MobilePay

By Danske Bank®

Balancing Diligence and Agility: An Investigation of MobilePay's Organizational Effect on Internal Data Processes

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Executive Summary

This report is an investigation of how the organizational nature of MobilePay affects its data processes, followed by potential solutions for current issues. The investigation found that MobilePay has four issues in their data process: A problematic data warehouse project, a frowned upon ‘fast track’, a tedious Excel SQL export, and legacy core banking systems. We present two solutions: Firstly, a BIS data consultant whose responsibility it would be to set up compliant data channels and make sure the current channels are compliant with Group IT compliance rules. The second solution is a documentation task force composed of representatives from respectively, BIS, MOBEC, and OPEX. Their goal would be to create improved service level agreements, operational level agreements, and a software requirements specifications to ensure aligned expectations and a successful data warehouse development, should they choose to continue. These two solutions address issues that are rooted in MobilePay’s focus on agility over diligence. Although being diligent is crucial, the proposed solutions do not compromise their unique organizational nature, which is integral to MobilePay’s long-term success.

Introduction

MobilePay is a mobile application for P2P (peer-to-peer) transactions. The app is free and allows private consumers to transfer money with a phone number and an attached payment card. The app is marketed in Denmark, and was launched in May 2013. As of April 2016, the app has 2.9 million unique users, and is the 3rd most popular app in Denmark. On average, 64.846 DKK is transferred every minute (MobilePay 2016). The app is gaining more and more presence as a payment solution in retail, apps, and webshops.

MobilePay's product line is designed to facilitate payments between consumers and businesses. The following is an overview of the product line:

Product	Features
MobilePay (P2P)	Send and receive payments from other users and businesses. Split the bill between other users. Request payments from others. Use different cards to pay. Save receipts from card payments. Find businesses in your area. Earn bonus points to get discounts at selected businesses.
MobilePay Business (P2B)*	Receive payments using your business' phone number.
MobilePay Online (P2B)	Mobile payments in your webshop.
MobilePay Appswitch (P2B)	Receive mobile payments in your app.
MobilePay Point of Sale (P2B)	Customers can pay with a cash register integrated MobilePay box.

Table 1: Product suite
**P2B = peer-to-business*

MobilePay is an organization owned by Denmark's biggest bank, Danske Bank. The term MobilePay will henceforth be referring to the organization and not the products. There are 29 employees working in the MobilePay organization (Kim & Martin interview, appendix). Within the organization there are several departments:

1. Concepts: Innovation and idea development.
2. Operational Excellence (OPEX): Business development and intelligence
3. Solution Sales: Close communication and contact to larger businesses implementing Point of Sale (POS).

MobilePay works with several partners within the Danske Bank organization as seen in figure 1:

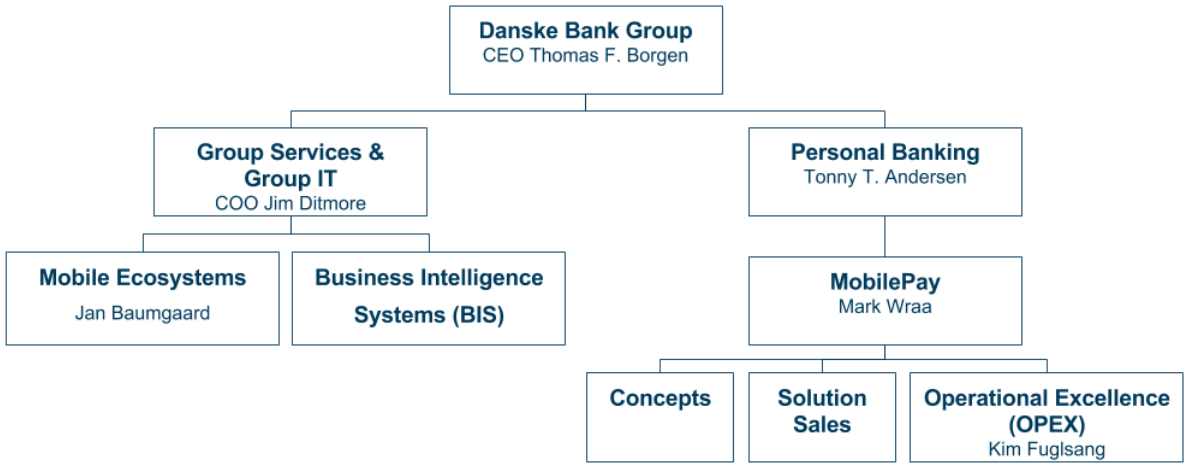

Figure 1: Organizational chart of relevant departments and managers in Danske Bank

The partners operate under Group IT, and MobilePay operates under Personal Banking. One partner is Mobile Ecosystems (MOBEC) who develop and maintain much of the infrastructure and applications for all of Danske Bank's mobile products. This includes MobileLife, Netbank, and MobilePay. In addition, they own the data that is specific to MobilePay. Another partner under Group IT is Business Intelligence Systems, in daily terms referred to as BIS (Dennis e-mail, appendix).

IT is a very broad area in Danske Bank and includes hundreds of employees. While MOBEC develop and maintain MobilePay's systems, BIS makes business intelligence possible for other Danske Bank departments. BIS are responsible for building and maintaining data warehouses throughout Danske Bank, which is done by collecting and processing data. BIS is not responsible for the actual creation of business intelligence, but rather the availability of data for other departments (Dennis interview, appendix).

The focus

MobilePay was chosen as a case study for this project because they had success in creating an almost completely ubiquitous product on the Danish market. The aim was to explore such an organization from the inside, asking questions like "who are they?", "what do they do?", "how do they work", and "how did they reach this level of success?".

But instead of focusing on exploration of new ideas and market development, OPEX became the focus of the project. The OPEX department became the focus because it is particularly interesting due to their involvement in vital strategic decisions and their issues were clear and controversial. OPEX has three full time employees and one student assistant. They are responsible for project portfolio management, business intelligence, quality assurance, and partnerships (John e-mail, appendix). They deliver business intelligence to managers in the

form of reports (Dennis interview, appendix). Data extraction emerged as a troubled process so it was considered a relevant and interesting research area.

In order to explore OPEX's work processes and apparent issues, it is essential to understand the technical foundation of MobilePay. MobilePay sprung out from a large corporate bank, and was built using existing infrastructures. The technical systems were integrated with Danske Bank's Core Bank system, which is the central system for most of Danske Bank's functions like transactions, accounts, fees, etc. While MobilePay can be perceived as an entrepreneurial organization, it is bound to large, complex IT-systems (ibid.). The integration with Core Bank made sense in the beginning, but now that the curve of registered users is moving towards more stable growth (from previous extreme growth), the analyses becomes more important. The IT-systems are difficult to extract data from. One reason being, prioritizing resources and critical transaction processing jobs make data extraction particularly complex. Also, personal information data is stored on these mainframes, making it necessary to undergo strict compliance rules (ibid.). OPEX's data collection and analysis process will henceforth be referred to as *the data process*.

There are many actors, systems, and processes related to the data process, but to keep the scope of this project limited, some areas have been black-boxed. For example, the analytics and executive decision making that happens after data extraction was black-boxed because they do not appear to have any major issues. BIS and MOBEC were also black-boxed because their outputs, as opposed to their inner workings, are the most relevant to the research design. Information about BIS and MOBEC's outputs, i.e. inputs into the data process, were sufficient from interviews with OPEX.

