks.	 Citizens act as the government's partner in tackling problems and enhancing the service quality by sharing their idea & opinion. The government provides tools and adjusts the internal processes to facilitate, give response to, and follow up the citizens' involvement. 	 The government act as the main service provider and the integrator of the services provided by private sectors. The private sectors provide their expertise and services to add values of the main services provided by the government. 	 The government connects the citizens who share their idea and private sectors who share their expertise in order to enhance the eventual services. Private sectors become the partner of the government to provide services and together address the citizens' needs. 	 The government provides the foundation in terms of assets and/or customer relation measures and stimulate the service creation by external developers who can be private sectors or individuals. The citizens and private sectors could be the user as well as a contributor of data, experiences or idea.

Table 7. Analysis of stakeholder management

4.2 Technology use

After discussion about the actors involved and their roles given in previous subchapter, in this subchapter we continue with the elaboration on technology used to perform the main functionalities offered in the platforms. The summary of the analysis of public data ownership is given in Table 8.

4.2.1 Internal

The existing e-government maturity models suggest that the initial stages of egovernment implementation, where participation from external parties is limited, mainly offered two types functionalities, which are digitization of government information and online interactions or transactions with citizens (Chun, Shulman et al. 2010). The forms of technology utilized to perform those functionalities are discussed as follows:

- Government online presence

The most common form to perform this functionality is a website where scattered information is organized in the basis of departments or, in an a better way, in the basis of services needed by citizens (Wescott 2001). In this way, government related information is available to search for and view in detail in addition to a comprehensive list of forms that can be downloaded (Layne and Lee 2001). Furthermore, maintenance and regular update need to be carried out to the web pages and their contents.

- Data integration

In order to provide more variant of services, government progress to integrate live databases from different levels (vertical) or from different functions (horizontal) (Layne and Lee 2001). The databases then can ideally communicate and share information to each other so that they could process data better in terms of collecting, aggregating, and cross-referencing individual citizens' data. Moreover, cookies can also be used to collect information from users in addition to the data loaded from the websites' forms (Belanger and Hiller 2006).

- Online interaction

Instead of just receiving information that the government provide, citizens could also take advantage of the interactive and two-way communications features provided by governments, for examples through informational databases manipulation, website personalization and search engines to search for material they want to see. Furthermore, democratic responsiveness is enhanced through features such as bulletin boards to put comments and push technologies (e.g., emails and electronic subscriptions) that provide automatic updates on issues the users care about (West 2004).

- Privacy and confidentiality

As much individual information is collected by government through the online interactions, security mechanisms are technical consideration that need to be taken into account (West 2004). In order to balance the privacy of personal information and the citizens' right to access public information, privacy notices may be posted to inform the use of information collected from the users. It explains a clear and specific purpose to whom of the authorized entities the information is directed (Layne and Lee 2001).

4.2. 2 Citizen co-production

As the main objective of this type of platform, functionalities are provided in order to facilitate the collection data and information from citizens' participation in order to improve the service provision. The following ICT tools support the participation of citizens:

- User interface

Basic tools to support e-participation encompass a portal where services such as a search engine, alert services, FAQ, etc., are provided to enable the citizens communicate and interact with governments (Medaglia 2007).

- User participation

There are diverse core tools for citizens' participation e.g., discussion forum, virtual community, e-consultation, and e-voting (Medaglia 2007). In addition, there are general tools that are extensively used for the same purpose such as wiki where users can create, modify, and delete information as well as 3D geo-visualization to facilitates the users in participatory planning process (Hansen and Kristensen 2007).

- Mobile technologies (de Reuver, Stein et al. 2013)

In conjunction with the development of mobile technologies, citizen participation could also be realized while they are on the move. For this purpose, applications on the smartphones are the main device for data input and sending where GPS positioning and the built-in camera on smartphones are utilized. Moreover, data presentation is also performed through the applications where the graphical user interface (GUI) and various sub-functions should be adjusted into the mobile devices' restrictions. The applications then need to be made accessible for citizens either via the government's official website or an application store of the operator, platform provider or device provider.

- Data processing

All comments and input from citizens are stored in a database from which information searching and query is facilitated and reports could be produced for the users (Hansen and Reinau 2006). A server may also be used to control the database as well as access external servers and data sources (de Reuver, Stein et al. 2013).

- Privacy and security

In this type of platform, the government as the main service provider should assure that the users' privacy and security are taken into account. Declaration of privacy protection can be made in addition to privacy notices to inform the use of information that is collected from the users in order to gain the citizens' trust.

4.2. 3 Provider partnership

In this type of platform, added value services are obtained through participation of service providers. For this reason, ICT tools could be utilized to integrate the services and communicate with the involved parties (Nikayin, Reuver et al. 2013):

- User interface

A portal serves as a medium on which the user interface is implemented. Through the portal, users have access to diverse services provided by different providers from one screen. In this way, single-sign-on could be provided to access the service providers' own systems in the basis of users' access rights that are managed in advance.

-Data sharing and functionalities expansion

In order to integrate data from different providers, a common database may be used as a key integrator where each provider opens their server's APIs to enable the data collection. However, an agreement about what data may and may not be collected should be made between the platform owner with the service providers. Furthermore, standard interfaces could be provided to enable complementary devices or services to be integrated to the platform. In this way, functionalities of the platform could be extended and data sharing with third party service providers could be utilized to obtain more value of the data.

-Privacy and security

A security mechanism is required as much sensitive and personal data is put into the platform. For examples by making the data owner anonymous, if it is possible, to the service providers, or verifying the privacy protection declaration by the service providers (de Reuver, Stein et al. 2013).

4.2. 4 Two-sided collaboration

In the light of its functionalities that are inspired from citizen co-production platforms which are incorporated into provider partnership platforms, the information and communication technologies that could be applied in this type of platform basically encompass the tools that are used to support in both types of platforms.

- User interface

A portal is a place where users interface is implemented and allow them to access diverse services. While the basic tools for e-participation (Medaglia 2007) could be accessed through this portal, a single sign-on to access the providers' own system is provided to allow them access the services they want to have according to their access rights.

- User participation
- Core or additional tools to engage citizens and facilitate them to participate in the platform are provided as the platform owner wants to utilize the input to improve the service quality. For example by providing 3D geo-visualization tools to enable users getting involved in planning process (Hansen and Kristensen 2007). In addition, mobile technologies could also be employed to enable the users participate while they are on mobile (de Reuver, Stein et al. 2013).
- Data sharing and processing

Diverse data flow in this type of platform either from the supply side where service providers may open their servers' APIs to let data exchange, or from demand side where all input from users' participation are collected, Hence, a key integrator for all the data is required where standard interfaces to enable data sharing and agreement on what data may be accessed are set up in advance.

- Privacy and security

A security mechanism is required to unsure that service providers comply with privacy protection declaration. Government as the service integrator may act as a filter where sensitive public data is controlled by them so that private sectors can only have limited access to public data (Sandoz, Eudes et al. 2008). In addition, citizens as the user could be sent privacy notices of the data they input to increase their awareness of their privacy.

4.2. 5 External innovation

Technologies that are applied for this type of platform are similar with the ones described for two-sided collaboration as the platform facilitates government agencies to collaborate with private sectors and citizens in delivering public e-services. As described in subchapter 4.2.4, technologies such as user interface, user participation, data sharing and processing as well as privacy and security could be used to support the implementation of this platform concept. However, as the prominent characteristic of this type of platform, the innovation in service creation is stimulated through external parties involvement, and therefore the focus of the platform owner is not only developing applications but also providing resources that support the application development by the third parties (Ghazawneh and Henfridsson 2013).

In their paper, Ghazawneh and Henfridsson refer the resources as platform boundary resources (PBRs). Furthermore, PBRs can be divided into three categories (Dal Bianco, Myllarniemi et al. 2014):

• Application boundary resources

Include program resources that enable the interaction between the third party application and the platform. E.g., application programming interfaces (APIs) through which an application can invoke the method in order to access the core modules of the platform.

• Development boundary resources

Include program resources or tools enabling the external developers to develop applications such as software development kits (SDKs) with additional tools like debuggers and compilers.

• Social boundary resources

Encompass resources that facilitate the coordination of the third party application development and knowledge transfer about it. E.g., developer portal, application development regulations, documentation, etc.

The PBRs serve as an interface between the platform owner and the external developers which balance the stimulation of external contributions (resourcing) and maintenance of the platform control (securing) (Ghazawneh and Henfridsson 2013). For examples, third party developers are enabled to build location-based services due to the release of an API for facilitating the use of a smartphone platform's functionality concerning global positioning. However, as public value becomes a major concern for government, they may regulate what type of public data is open and what type of applications may be built on top of that. In this way, the regulation acts as a social boundary resource which gives control for government over the platform development.

4. 3 Public data ownership

Following the discussion about technology used in performing the platform functionalities, this subchapter outlines how each stage of the models deals with public data that is used to support the service delivery. The summary of the analysis of public data ownership is given in Table 9.

Table 8. Analysis of technology use

Internal	Citizen co- production	Provider partnership	Two-sided collaboration	External innovation
 Government online presence Data integration Online interaction Privacy and confidentiality 	 User interface User participation Data processing Privacy and security Mobile technologies 	 User interface Data sharing & functionalities expansion Privacy and security 	 User interface User participation & Mobile technologies Data sharing and processing Privacy and security 	 User interface User participation & Mobile technologies Data sharing Privacy and security Platform boundary resources

4.3 1 Internal

In an internal platform where there is no involvement from external parties, the government focus on processing data and information flowing within the organization and hardly deliver it as citizen-centric services (Ronaghan 2002). Referring to the one-way service provided in the initial of e-government, parts of the government's non transactional information are provided in the official website for the citizens (Layne and Lee 2001). For example, public facilities data and other information are gathered and made available by local governments so that the citizens can access them.

With regard to the transactional services, information about an individual might be recorded by the government agencies. In this case, the government have to make sure the access and accuracy of the data collected. Furthermore, activities to protect personal information are required such as allowing individual inspection, obtaining permission to share the information, and informing the individual of the information use (Hiller and Bélanger 2001).

4.3 2 Citizen co-production

As the citizens take more active involvement in the public service delivery, the data flowing from the citizens to the government is not limited to personal information as a requirement to receive the services. In this type of platform, data is also received from citizens to improve the service quality. The citizens input various data in terms of suggestions, ideas, preferences, etc. that can be leveraged by the governments in service design, execution, and monitoring (Linders 2012).

Furthermore, to make it more citizen-centric, government information and those data could be processed and enhanced before being disseminated in order to give more value to the citizens (Linders 2012). For example, the government provide the citizens personalized information that is needed in order to assist them in making informed personal decision. To be more specific, this service can be found when the government conduct data mining to relate citizens' personal health data with information about useful government health programs that they qualify and hence inform them. Another example is publishing data that can be accessed and tracked by the citizens as a means of realizing "open book government" such as government spending data for public scrutiny (Dunleavy and Margetts 2010). In this way, instead of requests for information regime, proactive

information dissemination is undertaken to empower citizens to hold the government to account.

4.3 3 Provider partnership

In this type of platform the government share a responsibility regarding the service delivery with private sectors. Government information and public data that is required in the service creation thus might need to be accessed by both government agencies and private sectors. However, taking into account the issue of citizens' privacy, public agency can retain control over sensitive information concerning the end users and be responsible for the enforcement of privacy protection (Sandoz, Eudes et al. 2008).

An example is given by Sandoz et al. (2008) in elaborating a platform for transactional service delivery under the constraints of public-private partnership. While executing the fabrication processes a public service, for instance a digital identities provision, private sectors do not have to handle sensitive personal data of the citizens. Instead, the government agencies have exclusive access to sensitive citizen-related data and have an option to block the process undertaken by the private sectors if there is a discrepancy between the data and users' requests.

4.3 4 Two-sided collaboration

Involving citizens as the customer of the service and private sectors who share their expertise to improve the service quality, the government could benefit from the platform to process relevant data that is inputted by citizens and provide e-services with a better public value assessment than a top-down approach conducted by the government alone. To do so, the government, private sectors, and citizens collaborate in the basis of multiparty inputting and multiple processing of data and information (Hui and Hayllar 2010).

Concerning public data flow, in addition to government information, public preferences that are received form citizens are shared with private sectors as data that is employed and processed to create the services. As data sharing mechanism implemented in provider partnership type of platform, the government could have an option to have total control over sensitive information and decide the continuation of the service delivery (Sandoz, Eudes et al. 2008). Utilizing the public data that is forwarded by the government, alternative services could also be created and delivered by private sectors to enhance the service provided by the government. Furthermore, the government information can also be re-used and distributed to the citizens so that they can organise it in new ways and generate more added-value information.

4.3 5 External innovation

In conjunction with innovation stimulation that becomes the focus in this type of platform, some considerations should be thoroughly studied before an approach to service creation and distribution is decided by the government. Concerning public data use, the government have to deal with particular issues in order to stimulate, for examples, SME's and one-man companies to be active in the service development, such as how to handle data that they already have on the citizens and opening this up; how to collect, manage, and apply the data that is generated by the services use, etc. (Walravens and Ballon 2011).

Services and applications generally provide higher quality experiences when it leverage user information in a balanced way considering its "costs" in sharing private information

(Walravens and Ballon 2011). Thus, opening up data and statistical information could be considered necessary in improving the service quality and encouraging the service development. Some public governmental data is made available via application programming interfaces (APIs) and can be accessed by a third party application developer's requests from the government agencies through web services (Warner and Chun 2009).

However, this action could have negative impact with regard to the privacy of individuals whose information is part of the public record. Therefore, the government have to decide to what extent the public data will be shared with external parties without losing a competitive advantage and violating the citizens' privacy. Some measures can be taken in order to balance the efforts at opening up its data and protecting the privacy of the citizens, such as (Warner and Chun 2009; Walravens and Ballon 2011):

- The interested developers have to apply with the government based on the service design that they have as a requirement to access the data. Personal data should not be easy to pull even if it is categorized in public domain data unless the purpose is deemed necessary for the benefit of the public at large. However, controlled access interfaces can be established in the basis of the privacy desire of the people who are associated with data or for external parties who promise to use the data in line with public policy.
- Clear opt-in options and secured environments need to be provided in addition to the measures to assure the transparency towards the end user on how the data will be collected, used or shared.

Internal	Citizen co-	Provider	Two-sided	External
	production	partnership	collaboration	innovation
 The government process internal data and deliver it to the citizens, such as data about public facilities. Protection for personal information that is collected. 	 Citizens contribute to providing data in terms of ideas, preferences, etc. The government process the data, enhance, and add more value to it. 	 Government share information and public data concerning the service creation with the private sector. Government can have exclusive access to sensitive personal data of citizens. 	 Government information, in addition to public data received from citizens, are shared with private sectors to create the service. Government can have exclusive access to sensitive personal data of citizens. 	 Public data can be shared by the government to improve service quality and stimulate service creation by external parties. Some measures need to be taken to protect individual privacy and minimize negative impact of opening data such as requirements to access the data.

Table 9. Analysis of public data ownership

4. 4 Return on public investment

This subchapter aims to outline the value that is expected by the government through the implementation of the platform concept with regard to the public e-service delivery. The summary of the elaboration is given in Table 10.

4.4. 1 Internal

The focus of an internal platform is placed in the organization and structure of the service components and its corresponding internal resources including the people, technology, data etc. In this way, the government expects to improve their performances in delivering e-services, for examples (Gawer 2010):

-Increase the internal managerial efficiency

- The process of structuring the service components offers better sufficiency in delivering the final service. As an example in disseminating public information, decomposing data resource in the basis of the existing divisions and later on integrating them by a particular team could minimize redundancies and inconsistencies rather than letting each division publishes their own data (Layne and Lee 2001).
- Following the previous example, it could reduce time demands on staff and administrative cost (Moon 2002). As the data processing and publication will be taken care by a particular division for all divisions, the general divisions only need to provide the raw data and can focus more on their main activities,
- Produce variety of services

By decomposing the service into components, improvement can be carried out by enhancing the quality of any component contributing to the final service. For example, improving the ICT tools as one of the components by providing fill-in forms so that the citizens can leave comment or opinion has changed the service from one way to two ways communication (Hiller and Bélanger 2001).

- Support the flexibility in service design

The organization of service components allows the government agencies to design a service by improving any components while considering how its implication on other components and obstacles that the government have in that component. For examples, different types of information can be published by taking into account the political obstacles in integrating the data from particular divisions; and different interaction service can be provided by considering to what extent the personnel are available to give response to citizens.

4.4. 2 Citizen co-production

This type of platform offers some benefits that can be expected by the government from the citizens' participation in conjunction with their goal to improve the service quality, for instances:

- Realizing open government initiative.

Some principals that are urged to be achieved by governments in providing services such as transparency and public engagement which lead to improve citizens' trust in governments (Bonsón, Torres et al. 2012) are supported through this type of platform.

• Promoting public participation by posting public notices and facilitating the exchanging messages and idea with the public (Moon 2002).

- Allowing the citizens to track the progress of their own interactions with government or to monitor the government's activities (Bertot, Jaeger et al. 2012).
- The government could utilize the citizens' participation as a source of information and idea to improve their performances.
 - The government analyse the inputs from citizens; identify the trend of problems and its potential solutions for example by utilizing analytic tools (Hui and Hayllar 2010).
 - Collective intelligence that are obtained in the basis of a large number of individuals from diverse backgrounds in nearly real time can help the government in making informed and reliable decisions including in designing a new service (Bonabeau, 2009).

4.4. 3 Provider partnership

In this platform private sectors are involved as the partner of the government in providing the services components. The government thus can benefit some superiority of private sectors over them, such as:

- The government can gain benefits from private sectors' expertise in technology, financial or management
 - As described by (Bhatnagar 2005), public-private partnership enables sharing of investment which could lead to reduction in the costs of a system development. Moreover, infusion of scarce skills from private sectors in designing a service or application supports the service quality improvement.
 - Private sectors can also contribute to adding more public value by providing new tools that can be used to improve information, choices, and customer-oriented services to citizens (Hui and Hayllar 2010).
- Financial participation from outside sources Entrepreneurial outcomes can also be expected by the government from a partnership with private sectors, for example by allowing payment advertisements on their portals or generating more non-tax-based revenues (Moon 2002).
- Risk transfer.

In the partnership, the government can ask the private sectors to take on the risks with regard to the changes in technologies and return on investment (Kaliannan, Awang et al. 2010).

