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Masterthesis

Where are the employees?!
The expansion of an integral IoT model.

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Abstract

Aim

This research aims to provide insight in the importance of embedding employees and their attitudes as a layer to the model of Wirtz et al (2019). Thus, providing the first integral IoT model that includes employees as a variable

Method

A qualitative study was conducted by using interviews and a focus group. Employees that participated in this study differ in age, gender, function, department and level of education. A total of 11 employees participated in this study, all participated in interviews and 4 participated in the focus group.

Results

This study shows that there is a relationship between employees and the other layers used in the model by Wirtz et al (2019) and that employees should be embedded into the IoT model to provide more in-depth information on the factors that influence implementation of IoT technologies.

Conclusion

Based on this study, it can be concluded that employees play an important role as facilitators for the successful implementations of technological change. The revising of the public integrative IoT framework model provides valuable insight on the importance of including employees are a variable for success.

Acknowledgements

This thesis is the end product of my master in Communication Studies that I followed at the University of Twente in Enschede. I started this thesis in collaboration with the Gemeentelijke Belastingkantoor Twente in order to deliver an end product that has an actual value for an organization, which I believe we have achieved together. This thesis was the most challenging part of my study but I enjoyed every day I spend on it. It helped me develop as a person and as a professional, for which I am grateful. It has been one and a half years since I started my journey at the University of Twente and with this master thesis the journey comes to an end. During this time, I have received support from a lot of people and I would like to take this opportunity to thank a few of them.

Firstly, I would like to thank my partner, parents and family for their unconditional love and support, for letting me make my own choices and letting me make my own mistakes. Thank you for letting me be me.

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Finally, I hope that whomever reads this thesis enjoys it as much as I did make it, that it may prove to be a valuable asset any organisation looking to implement a new technology and that it provides valuable insights. Please contact me if there are any further questions of feedback regarding this thesis.

- Jaimy van der Wei

Hengelo, 01-04-2020

Contents

List of Abbreviations

e-Government	Electronic Government
IoT	Internet of Things
AI	Artificial Intelligence
GBT	Gemeentelijke Belastingkantoor Twente
H2M	Human to machine interaction
M2M	Machine to machine interaction

1. Introduction

Public organisation and in particular (semi)governmental organisations appear to be promising application areas to implement the Internet of Things (IoT). IoT can play a significant role for governments to become ''smart governments'' a trend that more governments will adopt in the future (Mellouli, Luna-Reyes, & Zhang, 2014). Smart government is regarded as "the highest modernization phase of public organizations" (Jiménez et al., 2015) and contains "elements of reflection, information-gathering, processing, and a reliance on ICT and on principles of openness, participation, and improvement of public sector services" (Kennedy, 2016). Literature defines and provides different aspects, factors and models that are of importance for successful implementation of new technologies such as IoT.

However, integral models in literature such as the model created by Wirtz et al. regarding implementation of new technologies focus on value creation, public demand, strategy and technological infrastructure but ignore employees as a critical factor. There is no model available in literature that takes into consideration employees and their attitude towards technological change and the impact this has on the successfulness of implementation of new technologies. Employees and their attitudes are considered key components for successful implementation in research conducted by both Schilling (2012) and Mehr (2017). Even thou these studies highlight the importance of employees as a factor for implementation, employees are yet to be embedded into a model as an important factor for the implementation of new technologies.

This research addresses the absence of employee and their attitudes as an important factor for successful implementation of new technologies by creating a new layer that is added to the core of the model by Wirtz et al (2019). This embedded model is defined as the employee integration layer and is derived from the model used by Schilling et al., (2012) and shows the interrelationship between the different layers.

This study was built upon existing knowledge found in literature to determine the factors that influence the successful implementation of new technologies. The models of Schilling et al (2012) was embedded within the model of Wirtz et al (2019) to create a revised model that covers the four layers suggested by Wirtz et al., (2019) and embedding employees as a 5th layer that need to be considered when implementing a new technology. From a scientific point of view, this study is relevant as it provides the first model in literature that includes employees and their attitudes as an important factor for successful implementation of new technologies. The model created in this research can contribute to the successfulness of organisations, both governmental as non-governmental when implementing new (IoT) technologies.

To validate employees and their attitudes as an important variable for successful implementation of new technologies the following research question was investigated:

''What is the added value of embedding employees as a layer within the model for IoT integration?''

To provide an answer on this research question, a qualitative study was carried out using both interviews and a focus group.

2. Theoretical framework

This theoretical framework will provide insight in the characteristics of E-governance. Secondly, the model of Wirtz et al (2019) and its layers will be explained in-depth to provide insight in the important variables within this model. Thirdly, Schilling et al, (2012)'s ''Framework for understanding professionals' reaction to strategic change'' will be discussed as a possible construct for adding employees and their attitudes as a key variable to the model.

2.1 E-government

During the last few years (semi)government organizations have tried to improve their administration and provided services by using Information and Communication technologies (ICT). The increase in the use of technology is transforming the processes within organisations and how they function. Electronic Governance, also called E-governance is one way of using ICT that is currently being developed by organizations that try to improve their back-office processes and as a way to increase employee efficiency by reducing time and workload. These ICT improvements include but are not limited to: integration of processes, improvements of services, innovation, management and providing citizens with more transparency, efficiency and a way to participate.

The definition of E-government according to Layne and Lee (2001) is: "*Electronic government refers to government's use of technology, particularly web-based Internet applications to enhance the access to and delivery of government information and service to citizens, business partners, employees, other agencies, and government entities. It has the potential to help build better relationships between government and the public by making interaction with citizens smoother, easier, and more efficient. Indeed, government agencies report using electronic commerce to improve core business operations and deliver information and services faster, cheaper, and to wider groups of customers."*

One of the great benefits of E-governance in that ICT enables the ability for an organisation to respond instantaneously with information gathered from different government agencies at the same time. This data is combined and used to increase the government's ability to respond. E-governance is also used to increase the information sharing between different agencies, making collaboration possible which helps to achieve greater coordination between different organisations, it also increases the likelihood that an organisation can respond within a timely manner and increases the effective implementation of decisions made by the government agencies (UN, 2008). E-government is about the use of technology to become ''smarter'' as an organization, offering citizens ways to collaborate with the government while offering them more transparency and a faster response.

A form of technology used in E-government is Artificial Intelligence or AI. Artificial Intelligence is the programming of computers to do tasks that would normally require human intelligence. AI can help to reduce administrative burdens, help resolve resource allocation problems, and take on significantly complex tasks enabling government workers to spend more time addressing citizen needs, AI could potentially help humanize the workers and foster a better relationship between government employees and citizens. In order for AI to work it will need a network of devices from which it receives data. This network of devices is called IoT.

According to Madakam et al., (2015) The definition of IoT is: ''an open and comprehensive network of intelligent objects that have the capacity to auto-organize, share information, data and resources, reacting and acting in face of situations and changes in the environment". The Internet of Things can be best described as a group of devices that are connected to each other by a data connection, with

this data connection the devices are able to communicate with each other and enables them to share information. The IoT network is becoming increasingly more complex since more devices become connected to the internet. This connected network of devices can contribute the E-government by functioning as a network that can gather, share and distribute the necessary data that is needed by other technologies such as AI to make decisions. (Brous & Janssen, 2015). IoT enables objects to become part of a network, making the devices able to work as a whole instead of a single entity. Also, by combining the information/data gathered from the connected devices and other systems using analysis, may provide new insights that can improve decision making (Miller & Page, 2009). Since the Internet of Things has a wide range of definitions a definition for this research was chosen from among them. Artificial intelligence in combination with IoT has the potential to have a major impact on the way the government communicates with their citizens and how these citizens experience it. AI can function as a powerful tool to increase the efficiency of the organization and in doing so reduce costs, time and workload. However, AI should be used as a way to augment employees and support them in their work and not as a means of replacing them.

2.2 Original Integrative public IoT framework model

Given the complexity and multifaceted character of IoT, as well as the specific nature of the implementation, traditional models for e-services do not appear to be suitable for describing and successfully implementing IoT-based public services. To fill this gap, Wirtz et al, (2019) developed a conceptual and integrative IoT framework for smart government. Wirtz based his framework on generalized definitions found in literature.

The model consists of accumulated concepts and constructs found it literature, these concepts and constructs were then organized and made into a tool for integrating and interpreting information and data, the model also depicts essential factors, constructs and variables either graphically of narratively and shows presumed relationships amongst the different layers. (Miles et al, 2014).

The IoT framework model that is explored in this research originally consists of four layers: the public strategic layer, public value creation layer, public demand layer and the technology infrastructure layer. As shown in figure 1, the model consists of 3 layers that relate to an organisation on a macro level and one layer that relates to an organisation on a micro level. The technology infrastructure layer reflects all the technological and functional capabilities of an IoT application and/or service and is located at the micro-level of an organisation. The public strategic, public value creation and public demand layers are seen as core layers that relate to the broader spectrum of an IoT system and are thus positioned at the macro-level of an organisation. The public demand and public value layers both emphasise the environment of an IoT services. The public demand layer looks at the market demands and particular needs of stakeholders while the public value creation layer deals with the creation of added value for these stakeholders (Wirtz et al., 2016). The public strategic layer is above these two layers and provides an overarching strategy that impacts the way other layers are filled in and directs them towards a unified goal.

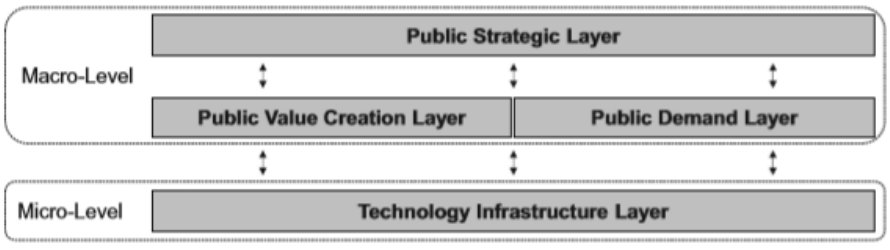


Figure 1: Basic structure and macro/micro integration of layers by Wirtz et al., 2019.