MobilePay is a growing organization and the balance between operating from within a large bank and at the same time working in a startup/entrepreneurial sense can be both conflicting and rewarding (John interview, appendix). We found this dichotomy of traditional and entrepreneurial organizations interesting, especially how those organizational traits may translate into diligence and agility.

Research Question

Research questions are important to aim the focus of the project and has been iterated many times over during the progression of the project as more knowledge was gathered. The aim of this project is to investigate the data process within the context of the organizational nature of MobilePay. To guide this investigation, the following research question has been formulated:

> *How does the organizational nature of MobilePay affect OPEX's data process and how can the shortcomings of said process be addressed?*

The goal of the research design will be to answer this question. There are two parts to the question: one to investigate the relationship between the MobilePay organization and OPEX's data process, and another to necessitate solutions to solve potential issues. It is important to note that while OPEX is a department and MobilePay is an organization, they are sometimes used interchangeably. For example, when Kim, head of OPEX, says "We are separated from Danske Bank" (Kim & Martin interview, appendix) he means MobilePay is separated from Danske Bank.

Theory

Academic theories are necessary to support analysis and arguments throughout the report. The following three theories were chosen because they help create insight from the empirical data.

The Ambidextrous Organization

In order to explore the relationship between the organization and the data process, the organizational nature must be understood and academic theories should be used to support discussion. One such theory is Tushman and O'reilly's (1996) *Ambidextrous Organizations: Managing Evolutionary and Revolutionary Change* that explores ways in which managers can overcome inertia and avoid the traps that evolutionary change presents. They urge managers to create ambidextrous organizations, that is, organizations that juggle evolutionary and revolutionary qualities at the same time. Tushman and O'reilly (1996) explain that focusing on evolutionary change will guarantee short-term success, but environments can change drastically, and this is when readiness for revolutionary changes are essential. Focusing only on one type of change yields only short-term success; both are necessary for long-term success (ibid.).

Tushman and O'reilly (1996) suggests three ways that successful ambidextrous organizations accomplish this: ambidextrous managers, multiple cultures, and organizational architectures. Organizational architectures involves making sure departments and teams don't get too large so "employees feel a sense of ownership and are responsible for their own results" (Tushman & O'reilly 1996, p. 25). Multiple cultures involves simultaneously having tight and loose social controls: "They are tight in that the corporate culture in each is broadly shared and emphasizes norms critical for innovation such as openness, autonomy, initiative, and risk taking" (Tushman & O'reilly 1996 p. 26). On the other hand, Tushman and O'reilly (1996) also state that to be loose, "the manner in which these common values are expressed varies according to the type of innovation required" (p. 26). The third key to ambidexterity is having ambidextrous managers. Ambidextrous managers typically have long tenures, employ continual reinforcement of the social control system, and embody the core values of the culture (Tushman & O'reilly 1996).

Lessons Learned Supporting Data Warehouses

Pedro Cerqueira's *Lessons Learned Supporting a Large-Scale, Real-World Production Data Warehouse/Business Intelligence Environment* (2015) lists six lessons learned in his work. According to Cerqueira (2015), it is not uncommon that projects related to business intelligence and data warehousing fail. The paper has its focus on the data warehouse support team, and as our project is focused on the business side, not everything is relevant to our study. Support teams maintain and provide assistance to business users of a DW/BI. From the six lessons, three of them were most valuable to this investigation. The remaining lessons are not relevant as they focus only on the support team's viewpoint and their actions, and does not directly involve the business user.

Lesson one focuses on the fact that support teams must have a unique set of skills in order to assist the business user. "[T]hey should be experts in executing a smooth transition between business knowledge and technology (and vice versa)" (Cerqueira 2015, p. 40). In order to achieve that business knowledge, it is suggested to invite a technical savvy business user into the DW/BI team to share their business expertise. The reason is that the support team "must be equipped to tackle complex business problems as if they were themselves business analysts" (Cerqueira 2015, p. 40). Lastly, the lesson clarifies the impact of a data warehouse: "[T]he DW/BI environment becomes a big part of a business user's daily life and increases its impact on the organization's critical strategic decisions…" (Cerqueira 2015, p 41).

Lesson two explains the importance of knowing and understanding the organization. One way to get to know your organization is by understanding the goals, skills and motivations of business users. Technical supporters and business users may clash as they have two different languages. Therefore, supporters must know their audience and leave out technical formulations when explaining the value of their DW/BI (Cerqueira 2015).

Lesson three explores the importance of listening to the clients' needs, i.e. the business user's needs. One way to secure healthy relationships between support teams and business users is with service-level agreements (SLAs). This can be beneficial in numerous ways: It can help in prioritization of problems and solutions by order of necessity. It takes away the opportunity for business users to make constant ad hoc demands for the support team and, perhaps most importantly, "expectations will become more manageable" (Cerqueira 2015, p. 42).

Of course, "different rules may apply depending on an organization's culture, politics, business expectations, methodologies, and processes" (Cerqueira 2015, p. 40). Cerqueira's insights are especially relevant to the data process and will be used to add perspective in the discussion.

Kotter's Eight-Step Change Model

In change management, there is one model that clearly stands out: Kotter's Eight-step Model has been acknowledged as "one of the most well known approaches to organisational transformation (Mento et al. 2002 cited in Pollack and Pollack 2014), as the mainstream wisdom for leading change (Nitta et al. 2009 cited in Pollack and Pollack 2014), and the most compelling formula for success in change management (Phelan 2005 cited in Pollack and Pollack 2014)" (Pollack and Pollack 2014).

The change model can be used to make change in how business is conducted (Kotter 1995). In the Harvard Business Review article, Kotter claims that "[l]eaders who successfully transform businesses do eight things right (and they do them in the right order)" (1995). The eight things to which Kotter is referring make up his eight-step model. The eight-step model will be used in the discussion section to support an implementation strategy for potential solutions.

Method

This section will describe the research design to answer the research question. Academic methodologies are vital to a grounded data collection and proper analysis. Without recognized methods, the research findings may not be credible. This section is divided in two parts: Data collection and Soft Systems Methodology.

Data collection

All interviews were semi-structured. The reason for this, was to make sure the right questions were addressed and at the same time, allowing the interviewee to speak freely. All interviews were recorded and notes were taken. All interviews were done in Danish and relevant quotes have been translated to English. Doing interviews in the interviewee's main language is appropriate since discussion can be complex.

Trine Thomsen, a business consultant in the Concepts department, became our gatekeeper to the organization. We signed a nondisclosure agreement which is standard procedure at Danske Bank, and often it also makes interviewees feel more safe, which can result in more interesting and honest insights. Unfortunately, observations and screenshots or documents were off limits due to confidentiality so the investigation is based solely on interviews. Trine briefly explained their development processes, and gave a general idea of the departments within MobilePay. As observations were off limit, it was decided that investigating the development process was too limiting because of the lack of observational data.

Instead of focusing on the development process, the investigation continued with John Ström introducing OPEX's main functions and some issues they are having. John has the role of Program Manager/Chief Consultant at OPEX, expanding the successful P2P part of MobilePay into a new, profitable business area. The interview with John focused on work processes, job functions and if they experienced any hurdles. Instead of going into depth with specific subjects, the interview was more general in order to gain an overall understanding of their work processes.

Kim Fuglsang, Head of OPEX, and Martin Buch, a student analyst were also interviewed. More insight was gained about the the organisation, culture, and the data process.