4.4. 4 Two-sided collaboration

This platform involves both citizens and private sectors in delivering the services and thus the government practically expect the advantages from integrating the supply side and demand side in addition to advantages that are offered by two previous platforms, such as (Hui and Hayllar 2010):

- Creating value-added and alternative services to address citizens' preferences.

The government need to constantly collect information about citizens' preferences and thus public value could be continuously (re)defined. Regarding the increasing demands, which are likely influenced by private sector's features, the government can gain benefit from the private sectors' involvement to improving the existing service. For example, collaborating with Youtube to provide relevant videos in the official website as the citizens widely use it. - Improve the quality of PPP's services by understanding the users' needs.

To relate it to potential PPP projects, public involvement at the initial stages could benefit the government to capture and identify what public concerns and values that are expected by citizens as the user. It could be of help to achieve more acceptable projects that is genuinely add public value. Furthermore, public input can also be employed to evaluate and refine the decisions required to undertake PPP projects.

4.4. 5 External innovation

Different from the four previous platforms, in this platform the government focus more on empowering external parties in the service design and creation. Some benefits that could be expected by the government through the implementation of this platform are (Tiwana 2014):

- Massively distributed innovation.

Compared to conventional service supply chain, this platform has the potential to innovate on an inconceivable scale and scope around the platform. Instead of attempting to innovate in designing or creating the service in terms of applications, the government could distribute innovation work to large numbers of app developers. In this way, different developers will experiment using a variety approaches, designs, or solutions as long as the government can encourage the application development.

- Risk transfer

Driven by their self-interest, the app developers bear most of the financial risk while they pursue their own ideas for the applications. The government thus can focus on doing its core activities regarding the platform ecosystem maintenance and leave the rest to the ecosystem partners; for examples organizing data that can be utilized in creating the applications and analyzing the data collected through the application use.

- Improve the service to address the 'niche market'.

In conventional service supply chain where typically there is limited approach that can be selected, the government will prioritize the service creation that addresses the citizens' common needs. However, in this type of platform, application developers might find the 'niche market' with highly specialized and uncommon needs lucrative enough to develop applications and thus the government can serve more variant services.

Table 10. Analysis of return in public investment

Internal	Citizen co- production	Provider partnership	Two-sided collaboration	External innovation
 Increase the internal managerial efficiency. Produce variety of services. Support the flexibility in service design. 	 Realizing open government initiative. Obtaining a source of information and ideas. 	 Benefit from private sectors' expertise in technology, financial, or management. Entrepreneurial outcomes. Risk transfer. 	 Provide alternative services from PPP projects to address citizens' increasing demands. Achieve more acceptable PPP projects that genuinely add public value. 	 Massively distributed innovation. Risk transfer. Enable service customization to address 'niche market'.

4. 5 Public value creation

We have discussed the expected benefits from the government's point of view in the previous subchapter. Furthermore, this subchapter elaborates the expected value that can be gained by the citizens as the customer of the services. The summary of the analysis of public value creation is given in Table 11.

4.5. 1 Internal

While the government could improve their managerial efficiency and flexibility in designing the services through this platform, citizens as the users can expect values on the services delivered to them, such as:

- Service quality improvement can be achieved in terms of faster response and more integrated data.

Referring to the basic and initial services in e-government (Chun, Shulman et al. 2010), when the service components are organized in a clear structure, data processing and interaction with citizens can be performed in a better way, for examples:

- When the personnel's' tasks are structured aligned with particular types of requests that are received from users, the requests thus can be processed and handled in a faster way.
- Data that is organized clearly in the basis of different types of sources and then followed up by integration could result in more accurate and reliable information.
- More variant of services.

The flexibility in the service design that is supported in an internal platform enables an organization to be more agile in conducting improvement in the services (Meyer and DeTore 2001). For example, the government could focus on utilizing ICT tools as one of the service components; improve the features in the official web by looking at how the existing technology evolves and selecting the most suitable ones to be implemented.

4.5. 2 Citizen co-production

Besides making contribution to the service quality improvement, the involvement of citizens in this type of platform also gives values to themselves as the customer of the services.

- Increase the likelihood that the created service will address their preferences.

Through the platform, the government provides means for citizens to express their needs and preferences. Hence, as the interactions with the users occur, the government gain more information, refine the services being offered and realizing citizen-centric service delivery (Hui and Hayllar 2010).

- A medium to accommodate personal motives regarding public service provision.

In addition to the needs to enjoy a better service that address their preferences, other motives might encourage people to get involved and contribute to content-based information system development, for examples learning and social motives (Thies and Stanoevska-Slabeva 2013). In the process of sharing their idea and opinion, people will also obtain insight and knowledge about the public service development. Moreover, people could receive appreciations by organizers and peers due to their participation.

4.5. 3 Provider partnership

The government involve private sectors in the service design and creation in order to increase the service value to the citizens as the customer. Hence, there are additional values that could be expected by the citizens, such as (Kaliannan, Awang et al. 2010):

- Greater confidence in the service.

As private sectors are more entrepreneurial and innovative by its nature, they could contribute to the best of the state of the art delivery in public services. The citizens thus can expect public services in the same quality as provided by private sectors.

- Cost savings.

The possibility of cost-sharing projects and a better financial management that could be achieved in partnership with private sectors can result in less cost –if any- that needs to be incurred by the citizens.

- Better customer care.

The private sectors' participation in providing public services can help in achieving better performance due to their characteristics that are more customer focused, better organized and managed, and thus improve the possibility in providing customeroriented services.

4.5. 4 Two-sided collaboration

In addition to the values that could be obtained in platforms with participation of private sectors or citizens, this type of platform offer additional value to the citizens. As described in subchapter 4.3.4, in this type of platform private sectors enable the government to deliver value-added services through alternative services that are provided to the citizens. In addressing the citizens' preferences that are obtained through their input, the government and private sectors could adopt the concept of 'doing more, but not doing more of the same' by providing alternative services to the citizens. Thus, the citizens could obtain more public value through enhanced information, choice and customer-oriented services (Hui and Hayllar 2010).

4.5. 5 External innovation

Focus on encouraging innovation by external parties, this platform offers some values that can be expected by citizens as the user, such as (Tiwana 2014):

- Faster innovation.

A faster rate of innovation in this type of platform is delivered due to the competition in the application design and creation. Both the government and application developers have incentives to increase the value of the platform by delivering more variant of services and citizens as the end-user is the primary beneficiaries of this incentive.

- High quality services (applications).

Another implication of the competition in this type of platform is the encouragement to create applications with good quality among the developers. As rival applications compete to attract end users' attention, the applications that survive then represent the fittest ones that address the citizens' needs.

Mix-and-match customization.

A platform with a variety of applications allow the end user to have an additional value through mixing and matching the applications. In this way, the users are enabled to get complex, highly customized bundles of service functionality from the platform. The

concept of this user-driven bundling of applications offer customization to end users' unique needs, that is different from a one-size-fits-all approach that is common in conventional service supply chain.

h								
	Internal	Citizen co- production	Provider partnership	Two-sided collaboration	External innovation			
	 Better quality of data processing and quicker response. More variant of services improvement to be offered. 	 Increase the likelihood that the service being offered will address their preferences. A medium to accommodate personal motives. 	 Greater confidence in the service. Cost savings. Better customer care. 	- More public value through enhanced information, choice and customer- oriented services.	 Faster innovation. High quality services (applications). Mix-and-match customization. 			

4.6 Conclusion

This chapter elaborates the five stages of the platform development model to examine how they are different to each other with regards to platform business model components. In subchapter 4.1, the discussion about the actors that are involved and their roles in each platform stage is provided. The government act a sole service provider and focus on the organization of its service components to provide the final services to citizens in the internal platform. Furthermore, the citizens take a more active role in the next stage by sharing their expertise and opinion in order to improve the service.

The government therefore need to provide tools and adjust their internal process to maximize the citizens' participation. In the third stage, government collaborate with private sectors by integrating the service components provided by them and utilize their expertise to add the service value. Next, the government collaborate with both private sectors and citizens in the last two stages of the model. While in the fourth stage the government focus on connecting them and maximize the users' increasing demands, in the last stage the government stimulate innovation in service creation by external developers. In this stage the citizens could participate by providing data through the application use, and also through application design and creation.

Following the elaboration of the actors' roles, in subchapter 4.2 the technologies used to perform the main functionalities are discussed. In the internal platform, two main functionalities, which are digitization of government information and online interactions, are supported by ICT utilization such as government online presence, data integration, online interaction as well as privacy and confidentiality. Next, in order to facilitate citizens participation in service delivery, user participation tools and mobile technologies are employed in addition to user interface, data processing, and privacy and security. For the third stage of the model, functionalities expansion and data integration among the service providers become the focus as in this platform the government act as the service integrator. The combination of technologies supporting platforms in stage two and three then can also be used to support to perform the functionalities in the fourth stage. Lastly, as the prominent characteristic of the last stage, platform boundary resources are

employed to facilitate and stimulate service and application development by external parties.

In subchapter 4.3 the public data use is elaborated. In the internal platform, the government focus on organizing internal information to be disseminated and dealing with protection of personal data that is recorded. Furthermore, the data sources are expanded by utilizing citizens participation in the next stage so that the government can process and enhance the governmental information. In the third stage, public data is shared with private sectors in order to create services with exclusive access can be granted to the government for sensitive personal data of citizens as the users. Public data sharing is also applied in the fourth stage in addition to the public data that is received from citizens' input. The data that is forwarded to private sectors enable them to provide alternative services to address citizens' needs. In the last stage, the government focus on the balance between opening up public data as a measure to stimulate service creation by external parties and protection of individual privacy with regard to the data that is used in the application creation and that is collected through the application use.

In subchapter 4.4 the expected values of the platform implementation from government's perspective is discussed. First, internal platform is expected to improve the efficiency and flexibility in service design and creation. Furthermore, in the second stage government utilize the citizens' participation as a source of ideas and information as well as realize open government initiatives. Private sectors' participation in the third stage is anticipated to contribute to the service delivery with regards to their expertise. In addition, entrepreneurial outcomes and risk transfer are also values that can be expected by the governments. In the fourth stage, as information about citizens' preferences are continuously received and defined, private sectors are expected to contribute in providing alternative services. Besides, more achievable PPP projects are also supported through the citizens' input which provide information of what the citizens really want. Lastly, massive innovation is expected in the fifth stage with some of the risks in the service development could be transferred to the external developers.

The last component of the platform business model that is elaborated in this chapter focus on what values that can be expected from the citizens' perspective, which is given in subchapter 4.5. As internal organization is enhanced in the first stage, service improvement that can be expected encompasses more variant services and better data processing carried out by the government. Meanwhile, in the second stage, through their participation the citizens enhance the likelihood that the service being offered will suit their preferences. In addition, their personal motives regarding public service provision are also facilitated. In the third stage, citizens could receive better care and save costs while expecting added-values as the private sectors share their expertise in providing the services. Moreover, the fourth stage offers the citizens enhanced information, choice and customer-oriented services which are enabled by connecting the citizens' preferences with private sectors' participation. In the last stage, the competition among application developers result in faster innovation and higher quality services. Furthermore, customization by mixing and matching the applications could address more diverse and unique needs of the citizens as the customer. This page intentionally left blank

Chapter 5 Model Evaluation

In the previous chapter, the five stages of the platform development model has been analysed in the basis of five attributes representing platform business model components. Furthermore, in order to evaluate the analysis, case studies are carried out in this chapter. Cases are selected and analysed to gain more understanding of the implementation of the concept of platforms in the field. The information of those platforms then are employed to improve the analysis conducted earlier and used to answer the fourth sub-question of this thesis, which is:

Q4. What is the lesson that can be learned from platform implementation in the field in order to refine the model?

This chapter elaborates the third step of the research approach of this thesis (shown by the grey area of Figure 9). In conducting the case study, the multiple case study method by Yin (2009) that is elaborated in subchapter 2.6 is employed. As the theory that will be evaluated, the structure of the platform development stages discussed in chapter 3 and the analysis of the platform business model outlined in chapter 4 are used. To do so, three platforms are selected as the cases and reviewed form which information is extracted. Documents that are related to the cases such as from the official websites, scientific journals, and electronic articles are collected and analysed. In this way, the model can be refined by utilizing the new information obtained from the analysis in this chapter.



Figure 9. Chapter five elaborates the third step of the research approach

This chapter starts with the case selection & data collection protocol given in subchapter 5.1 which elaborate the reasons how the platforms are selected and how the documents are reviewed. Next, the description of each case is given in subchapter 5.2. It gives the individual case reports by elaborating each platform. After each platform is discussed, a cross-case analysis is then drawn to refine the theory; it is provided in subchapter 5.3. Lastly, a conclusion is given subchapter 5.4.

5. 1 Case selection & data collection protocol

In selecting platforms as cases that will be studied, platforms representing the last stage of the model are chosen. It is in conjunction with the purpose of the model evaluation. First, by reviewing how the platforms in that stage was evolving, it is expected that the structure of the platform development stages that is resulted in chapter 3 can be evaluated. For example, whether the platform was initially developed as a closed platform or directly built with involvement of private sectors and citizens as described in stage four and five of the model.

Second, taking into account the desired state in the model that want to be achieved, the analysis on the platforms could provide information about the state of the art in platform implementation as an enabler for the collaboration between public agencies, private sectors, and citizens while delivering public services. In this way how the platforms work with regard to the platform business model components as described in chapter 4 could be evaluated. However, considering that the criteria that will be used to select the cases only represent platforms in the last stage of the model, the evaluation thus can only be done for the last stage of the model. This is considered as the limitation of this research as the evaluation of the remaining stages of the model is out of scope of this thesis.

The criteria in selecting the cases are given below:

- Digital platforms. The platforms cover information systems as the assets where the internet is mainly used to deliver the services.
- Producing public e-services as the main product. The platforms deliver services or facilitate service provision that can be utilized by citizens/public.
- Facilitating various actors to have transactions from different sides of the platform. The platform allows diverse actors to participate with different roles and add the values of the platform. With regard to this thesis's focus, at least government organizations, private sectors, and citizens should be involved in the platform.
- Stimulating and capturing value from external participation. The platform acts as a foundation where different services and applications can be developed by third parties. Moreover, measures are taken by the government in order to support external parties in developing the services or applications.
- Access to the information of the platforms should be available, either through its official website, academic journals, books, or electronic articles.

In the basis of these criteria, three platforms are selected which are: Ushahidi, Open311, and DataSF.

After selecting the cases, data about those three platforms are analysed. To do so, documents including the official websites of the platforms, academic journals, and electronic articles that discuss the platforms are collected and reviewed. At first, general information is extracted to gain common understanding about each platform. This includes the initial development, its key concepts, its current implementation, and its innovation focus. In this way, it is expected that information about how the platform evolves can be gained. The information is then used to evaluate the structure of the platform development model stages.

Second, the documents are analysed in conjunction with the five attributes used to analyse the model in previous chapter including the actors' involvement, technology use, public data ownership, and the expected benefits from the government's and citizens' point of view. The information is then compared with the result of the analysis conducted in chapter 4, particularly related to the stage 5 of the model. The discussion of each case is given in the following subchapter.

5. 2 Case analysis

In this section each case is analysed by following the protocol described in subsection 5.1. The overview of the analysis of the three platforms is provided in Table 11.

5.2. 1 Ushahidi

Initially, Ushahidi was developed by a group of volunteers as a tool to track violent outbreaks and map reports related to disputed Kenyan election in early 2008. In collaboration with Kenyan citizen journalist, the website was designed as a means of sharing information by harnessing the benefits of crowdsourcing information when the environment was dominated by rumors and uncertainty (Okolloh 2009). The website was aimed at facilitating Kenyans to report daily incidents through mobile phones, creating a historical record of conflict by means of archiving news and reports that are received, and providing up-to-date information about the violence to Kenyan community (Heinzelman and Waters 2010).

The design teams combined Google Maps with a tool to report incidents of violence for users via mobile phones or Internet browsers (Goldstein and Rotich 2008). The users could also add photos and videos to support their claims. Nowadays, Ushahidi platform enables the users to send information through more variety of resources including email and social media like Twitter (Goolsby 2010). Each message is placed on the map as a blob bringing up the message reports, photos, and other information explaining what and when a situation occurs when it is clicked as shown in Figure 10.

Ushahidi platform was began by volunteers with no funding. However, as it was widely received with great benefits to humanity, they received funding from organizations such as Humanity United. It was used to redevelop the platform and improve its functionalities so that any person or organization can use to collect and visualize information in their own way (Okolloh 2009). The organization constantly brings innovation in developing the platform for various purposes, for examples, the depletion of medical supplies, tracking wildlife, building networks of peace actors, etc. (Heinzelman and Waters 2010). Nowadays the platform has main products, for examples (Ushahidi 2015):

- A data management system which focus on collecting data from the crowd rapidly and visualizing what, when, and where it happened.
- A map-making tool that facilitate the users to make collaboration in mapping world for their own purposes.
- A tool to process and interpret massive amounts of conflict and disaster data.

In addition, the map-making tool is built on an open API enabling users and organizations to develop their own robust applications on top of what are provided by the Ushahidi

team. The basic software is kept free and open source, nevertheless, the additional features or strategic consulting on deployments require certain costs.



Figure 10. The Ushahidi map for Japan's Earthquake (Meier 2011)

Information flow is the critical point in Ushahidi platform as it gathers data received from the citizens and other sources, process and provide it to the related actors requiring the information. Hence, collaboration among various actors with different is needed. Citizens, reporters and other actors providing the information about situation in the field are the start point as the information source. While tools and services are improved by Ushahidi team to facilitate them to input the data, user engagement also needs to be encouraged by introducing the platform and how it can benefit them so that the citizens' participation can be gained. In this case, the government could set up a mechanism to spur the dissemination and deal with local challenges in order gain citizens' trust, for example through a culture of free press and information sharing (Okolloh 2009).

In the data processing, accurately mapping reports in near real-time is the is the greatest challenge. While the basic information of the map is leant towards private sectors' contribution such as Google Maps and Yahoo! Maps, the detail and completeness of the map for the particular area can be achieved through diverse parties' collaboration. Volunteers work together to edit and build the map as complete as possible by using any sources of information including the satellite imagery declassified by the government. Without having to wait until the disaster strikes, governments, international organizations, NGO's and mapping enthusiasts need to collaborate and consolidate information in order to keep the geographic information accurate. Generally speaking, involving as many sources and partners into the mapping process as possible is the key in the Ushahidi platform (Heinzelman and Waters 2010).