Public strategic layer

This core layer of the model refers to the overarching strategy of an organisation, what is their objective, their vision and mission. This layer's primary objective is to provide, generate or secure an advantage for the organisation and functions as a guideline for the other layers to direct them towards a primary objective. This layer combines three essential models that are relevant for the creation of a public strategy which are: the strategy model, the resources model and a network model. These components are extensively researched and have increased in importance over the last several years (Chesbrough, 2006). The first of these three models is the strategy model, this model is used to define the long-time objective of a IoT framework, which in most cases is to create additional public value. The strategic model refers to three public value dimensions taken from the study of Moore (2002), which are: enhancing efficiency of IoT service provision to increase the effectiveness of goal attainment, improving IoT service outcomes and to increase trust in public actors such as the government, public administrators and public service provides. Strategic decisions for IoT could be, for example: how to develop and provide services. Should these services be implemented with the organisations own IoT systems or should it rely on external providers to provide the system for the organisation. A decision like this can greatly impact an organisations strategy for aspects of their technology model, this example also highlights the relationship between the different layers and models used in the framework. The second model used in the public strategic layer is the resources model. This model takes in to account both internal and external resources that are considered to be critical for the organisations value creation (Osterwalder & Pigneur, 2010). This model addresses the way how resources should be integrated within an organisation and the way resources can be used to create services and/or products. Lastly the resource model defines the factors that are of critical importance for creating public value, these factors are often categorized as core assets and core competencies (Wirtz et al., 2016). The last model in this layer is the network model, which refers to the relationships between the different actors that are involved with the development of the IoT service. Previous studies indicated that partnerships and networks play a significant role in implementation of an IoT application (Dijkman et al., 2015). The model can be viewed as a tool to manage and control these networks and connect them to the right processes and services.

Public value creation layer

This layer of the model refers to the public value creation layer, which deals with the internal creation of value within the organization and addresses the questions of how and under which conditions value can be generated (Wirtz & Daiser, 2017). The public value creation layer consists of the public procurement model, the budget model and the public service creation model. The public procurement model maps the sources and the structure of factors that are necessary for the IoT application to create public value. The model includes goals, measures and management activities such as the analysis of information and the monitoring of said resources (Wirtz & Daiser, 2017). There are two procurement sources available for a public IoT application. The first one is private and commercial providers such as software developers and technology suppliers. The second one is the public providers; these providers are agencies or departments that play a critical role for the procurement of information. The second model of this layer is the budget model, this model functions as a financial model, which is considered a crucial component of a IoT model (Pang et al,. 2015) . The budget model includes financial planning and controlling of the costs that come with the implementation of an IoT application, while also taking in to account the financial impact of the other models within the frame work. The last model of this layer is the public service creation model, this model describes the generation of value within the public value creation layer. For IoT services this generation of value comes forth of providing processed data to users and/or citizens, the process of service development and provision comprises the collection, analysis and systematization,

classification, storage and on-demand provision of information or data. Another type of public IoT service creation consists in enabling machine-to-machine (M2M) interaction or human-to-machine (H2M) interaction based on the analysis, automation and management of IoT services and channels. The last type of public IoT service creation is closely related to the concept of open government, relying on its widely accepted principles of transparency, participation and collaboration (Lee & Kwak. 2012).

Public demand layer

This layer of the model refers to the public demand layer, which focusses on the service environment and market and/or user related aspects (Wirtz et al., 2016). The public demand layer consists of a public service offer model, a fee model and a user model. The first of these models is the public service offer model, this model focuses on the market-related service offer and the external demand. It analyses and evaluates the needs and behaviours of stakeholders and translates these needs and behaviours into value propositions and service offers. For IoT appliances this is characterized in four service offers namely: information and communication, automation, transaction and integration. Information and communication include services as location sharing, notifications and communication. Automation offers a way to automatize certain services such as transactions. Transaction and integration include services and products such as public terminals and the integration of a mobile platform. The goal of these service offers is to improve the outcomes for stakeholders by means of higher performance, cost reductions, increased convenience and usability (Dijkman et al., 2015). The second model is the fee model, this model is similar to the budget model in the public value creation layer, and acts as an interface between the public service offer model and the following user model which will be discussed afterwards. The fee model maps incoming cash flows that an organisation receives for providing an IoT service, like usage fees. The user model is the last model included in the public demand layer and focusses on the target groups of the IoT application, these groups are usually categorized with the used of demographic data and user characteristics. For public IoT applications there are usually three target groups namely: the citizens, private organisations and public organisations. These target groups are vital for the IoT application since these types of services are often user-orientated, meaning that the service has been developed specifically to provide according to certain needs (Dijkman et al., 2015). The user model describes the finalized service that is provided to the end users.

Technology infrastructure layer

The technology infrastructure layer is a collection of technologies and applications that can be used to create an IoT framework. Since IoT is a complex network of interconnected devices this layer aims to provide the information needed to successfully develop an IoT service. The technology infrastructure layer takes account of this issue in terms of a technology model that is composed of the three components: 1. data centres, 2. Internet infrastructure and 3. endpoints/connected objects.

The first component: data centres, these centres process the information that is collected from the endpoints and is received to the various components in the network. This data centre does not necessarily have to be a physical location but could also be cloud based servers throughout a decentralized network of servers (Porter & Heppelman, 2014). These centres will be the databases from where the citizen feedback from different channels can be analysed and summarised in order to create a standardized output that can be used by AI technologies.

The second component of the technology layer is the internet infrastructure which refers to the connection and data transmission between the endpoints and the data processing centres and is mainly about the capability of transmitting data from one device to another.

The third component of the technology model is the endpoints/connected objects component. Endpoints not only serve for the generation of data but also as the interface connecting humans and the machine network. Endpoints are seen as the last contact point between humans and machines. (Porter & Heppelmann, 2014; Mitchell et al., 2013). These endpoints serve as the means to generate and transfer data to the processing centre. These endpoints include but are not limited to computers, phones, faxes and other devices that are used to receive citizen feedback. These interfaces act as the steering items of the IoT, as they receive commands from different people. Concerning the smart government setting, those humans are either citizens or public service managers. In this context, it is important to mention one central function of the H2M interface: The recognition of the identity of people and the associated access rights, to maintain a secure network and prevent any unauthorised access to private information.

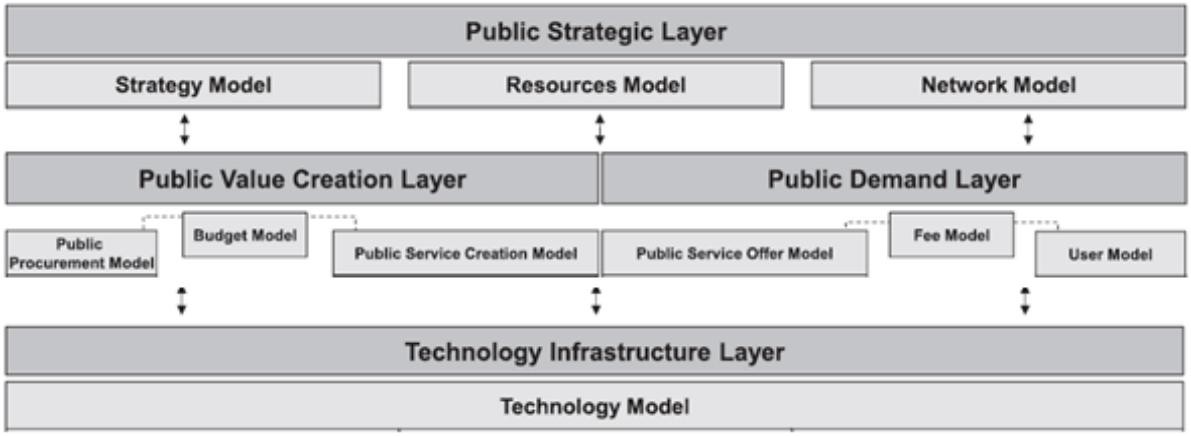


Figure 2, the integrative public IoT framework by Wirtz et al., 2019. (simplified)

As explained in the texts above the model by Wirtz et al. (2019) combined several highly valuable models into layers, each of these layers addressing important factors that are essential for the implementation of IoT technologies. The research by Wirtz et al. (2019) states that that each layer is important for the successful implementation of IoT technologies and that the layers influence each other. This means that a change in for example the public strategic layer directly influences the models in other layers highlighting an interdependence between said layers. Since the model has a high interdependence between its layers it is essential to manage and control all the factors that influences them. On this note, one critical factor that influences all layers is missing from this model, which is employees. Especially from a public service organisation's point of view are employees of critical importance to provide the necessary services to their stakeholders. To close this gap in the model a 5th layer is embedded into the model of Wirtz et al., (2019) based on the ''Framework for understanding professionals' reaction to strategic change'' by Schilling et al., (2012).