Another interview was with Dennis Norup, the Senior Analyst in OPEX. Martin and Dennis collaborate closely on data analysis which is reported to managers. The main focus of the interview with Dennis was on the data process. Dennis gave insight into the former, the current, and the expected future of MobilePay and OPEX's data process.

With the interviews, inputs from all employees in OPEX was gathered, as well as Trine from Concepts. Table 2 is an overview of interviews:

Date (2016)	Type	Duration	Interviewee
11/02	Semi-structured interview	45 min.	Trine
19/02	Semi-structured interview	55 min.	John
17/03	Semi-structured interview	65 min.	Martin, Kim
01/04	Semi-structured interview	75 min.	Dennis
17/04 - 18/04	17th: E-Mail questions 18th: E-Mail answers	n.a.	Dennis, Martin (CC)

Table 2: Data collection overview

Soft Systems Methodology

Soft Systems Methodology (henceforth referred to as SSM) was mainly developed by Peter Checkland and is a method used to analyze complex situations. SSM distinguishes between two different schools of system thinking: Soft systems thinking and hard systems thinking (Checkland 2000).

Hard systems thinking is "see[ing] organizations as coordinated functional task systems seeking to achieve declared goals and that see the task of management as decision making in support of goal seeking" (Checkland 2000, p. 54). The hard systems thinking sees the

interacting subsystems as elements that can be engineered in order to better the final output (Checkland 2000).

On the other hand, Checkland describes soft systems thinking as “the process of inquiry into the world, which is the crucial intellectual distinction between the two fundamental forms of systems thinking...” (Checkland 2000, p. 17). Checkland defines soft systems thinking as “more appropriate in fuzzy ill-defined situations involving human beings and cultural considerations” (2000, p. 17). This is one of the reasons that SSM was chosen as part of the research design.

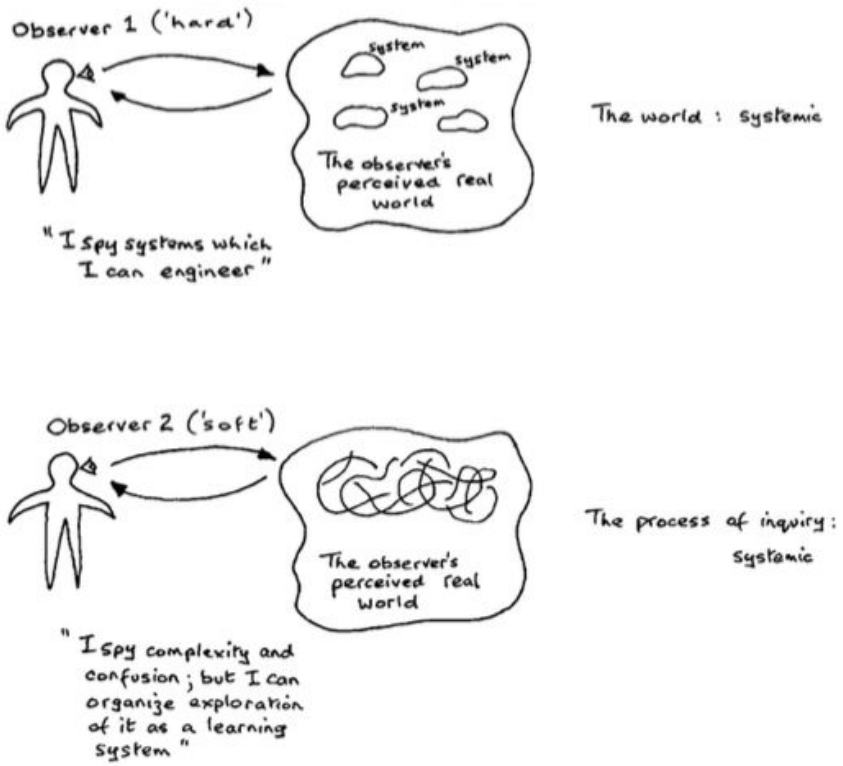

Figure 2: The hard and soft systems stances (Checkland 2000)

Something that separates system thinking from more traditional methods of analysis is that it examines the relation between the different parts of the system rather than trying to separate the parts and examine them individually. Supporting the idea of system thinking is the notion that to understand the different parts one need to understand how they are related as a whole (Checkland 2000).

When using SSM the process is divided into seven different stages. As shown in figure 3, the stages alternate between real world thinking and systems thinking. Real world discourse should mirror what *actually* happens in the real world. Systems thinking involves *interpreting* the empirical data by applying systems thinking tools (like CATWOE, PQR, Activity models, 3Es). Even though the model portrays the stages occurring in a linear arrangement, the stagescan happen in any order:

> The arrows which link the seven stages simply show the logical structure of the mosaic of actions which make up the overall process; it has always been emphasized that the work done in a real study will not slavishly follow the sequence from stage one to stage seven in a flat-footed or dogged way. (Checkland 2000, p. 19)

Checkland states that much of the learning happens when returning to the different stages. This emphasises the fact that the stages are numbered mostly to complete an initial draft of the system. From here the real learning begins (Checkland 2000). This back and forth learning truly helped us to understand the complicated process of data handling in MobilePay.

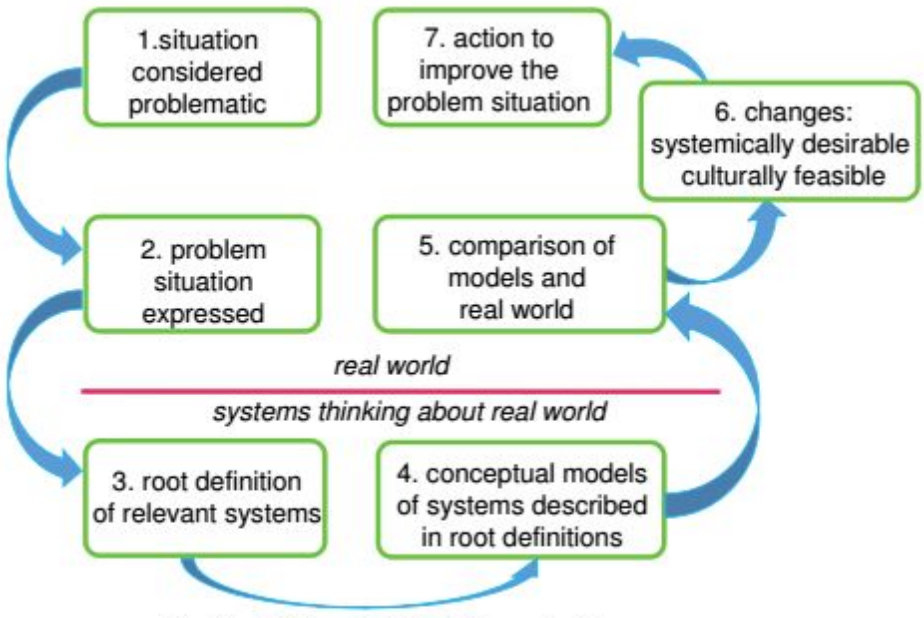

Figure 3: The seven stages of the Soft Systems Method (Checkland 1999)

Stage 1: Situation considered problematic

The first stage is meant to establish the situations that are considered interesting in the system (Checkland 2000). The analysis of OPEX's data process begins by acknowledging that the situation is indeed problematic.