Concerning public data ownership in this platform, there are two types of public data source that are used in order to generate the information. First, the data that is collected from citizens and other resources in the field. People report the situation online or via mobile phone anonymously. In this case, the reports are counter-checked by comparing with other sources (Okolloh 2009). The second one is government information that is needed in order to complete the first type of data and thus processed to generate the final information. For instance, in the Ushahidi platform for watertracker in Afganishtan, the government provided information about 3000 new water points throughout the country that were marked and mapped by using codes (Ushahidi 2015). An example of data flow in Ushahidi platform that was used for Libya crisis is shown in Figure 11.



Figure 11. Information flow in Ushahidi Platform for Libya Crisis

Ushahidi platform offers some benefits that can be utilized by governments in providing public services. Technological solutions are provided by the Ushahidi team which means that the risk of developing such a system is transferred to them. They also provide the technical ability that enables organizations including governments to perform better by pulling the integrated reports into their response systems automatically (Heinzelman and Waters 2010). As Ushahidi team is a specialist in data mapping and processing, the government thus could focus more on their other activities. Moreover, it can bring the government to one step closer to the citizens as the platform facilitate communication and collection of citizens' input. Another form of the platform can be used to improve the transparency and accountability of government activities through a multilayer map (Goolsby 2010). These features could support the government towards more open and participatory government. Moreover, innovative services and applications that become one of Ushahidi team's concerns can be utilized by the government to provide unforeseeable services to the citizens, which lead to more varieties and a higher quality of services.

From the citizens' perspective, the Ushahidi platform facilitate them to indirectly communicate with the related organizations or actors that can help providing assistance in particular situation in a better way. In addition, citizens can also access and interpret

the information themselves rather than rely on the mainstream media and organizations (Heinzelman and Waters 2010). Added value then is obtained through the integrated efforts from various types of actors. Moreover, other citizens can also contribute through many ways such as being the reporters or volunteers in processing and mapping the data. In this way, the citizens are facilitated to be the consumer as well as the contributor of the services.

5.2. 2 Open311

Originally developed to support 911 emergency call service, 311 was launched as a citizen service call center in October 1996 by the city of Baltimore (Suri 2013). Through this service, all questions, requests, and problems that are not emergencies were answered in order to ensure the emergency calls would be handled immediately via the 911 service.

Built before the internet, the original 311 telephone-based systems were implemented as standalone efforts with a lack of interoperability across city governments (Fountain 2014). Although the concept of citizen-generated data was utilized to speed up the municipal process and improve efficiency in terms of time and money, the original 311 service did not make the information public and resulted in duplicate complains about the same issues (Anna, Kateryna et al. 2011). The service then was expanded by embracing the concept of a one-stop shop, responsiveness to citizens, and calls for transparency and performance management. As this service grew in size and number, the development of its interfaces and functionalities was carried out by many cities. Citizens were facilitated to give comments and reports through web-based functionalities, such as upload photographs via smart devices using geo-tagging (Suri 2013).

This new web-based 311 system then evolved by the involvement of new private and nonprofit organizations in developing the functionalities or services that are provided to the citizens; leading to the new open311 platform. The civic technologists started to cooperate with municipalities to address issue reporting and citizens engagement in a more robust platform. Various particularized smart-phone applications were developed to be able to interact with the 311 platforms in some cities like Boston, New York, and Portland; some are commercial while others are open source application developed by the government and third-party developers (Suri 2013).

In order to stimulate the innovation in the service creation, the open311 platform uses open source software and provide the GeoReport API v2 enabling civic developers to build reusable tools and applications (Open311 2015). The applications are aimed at facilitating activities such as viewing and reporting issues that government entities are responsible for addressing. In this way, government and third party developers are allowed to create new applications and technologies that can be integrated with the same official government's contact center (the existing 311 service) which supports the standard. Nowadays, there are various mobile applications and web front-ends that are developed on top of the open311 service and connected to the API, for examples, SeeClickFix (shown in Figure 12), GeoReporter, ConnectedBits, etc.

While private companies and civic developers are contributing to the application creation, citizens are considered as co-producers by identifying and reporting non-emergency problems. Furthermore, as a measure to support open311 platform's expansion, the

developers create a mechanism where they can discuss the platform's components interoperability, particularly relating to technological and data. The governments can also support through regulatory and non-regulatory mechanisms that improve the human and institutional interoperability of the platform's implementation in different cities, such as through coordinated conversations and policy creation (Suri 2013).



Figure 12. SeeClickFix, an application built and work in connection with 311 services.

Open311 platform adopts an open model which provides transparency, participation, and collaboration in the public data use (Open311 2015). Citizens data sources including citizens profiles, incident reports, reviews, etc., and government data sources are provided and used, in addition to the standard and open API, to facilitate the development of new citizens service. Moreover, additional information can be obtained through the feedbacks and additional comments that are enabled to be seen across the system. The developers thus can build applications that feed data directly to or use data from 311 system (Belissent 2015). However, some issues regarding the data reuse should be taken into account. Particularly when private companies have control over the data generated by particular service, as they might rather look to sell the data rather than open it freely for new service development (Walravens 2014).

The implementation of open311 platform offers some benefits that can be expected from the government's point of view. Functionalities and features of the platform that are improved by private sectors and civic developers allow the government agencies to leverage their expertise and transfer the risks to them. Moreover, various services and applications could assist the government in performing their tasks. For examples, the platform serves as a tool to empower citizens in identifying problems as well as shaping the solutions; activities that are traditionally fallen to municipal employees (Farrell and Goodman 2013). Input and ideas from diverse communities can be collected and distilled from which trends and structural issues are identified and thus employed to alter or tailor specific policies. Furthermore, the government could expect from the development of the platform's functionalities by external developers to provide more sensitive services, such as to crowdsource crime-prevention and healthcare improvement. Lastly, the government can expect an financial advantage from the platform. In his paper, Walravens (2014) described that a city might reduce costs by opting for multichannel approach in facilitating the citizens to express their voices. Despite the initial investment, they do not have to hire more staff to deal with the call center process and thus keep cost balanced in the longer term.

Nevertheless, Open311 platform focuses more on customer satisfaction and offering high quality services rather than expecting financial return in particular (Walravens 2014). From the citizens' perspective, the involvement of private companies and external developers in creating the services and applications give added values to the service quality. Diverse applications are created and can be connected to the open311 platform which offers more variant ways in expressing their complaints, problems, etc. In addition, they can also report or update information as a way to contribute to solving the common problems in society. In this way, citizens as the user can gain an advantage from the technological innovation provided by the government in collaboration with the private sectors and civic developers.

5.2. 3 DataSF

DataSF was launched in 2010 as the official open data portal in San Francisco. This portal was aimed at providing hundreds of city datasets to be used by developers, analysts, citizens, and more (DataSF 2014). Being claimed as the central clearinghouse for data published by the city and county of San Francisco, some main features were provided in DataSF for users to process the data including filter, visualize, export, discuss the quality of the data, etc.

There are some reasons behind the measure of releasing data such as increasing internal data sharing, stimulating new ideas and services, and changing how the data is used (DataSF 2015). By opening datasets, internal departments can share and access to each other in a better way that may lead to more valuable insights into how the city works. It also could serve as the fuel for innovative ideas and solutions from the local technology community that can address common problems in the city. Moreover, open data is deemed as an enabler to create a range of positive outcomes like city service creation that can enhance citizens' quality of life and improvement in decision making. The way how DataSF changes the data is used is described in Figure 13.



Figure 13. Data use in DataSF (DataSF 2014)

As the data is the main product of this platform, the access and facilities for the users to obtain the data is the main concern of DataSF team. Continues improvement and several innovations are performed to provide the services. One of the examples is open data standards creation, which supports the use of applications, which are built by using the data from DataSF, in localities that are different from where they are built easily or even its integration into private applications (Bonaguro 2014).

Another form of the DataSF innovation is the adoption of cloud services to support the new site called data.SFgov.org, as the successor to DataSF.org. (Empson 2012). Two main features provided by this site are easy-to-use citizen interfaces and automatic API access to every dataset. In this way, citizens are facilitated to utilize the site in easier ways such as automatic full-text indexing and multiple open, machine-readable formats to explore and download the data. Particularly for civic developers, technical support and online developer resources are provided to minimize the barriers in using the data for application development. Figure 14 shows one of the applications, named Neighborhood Score, that is built on top of data provided in DataSF.

Neighborhood Score

CRIME, EDUCATION, ENVIRONMENT, LOCAL, MAPS

<complex-block>

Figure 14. Neighborhood Score, An example of applications built using DataSF

There are various types of actors that are involved in the implementation of DataSF platform. Starting from the government as the initiator of opening their data, they also arrange specific roles for internal agencies in order to improve and maintain the quality of data released in the platform, i.e. (DataSF 2015)

- Data Coordinators who represent each department's contact and accountability for open data;
- Chief Data Officers who are responsible for the creation and implementation of open data policy;
- Data Stewards as well as Data Custodians who are in charge in technical implementation of databases and information systems.

Furthermore, the government also leverage the services and features provided by private sectors for the portal development. A data sharing start-up, which is called Socrata, is engaged to facilitate the new data initiatives by providing a cloud-based platform for aggregating data from various sources and disseminate it as interactive information
(Empson 2012). Through diverse interfaces such as web, app, social, and API interfaces, the government then can share and enable users to access and re-use the data. New functionalities can also be added to support the development of the portal as Socrata extends and broadens their features (Bonaguro 2014). After the data has been opened and access has been provided, various types of users encompassing citizens, researchers, analysts, civic developers, and the government agencies themselves are enabled to perform data-driven works whether to act as a concerned citizens, to develop applications and services or conduct research.

As an open data portal of the city and county of San Francisco, the main source of the data in the platform is the city itself. There are 847 items in the catalogue with much of them are derivative of a smaller set of datasets (Bonaguro 2014). However, non-city data, such as US Census and other national survey data, is also employed and incorporated into the platform in order to increase the value of the city data by contextualizing and extending the city data, for example, dozens of datasets are pointers to data outside of DataSF system (Bonaguro 2014). In this way, DataSF can also serve as a central data repository by gathering data not only from the city but also from diverse sources and thus provides added value for the users.

In conjunction with the purpose of releasing data to public, the city of San Francisco expects some benefits from the implementation of DataSF platform. Through the platform, new ideas and innovation are stimulated which support the application design and development. It enables the city to provide more variants of public services in a higher quality. In 2011, 60 applications have been produced by using the data provided in DataSF. In addition, the applications were developed at no costs to the government; leaving the financial risk to the private sectors and civic developers (Nath 2011). As a user, the government utilize the platform as a medium to share and access to each other's datasets. They can also work together to improve the completeness and transparency of the data and thus enhance the value of the data. Lastly, DataSF serves as an enabler for the government to leverage their data in addressing different needs of more diverse actors, such as researchers and analysts.

On the other side, citizens could also expect some benefits from the platform either as a user or contributor. A better quality of the data resulted through the involvement of more resources and the mechanism to discuss the data is useful for a wide range of data-driven works conducted by the citizens. Innovative applications and services stimulated by the platform also give benefits to the citizens with regard to the variety of the applications and their concerns on public services. Furthermore, the platform gives opportunities to citizens to contribute to the data quality improvement, for example by providing insights or update the existing information. They are also facilitated to build applications by using the data available with diverse motivations e.g., purely altruistic and profit making (Nath 2011).

5.3 Cross-case conclusions and model refinement

After each case is reviewed and elaborated in previous subchapter, in this part a conclusion is made in the basis of those three cases. Furthermore, an analysis is conducted to obtain information that is used to evaluate the platform development model. Firstly, we analyse the cases with regard to the platform business model components in

order to figure out how they work. Secondly, the analysis is carried with more focus on how the platform was evolving into the current condition.

With regard to the analysis of how the platforms work, at first a summary of the document analysis of the three cases is provided which is shown in Table 12. Furthermore, it is compared to the analysis of the stage 5 of the model discussed in chapter 4. As the result of the comparison, information obtained from the analysis of stage 5 outlined in chapter 4 is found similar in analysis of the 3 platforms in this chapter. Thus, the three platforms are classified as the implementation of platform concept in the fifth stage of the platform development model in this thesis (Figure 15). However, additional information is also extracted from the case study. Therefore, it is used to complement the existing information and thus refine the model.



Figure 15. The three cases are classified as the fifth stage of the model

	Ushahidi	Open311	DataSF
General description: • Initial motivation • Key concept • Coverage • Innovation focus	 Designed as a tool for information sharing in a crises. Crowdsource information and visualize it on a map; forwarded to the concerned actors. 159 countries; 31 languages. Expand the implementation not only in the crises; support the government transformation through tools to facilitate participation and information sharing 	 Designed as a medium to handle contact in non- emergency issues. One-stop shop for citizen- generated data to be followed-up by the cities. Around 30 cities in U.S.A and 4 cities in Canada and Germany . The interoperability across the platform in different cities, particularly in human and institutional contexts. 	 Aimed at providing city datasets to public. Open up data, provide access, and facilitate the re- use. 847 items data of the city of San Francisco (2014) Improvement of the access and the re-use of data: open data standards, cloud services
Stakeholder management	Development of technical functionalities are carried out by Ushahidi team; Government act as the information receiver as well as contribute to the dissemination of the information about the platform;	The government, as the initiator of the origin system, provide the foundation of the platform assets including data and the mechanism of the data flow. They also have a role in policy making to support the platform improvement;	The city of San Francisco improve and maintain the quality of data through internal role division; A start-up provides technological support for the open data portal;

Гable 1	l2. Over	view of	the case	e analysis

	citizens and journalists contribute to the information source (accidents, reports, etc); Volunteers, government, NGO's and mapping enthusiasts participate in updating the particular maps.	Citizens contribute to co- producing the information; Private sectors and civic developers enhance the services through application creation and its environment.	Various types of users e.g., citizens, civic developers, analysts, researchers, and the government agencies itself use, re-use, and discuss the data, result new information from the existing data.
Technology use	 Mobile technologies for citizen participation; Data mapping and process to generate integrated reports; PBRs: map making tool, APIs, open source and free basic software. 	 Mobile technologies for citizen participation; Open source software; PBRs: GeoReport API, developer community, regulatory mechanism for interoperability. 	 Open data and data processing tools for users; Open data standards creation; A cloud-based platform for data integration; PBRs: automatic API for every dataset, technical support, online developer resources.
Public data ownership	The platform receives and processes data from citizens' input and government's information (if the project is related to a government's mission) and produce information to be forwarded to the concerned actors.	The government have control over assets including data from citizens' input. Private sectors and civic developers might access the data to build applications with special considerations regarding personal data.	The city of San Francisco provide the main city data and provide additional data from other sources e.g., non- city data.
Return on public investment	 Technology expert; Risk transfer; Innovation services and applications to assist the government agencies; Support more open and participatory governance 	 Technology expert; Risk transfer; Innovation services and applications to assist the government agencies; Financial advantage. 	 Stimulating innovation services and applications for the city; Financial risk transfer; A medium to cooperate with other government agencies; An enabler to address wider range of users.
Public value creation	 More innovative and variant of services; Opportunities to contribute to public services; A medium to communicate with concerned actors involved in the platform 	 More innovative and variant of services to make contact with government; Opportunities to contribute to public services 	 More innovative and variant of services; Support for data-driven works; Opportunities to contribute to public services.

Various actors are involved with diverse roles in the platforms categorized as stage 5 of the model. Besides the roles described in the analysis, additional insights are identified from the cases. First, despite public service delivery is the government's responsibility, citizens, NGOs and general publics can take part in the platform's operation. An example can be found in Ushahidi where volunteers, NGO's, mapping enthusiasts contribute to the mapping creation which is the vital feature of the platform. Furthermore, in order to stimulate the innovation and support the platform's sustainability, rules and policy are required to made by the governments. For example, the governments in some cities in U.S.A concern in policy making to regulate the standards of the applications to enable an application use in different cities.

Additional points are also identified from the cases with regard to the benefits that can be expected by the government and citizens. From the government's point of view,

technological support can be gained from external parties. For instance, in Open311 diverse applications are developed by civic developers and private sectors that can be leveraged by the cities to enhance their basic service. The platform can also facilitate the government to have better communication and cooperation with citizens as well as other government agencies; leading to more open and participatory governance. Another insight is that the government could gain financial advantage by minimizing operating costs. For example to keep the number of call center staff balanced by utilizing applications which is shown by Open311 platform.

Moreover, there are also three additional insights from the citizens' perspective. Firstly, this kind of platform offers opportunities for citizens to participate and contribute to public services through diverse roles. The simplest way is by using applications created on top of the platform and therefore they share data, experience, opinion, etc., which can be used to improve the public service. It can also be an option for citizens to be volunteers such as in Ushahidi, or create innovative service and applications for cities such as in DataSF. Secondly, through the platform citizens could indirectly interact and communicate with other parties that are involved in the platform; leading to more chances for their needs to be addressed. This is possible because the platform allows diverse type of parties to join, such DataSF which facilitates, researcher, analysts, etc,. Lastly, the platform could be useful for them to support their data-driven works. DataSF, for example, facilitates data collection and processing to be re-used by public to create innovative business and gain profits. Different with the other three attributes, there is no additional insight is identified for technology use and public data ownership attribute from the three cases. The overview of the results of the comparison is shown in Table 13.

In addition to the analysis of the five aforementioned attributes of the platforms, we continue the case studies with the focus is on the platforms' evolution which is aimed to evaluate the model in terms of the structure of the platform development stages. However, the data gained from the documents is insufficiently complete to capture the information of the platforms' evolution with regard to the platform openness and platform stream. Hence, insights are captured from the case studies with no additional information of the structure of the model stages is added.

• Ushahidi

The platform was developed by a group of volunteers to share information obtained from crowdsourcing the citizens and then forward it to government agencies, NGO's and other related organizations. Since its initial development, the key concept remains the same. However, there are some notable points of its evolution, as follows:

- At first, the tools used to input information were SMS and the website itself. It has evolved by utilizing mobile phone applications, meanstream news and social media.
- It evolved from a volunteer-based project with no founding source into non-profit organization who received funding from humanity organizations redevelop the platform's functionalities. Nowadays, they offer various customized features and services with charge for any public and private organizations as their business model, e.g., strategic deployment consulting, and data visualization and analysis.

Table 13. The result of comparison between analysis in chapter 4 and case studies.