2.3 Framework for understanding professionals' reaction to strategic change

Providing a construct not included in the previous model and in any technology implementation model for that matter, the model of Schilling (2012) focusses on the attitudes of employees/professionals and their reaction to strategic change within the organization. Because these professionals have control over their individual knowledge and networks, they are a key productive resource of an organization, making their reactions to change key to the success of these changes. Professionals reaction to change, often with a focus on their 'resistance', have been extensively researched. It has been claimed that people resist change because it is in their nature to resist. Resistance is often based on emotional reactions which derive from a low tolerance for change, a general fear of loss of control or from fear of the unknown situation that follows the change. (Armenakis & Bedeian, 1999; Kotter & Schlesinger, 1979). Under the wrong circumstances

change can facilitate reactions such as feelings of agitation, anxiety and even depression. (Klein, 1984). Resistance can be expected when the change made by the organisation has a negative impact on the professional at a personal level, this can include a lower salary, loss of power and status and a loss of certain benefits the professional received before the changes. (Fiedler, 2010). Rafferty & Restubog, (2010) state that ''reactions to change have been attributed to more external principle-based reasons. Resistance has found to be motivated by a belief that change is harmful to the organization or a conviction that the organization should develop in another way, this can be based on misunderstandings and a lack of communication or a lack in trust''. This model is a graphical representation of a framework that helps to understand professionals' reactions to change in organizations, in organizational roles and practices and the nature of existing professional identities (Schilling et al., 2012). The model is shown in figure 2 on the next page.

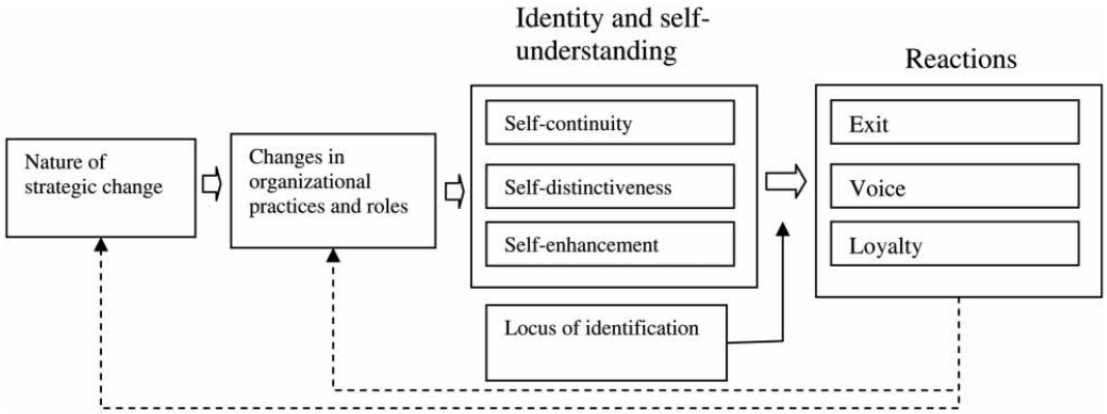


Figure 3: Framework for understanding professionals' reaction to strategic change (Schilling et al, 2012)

The first component of this model is *the nature of strategic change*. Strategic change is about the way the organization relates to its environment, this can be both internal (new goals and objectives) and external (client demands, competition) (Rajagopalan & Spreitzer, 1997). Strategic change should be considered relatively to its content, issue and extent of change. The significance of the strategic change can be defined by the extent to which it is viewed as a reason to change practices and roles in daily work and/or changed professional identities.

The second component of this model is the *''changes in organizational practices and roles''.* This refers to the actual implementation within the organizational practices of a change in order for it to take effect. These changes usually create new roles within the organization. Organizational practices are seen as the focus on structure and processes of the organization and the expected changes in how work is done. These practices are fundamental in shaping and reproducing professional identities as well as having an effect on the client's satisfaction (Camaran, Moizer, & Pettinicchio, 2010).

The third component of this model is the *''changes in identity and self-understanding''.* This layer focusses on the change in skill sets and identities new structures and roles in the organization bring with them, are they acceptable to the professionals? do the professionals have the means, both cognitive and organizational to adapt, evolve and assume the new roles (Dalmasso & Sardas, 2008). This component is about analysing the relationship between the offered structures and roles and the professional identities, this means that a new identity created by an organisation has to be perceived

as positive and acceptable by the professional. The new identity has to fit with the way the professional views him/herself in order for the professional to adopt the changes made by the organisation (Eilam & Shamir, 2005).

For an identity to be seen as attractive by the professional, it needs to offer them a sense of self-continuity, self-distinctiveness and self-enhancement. This means that a new identity created by the organisation has to be perceived as something that fits the professional, the professional has to be able to place the new identity as his own, it has to fit the person he or she is (self-continuity) so they can express and be themselves in the work place. Secondly, an attractive identity offer should also provide a clear image of the group/organization in relation to other comparable groups/organizations (self-distinctiveness), having a distinct strategy and structure helps to create strong levels of identification. Finally, to maximize the attractiveness of the perceived identity, the organization itself has to have a positive and desirable image as this supports the creation of a positive self-image (self-enhancement) (Dutton et al., 1994).

The last component of this model is the *''professionals' reaction''.* This component provides understanding about the reaction professionals might have regarding strategic change and requires an analysis of the attractiveness of new roles and practices compared to existing identities that are present in the organization. How do they affect a professionals' experience of self-continuity, self-distinctiveness and self-enhancement? Professionals that encounter changes can act in three way according to Schilling et al. (2012), namely: exiting, voice and loyalty. In the first instance a professional leave the organization. In the second instance (voice), the professional will talk to superiors and others about the issue in order to get more information and change his/hers opinion and in the third instance the professional will quietly accept and adapt to the changes, often at the price of commitment and engagement. These different reactions can act both as a barrier and as an enabler of strategic change.

2.4 Revised Integrative public IoT framework model

When revising the model of Wirtz et al. (2019), the main goal was to include employees as a variable for successful implementation of new technologies, filling in the gap in literature by providing a model that includes all aspects that influence successful implementation of a new technology and focusing on the importance of employees and attitudes as a variable of this success.

The revised integrative public IoT framework model consists of layers taken from both the model of Wirtz et al., (2019) and the model of Schilling et al., (2012). By placing the layers from the model of Wirtz around the construct of Schilling a new model was created, with employees and their attitudes as the focus point in the centre. This combination of models creates a new view point in which not only employees are seen as the key component for successful implementation of a new technology but also shows the relationship between employees and the different layers surrounding it. The arrows indicate a relationship between employees and the connected layer, presuming that the layers influence each other, be it in a positive or negative way.

As mentioned before in part 2.3, Schilling et al., (2012) research states that employees can react in three different ways, namely exiting, voice or loyalty. By including these reactions in the model, the model uses employee reaction as a tool to measure the successfulness of implementation of a change in strategy, technology, value creation and public demand.

Furthermore, by adding employees in the centre of the model, the arrows function as an indicator of the relationship between changes made in the surrounding layers and the way employees perceive these changes to influence their roles and practices within the organisation, which can be both

negative and positive. In return, the way employees perceive these changes in their practises and roles influences the successfulness of said change. When employees perceive the changes made as something that influences them positively, they will accept and adapt to the change made, increasing commitment and engagement which influences the successfulness of an implementation (Schilling et al., 2012).

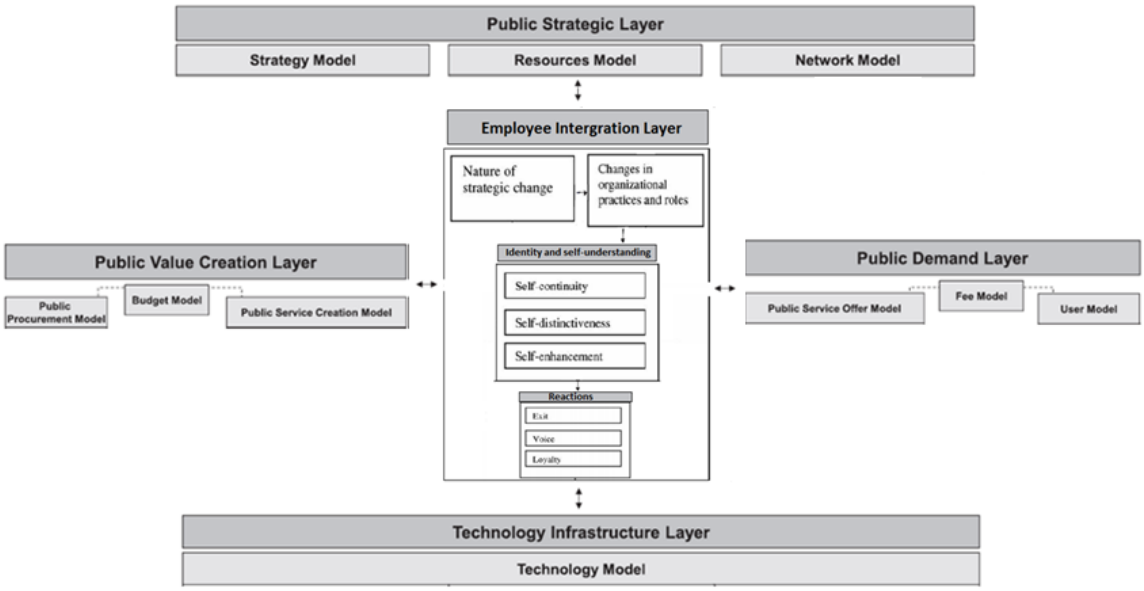


Figure 4: The revised integrative public IoT framework.

To verify the importance of including employees and their attitudes as a variable for successful implementation of new technologies and to gain insight in their influence on the other layers of the model the following sub questions were formulated:

SQ1: *''How do employees react on perceived changes in an organisation?''*

SQ2*: ''What is the relationship between employees and the public strategic layer? ''*

SQ3: *''What is the relationship between employees the technology infrastructure layer?''*

SQ4: ''*What is the relationship between employees and the public demand layer*?''

SQ5: ''*What is the relationship between employees and the public value creation layer?''*

3. Method

In this chapter the methods used in this research are discussed. Firstly, the research design is discussed, followed by the procedure, the participants and finally the analysis of this study is discussed.