Stage 2: Problem situation expressed

The second stage approaches the situations by expressing the problems present in these situations. The problems are portrayed using a rich picture, which contains two things: firstly the system needs to be explained in all its richness. Secondly, it should show key structures, processes, climate, people and conflicts. In rich pictures, crossed swords symbolize conflicts or issues. The rich picture is where the situation as a whole, and OPEX's data process problems are presented. Stage one and two is all about gathering data and understanding what the current system is like and what the potential problems are (ibid.).

Stage 3: Root definitions of relevant systems

This stage utilises two tools: PQR and CATWOE. A PQR consists of three parts: P) What does the system do, Q) how does system do it, and R) why does the system do it. This stage helps to understand why a system is implemented in the first place. It can also challenge a system that might be redundant by explicitly stating the purpose.

SSM is based on the notion that it is not possible to address all perspectives at once. The goal is to understand specific perspectives and through this process gain clarity about positive future actions. To accomplish this, Checkland (2000) provides the mnemonic CATWOE model:

- Customers are those for whom value is created through the system.
- Actors are those who facilitate the transformation to these customers.
- Transformation describes the change from input to output.
- Weltanschauung gives the transformation some context and meaning in a certain worldview.
- Owner to whom the "system" is answerable and/or could cause it not to exist.
- Environment that influences but does not own the system.

The CATWOE and PQR will be used to indicate the purpose and context of the data process and its subsystems.

Stage 4: Conceptual models of systems described in root definitions

In this stage, conceptual models are made portraying the systems described in the root definitions (stage 3). One such model is the activity model where activities are linked to show how they are related. The activities are described using imperative sentences to specify what is happening in each activity (ibid.). This will map vital activities in the data process, while providing an overview of how they are related.

During this stage it is also necessary to set up one or more measures of performance using Checkland's (2000) 3Es. The three Es consist of E_1) efficacy; which looks at whether the system *actually works*, E_2) efficiency; what is the relation between resources used for input compared to the output, and E_3) effectiveness; does it accomplish its long term goal. Being able to measure the data process allows for easier assessment of the overall performance and identify any shortcomings.

This stage should create a clear overview of the purpose of the process from start to end. Checkland (2000) emphasizes not spending too much time on the models during the first draft. He considers it better to spend time on the comparison stage (Stage 5), gain more insight and then return to improve the models later. Throughout the investigation the models were updated and validated by Dennis.

Stage 5: Comparison of models and real world

As the model reaches stage five, it moves back into the real world. Considering the constructed CATWOE, root definitions, and activity model, how do the models actually compare to the real world? A big mistake at this stage is to assume that the models and the real world are the same

thing. Identifying where the models and the real world differ is important in the iteration and vital to successfully using SSM (ibid.).

Stage 6: Defining systemically desirable and culturally feasible changes
This stage is where changes to the OPEX system are defined. The changes should be both systemically desirable and culturally feasible. Systemically desirable means the change is beneficial to the performance of the system. Culturally feasible means the change is feasible "given the characteristics of the situation, the people in it, their shared experiences, and their prejudices" (Checkland 1981 in Simonsen 1994, p. 7).

Stage 7: Action to improve the problem situation
This stage concerns either the actual implementation of the desirable and feasible change or merely defining the changes needed for improvement (ibid.). In this stage, Kotter's Eight-step model will be used to structure the implementation guidelines for potential solutions to OPEX's issues.

Analysis

The analysis will focus on two parts of the OPEX soft system: The organization and the data process. An analysis of MobilePay as an organization is vital to building an understanding of actors and what their roles are in 'the big picture'. The data process analysis will utilize stages 1-4 in SSM to understand how OPEX collects and uses data, and to identify potential issues.

Organizational Analysis

One of the things that makes MobilePay so interesting to study is their organizational nature. Despite being a department of Danske Bank (as opposed to an independent company), they have different values, processes, tools, and culture. For example, work attire is semi-formal, compared to Danske Bank where formal attire is the norm. When entering the MobilePay office it is easy to see how their culture is different from their parent. They have a foosball table set up which creates the center of their break room. The atmosphere of the place is more free and creative compared to Danske Bank. Generally, MobilePay do things differently than Danske Bank. Kim calls this "the quirky existence" (Kim & Martin interview, appendix).

Strategy
Kim emphasized that the user is central to their strategy: "We run on some pretty old systems but the most important thing is that the user can actually transfer funds. [...] It's the image of the user that drives us" (Kim & Martin interview, appendix). This user-heavy focus is slightly different from Danske Bank's strategy, focusing on creating "long-term value for [the] customers, investors and the societies" (Danske Bank, 2016). MobilePay also aims to balance

agility and established processes: “We live off agility. But there has to be *some* structure like budget frames. It’s not all wild west” (Kim & Martin interview, appendix).

In addition, Kim keeps his strategic scope to less than three months: “I know what we’re doing in three months but I have no idea about six months or twelve months. Eight years is complete utopia for me” (Kim & Martin interview, appendix). This short term strategy is key to flexibility and agility. On the other hand, Martin also expressed concern with the lack of control measures which follow the fast paced, agile strategy of MobilePay (Kim & Martin interview, appendix). The lack of control measures are intentional, which Kim expresses using a metaphor:

> When we take off with a new product, picture an airplane taking off. No seats, some wires hanging when we take off. There’s a pilot, so good so far, then we’re flying. Then we find out we want to fly in that direction, so we need a rudder. Then we gotta send a guy out and install one. (Kim & Martin interview, appendix)

Kim justifies their disregard for the rudder and seats because of their focus on fast pace and agility (ibid.).

Startup-style

MobilePay has a startup-style approach: “We have been a startup in a big Danish financial company. So we act like a startup” (Kim & Martin interview, appendix). They are also not as stringent with control as Danske Bank. Instead, Kim says, “[w]e don’t run with belt and suspenders. We think it’s enough just to button your pants and go” (ibid.). This analogy can be interpreted as having just enough control to stay safe, but not so much that the organization lags behind competitively. Kim values the different point-of-view they have:

> If we sat over in the mahogany building [Danske Bank’s headquarters] with all the old paintings of old bankers that sit and stare at you, then you’d feel pressured by something that *was* and forget what *is*. (Kim & Martin interview, appendix)

So Kim is aware of MobilePay’s present situation and strategy and how that makes them different from Danske Bank.

Stage 1: Situation considered problematic

As SSM suggests, first it is needed to establish what situations are considered problematic. During the interview with John, when asked what the biggest hurdle to performing efficiently, he expressed that some of his colleagues were having trouble collecting data about MobilePay’s customers and products. He explained that data is vital in making strategic decisions concerning MobilePay (John interview, appendix). But with one data set taking two to three weeks to get to OPEX, analyzing real world situations was troublesome. For example, after implementation of the Point of Sale (POS) boxes, MobilePay wants to show the executives some data analysis on their performance. It is vital for a performance report to be timely, so if the raw data is three weeks late, the information might be outdated (Dennis interview,

appendix). When asked if anything could be improved, John expressed concern with their data sources:

> Everything about data should be streamlined. Getting a data warehouse established has been troublesome. In Danske Bank it always takes a long time from when you start a project until you can actually move the data and there's always problems. (John interview, appendix)

Dennis and Martin have also expressed concern with the process. When Dennis was asked if he agreed with John, that the data process had issues, he confirmed and said "Yes, that is correct" (Dennis interview, appendix). Martin expressed concern with the process as a whole: "It's difficult to get a smooth and seamless process running" (Kim & Martin interview, appendix). It is clear that the situation is considered problematic.