	Similar results	Additional insights
Stakeholder management	Government get involved by providing a foundation in terms of data, information flow mechanism, infrastructure, etc. and/or customer relation measures. Private sectors contribute in assets provision and application/service creation. Citizens and public can contribute to the application creation and data provision by using it.	Citizens, NGOs can contribute in the operation of the platform. Government have an important role in policy making to support the platform's sustainability.
Public data ownership	Two main public data sources are the government and the citizens through the use of applications/services. The data need to be shared with external actors to support the application creation.	-
Technology Use	User interface and user participation are supported through mobile technologies. Tools for data sharing, processing and integration play are important to generate integrated reports. Platform boundary resources are available in diverse forms.	-
Return on public investment	 Massively distributed innovation. Risk transfer. Enable service customization to address 'niche market'. 	 Technology expert. Support for more open and participatory governance. Financial advantage.
Public value creation	- Faster innovation. - High quality services (applications). - Mix-and-match customization.	 Opportunities to contribute to public services. A medium to communicate with more actors. Financial advantage.

• Open311

Open311 could be an example of how a city government deployed a system and expanded it by embracing private sectors and citizens as co-producers in delivering their services. Initially, it was a telephone-based system which then evolved into a one-stop shop for citizens to submit a complaint or report. Furthermore, as the platform grew in size and number, the features and interfaces began to grow in conjunction with the government's measures to encourage innovation from external parties.

- The platform evolved from a mere call-center system into a digital foundation and resources for external parties to create complementary services and applications, such as by opening data to public and providing standards.
- Following the government's measures, private and non-profit organizations as well as civic developers are involved in the development of the platform's functionalities, particularly through mobile application creation.
- As an implication of the various applications, citizens are not deemed merely as the user but also co-producers when they report problems and use the applications. Empowering them to take part on activities that have been traditionally fallen to the municipal employees.

• DataSF

Initially developed as an official portal for opening their data, the city of San Francisco has partnered with a start-up to developed and operated the portal. They then encourage innovation conducted by external parties by providing standards for application created on top of their data. Improvement of the data quality is also conducted by embracing the citizens and public as the user through a mechanism where they can make discussions related to the data access and use.

5.4 Conclusion

This chapter discuss case studies as an evaluation tool for the platform development model constructed in this thesis. In subchapter 5.1, the cases are selected and the protocol to collect data is set up. The platforms representing the last stage of the model are selected with considerations to gather information about the state of the art in platform implementation. Following the criteria, three platforms are selected which are; Ushaidi, Open311, and DataSF.

Each case is analysed and elaborated in subchapter 5.2. General description is given encompassing the initial development and the innovation focus of the platform in order to support the analysis. In addition, the analysis is conducted with regards to the five platform business model components. The overview of the case studies is provided in Table 12.

In subchapter 5.3 a cross-case conclusion is given. First, the analysis of the cases with regard to the five attributes is compared to the analysis conducted in Chapter 4. As the result, there is no contrary information between the two analysis while additional insights are identified and employed to complement the model. It is shown in Table 13. Furthermore, analysis is also conducted to capture information about the platform evolution. However, the information from the documents is not sufficient to draw a cross-case conclusion so that no additional information can be made with regards to the structure of the model stages.

This page intentionally left blank

Chapter 6 Conclusion

This chapter presents and discuss the summary of research findings which is presented in subchapter 6.1. Furthermore, recommendations are provided in the basis of the research findings, particularly aimed for governments in utilizing the concept of platform in public e-service provision. The recommendations are elaborated in subchapter 6.2. Next, in subchapter 6.3 thesis reflections are presented. Lastly, limitations of the research is presented which is followed by a brief discussion about further research in subchapter 6.4.

6.1 Research Findings

This research starts with a gap between platform development from industry contexts and its application in public e-service provision. Hence, a platform development model is constructed by applying the concept of platform in terms of platform stream and platform openness in order to synthesise existing e-government maturity models and platform development models. Five stages are identified which constitute the model. The stages shows how the concept of platform is evolved as more external parties, which are private sectors and citizens, get involved in the process of public e-service provision. Thus, the model delineates the movement of government from "closed" condition towards condition where they collaborate with private sectors and citizens in delivering e-services.

The first four stages of the model represent organizational and product family streams. Those streams' focus is on the decomposition of the service components including human and technological components, and the organization of those components. The four stages are internal where no external parties get involved, citizen co-production where citizens are engaged as the partner of the government in providing the public e-services, provider partnership where government and private sectors form a partnership in delivering public e-services, and two-sided collaboration where those three parties work together in order to enhance the value of the services. For the final stage, external innovation, market intermediary and platform ecosystem streams are adopted. In this stage, innovation in improving the service delivery is stimulated through external parties' participation. The platform serves as a foundation where various services and applications are more influenced by participants' creativity instead of solely rely on the platform owner's design.

Furthermore, implementation of the concept of external innovation platform in the field, which is captured through case studies, varies with regards to the government's role and the platforms' values. Government might take slightly passive roles by being a user and performing common activities as shown in Ushahidi platform, or play more active roles by stimulating and facilitating the service and application creation through infrastructure and mechanisms as shown in Open311 platform. The answers to the research question of this thesis is summarized as follows:

1. What are the concept of platform, development model, and methods that can be used for synthesising the models?

There are four platform streams that can be used to define the term platform in this research, which are:

- Organizational: Platform as organizational capabilities that enable superior performance
- Product family: Platform as the stable centre of a platform family which leads to derivative products
- Market intermediary: Platform as an intermediary between two or more market participants
- Platform ecosystems: Platform as a system or architecture that supports a collection of complementary assets

Moreover, the concept of product family can be interpreted in service context as a management method to structure resources and activities in delivering the service, which consists of both human and technological components. In addition, the concept of platform openness is used to identify the participation of external parties in delivering the services. For this research, a platform is considered open when there is no restrictions for participant to get involved in the development, commercialization or use of the platform and, if any, the restriction is reasonable and non-discriminatory.

As the input of the synthesis process, e-government maturity models which represent eservice development provided by the governments, and platform development models which represent the development of technological platform, are employed. In this context, development models describe the growth of organizations through stages or levels that are sequential in nature. For the synthesis process, meta-synthesis methodology is followed. The methodology is defined as a research method used to produce interpretive translations, ground narratives or theories by integrating, and comparing the findings or metaphors of different qualitative studies. Furthermore, case studies methodology is also employed as a means for evaluation process of the platform development model resulted from the synthesis process.

2. What are the stages of the model (that are used as a guide to move from closed condition towards the collaboration of the government, private sectors, and citizens in *e-service provision*)?

This question is answered by synthesising the existing e-government maturity models and platform development models. The synthesis process follows qualitative metasynthesis procedure and employ the concept of platform streams and platform openness as key attributes. As the result, five stages are identified which are internal platform, citizen co-production platform, provider partnership platform, two-sided collaboration platform, and external innovation platform.

Furthermore, in interpreting the platform development model resulted from this research, the government may see it as a development trend rather than a must-go-path. Depending on the government organization's capabilities, resources, and needs, it is not necessary for them to go through the five stages step by step. Instead, the stages can be seen as alternatives on how a priority is made on engaging external parties in delivering public e-services.

3. What are the distinctions of the stages with regard to the participation of the government, private sectors, and citizens in public e-service provision?

In order to answer Q3, five platform business model components are employed which are stakeholder management, technology use, public data ownership, return of investment, and public value creation. These components are adopted to delineate how the platforms work with regards to the involved actors' roles and their values for governments and citizens. The elaboration of the analysis is shown in Table 15.

4. What is the lesson that can be learned from the implementation of the concept of platform in the field in order to refine the model?

As the last step of the thesis approach, case studies is conducted by analysing documents of three platforms that are selected as the cases. These platforms represent the last stage of the model and studied in order to gain insights of the state of the art in platform implementation. The comparison of analysis in Chapter 4 with the case studies in Chapter 5 results in additional insights which are used to complement the model (shown in Table 14). However, the structure of the model stages cannot be evaluated due to the insufficient information obtained from the documents. By considering the limitation on the data collection, further research can be focused on the model evaluation with more reliable data and different approaches.

Table 14. Additional insight	s from case studies.
Attributes	Additional insights
Stakeholder	Citizens, NGOs can contribute in the
management	operation of the platform.
	Government have an important role
	in policy making to support the
	platform's sustainability.
Technology Use	-
Public data ownership	-
Return on public	- Technology expert.
investment	- Support for more open and
	participatory governance.
	- Financial advantage.
Public value creation	 Opportunities to contribute to
	public services.
	- A medium to communicate with
	more parties.
	- Financial advantage.

Table 14. Additional insights from case studies

Table 15. Model analysis by employing platform business model components as the attributes

	Internal	Citizen co-production	Provider partnership	Two-sided collaboration	External innovation
Stakeholder management	The government organize internal assets and service components; act as the sole service provider, e.g. - Categorization of published information in the basis of data integration and personnel's' tasks.	 Citizens act as the government's partner in tackling problems and enhancing the service quality by sharing their idea & opinion. The government provides tools and adjusts the internal processes to facilitate, give response to, and follow up the citizens' involvement. 	 The government acts as the main service provider and the integrator of the services provided by private sectors. The private sectors provide their expertise and services to add values of the main services provided by the government. 	 The government connects the citizens who share their idea and private sectors who share their expertise in order to enhance the eventual services. Private sectors become the partner of the government to provide services and together address the citizens' needs. 	 The government provides the foundation in terms of assets and/or customer relation measures and stimulate the service creation by external developers who can be private sectors or individuals. The citizens and private sectors could be the user as well as a contributor of data, experiences or idea.
Technology Use	 Government online presence Data integration Online interaction Privacy and confidentiality 	- User interface - User participation - Data processing - Privacy and security - Mobile technologies	-User interface - Data sharing & functionalities expansion - Privacy and security	 User interface User participation & Mobile technologies Data sharing and processing Privacy and security 	 User interface User participation & Mobile technologies Data sharing Privacy and security Platform boundary resources
Public data ownership	 The government process internal data and deliver it to the citizens, such as data about public facilities. Protection for personal information that is collected. 	 Citizens contribute to providing data in terms of ideas, preferences, etc. The government process the data, enhance, and add more value to it. 	 Government share information and public data concerning the service creation with the private sector. Government can have exclusive access to sensitive personal data of citizens. 	 Government information, in addition to public data received from citizens, are shared with private sectors to create the service. Government can have exclusive access to sensitive personal data of citizens. 	 Public data can be shared by the government to improve service quality and stimulate service creation by external parties. Some measures need to be taken to protect individual privacy and minimize negative impact of opening data such as requirements to access the data.
Return of investment	 Increase the internal managerial efficiency. Produce variety of services. Support the flexibility in service design. 	 Realizing open government initiative. Obtaining a source of information and ideas. 	 Benefit from private sectors' expertise in technology, financial, or management. Entrepreneurial outcomes. Risk transfer. 	 Provide alternative services from PPP projects to address citizens' increasing demands. Achieve more acceptable PPP projects that genuinely add public value. 	 Massively distributed innovation. Risk transfer. Enable service customization to address 'niche market'.
Public value creation	 Better quality of data processing and quicker response. More variant of services improvement to be offered. 	 Increase the likelihood that the service being offered will address their preferences. A medium to accommodate personal motives. 	- Greater confidence in the service. - Cost savings. - Better customer care.	- More public value through enhanced information, choice and customer-oriented services.	- Faster innovation. - High quality services (applications). - Mix-and-match customization.

6.2 Recommendation

In the basis of research findings, some recommendations are made for governments in applying the concept of platform by utilizing the platform development model in order to improve the quality of public e-service provision.

• Internal process adaptation is required in the application of all stages of the platform development model

Applying the concept of a platform as an organizational platform means that an organization has to organize and manage their internal resources and capabilities in order to improve their performance. To relate it to having private sectors and citizens as partners in delivering public e-services, in order to benefit from their participation, it means that the government need to adjust or adapt their common processes or activities so that the input or values that they receive could be followed up and leveraged maximally. Moreover, the internal process adaptation does not only apply for the internal platform, but also for other platforms in the stages of the platform development model.

For example, in citizen co-production stage, when getting citizens involved in e-service design by accommodating their opinions or requests, government need to take into account the role or task divisions that will deal with those input. This might include personnel capacity to receive the input, mechanism to give response for participants and how the data can be analyzed to obtain the trend of the data for long term use.

$\circ~$ Communication with external parties as innovation creator

In conjunction with the concept of platform boundary resources, as the government empower and stimulate external parties to contribute to service provision, active roles to manage and organize the service development are required, particularly for external innovation platform. This also beneficial to figure out the required measures to support their productivity in generating services. This is also beneficial to control the service development so that the innovative solutions created by external participants are aligned with the government's main goal. For example by creating a community of civic developers so that the government can monitor the services and applications generated by them and analyze their implications for citizens' satisfaction.

• Support the readiness of citizens to adopt the concept of platforms

Three stages of the platform development model elaborate the importance of citizens' partnership in realizing good quality of public services. However, the citizens' readiness to adopt the concept of platform may differ from one region to another, and thus influence to what extent they want to contribute. In order to attract the citizens to get involved in public e-service provision, government need to look from the citizens' perspectives and thus figure out the motives that can motivate them and the obstacles that hinder them to contribute. For example, in the implementation of Ushahidi, the lack of sharing culture hinders the citizen to participate and thus make the platform difficult to works well as the citizens are the key in data sourcing. Moreover, trust and the way they welcome the idea of the platform should be considered before the government implement it. Actions thus can be taken to minimize the obstacles, for example by promoting the platform use according to the local condition.

$\circ~$ Considering the trade off in utilizing external technological expert

The result of case studies suggest that private sectors have already taken a step in developing platforms that bring together multi parties while facilitating the participants to expand the platform functions according to their creativity and innovative ideas. It means there are private platforms which focus on public service provision and thus can be an option for government to employ instead of develop their own. The example is found in Ushahidi platform which target governments as their clients. On the one hand this could be beneficial as technological risks are transferred to them, but on the other hand, the government need to consider the risk of data sharing and less control in the use of private platforms. This is important as the model analysis shows that the five stages indicate the importance of the security and confidentiality of public data. Moreover, the initial investment of adopting a private platform should also need to be taken into account with regard to the long term purpose of the government.

Another option is developing a public platform for their use while keep integrating the platform with the existing private platforms. An example is shown by Open311 platform which enables private platforms such as SeeClickFix platform to be connected. This is important considering that the more user of a platform, which might be obtained from another platform's users, the more attractive the platform is, and this could lead to a higher number of citizens that can use the services.

• Policy making by government to support the platform sustainability

Government play an important role in supporting the platform development through mechanisms or policies that support the platform expansion or public data protection. For examples, in private partnership platform, a clear agreement with private sectors on how individual data can be accessed should be made to protect citizens' privacy. In this way, the citizens' trust could be gained as their data security is taken into account. Another example is a mechanism, that can be applied in external innovation platform, on how public data can be accessed by civic developers in order to create applications, what kind of applications that are allowed to be built by using public data, how the interoperability among applications that are developed can be supported, etc.

6.3 Reflection

In this section, a self-reflection on lessons learned from the process of doing the research and the content of the research in this thesis is provided.

Process

Describing the research problem

I probably started my thesis not with an ideal situation where the research problem is defined clearly. It took a long time for me to finally be able to describe the research problem even after I have identified other research components such as the research deliverable and approach. Getting inspired by a practical project, which then turned into getting canceled, I somehow interpreted a research problem as "why I want to have that kind of output of the research", which is because I know how it will be useful, and not "what kind of situation that I want to deal with by doing the research which will have that kind of particular output".

Once I figured out the misunderstanding, describing the research problem was still an issue for me because of the entangled concepts that I want to deal with. Again, it was

probably influenced by the components that I wanted to have in the research output which blurred the main problem of the research. To deal with such an issue, intensive discussions with the supervisor helped a lot to be able to see things differently.

• Finding suitable research methods It is probably quite common for students to have an idea on how to deal with the research problem without really know what the name of the method or if the particular methodology exist. For this research, the meta-synthesis methodology was discovered after some time dealing with the idea. To deal with such an issue better, in addition to the self-searching, it is always better to talk to and discuss with the supervisor or other people who are more familiar with research about the temporary idea, in order to find out the more possibilities and information of the suitable methods to work with.

Synthesizing two different domains of models

Following the meta-synthesis method, the main challenge in this research is to determine how the studies are related. As the domains of the studies which are used as the input of the process are different, qualitatively interpreting the studies into each other could be frustrating. Thus, finding the key attributes that may be used to accommodate the studies is an important step that may be helpful to deal with the issue..

Model analysis

As the model resulted in this research is a product of the meta-synthesis process by employing a number of growth stage models, I expected that the analysis of the stage could be done much because of information from the literature discussing those models. In fact, more information supporting the analysis is obtained much more from literature which do not discuss the models. Therefore, it is recommended to allocate more time in the research plan for the information search by taking into account diverse literature.

Dealing with the writing process

Putting ideas and thinking down on paper is very challenging. In addition to the language barrier, arranging a storyline and assuring that it is understood from the reader's perspective could be frustrating. For me, online dictionaries are a must thing to have when I write. Furthermore, in order to make a storyline, for me it is helpful to putting down all main points that are captured from literature, going through them to get the main ideas and then re-arranging it in a storyline. It indeed requires more time but it somehow can be helpful to minimize getting stuck in writing. It is also very helpful, if it is possible, to have someone else reading and checking the writing.

<u>Content</u>

Interpreting the results

This point is particularly aimed to reflect on the stage model resulted from this research. The first four stages of the model represent organizational and product family streams, while the last stage represent market intermediary and platform ecosystem streams. However, referring to the concept of those four platform streams, the last stage of the model (external innovation) can also be deemed as a representative of organizational and product family streams. In applying the concept of external innovation, which facilitates collaboration among multi parties and empower them to bring innovative solutions, the government also need to organize their internal

capabilities which consists of diverse types of components. The later concept represents organizational and product family streams. For example, in DataSF, the city of San Francisco allocates personnel for roles that are dedicated to deal with public data access, use, and maintenance. From institutional perspective, the government need to manage the accessibility of data, the interoperability of the applications, and others which then are addressed through standards or mechanisms for developers in utilizing the government's assets and creating the applications. In this sense, the first four stages focus more on structural organizational management while the last stage shifts the focus on empowerment of the external parties to stimulate innovation and produce unforeseeable public e-services.

6.4 Limitation & Further research

The limitations of the research performed in this thesis are presented as follows:

- In the meta-synthesis process that is conducted in this research, various growth stage models are employed as the input of the process. Noting that the research does not address the question of appraisal of the models, the thesis limits itself through an assumption that those models are acceptable in quality.
- Model evaluation is only conducted by selecting cases which represent the last stage of the model constructed in this thesis. Although it could give benefit with regard to information about the state of the art platform implementation as a collaboration medium for multi parties, evaluation for other stages will contribute to the model refinement.
- Data collection for the model evaluation is only conducted through document analysis. This method limits the information that can be extracted from the case studies particularly with regard to the evolution of the platform.