3.1 Research design

To gain the insight needed to verify the importance of including employees and their attitudes as an important variable for the implementation of new technologies, a qualitative research method was used for this study. A qualitative research approach was chosen because it provides in-depth information and understanding about current changes the organisation is implementing as well as providing insight in employee attitude towards changes in the organisation, how they perceive it and how they influence changes made in the organisation. To get these answers two qualitative research methods were used, namely: interviews and focus groups. In this research the choice was made to organise the focus group after the interviews were held, insights and important subjects that came from the interviews were used to create the discussion topics for the focus group, the focus group was used as a way to validate the data gathered with the interviews and to provide additional information about the topics that were discussed.

Interviews

The interviews were conducted using a semi-structured approach, the structure of the interview was partly determined before the interviews were conducted, during the interview there was room to ask questions that came up during the interview, giving the person that is being interviewed a degree of freedom to talk topics that come to mind. Semi-structured interviews are considered a flexible technique for small-scale research and can provide answers that help to identify certain needs, problems or provide information about a certain subject in general. The interview questions were divided into three groups, namely: front office employees, IT employees and management. The interview questions for the three groups was divided in two parts, the first part of the interview contained the same questions for all three groups, the second part contained questions that were specific to their job function. The interviews consisted of a small explanation of the interview goal, the main purpose of this thesis and the explanation of used terminology to make sure everything was understood well and all interviewees had the same definition of terms used in the interview. The duration of each interview was between 23 and 45 minutes.

Focus group

To gain further insight in the employee's attitudes, their perceived influence on changes within the organisation and the influence of changes on their roles and work, a focus group was held. The main goal of the focus group was to create a dynamic group that would discuss certain topics important for this study. With the group consisting of employees from different departments, age, gender and personal experiences. This group interacted with each other without noticeable influence from the observant. During the focus group session 4 participants discussed topics that were deemed important for this study. The topics were derived from the research and sub questions and adjusted based on the interview results. The first topic discussed was GBTwente as an organisation and what their vision is on this organisation. This first topic was mend to start the discussion between the participants, giving them a shared subject on which all participants could talk and voice their opinion. The second topic was about changes within the organisation and how they perceived changes made by the organisation. This topic was discussed to get an understanding of the participants attitude towards changes made by the organisation in general, the third topic for discussion was about the importance of including employees with decision-making and if they think they influence the

successfulness of a change made by the organisation. This topic was to gain insight in how employees act when confronted with change, if they feel they influence the changes made. The last topic for discussion was about employees and their influence on the implementation of technology, value creation and public demand. This last topic was used to verify the different factors, their importance and what the relation is between employees and the different layers of the model created in this study.

3.2 materials

In order to conduct the interviews and the focus group a number of materials were required. In order to reduce distractions and noise as well as providing a controlled environment that remained the same for all interviews, the same room was scheduled for all participants. This provided a clean, silent room with no distractions and provided a place where participants could freely talk without being heard by other employees. An Iphone X was used to record the session of each participant.

3.3 Participants

This study is conducted for the case of GBTwente, all participants in this study were Dutch. This means that all interviews and the focus group was conducted in Dutch. 11 participants were selected for the interviews based on a convenience sample. The participants were sorted into three groups, namely: front office employees, IT employees and managers. The first group consisted of 7 participants, 5 female and 2 males. The second group consisted of 2 participants, both male. The last group consisted of 2 participants, 1 female and 1 male.

4 participants for the focus group were selected based on their availability and the department they work for, as well as age and gender, to ensure a dynamic and heterogeneous group. The focus group consisted of two front office employees, one IT employee and a manager.

3.4 Analysis

After the interviews and the focus group was held all data was collected. The audio that was recorded during the interviews and the focus group discussion was transcribed using Amberscript, an AI based software capable of transcribing audio with up to 6 different speakers. Personal information such as names were anonymized. After transcribing the audio logs using Amberscript, all transcripts were checked and altered by hand, since the AI software can make mistakes when there is background noise, heavy accents or soft speaking, where necessary the transcripts were corrected. After all the transcripts were checked for accuracy the coding of said transcripts began. The coding started by following the guidelines explained in the book of Boeije (2009), which is available both online and as paperback. The guidelines in the book consists of three steps of coding, namely: open coding, axial coding and selective coding.

Firstly, all the transcriptions were loaded from Amberscript into ATLAS.ti. In ATLAS.ti, the transcriptions were segmented into parts based on their relevant information and their completeness. These parts were then connected to their corresponding participant to be used as a way to discover connections between different segmented parts. All the quotations in the segmented parts were read and given descriptive labels, which would be used later in the analysis. this is the first part of coding called open coding. After labelling all the quotations present in the various segmented parts from the transcriptions, the axial coding started. In ATLAS.ti a list of all descriptive labels was created in order to compare these labels with each other to look for overlap and similarity. Codes that overlapped or were too similar to each other were combined with each other were possible. Based on these codes, categories were made combining several codes into one category. In figure 4 (on the next page) are the categories, their description, discussed topics and some example quotes shown.

Figure 4: Categories, descriptions and example quotes

Category	Description	Topics	Example 1	Example 2	Example 3
Attitude towards change.	Employee attitude towards changes made within the organisation.	General attitude towards change in the organisation, viewpoints on the impact of changes on employees role. Perceived usefulness of changes made.	'They have a saying, if you stand still you dont go forward, so yes. I am open to change and i dont mind doing things differently."	'We see that our society is changing, so in order to keep up we have to change aswell. It is our job to follow change and adapt to it."	'I am really happy that we have made the change as an organisation, it was needed for further progression."
Feeling of inclusion.	Employee's feeling of being included and heard when a decision is made.	Employees about management, Ways of being included, viewpoints about sharing opinions.	'I have the feeling that the management is open to discuss plans and if i go to them that they will listen to me and take my opinion seriously."	''We are a flat organisation, therefor we are always close to the management. Talking about certain topics and sharing opinions happens every day. This gives me the feeling that management listens to my opinion and takes it with them when they make a decision.''	'I sometimes give advise to the management about certain topics, so i know for a fact that they listen to their employees."
Attitude towards technology.	Employee attitude towards new technologies.	Viewpoints on the usefulness of technology for employees work, Willingess to accept usage of new technologies into their daily work, Opinion wheneter technology could replace employees, the role of technology within the organisation.	'Technology allows us to analyse certain data, which provides us with the neccesary information to make well informed decisions, so yes, new technology that helps us do our job ? Bring it."	'Technology provides us tools to do our job as efficient and as good as we can, without technology some tasks would be very time consuming."	'Some employees are spending whole days doing certains tasks for the organisation, if there is a technology that can help ease their workload and free them up then we should try it."
Employees as a key factor for implementation.	Employee's feeling of being important for succesful implementation.	Viewpoints of employees and their role with implementing changes, added value including employee expertise with implementation decisions, employees as generators of data for an IoT application.	'Without people, the systems would not be able to function. Data is put in by employees and without employees doing their job well, there is no data for a system to use."	'I think that technology and employees are connected with eachother, technology helps by supporting the employee in their job. The other way around, employees are essential for some technologies to properly function, think of IT employees and the people at the frontoffice."	'I think that employees here always aim to try and make the process as efficient and cost effective as possible, this way of working will be valuable when a new technology is implemented, they can fish out the kinks."

4. Results

This chapter of the study presents the results and findings of the interviews and the focus group. The results and findings are split up in 4 sections, each covering one of the categories seen in figure 4. The findings in each section are based on both the interviews as well as the focus group. Quotations from the interviews and the focus group will be used to provide context to the results.

4.2 Attitude towards change

The first topic that was discussed in the interviews is employees' attitude towards change. Firstly, employees were asked about their feelings about changes made in the organisation in general and how they perceive these changes made in the organisation. Attitudes amongst participants were positive. Changes made in the organisation does not scare them, in fact being part of a changing organisation was seen as a positive change. The organisation is changing to a more citizen centralized organisation, with more attention for citizen needs. Bureaucracy is becoming less and lines are made shorter. The organisation is becoming modern and changing to fit more in today's society. The perception of participants about changes made in the organisation comes forth from the idea that the world is constantly changing, in order for an organisation to stay relevant it has to change and adapt to the world.

The following two quotations are examples of this perceived need to change:

''They have a saying, if you stand still you don't go forward. I am open to change and I don't mind doing things differently'' (Interview 5, Male, Front office employee)

&

''We see that our society is changing, so in order to keep up we have to change as well. It is our job to follow change and adapt to it'' (Interview 10, Male, Manager)

There were also participants who encouraged changes within the organisation because they perceived this as a way to have a more dynamic workspace, with different tasks to perform, instead of having the same tasks to perform for months or even years.

There are two participants that shared this point of view, the following quotes are theirs:

''I am really happy that we have made changes as an organisation, it was needed for further progression'' (Interview 1, Male, IT employee)

&

''Change? I can't get enough of change. I encourage it whenever I can, I'm always interested to see what change can bring to us'' (Interview 2, Male, IT employee)

What was interesting is that both participants that perceived change as a way to increase the dynamic of the workspace and make their work more diverse came from the IT department, both were males and both were younger than 30 years old. This positive attitude towards change could be tied to the fact that these employees, working in an IT department where creativity is needed to circumvent certain bottleneck gives them a natural interest in the new and unknow things.

Even thou the participants claimed to have a positive attitude towards change, a slight nuance can be made in the context of why they have a positive attitude towards change. On one side participants, (mostly older participants) see change as a necessity for the organisation in order to keep up with modern society and the demand of citizens, while on the other side younger participants, that work

in the IT department see change as an exciting and interesting way to increase the dynamic of their work.