Stage 2: Problem situation expressed

This section will focus on what OPEX's data process 'does' and which parts are problematic.

Rich picture

Rich pictures are a way to express complex workplace systems. The rich picture is meant to portray the entire situation including actors, activities, and technical systems. Arrows and icons show the relationship between the different parts. The crossed sword icons indicate issues or conflicts (Checkland 2000).

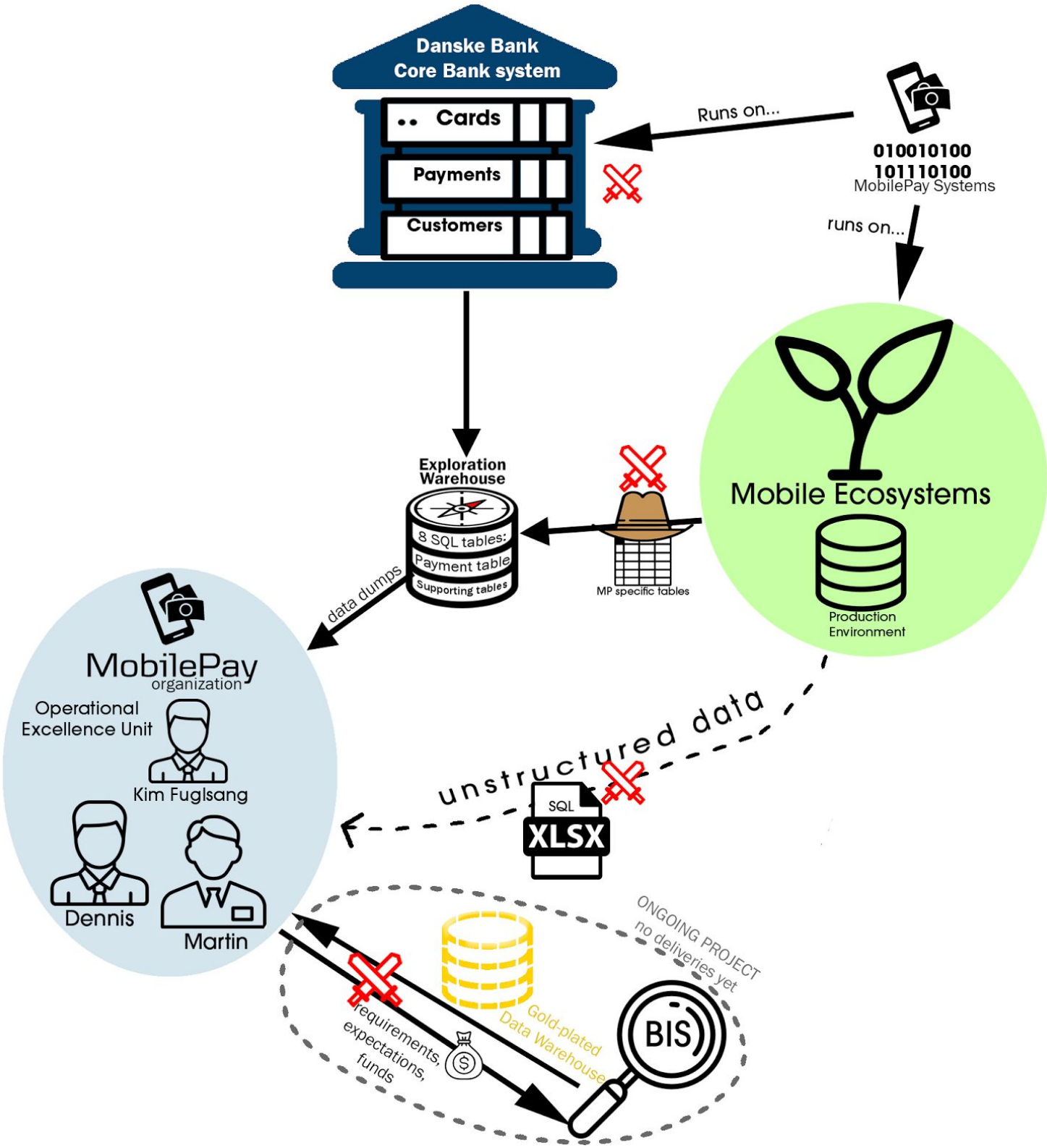

Figure 4: Rich picture

Danske Bank Core Bank system

In the top right, the picture shows MobilePay's applications being run on two systems. The foundation of MobilePay is built on a large and very complex Core Bank system owned and maintained by Danske Bank. The Core Bank is effective at handling large amounts of payments, loans, cards, etc. and is used in almost all departments of Danske Bank. Much of MobilePay's data is stored along with all other kinds of transaction, customer, and account data, e.g. card transactions, account balances, ATM withdrawals, etc. (Dennis interview, appendix). The data is stored alongside Personal Banking data because MobilePay was originally built on Danske Bank's Core Bank systems: "So we initially built MobilePay on top of Danske Bank's existing systems. [...]We simply took all the corners from the other systems and pulled those modules together and then that was MobilePay" (ibid.) But not all features and products are supported by Core Bank; the rest of MobilePay data runs on MOBEC's system (ibid.).

MOBEC

The products and features that are specific to MobilePay, like the POS boxes and Bonus points, are only run on MOBEC's system. This is because Core Bank cannot support those features and instead of modifying the Core Bank, it's easier to develop those features in a different environment (ibid.).

> In order to get the data out, then [the data] is clustered together in millions and billions of rows and Dankort transactions. So it's not easy to just find the data. What we have for some of the departments, we have some copies of daily updated SQL tables that sit with some customer information, payment information, and some other components to support the tables. (ibid.)

Exploration Warehouse

Dennis and Martin, the two analysts at OPEX, have access to an analysis environment which is named the Exploration Warehouse (EW). The EW is an internal Danske Bank platform where certain employees have different access rights to different tables and data (ibid.). Dennis also used the EW in his previous job, where he worked in another branch of Danske Bank. Here, he had access to other tables, which he no longer has access to (ibid.). Dennis and Martin can access an area of the EW, where there are eight SQL tables, each containing MobilePay related data. These tables are copies of data from the production environment where raw data is stored (ibid.). The access rights to these tables are given in a hierarchical manner whereby the manager above you – in the case of Dennis and Martin, the manager is Kim – can give you access rights.

> In addition to having access to copies of the production data [production environment], that is like our mini-analysis environment [exploration warehouse] if you will, then I also have access to a part of the other production tables if I want to dig deeper. And for every single table a separate access right is needed, in which I have to explain why I need that specific access right. (Dennis Interview, appendix)

Fast Track

OPEX uses a Fast Track to extract data from MOBEC, (indicated by the table with the cowboy hat). OPEX and MOBEC made a joint decision to build the Fast Track. The reason for implementing the Fast Track was to receive data without taking too much of MOBEC's time and to collect data faster than BIS could deliver the 'gold-plated data warehouse':

> We're in the situation now, that BIS was developing this gold plated data warehouse and that's great and all, but the problem was when we asked when we could have some numbers and they said sometime in September. Then we said, that's not possible. We need something *now*. That's when we decided on making a 'fast track' where we skip data modelling and security and quality control: We just need raw dumps of data. (Dennis interview, appendix)

With their Fast Track solution, OPEX is able to deliver analyses to management despite BIS's disapproval. "IT [BIS] aren't too happy we are doing it this way. They call it the cowboy style. They think of it as something you did ten years ago" (ibid.). According to Dennis, what is meant by 'cowboy style' is that OPEX are behaving like outlaws, taking shortcuts and breaking compliance rules. But OPEX believe it is their only option due to high time pressure and pressure from the managers: "We just can't wait. I mean, with managers all the way up that are just screaming asking for status updates" (ibid.).