By taking into account the aforementioned limitations, the following points are the recommendations made to improve the research presented in this thesis:

Model analysis

The five stages of the model in this research are analysed by employing five platform business model components as the attributes. In order to gain more understanding of the each stage, the attributes can be expanded by including other aspects.

Model evaluation

The evaluation of the model resulted in this research is limited because the criteria that are used to select the case only represent the last stage of the model. This is sufficiently aligned with the purpose of the evaluation. However, in order to improve the evaluation, multiple case studies (Yin 2009) can be employed to evaluate each stage of the model. In this way, other information can be gained to evaluate related theory, for example to evaluate the circumstances under which an organization move from a stage to another. Moreover, in this research the structure of the stages cannot be evaluated due to insufficient data. For this reason, data collection might be done in different ways in order to gather more reliable data, for example by collecting data from official documents that are released by the organization and government who in charge in the development of particular functions of the platform in addition to personal interviews may give better results.

References

Accenture (2003). eGovernment Leadership: Engaging the Customer <u>The Government Executive</u> <u>Series</u>, Accenture.

Andersen, K. V. and H. Z. Henriksen (2006). "E-government maturity models: Extension of the Layne and Lee model." <u>Government Information Quarterly</u> **23**(2): 236-248.

Anna, U., L. Kateryna, et al. (2011). An Open Civic Platform. <u>2011 21st Int. Crimean Conference</u> <u>"Microwave & Telecommunication Technology" (CriMiCo'2011)</u>. Ukraine.

Armstrong, M. (2006). "Competition in two-sided markets." <u>RAND Journal of Economics</u> **37**(3): 668-691.

Baldwin, C. Y. and K. B. Clark (1997). "Managing in An Age of Modularity." <u>Harvard Business Review</u>: 84-93.

Ballon, P. (2009). Control and Value in Mobile Communications: A Political Economy of the Reconfiguration of Business Models in the European Mobile Industry. <u>Commun.</u> Brussel, Vrije Universiteit Brussel. **Ph.D**.

Ballon, P. and N. Walravens (2009). <u>Towards a New Typology for Mobile Platforms: Validation</u> <u>Through Case Study Analysis</u>. 1st Europe, Middle East, North Africa Regional ITS conference, Manama, Kingdom of Bahrain.

Basole, R. and J. Karla (2011). "On the Evolution of Mobile Platform Ecosystem Structure and Strategy." <u>Business & Information Systems Engineering</u> **3**(5): 313-322.

Baum, C. H. and A. D. Maio (2000). Gartner's Four Phases of E-Government Model, Gartner Group.

Belanger, F. and J. S. Hiller (2006). "A framework for e-government: privacy implications." <u>Business</u> <u>Process Management Journal</u> **12**(1): 48-60.

Belissent, J. (2015). 3-1-1 Meets Open Data: Open 311 Empowers Citizens and Extends Smart City Governance. <u>Forrester J. Belissent</u>, Forrester Research, Inc. **2015**.

Bente, S., U. Bombosch, et al. (2012). Chapter 5 - EA Maturity Models. <u>Collaborative Enterprise</u> <u>Architecture</u>. S. B. B. Langade. Boston, Morgan Kaufmann: 123-135.

Bertot, J. C., P. T. Jaeger, et al. (2012). "Promoting Transparency and Accountability Through ICTs, Social Media, and Collaborative e-Government." <u>Transforming Government: People, Process and</u> Policy **6**(1): 78-91.

Bhatnagar, S. (2005) e-Government in the Asia-Pacific Region: An Assessment of Issues and Strategies.

Bonaguro, J. (2014). Open Data in San Francisco: Institutionalizing an Initiative, City and County of San Francisco.

Bonsón, E., L. Torres, et al. (2012). "Local e-government 2.0: Social media and corporate transparency in municipalities." <u>Government Information Quarterly</u> **29**(2): 123-132.

Brinkerhoff, D. W. and J. M. Brinkerhoff (2011). "Public–Private Partnerships: Perspectives on Purposes, Publicness, and Good Governance." <u>Public Administration and Development</u> **31**(1): 2-14.

Britten, N., R. Campbell, et al. (2002). "Using Meta Ethnography to Synthesise Qualitative Research: A Worked Example." Journal of Health Services Research **7**(4): 209-215.

Chun, S. A., S. Shulman, et al. (2010). "Government 2.0: Making connections between citizens, data and government." Information Polity **15**(1): 1-9.

Cusumano, M. (2010). "Technology Strategy and Management. The Evolution of Platform Thinking." <u>Communications of the ACM</u> **53**(1): 32-34.

Dal Bianco, V., V. Myllarniemi, et al. (2014). <u>The Role of Platform Boundary Resources in Software</u> <u>Ecosystems: A Case Study</u>. Software Architecture (WICSA), 2014 IEEE/IFIP Conference on.

DataSF (2014). "About DataSF." Retrieved March 3rd, 2015, from https://data.sfgov.org/about.

DataSF (2015). DataSF Guidebook: Data Coordinators Edition, City and County of San Francisco. 1.1.

de Reuver, M., S. Stein, et al. (2013). "From eParticipation to mobile participation: Designing a service platform and business model for mobile participation." Information Polity **18**(1): 57-73.

Deloitte and Touche (2001). "The citizen as customer." CMA Management 74(10): 58.

Dias, G. P. and M. Costa (2013). "Significant socio-economic factors for local e-government development in Portugal." <u>Electronic Government, an Int. J</u> **10**(3/4): 284-309.

Doran, D., C. de Blok, et al. (2010). "Modular care and service packages for independently living elderly." International Journal of Operations & Production Management **30**(1): 75-97.

Dubosson-Torbay, M., A. Osterwalder, et al. (2002). "E-Business Model Design, Classification, and Measurements." <u>Thunderbird International Business Review</u> **44**(1): 5–23.

Dunleavy, P. and H. Z. Margetts (2010). "The Second Wave of Digital Era Governance." <u>APSA 2010</u> <u>Annual Meeting Paper</u>

Eisenmann, T. R., G. r. Parker, et al. (2009). Opening Platforms: How, When and Why? <u>Platforms</u>, <u>Markets and Innovation</u>. A. Gawer. Cheltenham, Edward Elgar Publishing Limited: 131-162.

Empson, R. (2012) Clouds & APIs: Mayor Lee Unveils The San Francisco Open Data Cloud.

Farlex (2014). "TheFreeDictionary." Retrieved September 11th, 2014, from <u>http://medical-dictionary.thefreedictionary.com/developmental+model</u>.

Farrell, D. and A. Goodman (2013) Government by Design: Four Principles for A Better Public Sector.

Fixson, S. K. (2005). "Product Architecture Assessment: A Tool to Link Product, Process, and Supply Chain Design Decisions." <u>Journal of Operations Management</u> **23**: 345-369.

Fountain, J. (2014). Connecting Technologies to Citizenship, Technology and the Resilience of Metropolitan Regions, University of Illinois Press.

Gawer, A. (2009). Platforms, markets and innovation: an introduction. <u>Platforms, Markets and</u> <u>Innovation</u>. A. Gawer. Cheltenham, Edward Elgar Publishing Limited: 1-16.

Gawer, A. (2010). Towards A General Theory of Technological Platforms. <u>"Opening Up Innovation:</u> <u>Strategy, Organization and Technology" Summer Conference 2010</u>. Imperial College London Business School: 1-40.

Gawer, A. and M. Cusumano (2012). <u>Industry Platforms and Ecosystem Innovation</u>. DRUID 2012, Copenhagen.

Ghazawneh, A. and O. Henfridsson (2013). "Balancing platform control and external contribution in third-party development: the boundary resources model." <u>Information Systems Journal</u> **23**(2): 173-192.

Goldstein, J. and J. Rotich (2008). "Digitally Networked Technology in Kenya's 2007–2008 Post-Election Crisis." <u>The Berkman Center for Internet & Society</u> **09**: 1-10.

Goolsby, R. (2010). "Social Media as Crisis Platform: The Future of Community Maps/Crisis Maps." <u>ACM Transactions on Intelligent Systems and Technology</u> **1**(1): 1-11.

Gottschalk, P. (2009). "Maturity Levels for Interoperability in Digital Government." <u>Government</u> <u>Information Quarterly</u> **26**: 75-81.

Hagiu, A. (2006). "Pricing and Commitment by Two-Sided Platforms." <u>RAND Journal of Economics</u> **37**(3): 720-737.

Hagiu, A. and D. B. Yoffie (2009). "What's Your Google Strategy?" Harvard Business Review: 1-9.

Hansen, H. and K. Reinau (2006). The Citizens in E-Participation. <u>Electronic Government</u>. M. Wimmer, H. Scholl, Å. Grönlund and K. Andersen, Springer Berlin Heidelberg. **4084**: 70-82.

Hansen, H. S. and P. N. Kristensen (2007). <u>Applying Internet Based 3D Visualisation and Priority</u> <u>Games in Public Consultation</u>. UDMS '06: 25th Urban Data Management Symposium, Denmark, Aalborg.

Hedman, J. and T. Kalling (2003). "The business model concept: theoretical underpinnings and empirical illustrations." <u>Eur. J. Inf. Syst.</u> **12**(1): 49-59.

Heinzelman, J. and C. Waters (2010). Crowdsourcing Crisis Information in Disaster-Affected Haiti. Washington DC, United States Institute of Peace.

Hiller, J. S. and F. Bélanger (2001). Privacy Strategies for Electronic Government <u>E-Government</u> <u>Series</u>. Arlington, The PricewaterhouseCoopers Endowment for The Business of Government.

Howe, J. (2008). <u>Crowdsourcing: Why the Power of the Crowd Is Driving the Future of Business</u>, Crown Publishing Group.

Hui, G. and M. R. Hayllar (2010). "Creating Public Value in E-Government: A Public-Private-Citizen Collaboration Framework in Web 2.0." <u>The Australian Journal of Public Administration</u> **69**(1): 120-131.

Jacobides, M. G. and M. Augier (2006). "Benefiting from Innovation: Value Creation, Value Appropriation and the Role of Industry Architectures." <u>Advanced Institute of Management Research</u> <u>Paper No. 040</u>.

Jensen, L. A. and M. N. Allen (1994). "Meta-Synthesis of Qualitative Findings." <u>Qualitative Health</u> <u>Research</u> **6**(4): 553-560.

Kaliannan, M., H. Awang, et al. (2010). "Public-Private Partnerships for E-Government Services: Lessons from Malaysia." <u>International Journal of Institutions and Economies Public-Private</u> <u>Partnerships for E-Go</u> **2**(2): 207-220.

King, W. R. and T. S. H. Teo (1997). "Integration Between Business Planning and Information System Planning: Validating a Stage Hypothesis." <u>Decision Sciences</u> **28**(2): 279-308.

Klievink, B. and M. Janssen (2009). "Realizing Joined-up Government — Dynamic Capabilities and Stage Models for Transformation." <u>Government Information Quarterly</u> **26**: 275-284.

Klievink, B. and M. Janssen (2012). "Challenges in Developing Public-private Business Models." <u>European Journal of ePractice</u> **18**: 9-23.

Kogut, B. and U. Zander (1992). "Knowledge of the Firm, Combinative Capabilities, and the Replication of Technology." <u>Organization Science</u> **3**(3): 383-397.

Krishnan, V. and S. Gupta (2001). "Appropriateness and Impact of Platform-Based Product Development." Journal Management Science **47**(1): 52-68.

Kubo, S., T. Akebe, et al. (2011). IT Progress Stage and Management Level Growth in Local Governments: The Modeling of the Japanese Government Using Empirical Surveys. <u>Public Sector</u> <u>Reform Using Information Technologies</u>. P. Kanellis and T. Papadopoulos, IGI Global.

Layne, K. and J. Lee (2001). "Developing Fully Functional E-Government: A Four Stage Model." <u>Government Information Quarterly</u> **18**: 122-136.

Lee, G. and Y. H. Kwak (2012). "An Open Government Maturity Model for Social Media-based Public Engagement." <u>Government Information Quarterly</u> **29**: 492-503.

Lee, J. (2010). "10 year retrospect on stage models of e-Government: A qualitative meta-synthesis." <u>Government Information Quarterly</u> **27**(3): 220-230.

Linders, D. (2012). "From e-government to we-government: Defining a typology for citizen coproduction in the age of social media." <u>Government Information Quarterly</u> **29**(4): 446-454.

Maranny, E. A. (2010). Stage Maturity Model of m-Government (SMM m-Gov). <u>School of</u> <u>Management and Governance</u>. Enschede, University of Twente. **Master**.

Mathew Horne and T. Shirley (2009). Coproduction in Public Services: A New Partnership with Citizens (Discussion Paper). U.K.: Cabinet Office [The Strategy Unit]. Mattson, G. A. (1986). "The Promise of Citizen Coproduction: Some Persistent Issues." <u>Public</u> <u>Productivity Review</u> **10**(2): 51-56.

Medaglia, R. (2007). "The challenged identity of a field: The state of the art of eParticipation research." <u>Info. Pol.</u> **12**(3): 169-181.

Meier, P. (2011). "Crisis Mapping Japan's and How You Can Help." Retrieved 13th February, 2015, from <u>http://www.ushahidi.com/2011/03/16/crisis-mapping-japans-earthquake-and-how-you-can-help/</u>.

Meyer, M. H. and A. DeTore (2001). "PERSPECTIVE: Creating a Platform-based Approach for Developing New Services." <u>The Journal of Product Innovation Management</u> **18**: 188–204.

Moon, M. J. (2002). "The Evolution of E-Government among Municipalities: Rhetoric or Reality?" <u>Public Administration Review</u> **62**(4): 424-433.

Muffatto, M. (1999). "Platform strategies in international new product development." <u>International</u> Journal of Operations & Production Management **19**(5/6): 449-460.

Nath, J. (2011). "Reimagining government in the digital age." <u>National Civic Review</u> 100(3): 19-23.

Nikayin, F., M. D. Reuver, et al. (2013). "Collective Action For A Common Service Platform For Independent Living Services." <u>International Journal of Medical Informatics</u> **82**: 922-939.

Noblit, G. W. and R. D. Hare (1988). <u>Meta-Ethnography Synthesizing Qualitative Studies</u>. Newbury Park, SAG Publications.

Nolan, R. L. (1979). "Managing the Crises in Data Processing." <u>Harvard Business Review(March-April</u> 1979): 115-126.

OECD (2011). Together for Better Public Services. Partnering with Citizens and Civil Society. <u>OECD</u> <u>Public Governance Reviews</u>.

Okolloh, O. (2009). "Ushahidi or 'testimony': Web 2.0 tools for crowdsourcing crisis information." <u>Participatory Learning and Action. Change at hand: Web 2.0 for development</u> **59**: 65-70.

Open311 (2015). "What is Open311?". Retrieved February 25th, 2015, from <u>http://www.open311.org/learn/</u>.

Oxford (2014). "Oxford Dictionaries. Language Matters." Retrieved September 11th, 2014, from <u>http://www.oxforddictionaries.com/definition/english/development</u>.

Oxford (2014). "Oxford Learner's Dictionaries." from <u>http://www.oxfordlearnersdictionaries.com/definition/english/public-service</u>.

Prahalad, C. K. and G. Hamel (1990). "The Core Competence of the Corporation." <u>Harvard Business</u> <u>Review</u>: 79-90.

Rappa, M. (2002) Business Models on the Web.

Reddick, C. G. (2004). "A Two-Stage Model of E-Government Growth: Theories and Empirical Evidence for U.S. Cities." <u>Government Information Quarterly</u> **21**: 51-64.

Robertson, D. and K. Ulrich (1998). "Planning for Product Platforms." <u>Sloan Management Review</u> **39**(4): 19-31.

Rochet, J.-C. and J. Tirole (2002). "Cooperation Among Competitors: Some Economics of Payment Card Associations." <u>RAND Journal of Economics</u> **33**(4): 549-570.

Ronaghan, S. A. (2002). Benchmarking E-government: A Global Perspective. Assessing the Progress of the UN Member States. New York, United Nations.

Salvador, F. (2007). "Toward a Product System Modularity Construct: Literature Review and Reconceptualization." <u>Engineering Management, IEEE Transactions on</u> **54**(2): 219-240.

Sandoz, A., J. R. Eudes, et al. (2008). <u>Public-Private Partnership in e-Government: A Case</u> <u>Implementation</u>. e-Technologies, 2008 International MCETECH Conference on.

Siau, K. and Y. Long (2005). "Synthesizing e-Government Stage Models – A Meta-Synthesis Based on Meta-Ethnography Approach." <u>Industrial Management & Data Systems</u> **105**(4): 443-458.

 Simpson, T. W., Z. Siddique, et al. (2006). Platform-based Product Family Development: An Introduction and Overview <u>Product Platform and Product Family Design: Methods and Applications</u>.
 T. W. Simpson, Z. Siddique and J. R. Jiao. New York, NY, US, Springer: 1-16.

Suri, M. V. (2013). "From Crowdsourcing Potholes to Community Policing: Applying Interoperability Theory to Analyze the Expansion of "Open311"." <u>Berkman Center Research Publication</u> **2013**(18).

Thies, H. and K. Stanoevska-Slabeva (2013). <u>Incentives for Inter-Organizational Environmental</u> <u>Information Systems</u>. ICT4S 2013: Proceedings of the First International Conference on Information and Communication Technologies for Sustainability, Zurich.

Thomas, L. D. W., E. Autio, et al. (2014). "Architectural Leverage: Putting Platforms in Context." <u>The</u> <u>Academy of Management Perspectives</u> **28**(2): 198–219.

Tiwana, A. (2014). Chapter 4 - The Value Proposition of Platforms. <u>Platform Ecosystems</u>. A. Tiwana. Boston, Morgan Kaufmann: 61-69.

Tiwana, A., B. Konsynski, et al. (2010). "Platform Evolution: Coevolution of Platform Architecture, Governance, and Environmental Dynamics." <u>Information Systems Research</u> **21**(4): 675-687.

UN (2012). United Nations E-Government Survey 2012. E-Government for the People. New York, United Nations.

UN (2014). United Nations e-Government Survey 2014. E-Government for The Future We Want. New York, United Nations.

Ushahidi (2015). "Ushahidi." Retrieved 13th February, 2015, from <u>http://www.ushahidi.com/product/ushahidi/</u>.