The focus group was also asked to talk about changes within the organisation. The participants discussed changes within the organisation and agreed together that the changes within the organisation provided positive changes. The group discussed about the fact that the organisation is changed to a citizen-orientated organisation and that the people working at this organisation tend to be flexible and adapt to the changes made by the organisation and that the employees that did not adapt to the changing organisation were mostly not working here anymore. What was interesting is that all four of the participants in the focus group agreed that employees should be following the change and that your job should be a bit challenging, if that's something a person doesn't want then maybe they are working in the wrong organisation.

A quote from the focus group, claiming the need for employees to be flexible:

''Employees that work here need to be flexible, if you want to go with the changes made in the organisation. Nobody says you have to stay here, if you don't want to follow the change you can always work somewhere else'' (Speaker 3, female)

This point of view about being flexible and following change stems from the creation of the organisation. The organisation is created by merging departments from all local governments in the area into one new organisation. This mend that the people working at the local governments were also transferred from their old job at the local government to the new organisation. Some of these employees did not like the new way of working and tried to avoid change, these employees are not working at the organisation anymore but left a lasting memory with those that still work there.

The following quotation is an example of the opinion of employees being flexible towards change:

''The neglect of following change stems from the time that we were still a true governmental organisation, we weren't allowed to be in the spotlights. We needed to do our work and stay quiet. Now that we are our own organisation, we are allowed to place ourselves in whatever role we see fit.'' (Speaker 4, female)

The answers from the interviews and focus group about the participants attitude towards change within the organisation granted insight in the attitudes amongst the different departments and the similarities and differences between older and younger members of the organisation.

4.3 Feeling of inclusion by management

The second outcome of the interviews was the feeling of employees of being included by management when decisions are made. The organisation the participants work at is a flat type of organisation meaning that the lines between employees from different departments and management are short. Participants told that they have the feeling of being listen to if they choose to voice their opinion. Management is open for discussion should someone feel the need to voice their opinion. Participants mentioned different ways management uses to keep them up to date on certain decisions and changes. There are monthly meetings where every employee is welcome to join in, during these meetings decisions and changes are explained and everyone has a chance to voice their opinion, critique or question. There is also the intranet, a type of social media platform used to share all the topics that are currently discussed by management. Employees can read notes from the meetings that are held by management and have access to all information regarding any topic be it past, present and future via the intranet. Participants explained that everyone working at the

organisation is a professional with their own expertise, so when a certain decision or change is made, people with expertise in this topic will be asked for their opinion about it.

An example of employees being included by management is the following quote:

''I sometimes give advice to the management about certain topics regarding technology, so I know for a fact that they listen to their employees'' (Interview 2, Male, IT employee)

Employees are also encouraged to pick up any activities they think are important, they are allowed to form groups to tackle certain problems or to improve processes, together with the management. Each employee has his or her own expertise, when a decision has to be made about a certain topic employees with experience and expertise in that topic are asked for their opinion and if they can provide advice that would help with the decision-making.

''We are a flat organisation, therefor we are always close to the management, talking about certain topics and sharing opinions happens here every day. So, yes, I think that my opinion matters and is taking into account.'' (Interview 4, Female, Front office)

Since the organisation uses flex workspaces, employees and managers from different departments are mixed together on the different floors, increasing the chance of employees and managers talking to each other.

The focus group was also asked to discuss the topic of being included by management, the group talked about change and how they create changes together as a team.

''The power of our organisation is our internal cooperation. We always do everything together and without getting help from outside parties. We also have different expertise's that allow to tackle a problem from different angles'' (Speaker 1, Male)

The focus group agreed that the team they have created now, as an organisation is a powerful one. All the employees that are currently working at the organisation are highly motivated professionals with experience in their job.

4.4 Attitude towards technology

The next topic discussed in the interviews is the participants attitude towards technology. The first thing that was noticeable is the positive attitude from the participants towards technology. Participants were enthusiastic when talking about new possibilities technology could bring them. There was one clear context which explained this positive attitude towards technology, the participants want to do their job as good as possible, for themselves, for the organisation and for the citizens they serve. This means that if technology can be used to provide a way to make their work easier, more efficient or allows to help citizens in a better way technology is welcomed.

The following quotes are examples of the employees' positive attitude towards technology:

''If implementation of new technologies makes my work easier, more efficient or makes me better able to help citizens then I am happy. I think my role would change a bit, but for the better. I think I would have more time to actually do something useful then to spend time looking for the right information.'' (Interview 3, Female, Front office)

&

''Technology allows us to analyze certain data, which provides us with the necessary information to make well informed decisions or to tune our services. So yes, new technology that can help us to improve and do our job better? Bring it!'' (Interview 2, Male, IT employee)

Participants clearly state that technology is welcomed but they expect it to bring some kind of improvement to their job, if this is the case the attitude towards a certain technology is positive.

Participants were asked if they think technology could potentially replace them. Participants indicated that they do not fear being replace by technology. The main reason being that they work at a citizen-orientated organization, the work employees do is based on reasoning and personal contact with citizens in order to make a decision about for example granting a longer payment time. These decisions are made based on their expertise, their experiences and based on feeling. Something technology is not able to do. Participants see technology as a supporting factor for their job, and as a supporting factor it is only able to improve their work and not able to take over their work entirely.

An example quotes of employees not fearing replacement by technology:

''The work I do mostly consists of talking to people, listening to their story and make a decision based on my feeling and experience, technology is not able to make a decision based on these things, a human is.'' (Interview 4, Female, front office)

&

''While technology is great to use as a way to support our work, it is only able to do what it is programmed to do, based on data it receives. This data is received from employees that work here. Not only that but technology has to be maintained and updated as well, this is something it cannot do on its own, that's why I have a job.'' (interview 1, Male, IT employee)

The focus group also discussed this topic, how they view technology and what their attitude towards technology is. The discussion brought up the same responses as mentioned in the two quotes above. Participants from the different departments view technology as a supporting factor, used to improve and enhance their job and the experience for the citizens.

''I speak according to our vision, that employees will work with technology as their aid to provide the best possible service the citizen needs, this is the way we are headed as an organisation'' (Speaker 2, Female)

This last quote from the focus group indicates that the management has no intention of using technology as a way to replace employees, instead technology will be used as a way to increase productivity and better provide in the needs of citizens. This statement verifies that employees do not have to fear being replaced by technology.

4.5 Employee as an important factor for implementation

This last topic that was discussed in the interviews in the way participants view themselves as an important factor for successful implementation of a technological change. Participants indicated that all employees within the organisation are important to successfully change anything within the organisation. The employees are the ones that actually implement the changes made by the organisation and they are the ones that maintain it as well. An example one of the participants made was the following:

''When we moved to this new building the organisation changed the way we use our workspaces. In the old building, we were all sitting in our own departments with our own desks, now we have no own workspace but everyone is allowed to sit where they want. For this to work we have to actively change our places, otherwise the flex workspaces do not work.'' (Interview 5, Male, Front office)

Participants indicated that changes only work when everyone agrees to them and actively follow these changes.

When narrowed down to technological changes specifically, participants stated that employees are the ''red line'' for these changes. Employees are the ones that can specify needs from both the work floor as well as the citizens, they are the ones that will actually use a newly implemented technology meaning that they are also the ones providing the data input for some of these technologies. The believe that employees are an important factor for successful implementation is shared by all three participant groups. A few examples that participants gave are the following:

''Without people, the systems we use wouldn't be able to function. For instance, the citizen information panel we use, data input for this system come from the employees themselves, they have to put information in. If the employee doesn't do this the system has nothing to work with.'' (Interview 6, female, Front office)

&

''I think that technology and employees are connected with each other, technology helps by supporting the employee in their job, the other way around the employee also provides essential information for the technology to properly function, think of the people at the front office and my colleagues here at the IT department'' (Interview 2, Male, IT Employee)

&

''I think that employees here always aim to try and make the process as efficient and cost effective as possible, this way of working will be valuable when a new technology is implemented. They can fish out the kinks a newly implemented technology can have.'' (Interview 11, Female, Manager)

The focus group was also asked to discuss this topic with each other, they reasoned that employees are an important factor for successful implementation of a new technology due to the fact that all employees that would use a new technology, will need to know how to properly use said technology. The group indicated that employees need to have proper training and know-how of the new technology for it to be successful. If the front office employees don't know how to use new technology, that technology is only making their job less effective. An example quote of this is the following:

''If a new technology is implemented, the employees that are going to use it should receive adequate training, so they know how to use the technology effectively. If employees do not know how to work with something, they will either not use it, or use it wrong which makes it less effective than the old way of working.'' (Speaker 1, Male)

The focus group also discussed that employees such as the front office are the first ones to come into contact with citizens, they listen to their needs, their complaints and their ideas. Front office employees are the first to discover certain problems or opportunities to provide a better service for the citizens. The following quote is an example:

''We as front office employees are the first contact a citizen has when they call the organisation, we hear their stories and their needs first hand, we try to provide answers and look for solutions to fix their problems'' (Speaker 3, Female)

5. Discussion

In this section of the study, the results are discussed. Firstly, the sub questions are answered using the results mentioned in chapter 4. With the answers provided on the sub questions the main research question is answered. After this, the practical and theoretical contributions are discussed, followed by the future recommendation, the limitations of this study and finally a conclusion is drawn.

5.1 Discussion of results

SQ1: *''How do employees react on perceived changes in an organisation?''*

Taking the dimensions of the model from Schilling et al., (2012) as a template the results from this study can be put to perspective. First of al the nature of the change has to be considered relatively to its content, meaning that the change has to be of significant importance to be viewed as a reason for the changing of practices and roles of employees (Van de Ven & Poole, 1995). The participants in this study claimed to perceive changes in the organisation to be of critical importance for the organisation to stay viable in todays society, therefor the changes in the organisation are accepted. Secondly Schilling et al., (2012) states that the changes in the organization can only be implemented if the roles within the organisation change with them. There has to be enough resources and opportunities available for employees to share knowledge and adapt to the changes (Camaran et al., 2010). This study has shown that employees receive every possibility to share their knowledge and adapt to the changes made. Research by Eilam and Shamir (2005) suggests that more radical changes typically threaten some aspect of the professional's identity which can result into resistance from the professional towards the change. This study could explain the participants willingness to follow changes made by the organisation since the changes made are often long term and slowly implemented over time, giving the employees the time needed to get used to the changes in their role.