Data Warehouse project and BIS

Near the bottom of the picture is BIS and a gold database icon. This indicates the gold-plated data warehouse project. The data warehouse was initiated in spring 2015, as executives wanted better analyses than what was currently possible. The executives wanted more analysis because 'the honeymoon period of growth', as Dennis called it, is over and a plateau has been reached (ibid.). The analysts had limited access to the relevant data. The reason was that extracting and exporting data from the systems and mainframes is a resource-heavy task i.e. it may take several months to pull out customer data for one year because the jobs extracting the data have to be scheduled in between many other jobs (ibid.). In addition, MOBEC is very cautious about access rights to the production environment, as even the most simple and small changes in the system can have critical consequences. At the same time, personal information data can be present, which must be handled with caution through strict governance, making it harder to access and integrate in analyses (ibid.).

> Everything related to our user data is very strict. As mentioned, we have a full-time legal advisor and she know what we can and can't do when it comes to analysis. And if it has to do with individual people's usage then it's a no-go. (ibid.)

All these factors increase the time and resources it takes to create a suitable data warehouse solution.

The analysts in OPEX needed data that would be readily available to access and build reports from. BIS began building the data warehouse in spring 2015. As of April 2016, OPEX have not even received the first version of the data warehouse and has decided to shut down the project after the first phase delivery in late May. Dennis, explains:

> It's not because we don't want a fancy data model where everything runs like clockwork, I just can't wait half a year. I have the bosses calling me all the time. So the dream is there, yes, but it just takes too long. (ibid.)

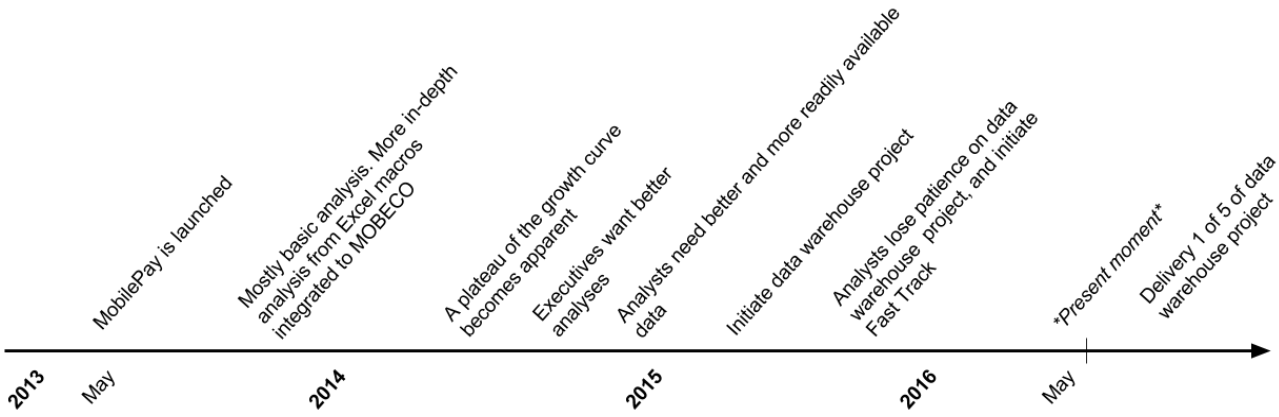

Figure 5: Data Warehouse Timeline

Four crossed swords

MobilePay's infrastructure

MobilePay runs on Danske Bank's Core Bank system.

> ...They're legacy systems. When I worked [in Danske Bank] there were 1.7 million customers that could be affected. There's some operational stability, you can't properly test things--well you can but it takes time to roll things out... (Kim & Martin interview, appendix)

According to Kim, the huge Core Bank system creates problems when it comes to integrating new features and extracting data. This is because, as mentioned, extraction jobs have to be scheduled between higher priority jobs like transactions (Dennis interview, appendix). Core Bank is an effective system that gets the job done: "Danske Bank [Core Bank]is really great at moving money around in all directions." (Dennis interview, appendix) But Kim considers it a legacy system nonetheless (Kim & Martin interview, appendix).

Cowboy style aka Fast Track

There is a crossed-swords icon over the MP Specific tables because, as mentioned, BIS find the data collection method problematic so they call it the cowboy style (Dennis interview, appendix). So it is clear that BIS doesn't like the way Mobile Ecosystems and OPEX have set up

their fast-track. The fast track is the result of MOBEC not having enough resources to regularly deliver data to OPEX. Instead, they set up this warehouse that copies MobilePay specific tables from the production environment (ibid.).

Martin's production access using Excel SQL
Martin has access to the production environment through an Excel worksheet. The worksheet is a few 'generations' old, meaning it has been inherited from the previous student workers. The worksheet has 20-30 tabs, each with hundreds of thousands of rows, and an SQL query that copies the data over from the production environment. This creates a huge problem since the excel has now amassed to such a size that it keeps crashing when being worked with (Kim & Martin interview, appendix).

Gold plated Data Warehouse project
The last crossed sword is between BIS and OPEX and aims to explain how there are and have been issues with regards to the data warehouse project. It shows how the expectations for the data warehouse have not been aligned between BIS and OPEX. As Dennis was asked what went wrong initially, he could only suspect the cause, as he was not employed at the time of initiation. However, he still had made a guess, as he had talked to the person in charge at the time of initiation. "I have talked to the guy who had the responsibility beforehand. He was in no way used to reporting and he was just thrown into it because there were no others" (Dennis interview, appendix). He clarified that "from the beginning, [OPEX] haven't been clear on their needs and the timeframe" (ibid.). Dennis explains the failure to align expectations using an analogy:

> From farmer's market to kitchen to when the food is on the table in the restaurant. We just have to sit pretty and wait for the main course. And we're just sitting here and haven't eaten in several hours thinking "can't we just get a starter?". We're okay with just a snack by the kitchen table but they won't let us. (ibid.)

To sum up, "[t]hey are building a limousine but all we need is a bicycle" (ibid.).

Stage 3. Root definition of relevant systems

In stage three, the SSM method steps away from the real world and into systems thinking *about the real world*. Hereby, the empirical data will be interpreted using PQRs and the CATWOE tools.

PQRs

MobilePay
(P) MobilePay creates value for their users **by (Q)** developing and maintaining their mobile application **in order to (R)** expand Danske Bank's competencies and market share.

OPEX Analysts
(P) OPEX monitors performance **by (Q)** collecting and analyzing data **in order to (R)** provide management with necessary information to make strategic decisions regarding MobilePay.

BIS
(P) BIS are constructing a data warehouse for MobilePay and enabling easy access to data **by (Q)** creating solutions that follow data quality standards and security protocols **in order to (R)** make data collection and analysis easier, faster, safer, and more responsive for OPEX.

Mobile Ecosystems
(P) Mobile Ecosystems collaborates with MobilePay **by (Q)** developing and maintaining MobilePay' systems and applications **in order to (R)** ensure successful and consistent operation of MobilePay's services.