Veen, C. V. (2009) New York City, Boston Add Web 2.0 to Customer Relationship Management.

Voss, C. A. and J. Hsuan (2009). "Service Architecture and Modularity." <u>Decision Sciences</u> **40**(3): 541-569.

Walravens, N. (2014). Smart City as a Service Platform: Identification and Validation of City Platform Roles in Mobile Service Provision. <u>Mobile Electronic Commerce: Foundations, Development, and</u> <u>Applications</u>. J. Wei. Boca Raton, Florida, CRC Press.

Walravens, N. and P. Ballon (2011). <u>The City as a Platform: Exploring the Potential Role(s) of the City</u> <u>in Mobile Service Provision through a Mobile Service Platform Typology</u>. Mobile Business (ICMB), 2011 Tenth International Conference on.

Walravens, N. and Pieter Ballon (2013). "Platform Business Models for Smart Cities: From Control and Value to Governance and Public Value." <u>IEEE Communications Magazine</u>: 72-79.

Warner, J. and S. A. Chun (2009). "Privacy protection in government mashups." <u>Information Polity</u> **14**(1): 75-90.

Wauters, P., M. Nijskens, et al. (2007). The User Challenge Benchmarking The Supply Of Online Public Services. Diegem, Capgemini

Wescott, C. G. (2001). E-Government in the Asia-Pacific Region, Asian Development Bank.

West, D. M. (2004). "E-Government and the Transformation of Service Delivery and Citizen Attitudes." <u>Public Administration Review</u> **64**(1): 15-27.

Winter, S. G. (2003). "Understanding dynamic capabilities." <u>Strategic Management Journal</u> **24**(10): 991-995.

Yamakami, T. (2010). <u>A stage view model of mobile data service platforms: Implications from mobile community and service platform evolution in Japan</u>. Service Systems and Service Management (ICSSSM), 2010 7th International Conference on.

Yin, R. K. (2009). <u>Case Study Research: Design and Methods. Fourth Edition</u>. Thousand Oaks, California, Sage Publications, Inc.

Zarei, B., A. Ghapanchi, et al. (2008). "Toward national e-government development models for developing countries: A nine-stage model." <u>The International Information & Library Review</u> **40**(3): 199-207.

This page intentionally left blank

Appendix A: Article

Towards a Public-Private-Citizens Collaboration Platform in Public e-Service Provision

Aulia Zulfa 4253175

SPM5910 Master Thesis Project System Engineering, Policy Analysis, and Management (SEPAM)

Technical University of Delft Faculty Technology, Policy and Management Delft, The Netherlands <u>auliazulfa@student.tudelft.nl</u>

Keywords – platform, public e-service, collaboration, government, private sector, citizens Abstract - Collaboration among governments, private sectors and citizens is considered critical to improve the quality of public e-services provision. Yet, there is little discussion about their collaboration in stage models that provide a guide in public eservice development. Meanwhile, the concept of a platform, which is predominantly discussed in industrial context, serve as a medium for collaboration among multi parties in creating products or services. Thus, it leads to a gap between platform development from industry contexts and its application in public e-service provision. For this reason, e-government maturity models and platform development models are synthesised to construct a platform development model for governments as a guide to move from the "government only" condition towards the "public-private-citizens collaboration" condition. As the findings, five stages of the platform development model are identified: internal, citizen co-production, provider partnership, two-sided collaboration, and external innovation. For verification case studies, the analysis and evaluation of the model could be improved through multiple-case studies for each stage of the model with more reliable research data.

1. Introduction

Governments all over the world seek to increase the quality of public e-services offered to citizens. One way of doing this is through a combination of efforts from public sectors, private sectors, and citizens in delivering the services (Brinkerhoff and Brinkerhoff 2011). However, although collaboration among multi parties has been a growing topic in journals and books, government institutions still work in "silos" and address issues in a sectoral perspective (UN 2014). For this reason, development models that apply the concept of collaboration among multi parties could be of help for governments as a guide to move

from the "government only" condition to the "public-private-citizens collaboration" condition. Nevertheless, there is only little discussion about that type of collaboration in the existing stage models that provide a guide in public e-service development.

Meanwhile, the concept of technological platform offers opportunities to be employed as a medium for multi parties to work together in generating products or services. A platform can serves as a foundation where participants can leverage the platform's assets to create complementary products (Thomas, Autio et al. 2014). Moreover, a platform can also act as an intermediary where multiple groups from different sides of the platform interact and transact. Yet, the

concept of platform is still rarely incorporated into public e-service development. Hence, there is a gap between platform development from industry contexts and its application in public e-service provision. To be more specific, the gap leads to a problem on how to synthesise the models that represent the development of public e-service provision and the development of technological platform.

This article addresses the problem by posing a question "How can the models representing the development of public e-service provision and platform development be synthesised ?". In order to answer the question, e-government maturity models are employed to represent the development of public e-service provision by governments. Furthermore, platform development models are used to represent the development of platforms. those models are then synthesised. As a result, a platform development model for governments is constructed, which consists of five stages: internal, citizen co-production, provider partnership, two-sided collaboration, and external innovation. The model is then analysed and evaluated.

The article is organized as follows. In section 2 the research methodology is presented. It outlines the three main steps in order to answer the question. In section 3, the platform development model constructed by following the meta-synthesis method is elaborated. In this section the five stages of the model are described with regard to the platform business model components. The subsequent section discuss the case studies and lesson learned from it. This is followed by section 5 where conclusion and future work are presented.

2. Methodology

In order to achieve the purpose of this thesis which is constructing a platform development model for governments, an approach which consists of three main steps is taken. At first, qualitative meta-synthesis method which consists of seven steps (Noblit and Hare 1988) is employed to synthesise e-government maturity models and platform development models. In order to compare and contrast each stage of the models, platform stream (Thomas, Autio et al. 2014) and platform openness (Eisenmann, Parker et al. 2009) are employed as the key attributes. The concept of platform openness is employed to see how the external parties are involved for each stage, while to understand to what extent the stages of the model represent the concept of a platform, the concept of platform stream is used. In this way, all stages of those models are compared and contrasted so that the relation and translation can be made. This step results in the sequential stages that delineate the evolvement of the platform in the basis of the private sectors' and citizens' involvement.

Next, the participation of the actors in each stage of the model is analysed in the context of public service provision. To do so, platform business model components which takes public actor participation into account (Walravens and Pieter Ballon 2013) are employed as the attributes. The consist components of stakeholder management, technology use, public value creation, return on public investment and public data ownership. As the result of this step, the model presents the difference between each stage in relation with the actors' participation in the service provision and the service's values. In the last step, in order to evaluate the model, multiple-case studies are carried out for three cases that are selected in the basis of a set of criteria. The criteria represent the concept of platforms delineated in the highest stage of the model in the light of the desired condition that want to be achieved. In this type of case study, each case is selected and employed in order to predict similar results (Yin 2009). To obtain the results,

electronic documents that are accessed from the official websites, journals and electronic articles are reviewed and analysed. Information and insights that are gained with regard to the five attributes used in the step 2 is then employed to complete and refine the model. Moreover, the cases are also reviewed to obtain insights into the evolution of the platforms in order to evaluate the structure of the stages of the model. This is particularly conducted by analysing the difference between involved parties and functionalities of the platform in its initial development and in the latest state.

3. The platform development model for governments

The meta-synthesis process

The platform development model resulted in this research is constructed by following the meta-synthesis process consisting of seven steps.

a. The research question is identified to represent the intended objective of the use of the methodology. In this thesis, we identify the question as the interrogation of underlying metaphors in e-government stage models and the platform development models that are currently available in the literature.

Literature that is relevant to the research b. question is identified. For this step, initially an electronic database search is conducted through the search engines such as Scopus, Google Scholar, Science Direct, TU Delft Library, and Google. Key words including "stage model" and "maturity" are used in the combination with key words "platform", "egovernment" and "service". This step results in 210 articles from all databases. In the first stage of the screening, the abstracts are reviewed and the articles that are not directly related to e-government and platform development stages are removed. As a result, 19 e-government maturity models and 3 platform development models remain. In the second screening, comprehensive reading

is carried out to the remaining articles and those that do not include external parties' participation in the growth stage models are removed. From this step, nine (9) egovernment maturity models and one (1) platform development model are identified.

c. After the relevant models are selected, in this step the 10 models are studied with special attention paid to understand the stages of each model.

d. Following the in-depth reading of each article, in this step each model is compared and contrasted to each other in order to understand the relationship between them. The process consists of two main subprocesses which are capturing the concepts of the models and relating them through the juxtaposition process (Jensen and Allen 1994). For this purpose, the concept of platform openness and platform stream are employed. After understanding the stages of the models, they are juxtaposed and put in a table. In this way, the homogeneity and heterogeneity among the models can be seen with regard to the concept of the platform openness and the platform stream that are used as the key attributes. In this step, four different stages are identified by considering the platform openness. This process is shown in Table 1. However, to relate it to the platform streams, the last stage which discusses the openness in the both sides can be divided into two different concepts. As the result, there are five stages are identified.

e. In the next step, a reciprocal translation process is conducted to reveal the metaphors used across and among different stages. Furthermore, the identified metaphors and the key attributes are compared repetitively among the stage models leading this process considered reciprocal.

This step refers to the translation of the finding by synthesising the translated and juxtaposed metaphors and concepts of the key attributes into a common frame of reference. This synthesis is expected to accommodate the contradictions and the overlaps that are identified in the previous step.

f. In the last step, the overall findings are presented in forms of tables and elaboration, which is given in the next part of this section.

The model elaboration

From the meta-synthesis process, five stages are identified, which are shown in Figure 1. The first four stages of the model represent organizational and product family streams. Those streams' focus is on the decomposition of the service components including human and technological components, and the organization of those components. While for the final stage, external innovation, market intermediary and platform ecosystem streams are adopted. In this stage, innovation in improving the service delivery is stimulated through external parties' participation. The platform serves as a foundation where various services and application are made and designed by participants. Thus, the final use of those services and applications are more influenced by participants' creativity instead of solely rely on the platform owner's design.

The more detail elaboration of each stage is given as follows:

a. Internal

The internal metaphor refers to the organization of the capabilities, resources and service components as a platform which is conducted by the government internally in providing the service. The direction of the service development is decided by the internal organization because there is only limited way of gaining the understanding of the citizens' need.

The main goal of this platform is increasing the productive efficiency and produce variety of the services with regard to the structure and modularization of the service components.

b. Citizen co-production

This metaphor refers to the involvement of the citizens as the customer as well as the partner in improving the quality of the public services. In order to improve the quality of the service, the expertise, the idea and the needs of the citizens are captured and utilized in the design and use process. Thus, in this stage the tools that facilitate the citizens in accessing the data or interacting with the governments need to be provided. Moreover, the governments as the user of the citizens' input also require the media and mechanism in gathering and following-up the input so that the citizens can know that their contribution is taken into account.

c. Provider partnership

The concept of public-private partnership is represented in this metaphor where the governments engage the private sector in delivering the services. Value-added service is pursued by utilizing the expertise of the private sectors while the end-use of the final service or technology is defined in advance by the government as the integrator of the service components. Furthermore, conformation in the internal structure of the government may also need to be considered in adjusting the different characteristics of public and private organizations while pursuing the common objective.



Figure 1. The stages of the platform development model for governments

No	Authors and Year	# of stages	1							2	3		4		
1	(<u>Hiller and</u> <u>Bélanger</u> <u>2001</u>)	5	Information	Commu	o-way inication	Trai	nsaction	Integration	Participation						
2	(<u>Wescott</u> <u>2001</u>)	6	Email system and internal network	Inter- organiza tional	2-wa commu tion	ay inica 1	7 Exchange Joined-up lica of value governme nt		Digital Democracy						
3	(<u>Ronaghan</u> <u>2002</u>)	5	Emerging	Enha	inced	Inter	ractive	Transactional	Sea	amless					
4	(<u>West</u> 2004)	4	Billboard	d	Partial-se delive	ervice ery	rvice Portal stage ry		Interactive democracy						
5	(<u>Siau and</u> <u>Long 2005</u>)	5	Web presence	Inter	action	Trans	saction	Transfor mation	e-De	mocracy					
6	(<u>Lee 2010</u>)	5	Presentir	ıg	Assimila	ating		Reforming	Morphing	e-Governance					
7	(<u>Kubo.</u> <u>Akebe et al.</u> <u>2011</u>)	5		·	Prepa	ration	·		Org	anizing		Ingenuity in practice	Evalu on	ati	Value generation
8	(<u>Lee and</u> <u>Kwak 2012</u>)	5		Initial			Data trai	nsparency	(part)pen icipation		Open collaborat	ion	Uł en	oiquitous gagement
9	(<u>Dias and</u> <u>Costa 2013</u>)	4	Co /su	mplaint Iggestion			Opinion poll /free discussion		Procedure for public discussion	Participatory budgeting					
10	(<u>Gawer</u> <u>2010</u>)	3			Internal	Platfor	m				Supply Chain Platform	Inc	lustry F	Platfo	rm

Table 1. Comparison of stages in the e-government maturity models and the platform development model

d. Two-sided collaboration

This metaphor practically refers to the combination of the citizen co-production metaphor and the provider partnership metaphor. In order to achieve the citizens' satisfaction, the service quality is improved by employing the private sector's expertise in addressing the citizens' need obtained from their participation. In addition, other types of actors might get involved in the service provision with regard to their particular contributions. However, representing the concept of product family stream, the final use of the service resulted from this collaboration is defined by the governments as the platform owner and integrator of the service components

e. External innovation

External innovation is the metaphor for the last stage of platform development for public e-service. In this stage, collaboration is conducted with multi actors including the private sectors and the citizens. Compared to the two-sided collaboration metaphor, this stage concerns the innovation that is obtained from the complementary service components provided by external parties other than the government. The complementary service components can be intended not only for the platform owner but also for any other actors involved in the platform. Thus, the end use of the final service in this stage may not be known in advance.

Furthermore, in interpreting the platform development model resulted from this research, the government may see it as a development trend rather than a must-gopath. Depending on the government organization's capabilities, resources, and needs, an organization might want to skip one or more stages (Klievink and Janssen 2009), and thus it is not necessary for them to go through the five stages step by step. Instead, the stages can be seen as alternatives on how a priority is made on engaging external parties in delivering public e-services.

To be more specific, citizen co-production stage is placed prior provider partnership stage with a motive that the private sector is utilized later to enhance the citizen's satisfaction by addressing their needs (Kubo, Akebe et al. 2011; Lee and Kwak 2012), however it does not necessarily mean that the opposite sequence cannot be taken. Partnership with the private sector can be done to provide the services while later on the citizens are involved to evaluate and improve it by sharing their opinions and idea (Hui and Hayllar 2010). Hence, these two stages serve more as an alternative on how a priority can be made by an organization in engaging the external parties. Practically, the two-sided collaboration stage is achieved by skipping one of the two previous stages as citizens or private sectors get involved in the platform afterwards. It may also the case when government skip citizen co-production and provider partnership stages and directly implement the concept of two-sided collaboration platform; that is when the government engage citizens and private sectors simultaneously.

The model analysis

Furthermore, the stages are analysed to delineate the collaboration among the actors involved in the public e-services provision by five platform business using model components. First, the actors that are involved in each stage and their roles in delivering the public e-services are elaborated. It is followed by elaboration on the technology (ICT) used to perform the main functionalities of the platform. Next, how public data is used in supporting the service provision is discussed. Fourth, return on public investment outlines the value that is expected to be gained by the government from the application of the platform concept. As the last attribute, public value creation represents the value of the platform from the citizens' perspective. The elaboration of the model analysis is given in Table 2.

Table **2**. The model analysis by employing platform business model components as the attributes.

	Internal	Citizen co-production	Provider partnership	Two-sided collaboration	External innovation
Stakeholder management	The government organize internal assets and service components; act as the sole service provider, e.g. - Categorization of published information in the basis of data integration and personnel's' tasks.	 Citizens act as the government's partner in tackling problems and enhancing the service quality by sharing their idea & opinion. The government provides tools and adjusts the internal processes to facilitate, give response to, and follow up the citizens' involvement. 	 The government acts as the main service provider and the integrator of the services provided by private sectors. The private sectors provide their expertise and services to add values of the main services provided by the government. 	 The government connects the citizens who share their idea and private sectors who share their expertise in order to enhance the eventual services. Private sectors become the partner of the government to provide services and together address the citizens' needs. 	 The government provides the foundation in terms of assets and/or customer relation measures and stimulate the service creation by external developers who can be private sectors or individuals. The citizens and private sectors could be the user as well as a contributor of data, experiences or idea.
Technology Use	 Government online presence Data integration Online interaction Privacy and confidentiality 	- User interface - User participation - Data processing - Privacy and security - Mobile technologies	 User interface Data sharing & functionalities expansion Privacy and security 	 User interface User participation & Mobile technologies Data sharing and processing Privacy and security 	 User interface User participation & Mobile technologies Data sharing Privacy and security Platform boundary resources
Public data ownership	 The government process internal data and deliver it to the citizens, such as data about public facilities. Protection for personal information that is collected. 	 Citizens contribute to providing data in terms of ideas, preferences, etc. The government process the data, enhance, and add more value to it. 	 Government share information and public data concerning the service creation with the private sector. Government can have exclusive access to sensitive personal data of citizens. 	 Government information, in addition to public data received from citizens, are shared with private sectors to create the service. Government can have exclusive access to sensitive personal data of citizens. 	 Public data can be shared by the government to improve service quality and stimulate service creation by external parties. Some measures need to be taken to protect individual privacy and minimize negative impact of opening data such as requirements to access the data.
Return of investment	 Increase the internal managerial efficiency. Produce variety of services. Support the flexibility in service design. 	 Realizing open government initiative. Obtaining a source of information and ideas. 	 Benefit from private sectors' expertise in technology, financial, or management. Entrepreneurial outcomes. Risk transfer. 	 Provide alternative services from PPP projects to address citizens' increasing demands. Achieve more acceptable PPP projects that genuinely add public value. 	 Massively distributed innovation. Risk transfer. Enable service customization to address 'niche market'.
Public value creation	 Better quality of data processing and quicker response. More variant of services improvement to be offered. 	 Increase the likelihood that the service being offered will address their preferences. A medium to accommodate personal motives. 	- Greater confidence in the service. - Cost savings. - Better customer care.	- More public value through enhanced information, choice and customer-oriented services.	- Faster innovation. - High quality services (applications). - Mix-and-match customization.