SQ2*: ''What is the relationship between employees and the public strategic layer? ''*

As stated in the research conducted by Wirtz et al. (2019), the public strategic layer involves around important decision making, such as choosing to maintain servers in-house or outsourcing it, which in turn affects the organisations decision about data security and administration. This result of this study show that employees and the public strategic layer affect each other in a number of ways. Firstly, employees are needed for a strategy or important decision to be implemented and maintained, if employees do not adopt the change in strategy because they perceive it in a negative way the strategy will not be maintained towards the citizens. Previous studies also show that employees who provide a service to citizens are also the first in the organisation that provides transparency, participation and collaboration with the citizens (Lee & Kwak, 2012). This makes employees an especially valuable asset to carry out a certain strategy. The other way around the strategy of an organisation influences the way employees have to work and behave. An organisation's strategy decides how employees should serve the citizens; it acts as a set of rules which employees have to oblige. The public strategy also influences the way employees work, what gets automated and what will be done by human hands (Wirtz et al., 2019). Furthermore, since the public strategic layer is about important decision making, employees can influence these decisions by voicing their opinion, based on their own experiences and expertise in the subject. As stated by Dijkman et al., (2015) competencies such as employee skills and knowledge-related resources are

regarded core assets when making a decision. Including employees with this decision making increases the likeliness of employees maintaining the changes that stem forth from this decision. Employees and their attitudes can also influence the public strategic layer based on their willingness to follow changes made in the organisation. As this study shows the positive attitude towards changes makes employees likely to follow and adapt to the changes made in the organisation.

SQ3: ''*What is the relationship between employees the technology infrastructure layer?*''

This study has shown that employees and the technology infrastructure layer affect each other in multiple ways. The first way being the willingness of employees to use a new technology. The main reason for using a new technology found in this study was the perceived advantage the use of technology gives an employee. When a technology is perceived to ease the workload, make their job more efficient or provide means to provide better service to citizens, employees will be likely to accept the new technology and use it (Krishanan et al., 2016). Employees also influence the technology infrastructure layer because they play an important part in providing the necessary information and data input a technology needs to function as intended. If the employee does not see a reason to provide the information necessary for the systems to work the chances of successful implementation are affected. Employees are not only the main users of new technology but also provide key insights that can aid in the implementation of it. Having employees actively using a new technology is paramount for its success. In the case of an IoT service application such as in this study, the employees influence the technology infrastructure layer more than the other way around because the infrastructure is based on the needs of the employees that are going to use it. Since the IoT technologies are fairly new and can be applied in numerous way a standardized framework is not present, every infrastructure is made to specifications (Al-Qaseemi et al, 2016).

SQ4: ''*What is the relationship between employees and the public demand layer*?''

The public demand layer focusses around the different target groups that are involved when implementing a new technology. Which stakeholders are associated with a certain service, what are their needs and how can these needs be met to provide optimal service for these stakeholders. In an organisation that provides services for their stakeholders, employees are the first point of contact with end users such as citizens. Employees such as front office employees are the contact point for citizens to tell their needs, file their complaints and share other information that could provide important insight in the citizens demands. Employees can provide information that can help to create a clear understanding of target group, providing employees are actively listening and sharing this information with the organisation. As this study shows, employees are also the ones that provide the services directly towards end users such as citizens, the way employees behave and handle situations directly affects the needs and demands of citizens, making employees a valuable asset. The public demand layer influences the employees work by providing real time notifications and enabling more environmental data gathered from stakeholders such as citizens which provides the employee with an increase in performance, more convenience and usability (Eskelinen et al., 2017). This study also states that employees are the generators of important data, they are the first to receive information from citizens. These user groups such as citizens are essential since the service offers are usually user-oriented and thus developed and provided according to their needs. (Dijkman et al., 2015).

SQ5: ''*What is the relationship between employees and the public value creation layer?*''

The public value creation layer deals with the internal creation of value within the organization and addresses the questions of how and under which conditions value can be generated (Wirtz & Daiser, 2017). This study showed that employees play an important part helping to create value within the organization. According to Wirtz & Daiser (2017) sources or input factors that are required for

developing public IoT services and creating public value are regarded as an essential component and can include information analysis, monitoring and management activities. This study shows that employees have their own expertise and experiences which can be used to locate possible improvements in internal processes. Employees are involved with the internal processes of an organisation on a daily basis, meaning they can provide valuable information regarding these processes, they can provide leads that can help improve a process, making it more efficient or locate a bottleneck that would be otherwise unknow to management. In this regard, the users (in this case employees) or citizens of a service have been considered as a critical component within IoT model literature (Bouwman, 2003; Mahadevan, 2004) The public value creation layer affects employees in a way that it influences the way they work. For IoT technologies employees will be required to gather more information and data from citizens.

Main research question: ''What is the added value of embedding employees as a layer within the model for IoT integration?''

With the insight provided by the results from the interviews, the focus group and the answers of the sub questions, it can be concluded that employees play an important role within the implementation of an IoT technology. By embedding employees as a layer within the model more insight is gained in the relationship between employees and their attitudes and the effect of employees on other factors that are important for IoT integration. This study shows that employees influence all the different layers of the model by Wirtz et al. (2019) and that in embedding employees the model provides more in-depth information regarding the implementation of IoT technologies. Employees provide the foundation needed for the other layers to be successfully implemented, increasing the likelihood of a successful integration of an IoT technology.

5.2 practical and theoretical contributions

This thesis aims to provide several contributions, both theoretical as well as practical contributions

Theoretical contributions

The results from this study provided insight in the added value of embedding employees as a variable for IoT implementation. By doing so this research fills in the gap in literature concerning the lack of models for IoT implementation that include employees and their attitudes. This research provides insight in the relationship between the different factors that influence IoT implementation and shows the influence employees have on the successfulness of both the IoT implementation as well as the affect they have on other organisational aspects. Similar studies (i.e. Wirtz et al 2019; Schilling et al. 2012; Mehr 2017; Madakam & Ramaswamy, 2015) have analysed the different factors that influence the implementation of IoT technologies and this study continued this analysis.

Furthermore, this research contribution to literature is the proposed ''Revised integrative public IoT framework model''. This proposed model is new in literature and can be seen as the first all-including model for successful implementation of a technology, taking in to account not only organisational aspects but also employee integration.

The findings of this research can be used to further analyse the effect of employees on the successfulness of IoT implementation

Practical contributions

The model that was created in this thesis is not limited to governmental organisations; it can also be used in any organisation that is looking to implement a new technology within their organisation. The model can also function as a guideline for organisations, that are considering of implementing a new technology. They can use the model to look at different aspects and to see if all conditions are met. The difference with other models in literature is that the revised model in this study is all-including and is the first IoT technology model which embedded employees. Since the model consists of multiple smaller models this also means that parts of the model can be used as stand-alone models to asses a certain aspect or layer. The model created can be used as a guide to assess employees and their willingness to accept a change and the influence their attitude has on successful implementation and to make recommendations which can increase the likelihood of successful implementation of an IoT technology

Limitations

The model is created using literature and then used in practise within an organisation, even thou this research shows that the improvements to the model are valid, it will still have some limitations:

1. This research is done in collaboration with GBTwente, thus the research is solemnly based on information gathered within this organisation, it provides limited information about the use within other organisations.
2. Because of the limited number of persons, that all work in the same organisation that are used as respondents for this thesis information can be biased and not representative for other organisations, especially non-governmental organisations.
3. Due to the limited time and resources available for this research only a set number of interviews and focus groups were held. The interviews and focus group provided sufficient information of this thesis; more quantitative research could be used to provide more in-depth information about actual implementation of the revised model.
4. The different layers of the ''enhanced integrative public IoT framework model'' have no weighing factors assigned to each layer, making them equally important, more research should be done to map the different layers and their importance for the model in comparison with each other.
5. Due to time and limited resources this thesis does not provide in-depth information for each layer inside the model.
6. There was an expected difference between groups that were participating in this study, however there was no difference found, further study must be conducted to determine if this lack of difference was coincidental.
7. The results from this study are all positive, the reason behind this positive attitude is not entirely clear, a possibility is that participants did not give critique in fear of getting a negative response from the organisation.

Further research

Looking at the limitations stated above, further research should be conducted in the following subjects:

1. Further research should be done to determine the effectiveness of this model in commercial businesses, it should include other organisations that are commercial. This should provide a more in-dept analysis of the effectiveness of including employees in other types of organisations.

2. Research should be done on the individual layers of the model to add weight to each layer, in order to determine the most important parts of the model.
3. Detailed research on the correlations between different layers, how does a certain layer influence another. Further research should be conducted in order to establish the relationships between the other layers of the model and how they affect each other. This will provide valuable insight on the importance of having each layer optimised to increase the successfulness of implementing new technologies
4. In order to generalize the model additional studies can be conducted in other governmental organisations such as a local government. Additional studies can verify the outcomes of this research, strengthening the claim that employees should be considered an important variable.