CATWOE

Customers
MobilePay's management and Danske Bank's executives are the customers of OPEX. They rely on OPEX to gather and analyze data and find areas to continuously improve performance, both economically and technically. OPEX creates a picture of MobilePay's performance that MobilePay's management can present to the executives of Danske Bank. The efficiency of OPEX's data collection and analysis is largely affected by the efficiency of BIS's data processes and systems. In addition, MOBEC also affects OPEX's efficiency by not dedicating resources to serving OPEX's data needs.

Actors
There are two actors who facilitate the transformation of the customers mentioned above: BIS and MOBEC.

BIS are responsible for building, maintaining and improving data warehouses and Business Intelligence systems that Danske Bank use to create knowledge about their customers, markets, products, and performance. BIS is responsible for smooth and easy access to relevant data. These are the people involved in the implementation of the changes in the system.

As mentioned, Mobile Ecosystems develop and maintain MobilePay's systems. Their services are vital to MobilePay's operations as well as the data process. Problems arise when MOBEC don't have enough resources to dedicate to MobilePay.

Transformation
Inputs: Use of the products and services. When users open MobilePay, pay their friends or pay for products at different stores, that use is the input to the soft system that is MobilePay. The use may be in the form of receiving or sending payments, signups, app installations, bonus points, etc. This raw data concerning usage is the input to the system.
Transformation: In this report, we're looking at OPEX in particular. OPEX takes the input and transforms it through analysis. Their analytics methods vary, but typically they structure the

data, summarize it, and present it using graphs. The end product is a presentable report or presentation for the executives and MobilePay management. This transforms the use of MobilePay's services into information to guide strategic decisions and effectively communicate the success of MobilePay's products.
Outputs: The end result is the knowledge to make the right strategic decisions.
Changes to the data collection process would increase OPEX's efficiency, allowing them to produce more accurate reports, faster.

Weltanschauung - the worldview
The worldview is different for each level of the organization. Danske Bank has a worldview on both a national and international level because their services reach markets around the world. MobilePay's users are within the borders of Denmark and are limited to smartphone users, so their impact is (so far) on a smaller group of people. OPEX, as an internal group, have a worldview focused on MobilePay as an organization, as a product, its competitors, and on the Danske Bank Group. Within OPEX we have four interviewees who have individual, smaller worldviews.

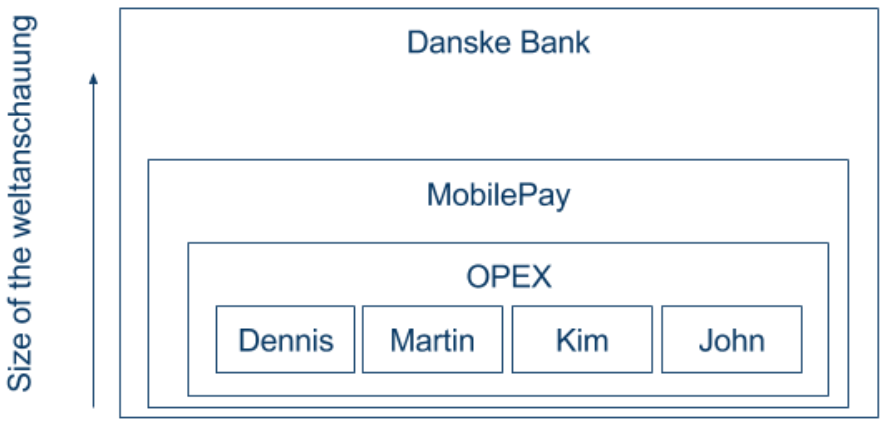

Figure 6: Size of the weltanschauung

OPEX's worldview is currently focused on their biggest problems, their complex data collection process and the controversial data warehouse project. These problems may seem to have a limited impact on OPEX's efficiency, but an impediment for OPEX is an impediment for MobilePay. The longer it takes for OPEX to collect and analyze data, the harder strategic decisions become. Those strategic decisions are essential to MobilePay staying competitive, which also affects Danske Bank's success. So although OPEX's data problems may seem limited in impact, they indirectly affect Danske Bank by hindering efficient management of MobilePay.

Owner
Kim Fuglsang, head of OPEX, is the highest authority of OPEX. He has the power to make and approve changes, especially to the data collection process. For example, he has approved Martin's access to the production environment which is normally controversial. This means Kim

also has the power to stop the transformation of input to output, meaning he is the owner of the process.

Environment
Environmental analysis looks at the external constraints that impact the system without owning it. In OPEX's case, budget is a major limiting factor specifically for their data warehouse project. Dennis estimated the project to have cost about [redacted] and financial constraints are the primary reason for ending the project after the first delivery.

Compliance rules from Group IT are also a limiting environmental constraint. They impact the freedom OPEX have to collect data.

The legal environment means OPEX are prohibited from disclosing data about individuals. This constraint affects the liberties OPEX may take during analysis and when building the data warehouse.

Stage 4: Conceptual model of systems described in root definitions

Still using systems thinking, the empirical data is continuously interpreted. This time using activity model and the 3Es.

Activity model

The root definitions are the basis for the conceptual model. Conceptual models emphasize the most vital parts for success in the process. In contrast to the rich picture, which mostly focuses on the how the process runs and who is part of it, activity models explore the flow of activities essential to the transformation.

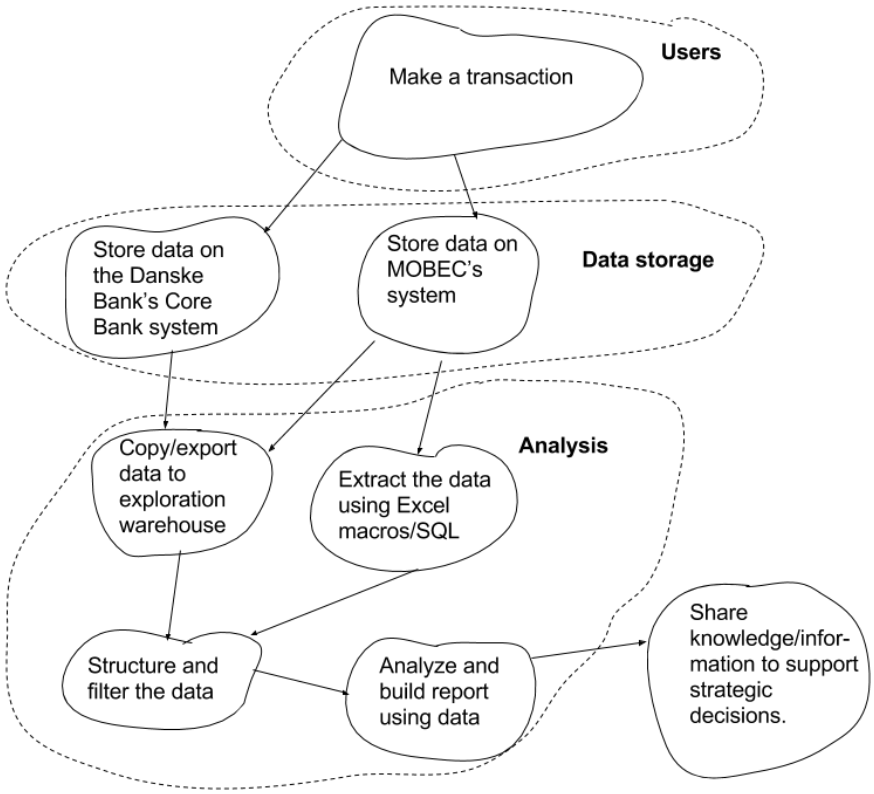

Figure 7: Activity Model

The activities are separated into three groups: Users, data storage, and analysis. Different actors are responsible for the different groups, e.g. OPEX owns the analysis part of the transformation. This model also includes the output of the transformation: business intelligence to support strategic decision making.