4. Case study

As the last step of the research approach, evaluation of the model is conducted through case studies. In selecting platforms as cases that will be studied, platforms representing the last stage of the model are chosen. It is in conjunction with the purpose of the model evaluation. First, by reviewing how the platforms in that stage was evolving it is expected that the structure of the platform development stages that is resulted in section 3 can be evaluated. Second, taking into account the desired state in the model that want to be achieved, the analysis on the platforms could provide information about the state of the art in platform implementation as an enabler for the collaboration between public agencies, private sectors, and citizens while delivering public services.

The criteria in selecting the cases are:

- Digital platforms.
- Producing public e-services as the main product.
- Facilitating various actors to have transactions from different sides of the platform.
- Stimulating and capturing value from external participation.
- Access to the information of the platforms should be available.

In the basis of these criteria, three platforms are selected which are: Ushahidi, Open311, and DataSF.

In order to evaluate the model, the electronic documents are reviewed in conjunction with the five attributes used to analyse the model in previous section. The result of case studies is then compared with the result of the analysis conducted in chapter section 2, particularly related to the stage 5 of the model. The result of the comparison is given in Table 3.

In addition to the analysis of the five aforementioned attributes of the platforms, the case studies is continued with the focus is on the platforms' evolution which is aimed to evaluate the model in terms of the structure of the platform development stages. However, the data gained from the documents is insufficiently complete to capture the information of the platforms' evolution with regard to the platform openness and platform stream. Hence, insights are captured from the case studies with no additional information of the structure of the model stages is added.

5. Conclusion and Future Work

This research starts with a gap between platform development from industry contexts and its application in public eservice provision. Hence, а platform development model is constructed by applying the concept of platform in terms of platform stream and platform openness in order to synthesise existing e-government maturity models and platform development models.

Five stages are identified which constitute the platform development model. The stages shows how the concept of platform is evolved as more external parties, which are private sectors and citizens, get involved in the process of public e-service provision. Thus, the model delineates the movement of government from "closed" condition towards condition where they collaborate with private sectors and citizens in delivering eservices.

Furthermore, implementation of the concept of external innovation platform in the field, which is captured through case studies, vary in the government's role and the platforms' values. Government might take slightly passive roles by being a user and performing common activities as shown in Ushahidi platform, or play more active roles by stimulating and facilitating the service and application creation through infrastructure and mechanisms as shown in Open311 platform. For verification case studies, model analysis and model evaluation can be improved For example, in the model analysis, in order to gain more understanding of each stage, the attributes can be expanded by including other aspects. Moreover, in order to improve the model evaluation, multiple case studies (<u>Yin 2009</u>) can be employed to evaluate each stage of the model. In this way, other information can be gained to evaluate related theory, for example to evaluate the circumstances under which an organization moves from a stage to another. Data collection might also be done in different ways in order to gather more reliable data, for example by accessing official documents that give information about the development of particular functions of the platform as well as through personal interviews.

Table 3. The result of com	parison between me	odel analysis in sect	ion 2 and case studies.
	•		

	Similar results	Additional insights
Stakeholder management	Government get involved by providing a foundation in terms of data, information flow mechanism, infrastructure, etc. and/or customer relation measures. Private sectors contribute in assets provision and application/service creation. Citizens and public can contribute to the application creation and data provision by using it.	Citizens, NGOs can contribute in the operation of the platform. Government have an important role in policy making to support the platform's sustainability.
Public data ownership	Two main public data sources are the government and the citizens through the use of applications/services. The data need to be shared with external actors to support the application creation.	-
Technology Use	User interface and user participation are supported through mobile technologies. Tools for data sharing, processing and integration play are important to generate integrated reports. Platform boundary resources are available in diverse forms.	-
Return on public investment	 Massively distributed innovation. Risk transfer. Enable service customization to address 'niche market'. 	 Technology expert. Support for more open and participatory governance. Financial advantage.
Public value creation	 Faster innovation. High quality services (applications). Mix-and-match customization. 	 Opportunities to contribute to public services. A medium to communicate with more actors. Financial advantage.

References

Brinkerhoff, D. W. and J. M. Brinkerhoff (2011). "Public–Private Partnerships: Perspectives on Purposes, Publicness, and Good Governance." <u>Public Administration and Development</u> **31**(1): 2-14.

Dias, G. P. and M. Costa (2013). "Significant socio-economic factors for local e-government development in Portugal." <u>Electronic Government, an Int. J</u> **10**(3/4): 284-309.

Eisenmann, T. R., G. r. Parker, et al. (2009). Opening Platforms: How, When and Why? <u>Platforms, Markets and</u> <u>Innovation</u>. A. Gawer. Cheltenham, Edward Elgar Publishing Limited: 131-162.

Gawer, A. (2010). Towards A General Theory of Technological Platforms. <u>"Opening Up Innovation: Strategy,</u> <u>Organization and Technology" Summer Conference 2010</u>. Imperial College London Business School: 1-40.

Hiller, J. S. and F. Bélanger (2001). Privacy Strategies for Electronic Government <u>E-Government Series</u>. Arlington, The PricewaterhouseCoopers Endowment for The Business of Government.

Hui, G. and M. R. Hayllar (2010). "Creating Public Value in E-Government: A Public-Private-Citizen Collaboration Framework in Web 2.0." <u>The Australian Journal of Public Administration</u> **69**(1): 120-131.

Jensen, L. A. and M. N. Allen (1994). "Meta-Synthesis of Qualitative Findings." <u>Qualitative Health Research</u> **6**(4): 553-560.

Klievink, B. and M. Janssen (2009). "Realizing Joined-up Government — Dynamic Capabilities and Stage Models for Transformation." <u>Government Information Quarterly</u> **26**: 275-284.

Kubo, S., T. Akebe, et al. (2011). IT Progress Stage and Management Level Growth in Local Governments: The Modeling of the Japanese Government Using Empirical Surveys. <u>Public Sector Reform Using Information</u> <u>Technologies</u>. P. Kanellis and T. Papadopoulos, IGI Global.

Lee, G. and Y. H. Kwak (2012). "An Open Government Maturity Model for Social Media-based Public Engagement." <u>Government Information Quarterly</u> **29**: 492-503.

Lee, J. (2010). "10 year retrospect on stage models of e-Government: A qualitative meta-synthesis." <u>Government Information Quarterly</u> **27**(3): 220-230.

Noblit, G. W. and R. D. Hare (1988). <u>Meta-Ethnography Synthesizing Qualitative Studies</u>. Newbury Park, SAG Publications.

Ronaghan, S. A. (2002). Benchmarking E-government: A Global Perspective. Assessing the Progress of the UN Member States. New York, United Nations.

Siau, K. and Y. Long (2005). "Synthesizing e-Government Stage Models – A Meta-Synthesis Based on Meta-Ethnography Approach." <u>Industrial Management & Data Systems</u> **105**(4): 443-458.

Thomas, L. D. W., E. Autio, et al. (2014). "Architectural Leverage: Putting Platforms in Context." <u>The Academy of</u> <u>Management Perspectives</u> **28**(2): 198–219.

UN (2014). United Nations e-Government Survey 2014. E-Government for The Future We Want. New York, United Nations.

Walravens, N. and Pieter Ballon (2013). "Platform Business Models for Smart Cities: From Control and Value to Governance and Public Value." <u>IEEE Communications Magazine</u>: 72-79.

Wescott, C. G. (2001). E-Government in the Asia-Pacific Region, Asian Development Bank.

West, D. M. (2004). "E-Government and the Transformation of Service Delivery and Citizen Attitudes." <u>Public</u> <u>Administration Review</u> **64**(1): 15-27.

Yin, R. K. (2009). <u>Case Study Research: Design and Methods. Fourth Edition</u>. Thousand Oaks, California, Sage Publications, Inc.

Appendix B: The Existing Development Models

In this appendix, 19 e-government maturity models and 3 platform development models are presented as the result of the first screening of the second step of the meta-synthesis methodology. In order to select the relevant models, as the second step of the screening process, the stages are reviewed to see the participation of the private sector and the citizen in the stages of the model.

1. e-Government Maturity Models

Among the e-government maturity models, there are many of them that discuss the involvement of the citizens in diverse terms such as interaction, transaction, two-way communication, cultivation, participation, etc. An example can be seen in model 10 by Siau and Long where in the stage 2 interactions can be conducted between the government and the citizens while in the stage 3 complete online transactions are enabled for citizens. In order to assess the citizens' involvement in the existing models, we refer to the concept of citizen coproduction where the citizens act not only as a customer but also as a partner in delivering the public service (Linders 2012). Thus, involvement can be done more than just interaction and transactions; the more active participation from the citizens can be done beyond activities such as asking questions, making simple request or personalizing the portal interface. (Lee 2010). Adopting this concept, only the stages that show the citizens' activities influencing decision making are considered suitable to represent the citizens' participation. In table A.1, the stages shown in grey colour represent either the citizens' participation or the private sectors' participation and therefore the models are selected to be proceeded to the third step of the meta-synthesis methodology.

No	Authors (year)	Title	Description			Stage						
1	Gartner	Gartner's Four	Showing e-	Web presence (1) Providing a website containing basic information, reports and publications of the government.		Interaction (2)			isaction (3)	Т	Transformation (4)	
	(Baum and Maio 2000)	Government Model	development in the connected environment.			Enabling users to contact the government agencies (self- service) via the website.		Enabling complete entire transaction online via the website (e.g. license application).		Trans opera enhar	Transforming the existing operational processes to enhance service efficiency.	
2	(Hiller and Bélanger	Privacy Strategies for	Describing and integrating the	Information (1)	cor	Two-way mmunication (2)	Transa	ction (3)	Integration (4)		Participation (5)	
	2001; Moon 2002)	Electronic Government	governments' relationship with its varied constituents	its'Government post simpleEnp withinformation for itstoconstituents on theantswebsite.re		bling constituents mmunicate with make simple ests to mmunicate		online Integrating s for government servi . through a single p		ices portal.	Enabling user participation through voting online, registration online etc	

Table A. 1. e-Governement maturity models after the first screening

No	Authors (year)	Title	Description					Sta	ge				
3	(Deloitte and Touche	Deloitte's six- stage model. The citizen as	Describing the public e-service transformation	Information publishing (1)	trans	wo-way saction (2)	Mult po	ti-purpose rtals (3)	Porta personali (4)	al zation	Clust commo	ering of n services (5)	Full integration and enterprise transaction (6)
	2001)	customer.	from evolution perspective	PublishingUtilizininformation on theenablewebsite as one-have elwaytransaccommunication.govern		enable citizens to have electronic transactions with governments.		zens to portal to access ronic services across ns with multiple nts. departments.		customize the service portal's features unified based on their along c needs. lines by govern		ng as a package mmon nent.	Providing integrated services for the users.
4	(Layne and	Developing Fully Functional E-	Outlining the transformation of	Stages (1)		Tr	ansactio	n (2)	Vertical	integrati	on (3)	Horizon	ital integration (4)
	100 2001	Government: A Four Stage Model.	government's structures and functions from multi- perspectives.	An on-line presence is established.		Enabling by integr system w interface	Enabling online transactions by integrating internal system with online interfaces.		Connecting local, state and federal government agencies to produce more diverse functions or services.		ate and agencies verse s.	Integrating different functions and services across government agencies.	
5	ADB (Wescott 2001)	E-Government in the Asia-Pacific Region	Describing e- Government adoption in Asia-	Email system and internal network (1)	Inter-or and pub inform	organizational 2-way ublic access to communication prmation (2) (3)		Exchange o (4)	of value	Digital D (emocracy 5)	Joined-up government (6)	
			Pacific region	Setting upDevelopinsystems withthat helpfocus is placed onworkflowinternalfiles, docuprocesses.etc.).		bing systems Utilizing ICT to p to manage facilitate 2-way w (images, communication between the government and the public.		Focus on ICT support to facilitate citizens conducting business with the government		Support f participa democra process b allowing to vote an express o	for tory and tic by citizens nd opinions.	Integrating information and services from different government agencies via a web-portal.	
6	United	Benchmarking	Used as a	Emerging (1)		Enhanced	(2)	Interac	tive (3)	Tra	nsactional	(4)	Seamless (5)
	(Ronaghan 2002)	E-government: benchmarking A Global tool of e- Perspective government implementation in diverse countries. Establishing an online presence government.		Establishing an offic online presence of t government.	an official Enhanc nce of the of the s . informa dynami		ncing the quality sites by making nation more nic.		sers to Facilita th having it via the transa ownload making ail officials, payme		iting users to online ctions and g online nt.		Integrating e- services across internal administrative boundaries to improve the service quality.
No	Authors	Title	Description				Stag	je					
----	---	--	---	--	--	--	--	---	--	--	--	--	
7	(Accenture 2003)	eGovernment Leadership:	Describing the characteristics of	Online Presence (1)	Basic	Capability (2)	Service Av	vailability 3)	Mature Delivery	7 (4)	Service Transformation (5)		
		Customer	development progress.	Information published online with few services available.	Creatin and de legislat	ng a central plan veloping a tive framework.	Basic portal providing a services as initial custo	ls s many possible; omer focus.	Intentions-based transactional por are available with added approach.	tals value	Multichannel integration to improve customer service delivery.		
8	(Reddick	A Two-Stage	Using Layne and	Cataloguir	ng of info	ormation (1)			Transaction phase (2)				
	2004)	Model of E- Government Growth: Theories and Empirical Evidence for U.S. Cities	Lee's model to analyse the prospects for future development in e-government growth in the U.S. cities.	Employing website where information about government and its activities is presented.				Setting up o electronic t pay taxes, f	Setting up online databases to facilitate citizens in making electronic transactions with governments for examples to pay taxes, fines, or fees.				
9	(West 2004)	E-Government and the	Using the model to determine the	Billboard stage (1)	I	Partial-service delivery stage (2)		Port	al stage (3)	Inte	ractive democracy (4)		
	Transformation of Service Delivery and Citizen Attitudes		progress of e- government based on incorporation of various web site features.	Users are facilitated to have a view of reports and publications via the website.		Providing online s and enabling user manipulate inform database to obtain desired informatio	services is to national n the on.	Focus on integration of agency sites where executable services are made available for users.		Shifting the focus from a service-delivery model to embrace the system wide political transformation.			
10	(Siau and	Synthesising e-	Creating a	Web presence (1)	Int	ceraction (2)	Transac	tion (3)	Transformatior	ı (4)	e-Democracy (5)		
	Long 2005)	Stage Models – A Meta-Synthesis Based on Meta- Ethnography Approach	reference for addressing the question of stages in e-government development	Posting simple and limited information via official web sites.	d Providing simple interaction such as search engines and email systems for the users.		Complete or transaction enabled for and busines	nline s are citizens sses.	Focus on transformation of governments' services provision by initiating vertical and horizontal internal integration		Improving political participation and citizen involvement, by offering ICT tools.		
11	(Andersen	E-government	Improving the	Cultivation (1)		Extensio	on (2)	М	aturity (3)		Revolution (4)		
	Henriksen 2006)	maturitycore activities andenmodels:bring end-usersExtension of the Layne and Leeas the keymodelfocusing on the use of IT applications.		 Horizontal and vertical integration within government, Limited use of front-end systems for customer services Adoption and use of Intranet within government 		- Extensive use - Adoption of pe Web user interf customer proce	use of intranet - Ab of personalized - Ac nterface for tran processes - Pe inte pro		ning of intranet - Data ability + organ ent process - App lized web- acros for customer - Own s trans		a mobility across nizations, olication mobility ss vendors nership to data iferred to customers		

No	Authors	Title	Description							Stage					
12	(Wauters, Nijskens et	The User Challenge	Illustrating the different levels of	Informatio	n (1)	Or	ne way interac (2)	tion	Two way interaction (3)		on	Tra	nsaction (4)	Personali	zation (5)
	al. 2007)	Benchmarking The Supply Of Online Public Services	online public services sophistication.	Information dissemination.		Pro dov for	viding vnloadable for the users.	ms	Provi forms way i	ding electronic s to support tw nteraction.	C 70	Full elec handlin	rtronic case g.	Pro-activ automate delivery.	e, d service
13	(Zarei, Ghapanchi et al. 2008)	Toward national e-government development models for	Proposing a national EGDM for e-government development in	Strategy development	Building infrastruct	ture	Building trust	Physi and electr porta	cal ronic l	Initial interactions and stimulation	Pro	totyping	Enrichment and multi- dimensional development	Integration	Developme nt of the ICT industry
		developing countries: A nine-stage model	other developing countries.	Development of e-government strategies by government and IT development officials.	Developin up-to-date and suitab infrastruct to address governme demands.	g ile ture ; e- nt	Governmen tal officials and IT professional s create mutual trust.	An off single porta gover is introd	ficial e l of the rnment duced.	Elaborate the potentials of e- government by setting up introductor y sessions.	Rel org ns v cru ser sele	ated anizatio with cial vices are ected.	Strengthen trust and interactions need.	Focus on integration of service delivery to citizens	Alignment with ICT industry developme nt.
14	(Klievink and Janssen	Realizing Joined- up Government — Dynamic	Describing the e- government progression from	Stovepipe	s (1)	c	Integrated organizations ((2)	Natio	onwide portal	(3)	Inter-o inte	organizational egration (4)	Deman join govern	id-driven, ied-up iment (5)
	2009)	Capabilities and Stage Models for Transformation	stove-piped situations towards joined- up government.	Interconnection between a few applications, se products with l information sha	n rvices or imited aring.	Cre sho org by i deli	ation of a one- p at the anizational lev integrating ser ivery and IT.	-stop vel rvice	Introd nation order access produ	duction of a nwide portal in to provide s to existing acts or service	1 5.	Integrat defined standar agency s	ion of clearly and dized cross- services.	The porta to search services a recomme citizens.	ll functions for relevant ind make ndations to
15	(Gottschal k 2009)	Maturity levels for	Improving interoperability	Comput interoperabi	er lity (1)	in	Process teroperability	(2)	inte	Knowledge roperability (3	3)	Value i	nteroperability (4)	Goal inte	roperability (5)
		interoperability in digital government	by utilizing the model to identify the current maturity and future direction.	Enabling direct exchange of me context-driven messages betw autonomous sy	aningful, data and een stems.	Enh inte alig pro ope org	nancing eroperability b ming work cesses in inter erating anizations.	ру ?-	Condu know throu relatio organ	ucting ledge sharing gh collaborati onships amon lizations.	ve g	Present creation interact primary differen configur	ing value through ions between activities in t value rations.	Minimizin conflictin interoper synergy a	ng g goals by rating mong .