5.3 Recommendations

1. The ''enhanced integrative public IoT framework'' can be used to map different aspects that affect successful implementation, and can be used to link employees with other important factors. The model can help to provide a close fit between employee needs and citizen demand, using technology as a supporting factor.
2. Managers should include employees with their decision, asking employees for their opinion as they are the first contact point with citizens.
3. Managers should encourage an open-door system so that employees are encouraged to voice their opinions.
4. There should be ongoing monitoring of citizen feedback, using chatbots on the organisation's website.
5. Better communications between departments to lower the chance of employees being unaware of situations or changes.
6. Employees should be provided with training so that they have the insight and knowledge of a new technology.
7. Managers should encourage support between colleagues to help each other learn how to use certain technologies or to improve job efficiency.
8. Information about changes within the organisation should be available for employees to improve loyalty

5.4 Conclusion

The main research question of this study was: ''what is the added value of employees within the model for IoT integration?'' The results in this research provided valuable insights that verify the need to include employees as a variable to the model. The answers in this study resulted in defining the relationship between employees, their attitudes and the influence they have on the successfulness of the implementation of a new technology. The results in this study will prove useful for any organisation that seeks to understand the importance of including their employees when looking to implement a new technology. Furthermore, this study takes the first step to provide a model that includes employees and their attitudes.

References

Al-Qaseemi, S. A., Almulhim, H., A., Almulhim, M., F., & Chaudhry, S., R. (2016). IoT architecture challenges and issues: Lack of standardization. 2016 *future technologies conference* (pp. 731-738) San Francisco, CA

Armenakis, A.A., & Bedeian, A.G. (1999). Organizational change: A review of theory and research in the 1990s. *Journal of Management*, 25(3), 293–315.

Androutsopoulou, A., Karacapilidis, N., Loukis, E., & Charalabidis, Y. (2019). Transforming the communication between citizens and government through AI-guided chatbots. *Government Information Quarterly*, 36(2), 358-367. doi:10.1016/j.giq.2018.10.001

Annika Schilling, Andreas Werr, Sébastien Gand & Jean-Claude Sardas (2012): Understanding professionals' reactions to strategic change: the role of threatened professional identities, *The Service Industries Journal*, 32:8, 1229-1245

Boeije, H. (2009). Analysis in Qualitative Research (1st ed.). Thousand Oaks, California: Sage Publications Ltd.

Bouwman, H. (2003). State of the art on business models.

Boyd, M., and N. Wilson. (2017). Rapid Developments in Artificial Intelligence. How Might the New Zealand Government Respond?. *Policy Quarterly*, 13 (4): 36–43. doi:10.26686/pq.v13i4.4619.

Brous, P. and Janssen, M. (2015) Advancing e-Government Using the Internet of Things: A systematic review of benefits. *14th International Conference on Electronic Government*, p. 156-169, doi: 10.1007/978-3-319-22479.

Camaran, M., Moizer, P., & Pettinicchio, A. (2010). Customer satisfaction, corporate image, and service quality in professional services. *The Service Industries Journal*, 30(3), 421–435.

Chen, S., Xu, H., Liu, D., Hu, B., & Wang, H. (2014). A vision of IoT: Applications, challenges, and opportunities with China perspective. *IEEE Internet of Things Journal*, 1(4), 349–359.

Dalmasso, C., & Sardas, C. (2008). Subjective investment and identity dynamics: The case of R&D activities. *Paper presented at the ISPSO*, Philadelphia, PA

Dijkman, R. M., Sprenkels, B., Peeters, T., & Janssen, A. (2015). Business models for the internet of things. International Journal of Information Management, 35(6), 672–678.

Dutton, J.E., Dukerich, J.M., & Harquail, C.V. (1994). Organizational images and member identification. *Administrative Science Quarterly*, 39(2), 239–263.

Eilam, G., & Shamir, B. (2005). Organizational change and self-concept threats: A theoretical perspective and a case study. *Journal of Applied Behavioural Science*, 41, 399–421.

Empson, L. (2001). Fear of exploitation and fear of contamination: Impediments to knowledge transfer in mergers between professional service firms. *Human Relations*, 54(7), 839–862

Eskelinen, T., Rasanen, T. (2017). Designing a business model for environmental monitoring services using fast MCDS innovation support tools. *Technology Innovation Management Review*, 7(11), 36-46.

Etikan, I., Sulaiman, A., & Rukayya, A. (2016). Comparison of Convenience Sampling and Purposive Sampling. *American Journal of Theoretical and Applied Statistics*. 5(1): 1-4. doi: 10.11648/j.ajtas.20160501.11

Fiedler, S. (2010). Managing resistance in an organizational transformation: A case study from a mobile operator company. *International Journal of Project Management*, 28, 370–383.

Glaser, B., & Strauss, A. (1967). The Discovery of Grounded Theory: Strategies for Qualitative Research. Mill Valley, CA: *Sociology Press*

Jiménez, C. E., Falcone, F., Solanas, A., Puyosa, H., Zoughbi, S., & González, F. (2015). Smart government: Opportunities and challenges in smart cities development. *Handbook of research on democratic strategies and citizen-centered e-government services* (pp. 1–19)

Kankanhalli, A., Charalabidis, Y., & Mellouli, S. (2019). IoT and AI for smart government: A research agenda. *Government Information Quarterly*, 36(2), 304-309. doi: 10.1016/j.giq.2019.02.003

Kennedy, R. (2016). E-regulation and the rule of law: Smart government, institutional information infrastructures, and fundamental values. *Information Polity*, 21(1), 77–98.

Klein, J.A. (1984). Why supervisors resist employee involvement. *Harvard Business Review*, 62, 87–95.

Kotter, J.P., & Schlesinger, L.A. (1979). Choosing strategies for change. *Harvard Business Review*, 57, 106–114

Krishanan, D., A. A. Khin, K. Low, L. Teng, and K. Chinna. (2016) "International Review of Management and Marketing Consumers' Perceived Interactivity and Intention to Use Mobile Banking in Structural Equation Modeling," Int. Rev. Manag. Mark. 6 (4): 883–890

Layne, K. and J. Lee,(2001). Developing fully functional E-government: A four stage model. *Government Information Quarterly*, 18(2): p. 122-136.

Lee, G., & Kwak, Y. H. (2012). An open government maturity model for social media based public engagement. *Government Information Quarterly*, 29(4), 492–503.

Madakam, S., Ramaswamy, R., & Tripathi, S. (2015). Internet of things (IoT): A literature review. *Journal of Computer and Communications*, 3(5), 164–173.

Mahadevan, B. (2004). A framework for business model innovation.

McGregor, S. L. T. (2018). Understanding and evaluating research: A critical guide. *Thousand Oaks, CA, USA: Sage*.

Mehr, H. (2017). Artificial Intelligence for Citizen Services and Government Artificial Intelligence for Citizen Services and Government artificial intelligence for citizen services and government. Retrieved from https://ash.harvard.edu/files/ash/files/ artificial_intelligence_for_citizen_services.pdf.

Mellouli, S., Luna-Reyes, L. F., & Zhang, J. (2014). Smart government, citizen participation and open data. *Information Polity*, 19(1), 1–4.

Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). Qualitative data analysis: A methods sourcebook (3rd edition). *Thousand Oaks, CA, USA: Sage*.

Miller, J.H., Page, S.E. (2009) Complex Adaptive Systems: An Introduction to Computational Models of Social Life: An Introduction to Computational Models of Social Life. *Princeton University Press*.

Mitchell, S., Villa, N., Stewart-Weeks, M. & Lange, A. (2013). The internet of everything for cities: Connecting people, process, data and things to improve the livability of cities and communities. Edited by CISCO. http://pie.pascalobservatory.org/sites/default/files/ioe-smart-city_pov.pdf

Moore, M. H. (2002). Creating public value: Strategic management in government (7th edition). Cambridge, MA, USA: Harvard University Press.

Osterwalder, A., & Pigneur, Y. (2010). Business model generation: A handbook for visionaries, game changers, and challengers. New York, NY, USA: Wiley&Sons

Pang, Z., Zheng, L., Tian, J., Kao-Walter, S., Dubrova, E., & Chen, Q. (2015). Design of a terminal solution for integration of in-home health care devices and services towards the internet-of-things. Enterprise Information Systems, 9(1), 86–116.

Porter, M. E., & Heppelmann, J. E. (2014). How smart, connected products are transforming competition. *Harvard Business Review*, 92(11), 64–88.

Rafferty, A.E., & Restubog, S.L.D. (2010). The impact of change process and context on change reactions and turnover during a merger. *Journal of Management*, 36(5), 1309–1338.

Rajagopalan, N., & Spreitzer, G.M. (1997). Towards a theory of strategic change. *Academy of Management Review*, 22, 48–79.

Reaidy, P.J., Gunasekaran, A., & Spalanzani, A. (2015). Bottom-up Approach based on internet of things for Order Fulfillment in a Collaborative Warehousing Environment. *International Journal of Production Economics*, 159, 29–40.

Ritchie, J., & Lewis, J. (2003). Qualitative research practice: A guide for social science students and researchers. *London: SAGE.*

Suresh, P., Daniel, J. V., Parthasarathy, V., & Aswathy, R. H. (2014). A state of the art review on the internet of things (IoT) history, technology and fields of deployment. *International Conference on Science Engineering and Management* Research (ICSEMR) (pp. 1–8).

United Nations (2008), United Nations e-Government Survey 2008. ISBN 978-92-1-123174-8

Venard, B. (2002). Organizational change in service multinationals: From radical change to destabilisation. *The Service Industries Journal*, 22(1), 57–76.