No	Authors (year)	Title	Description	Stage						
16	(Lee 2010)	10 year retrospect on	Extracting concepts,	Presenting (1)	Assimilating (2)	Reforming (3)	Morphing (4)	e-Governance (5)		
		stage models of e-Government: A qualitative meta- synthesis	metaphors, and themes of 12 stage models through a series of in-depth semantic analysis	Simple information presentation with limited functionality.	Integration of scattered information bases and applications to support the creation of interaction based services.	Utilizing ICT to reform and change government' business processes (streamlining).	Focus on planning and creating new services for the benefit of citizens. Encouraging more active participation from citizens beyond simple interaction and conduct of ordinary transactions.	Citizens' involvement in political and administrative decision-makings concerning services and operations.		
17	(Kubo <i>,</i> Akebe et	IT Progress Stage and	IT progress stages in local	Preparation (1)	Organizing (2)	Ingenuity in practice (3)	Evaluation (4)	Value generation (5)		
	al. 2011)	Management Level Growth in Local Governments: The Modeling of the Japanese Government Using Empirical Surveys	government which are used as a basis consideration for management levels of local government discussion	The development of the information infrastructure and basic information disclosure	Gaining an understanding of the citizens' needs and their participation	The development of cooperative relationships with other organizations, utilizing the resources of other organizations, and improving the citizen's ability to use government services effectively	Improving public management quality through public-private partnerships, particularly for performance evaluation	The collaboration between various stakeholders for mutual purposes and the demarcation of the responsibilities of the government, the citizens, and other organizations.		

No	Authors (year)	Title	Description	Stage						
18	(Lee and Kwak	An Open Government	A maturity model used to assess	Initial (1)	Data transparency (2)	Open part	ticipation (3)	Open collaborati	ion (4)	Ubiquitous engagement (5)
	2012)	Maturity Model for Social Media- based Public Engagement	and guide open government initiatives with a focus placed on the use of emerging technologies such as social media	 One-way, static communication No or little online interactive capabilities 	 Feedback from the public on the usefulness and quality of data Keeping the public informed and engaged by using limited social media. Realizing public participation by experimenting social media. 	teedback from the lic on the fulness and quality ata• Utilizing media for on-going conversati telling, and communic engaged by using ted social media. ealizing public ticipation by erimenting social dia.• Utilizing media for on-going conversati telling, and communic • Voting, p feedback, i • Tapping and expert public throwsourcing.		 Value-added services creation through public-private collaboration. Decision-making through inter-agency collaboration. Solves complex problems and policy rule making through open collaboration. 		• The scope and depth of open participation and open collaboration are expanded.
19	(Dias and Costa	Significant Socio-Economic	IT progress stages in local	Complaint/ Suggestion (1)	Opinion poll/free (2)	discussion	Procedu	re for public ssion (3)	Participatory budgeting (4)	
	2013)	Factors for Local e-Government Development in Portugal	government which are used as a basis consideration for management levels of local government discussion	Suggestion (1)(2)Citizens are allowed to submit suggestions or complaint without authentication through features on the website.Participation in opin or discussion groups regarding policy area facilitated.		inion polls The city courses provide resp eas is participation public discus		council is obliged to response for tion in processes of scussion. Citize contri the de proce budge		ns are allowed to bute to and influence cision making sses of participatory t.

2. Platform Development Models

As the result of the first screening, there are three platform development models that are related to the topic in this thesis. Furthermore, in selecting the relevant platform development models, the three models are reviewed to see the external participation other than the platform owner. To be able to contribute to the model construction in this thesis, the models are expected to show how a platform develops as the variety of the external actors gets increased. In the following table, model 1 shows how a closed platform with no external actor develops into a platform with several external actors getting involved. Meanwhile, model 2 and 3 emphasize the development of the platform in terms of the number of the same type of actors from the first stage to the latest stage. Therefore, only model 1 is considered relevant for the next step of the meta-synthesis methodology in this thesis.

No	Authors (year)	Title	Description	Stage							
1	(Gawer	Towards A General	An evolutionary	Internal Platfe	orm (1)		Supply Chain Platform	(2)	Indust	Industry Platform (3)	
	2010)	Theory of Technological Platforms.	perspective on platform emergence.	 It is used within a firm or an organization Facilitates the division of internal labor and modules imitation 		 Inv cha The pla in e 	 Involves some actors in a supply- chain context The products resulted from the platform are developed and produced in collaboration among those actors 		 Several actors are involved in the platform, but not necessarily part of the supply chain nor buy or sell from each other Focus on the innovation of complementary products or services 		
2	(Yamaka	A stage view model	The evolution of mobile	Niche commu	nity (1)		Nationwide community (2)		Developer cor	nmunity ecosystem (3)	
	mi 2010)	service platforms: Implications from mobile community and service platform evolution in Japan	the viewpoint of community evolution and business model evolution	 Focus on the niche community needs. Billing capability is featured in the platform as a backend, provided by carriers with a strong marketing brand. 		 Aggregating grassroots communities. Social service infrastructure is provided to accommodate aggregation of communities. 			 Application stores or new revenue sharing models are facilitated. Enabling factors for mobile and social enhanced services are provided with mobile-fit revenue models. 		
3	(Basole	On the Evolution of	Providing a deeper	2006 (1)	2007(2)		2008(3)	2	009(4)	2010(5)	
	2011)	Ecosystem Structure and Strategy	of the evolving structure and strategies used in the mobile platform ecosystem by using a visualization approach.	Identifying three distinct clusters; firms that are linked to Symbian, Windows Mobile, and Black-Berry.	iOS, Android LiMo were released in addition to th existing platfo	and ie orms	BlackBerry, Windows Mobile, and Android gained market share, while Symbian's platform leadership continued to decrease	The contin iOS and An significant Symbian, a of BlackBe Mobile, an share.	ued growth of adroid, a decrease in and a stagnation erry, Windows d LiMo market	The continued growth of platform diversification among MNOs, suggesting that a single dominant platform has not yet emerged	

Table A. 2. The platform development models after the first screening

Appendix C: Capturing the Concepts of the Relevant Models

This appendix provides the elaboration of the first sub-process of the forth step of the metasynthesis methodology (capturing the concept of the ten models mentioned in table 4). To do so, each stage of the model will be analysed by using the concept of platform openness that has been explained in chapter 2.2. Furthermore, particularly to relate the concept of the stages in egovernment maturity models and the stages in the platform development model, the concept of platform stream that has been described in chapter 2.1 is employed.

In analyzing the stages from the openness perspective, the actors are seen from the supply side where the actors provide the service and the demand side where the actors have a role as the customer. As public service is defined as a service that is provided by a government or an official organization generally for people in particular society (Oxford 2014), therefore the government can be considered in the supply side, the citizens are in the demand side, and private sectors can be either in both sides. The same concept is also applied for the platform development model where the product supplier is in the supply side while the customer is in the demand side. In the following tables, the openness in each stage of the models are described with regard to the side where restriction is eliminated and thus the actors can participate in creating the service or product.

Meanwhile, the concept of platform represented by the models is captured by using the four platform streams that are explained in chapter 2.1. Particularly for the product family stream, considering that the focus in this thesis is the provision of public e-service, the definition is adjusted in service context instead of in product context. In the rest of this appendix, we discuss each model from the perspective of openness and platform stream.

1. Capturing the concept of model 1-6

Model 6 (Lee's model) is a result of a synthesis process by using twelve models including model 1-5 shown in table 4. Hence, in this step, the stages of Lee's model are utilized to represent the stages of model 1-5. The juxtaposition of the six models is shown in table B.1. In the first stage, the government focus on presenting public information to citizens. It continues in the next stage with the emergence of the interaction based services where information and applications start to be integrated. In the third stage, the government's business process is reformed in order to support the application of transaction between the government and citizens by utilizing information technology.

In these first three stages, although the services provided to citizens are gradually improved, all activities and capabilities are organized by the governments with no participation from the citizens. The citizens, as a customer, can communicate and transact with the government as a part of the service, yet they do not contribute in terms of designing or enhancing the services. Thus, these stages are closed from demand parties' participation. Furthermore, although it does not necessarily mean that the private sector cannot participate in performing those services together with the government, in these stages there is no information of the private sector's involvement. Thus, these three stages are considered internal platforms.

Hiller and Bélanger (model 1)	ADB (model 2)	UN (model 3)	West (model 4)	Siau and Long (model 5)	Lee (model 6)	Description	Openness	Platform Stream
Information (1)	Inter- organizational (2)	Emerging (1)	Billboard stage (1)	Web presence (1)	Presenting (1)	Simple information presentation with limited functionality.	Closed	- Organizational - Product Family
Two-way communication (2)	2-way communication (3)	Enhanced (2)		Interaction	Assimilating (2)	Integration of scattered information bases and applications to support the	Closed	- Organizational
Integration (4)	Joined-up government (6)	Transactiona l (4)	Portal stage (3)	l stage (2) 3)		services.	oroșeu	- Product Family
	Exchange of value (4)				Reforming (3)	Utilizing ICT to reform and change government' business processes (streamlining)		
Transaction (3)		Interactive (3)	Partial- service delivery stage (2)	Transaction (3)			Closed	- Organizational - Product Family
Participation	Disital		Interactive	Transformati on (4)	Morphing (4)	Focus on planning and creating new services for the benefit of citizens. Encouraging more active participation from citizens beyond simple interaction and conduct of ordinary	Open in demand side	- Organizational - Product Family
(5)	Democracy (5)	Seamless (5)	democracy (4)			transactions.		
				e-Democracy (5)	e-Governnance (5)	Citizens' involvement in political and administrative decision-makings concerning services and operations.	Open in demand side	- Organizational - Product Family

Table B. 1. Capturing the concept of the models (adjusted from Lee's model 2010)

In stage 4, newer configuration of services and process are enabled which lead the government to shift their focus more into planning and developing new services for the citizens' benefit. This means more active participation from the citizen than prior stage. Furthermore, in stage 5, by utilizing the full capability of advance ICT the citizens' actual involvement in decision makings of the government is enabled. The involvement influences the new configuration of the business process of administrative and political services. In the last two stages, we can see that the citizens are facilitated to get involved in the service provision. In other worlds, these stages are open for the citizens as the customer to participate and contribute to generating and delivering the service.

From the platform stream perspective, the way the governments organize its resources and capabilities shown in the stages represents the organizational stream of platform. For examples, the way the information is simply disseminated and further integrated to support the transaction between the governments and citizens; the reformation of business processes by utilizing ICT in order to be more customer-oriented; and the government agencies and citizen engagement in the process of decision making.

Furthermore, the stages can also be viewed from the perspective of product family stream in service context considering on how the government identify the components in order to deliver the final services such as information, ICT tools, applications (functions) and business processes. While in the first stage simple functions are used to disseminate the information, business process is then adjusted to integrate the information and applications; and provide additional functions that can facilitate the users to interact with the government to achieve the second stage. In this way, enhancement of some components can result in a better service.

2. Capturing the concept of model 7

In the first stage of Kubo's model, the focus is making the basic infrastructure and information available. Furthermore, citizens' participation starts being gained which commences with understanding their needs in the second stage. Hence, in this stage the demand side is allowed to participate.

Stage	Description	Openness	Platform Stream
Preparation (1)	The development of the information infrastructure and basic information disclosure	Closed	- Organizational - Product Family
Organizing (2)	Gaining an understanding of the citizens' needs and their participation	Open in demand side	- Organizational - Product Family
Ingenuity in practice (3)	The development of cooperative relationships with other organizations, utilizing the resources of other organizations, and improving the citizen's ability to use government services effectively	 Open in supply side Open in demand side 	- Organizational - Product Family
Evaluation (4)	Improving public management quality through public-private partnerships, particularly for performance evaluation	 Open in supply side Open in demand side 	- Organizational - Product Family

Table B. 1. Capturing the concept of the models (Kubo's model 2011)

Value generation (5)

The collaboration between various stakeholders for mutual purposes and the demarcation of the responsibilities of the government, the citizens, and other organizations.

- Open in supply side Open in demand side

- Organizational - Product Family

From the platform stream perspective, the condition exhibited in the five stages represents both the organizational stream and the product family stream in the service context. The organizational stream can be seen through the government's arrangement of their internal resource (e.g., infrastructure and information) to provide the service and thus develop it by utilizing the other organizations' resources. Meanwhile, the product family stream is exhibited by the public management for improving their service quality through diverse subprocesses such as understanding the citizens' needs, improving the citizens' access, and evaluating their satisfactions.

3. Capturing the concept of model 8

The first stage of model 8 describes the one-way communication from the government to citizens in providing the public information. Furthermore, the citizens can have more active role by giving feedback on the quality of the data, which is shown in stage 2. Although there is already two-ways communication between the government and the citizens, the restriction still exists that hamper the citizens to further participate.

In the third stage, public participation is opened so that the citizens can get involved in terms of voting, polling, and ideation. In addition, timely and consistent response is provided by the government. The condition indicates the openness in the demand side. Furthermore, after the public participation has been achieved, the open collaboration among the government agencies, the citizens, and the private sector is fostered in the stage 4 and 5.

In the stage 4, value-added government services are co-created by utilizing government data and public input. An example is given through The Health Data Initiative (HDI) that is aimed to improve the community health performance where diverse actors are involved such as technology companies, researchers, health advocates etc. The idea is to create a network of health data suppliers and data appliers so that it can be used to develop various applications through the public-private effort.

However, although various applications are intended to be developed in order to create value-added services, the data analytics activities in this stage are still isolated and disconnected from the decision making processes. This limitation is further expanded in the stage 5 where the power of social media and related technologies are fully harnessed to integrate data analytics with the mission-critical government activities and decision making processes. In this manner, the stage 4 and 5 exhibits the openness in both supply and demand sides.

From the platform perspective, stage 1-3 exhibit organization platform and product family platform in service context. The way the government organize their capabilities and processes such data architecture, data privacy standards, etc represents the organization platform. Meanwhile the list of the expected outcomes and the metrics shows the decomposition of final service into smaller components that exhibit the product family platform.

Stage	Description	Openness	Platform Stream
Initial (1)	 One-way, static communication No or little online interactive capabilities 	Closed	- Organizational - Product Family
Data Transparency (2)	 Feedback from the public on the usefulness and quality of data Keeping the public informed and engaged by using limited social media. Realizing public participation by experimenting social media. 	Closed	- Organizatronal - Product Family
Open Participation (3)	 Utilizing social media for interactive, on-going conversation, storytelling, and communications Voting, polling, feedback, ideation Tapping into ideas and expertise of the public through crowd-sourcing 	Open in demand side	- Organizational - Product Family
Open Collaboration (4)	 Value-added services creation through public- private collaboration Decision making through interagency collaboration Solving complex problem and policy rule making through open collaboration. 	- Open in supply side Open in demand side	- Market Intermediary - Platform Ecosystem
Ubiquitous Engagement (5)	• The scope and depth of open participation and open collaboration are expanded.	- Open in supply side - Open in demand side	- Market Intermediary - Platform Ecosystem

Table B. 2. Capturing the concept of the models (Lee and Kwak's model 2012)

Nevertheless, different characteristic can be seen from stage 4 and 5. In the HDI, as an example, diverse types of external actors with diverse roles are involved that constitute a part of health care system in which they are related each other and mediated. Moreover, product and service innovation becomes the concern that is derived from the external actors' participation, for example, in terms of application development and policy/rule making. In this manner, stage 4 and 5 represent market intermediary platform and platform ecosystem.

4. Capturing the concept of model 9

Dias' model shows the concept of the organizational platform with regard to the way the government arranges the features that facilitate the citizens' participation. For examples, authentication mechanism is provided in the initial stage while in the latter stages regulations is made available to assure the response by the government agencies. From

another perspective, the model also represents the product family patform in service context with regard to the divisions of the features that the citizens can utilize. For examples, submitting complaint, free discusion, and participatory budgeting.

Although all stages in this model concern the citizens' participation in the service provision by the government, the first two stages still indicate the restricition in the demand side. It is considered so because although the citizens can express their opinions or complaints there is no mechanism that assure the further processing of the submissions. Conversely, in stage 3 and 4, the mechanism of mandatory response given by the government has been stablished. It indicates better opportunities for the citizens to contribute either in general public discussion or in public budget decision making. Thus, in these stages the demand side is opened to participate.

Stage	Description	Openness	Platform Stream
Complaint/ Suggestion (1)	Citizens are allowed to submit suggestions or complaint without authentication through features on the website.	Closed	- Organizational - Product Family
Opinion poll/ free discussion (2)	Participation in opinion polls or discussion groups regarding policy areas is facilitated.	Closed	- Organizational - Product Family
Procedure for public discussion (3)	The city council is obliged to provide response for participation in processes of public discussion.	Open in demand side	- Organizational - Product Family
Participatory budgeting (4)	Citizens are allowed to contribute to and influence the decision making processes of participatory budget.	Open in demand side	- Organizational - Product Family

Table B. 3. Capturing the concept of the models (Dias' model 2013)

5. Capturing the concept of model 10

The last model by Gawer delineates platform development in general rather than in specific e-government context. It particularly exhibits the concept of platform for physical product. The first stage indicates no openness either in demand or in supply side so that the product creation is made without any participation from any external parties. The openness in the supply side is indicated open in the second stage where the product component suppliers throughout the supply chain are involved in the product generation. Together with the platform owner they complement each other to generate the final product.

In these two stages, the concept of product family platform is represented. The platform can be seen as the way the final product is structured into components and thus can be recomposed in order to generate added values and a variety of products. It is also a way to enhance flexibility in designing new products and increase productive efficiency along the supply chain. The final stage in this model exhibits the concept of market intermediary and platform ecosystem. Several firms are involved and complete each other to provide the final product by utilizing complementary products or services produced by the external parties. Thus, the innovation on the complementary products become important as it facilitates and supports the participation of other sides of the actors including the customers. An example is various applications that are built to support the data collection from the customer and data exchange among the suppliers in order to create value-added products. In this manner, the platform is open to both supply side and demand side.

Stage Description		Openness	Platform Stream		
Internal (1)	 It is used within a firm or an organization Facilitates the division of internal labor and modules imitation 	Closed	- Product Family		
S Supply Chain (2)	 Involves some actors in a supply-chain context The products resulted from the platform are developed and produced in collaboration among those actors 	Open in supply side	- Product Family		
Industry (3)	 Several actors are involved in the platform, but not necessarily part of the supply chain nor buy or sell from each other Focus on the innovation of complementary products or services. 	 Open in supply side Open in demand side 	- Market Intermediary - Platform Ecosystem		

Table B. 5. Capturing the concept of the models (Gawer's model 2010)