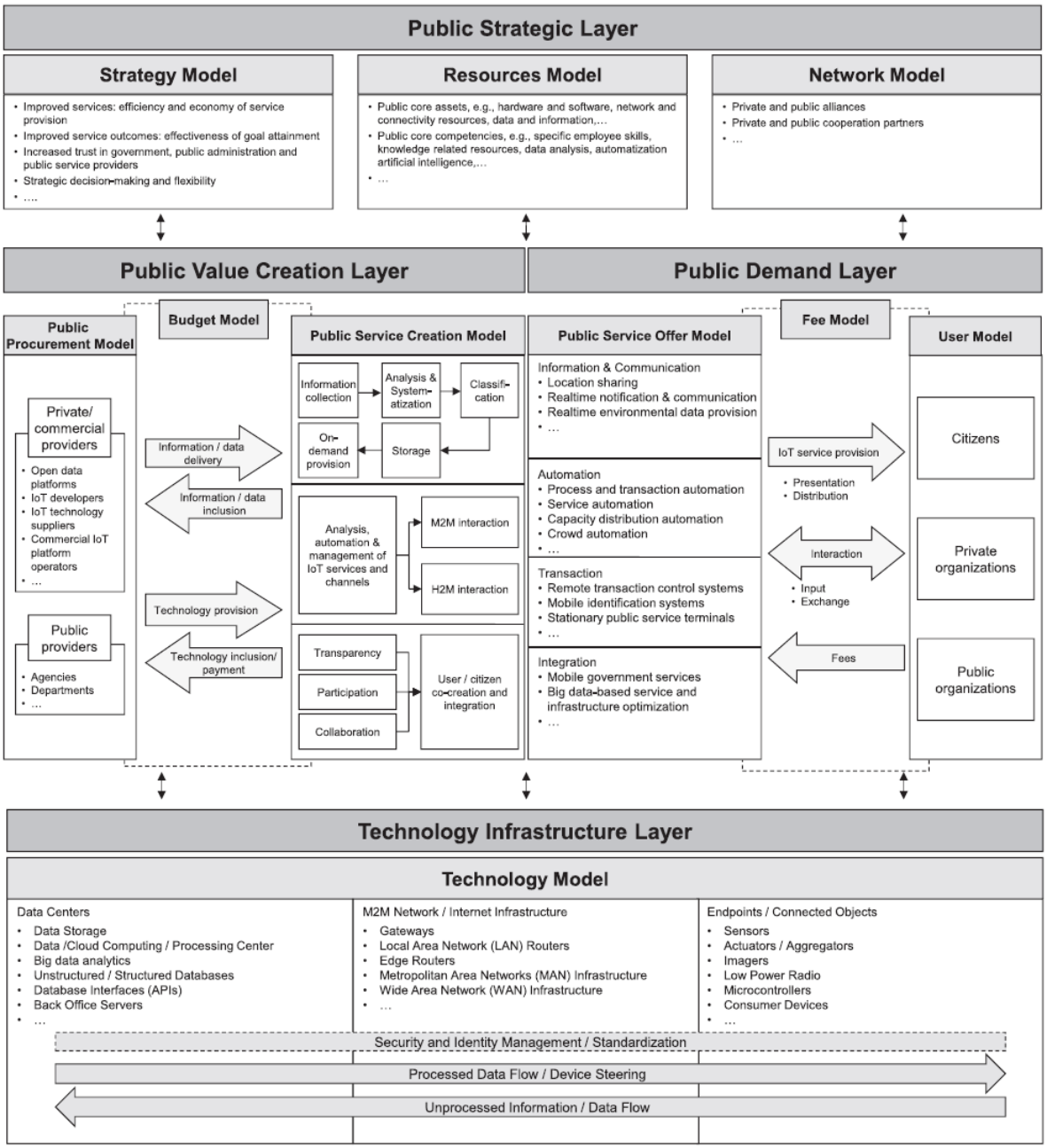
Wirtz, B. W., & Daiser, P. (2017). E-government: Strategy process instruments. Textbook for the digital society (2nd edition).

Wirtz, B. W., Weyerer, J. C., & Schichtel, F. T. (2019). An integrative public IoT framework for smart government. *Government Information Quarterly*, 36(2), 333-345. doi:10.1016/j.giq.2018.07.001

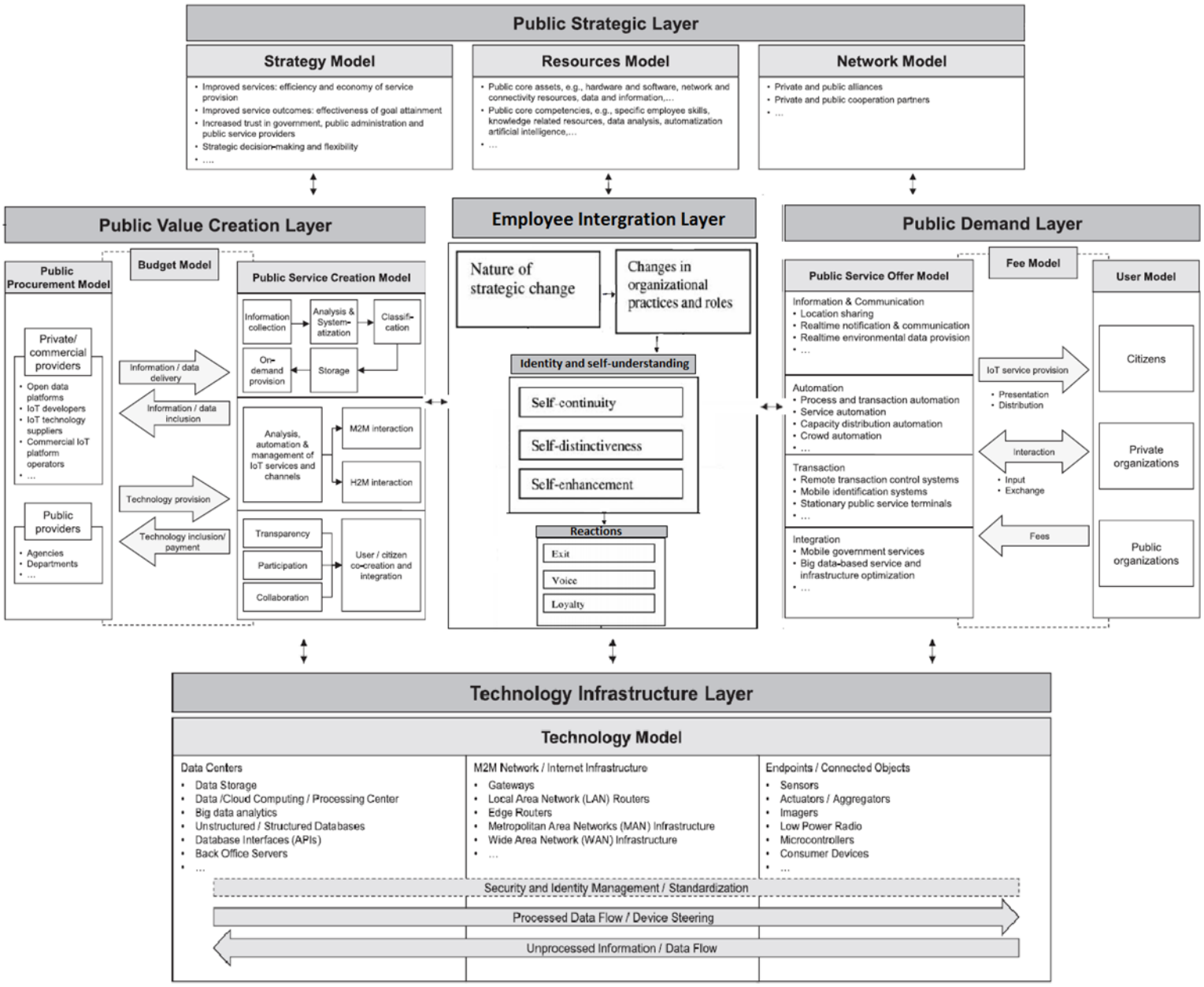
Xia, F., Yang, L.T., Wang, L., Vinel, A. (2012) Internet of things. *International Journal of Communication Systems*. 25, p.1101–1102.

Appendices

Appendix A



Appendix B



Appendix C

Introduction (global)

Global questions

1. Could you first give me an insight into your work? What is your job and what are your main tasks?
2. How do you feel about changes made in the organisation?
3. Do you feel like your opinion matters when changes are made within the organisation?

1A. Interview guide for IT employees.

1. To what extend is the current infrastructure at Twente capable of combining and analysing citizen feedback?
   (Followup) What is the role of employees within this combining and analysing of citizen feedback?

2. What kind of features, functions, implementations would you like to see within the infrastructure?

3. What kind of possibilities do you think are present with implementing a smart IoT framework?

   (followup) What is the involvement of employees with these possibilities, if any?

4. What kind of possible problems or difficulties might occur with the implementation of a smart IoT framework according to you?
   (followup) What is the involvement of employees with these possible problems of difficulties, if any?

5. How will the implementation of a smart IoT framework affect employees ?

6. What do you think are important factors for the successful implementation of a smart IoT framework?
   (followup) Do you think employees are a important factor of the successful implementation? Why or why not?

7. What is your opinion about a possible implementation of said framework and do you think it will affect you? if yes, in what way?

1B. Interview guide for front office employees.

1. What is the current way you summarise citizen feedback?

2. What is your personal experience with receiving citizen feedback?

3. Are there any flaws in the current process? (pijnpunten)

4. What kind of features, functions, implementations do you think can improve this process?

Let's say the current process is replaced with a smart IoT framework...

5. What kind of possible problems or difficulties might occur with the implementation of a smart IoT framework according to you?

6. What is your opinion about a possible implementation of said framework and do you think it will affect you? if yes, in what way?

1C. Interview guide for managers.

1. What is the current process for summarising customer feedback?

2. What is the role of the employees within the current process?

3. Are there any flaws in the current process? (pijnpunten)

4. What kind of features, functions, implementations do you think can improve this process?

Let's say the current process is replaced with a smart IoT framework...

5. What kind of possible problems of difficulties might occur with the implementation of a smart IoT framework according to you?

6. What do you think are important factors for the successful implementation of a smart IoT framework?

7. What is your opinion about a possible implementation of said framework and do you think it will affect you? if yes, in what way?