Three Es

In order to measure the performance of the current system we apply the concept of three Es.

E_1 stands for efficacy, which relates to the actual transformation and *if* this transformation actually works. For OPEX, the question can be formulated as so: *Does OPEX transfer the input data into reports for management?* Despite the problems that are present in the process this goal is indeed reached.

E_2 stands for efficiency and aims to explore *how well* the system transforms the input into the output. Improving the quality of the output would also improve the system. Efficiency is the most lacking of the 3Es and one of the data process' greatest shortcomings. One argument for implementing the data warehouse project is that the current process from input to output is not efficient enough.

E_3 is effectiveness which explores whether the system achieves its long term goals. For OPEX, the long term results of the system are measured by how well the reports support

management's decisions. There are numerous factors which affect the quality of the final reports. Time certainly impacts the quality of the reports because delayed reports are less strategically valuable. This focus on time is enforced by the environment of mobile payment technologies which is highly turbulent and competitive. A different factor is the accuracy of the information.

> We have the responsibility to give meaning to all this raw data. We have to structure it and remember to make a sort of human quality control - asking “does it make sense? Does it make sense that 28 new shops signed up? (Dennis interview, appendix)

When Martin has to extract data or rely on the eight tables it is likely that the data won’t be 100% correct. This is one of the features that the new data warehouse would improve by implementing automatic data validation to improve the system’s effectiveness.

Analysis summary

Using four of the seven stages of the soft systems methodology, the analysis has yielded a thorough understanding of the situation and issues.

Organization

The organizational analysis explored how OPEX’s strategy and their startup-style set them apart from Danske Bank. Their strategy is user-driven, short-term, and fast paced. Their startup-style is another important defining factor. They maintain many startup qualities, most notably the disregard for too much control, instead opting for just enough control. As Kim puts it, they try to be aware of what *is*, where Danske Bank are merely aware of what *was* (Kim & Martin interview, appendix). These differences make up their unique organizational nature, which Kim calls ‘the quirky existence’.

Data Process

The data process is the transformation of inputs (users using MobilePay’s products) to outputs (reports to support strategic decisions). The previously mentioned actors all play an important role in this transformation. BIS supply OPEX with data services, so they can be considered part of the transformation of input to output. MOBEC deliver data to the Exploration Warehouse from the production environment. Martin’s Excel queries extract the rest of the relevant data. OPEX then structures and analyzes this data and transforms it into valuable reports for executives and managers.

Issues

Gold-plated data warehouse

BIS, at the time of writing, have still not delivered the first version of the data warehouse. The data warehouse will apparently solve almost all of the data process problems, but OPEX thought it took too long and cost too much so they will be abandoning the project after the first release in late may. The project has problems because the actors failed to align expectations and timelines.

Core Bank as a legacy system
Although the Core Bank system is effective in traditional banking applications, it can be considered a legacy system with regards to MobilePay's applications. MobilePay runs on Core Bank because it was the simplest solution during development, but now that more features are implemented, the data structure is split up. As Kim explains, it takes time to roll things out (Kim & Martin interview, appendix). Those problems are grounds to change but because Core Bank is a legacy system, it is resistant to change.

Fast Track
BIS don't like the way OPEX and MOBEC export data into the exploration warehouse because they consider it outdated and improper. Ideally, the Fast Track should have data validation and quality assurance as well as stricter security protocols.

Excel queries
The Excel workbook that extracts data from the production environment makes Martin's data collection very difficult: "[I]t almost always crashes just by playing around with it" (Kim & Martin interview, appendix). Not only is this method difficult to work with, it also isn't good practice to extract data from the production environment because extraction may interfere with operational functions.

Discussion

First, the organizational nature should be discussed with regards to Tushman & O'reilly's *The Ambidextrous Organization* (1996). Then, the organizational nature's effect on the data process will be discussed. Afterwards, in order to get external perspective on how typical data warehouse projects should be managed, Cerquiera's *Lessons Learned* (2015) will be included. Then the discussion continues with stage 5, 6, and 7 of SSM which involve stepping back out of systems thinking and viewing the systems with a real-world perspective again. The comparison stage (stage 5) will be portraying the evolution of the activity model and creating a matrix with those activities from the model. The 6th stage is where solutions to overcome data process issues will be presented and their cultural feasibility and systematic desirability will be discussed. The 7th stage will discuss potential implementation strategies for the proposed changes.

MobilePay as an ambidextrous organization

This section will interpret the findings from the organizational analysis with regards to MobilePay's ambidexterity. Tushman and O'reilly's research (1996) suggest three ways for organizations to become ambidextrous: multiple cultures, ambidextrous managers, and

organizational architecture. So can MobilePay, and by extension, OPEX be considered ambidextrous?

Multiple cultures

Culturally, ambidextrous organizations "are simultaneously tight and loose" (Tushman & O'reilly 1996, p. 26). The culture of these organizations is tight in that it is "broadly shared and emphasizes norms critical for innovation" (Tushman & O'reilly 1996, p. 26), but also loose because the "common values are expressed [differently] according to the type of innovation required" (Tushman & O'reilly 1996, p. 26). The tight-loose aspect "is supported by a common vision and by supportive leaders who both encourage the culture and know enough to allow appropriate variations to occur across business units" (Tushman & O'reilly 1996, p. 26). The quirky existence is what Kim uses to describe the culture within MobilePay. Their culture stands out from the corporate culture present in Danske Bank, meaning there are multiple cultures.

Ambidextrous managers

Ambidextrous organizations should be led by ambidextrous managers. The managers have a lot of responsibility to continually reinforce the core values. They need to embody the culture and lead by example. "I got pulled out of the classic bank and personally think I am a creative boss, but it's also something to do with how you approach things" (Kim & Martin interview, appendix). MobilePay's managers are all managers have all had relatively long tenures in Danske Bank. On one hand, Tushman and O'reilly say "[o]ne of the explanations for this special ability is the relatively long tenure managers have in these organizations" (1996, p. 27). So MobilePay's managers are familiar with Danske Bank's corporate culture and control schemes. But with MobilePay having a largely different culture from its parent, these managers have had to adapt to a new organizational culture. This is a natural development in MobilePay's organizational life because, as Tushman and O'reilly (1996) say, managers need to prepare for revolutionary change, not just evolutionary change. So, because they went from one culture to a radically different culture, the managers are both evolutionary and revolutionary, meaning they are ambidextrous.

Organizational architecture

Organizational architecture involves making sure departments and teams don't get too large so "employees feel a sense of ownership and are responsible for their own results" (Tushman & O'reilly 1996, p. 25). MobilePay utilizes this architecture by both *being* an autonomous unit, and *having* small autonomous departments (OPEX, Solution Sales, and Concepts).

In addition to the three ways for organizations to become ambidextrous, Tushman and O'reilly also claim that "[m]anagers must be prepared to cannibalize their own business at times of industry transitions" (1996, p. 28). Dynamic and disruptive environments "require that managers periodically destroy what has been created in order to reconstruct a new organization better suited for the next wave of competition or technology" (Tushman & O'reilly

1996 p. 24). What has MobilePay destroyed? They 'destroyed' the existing Danske Bank corporate culture in their department and constructed their own culture. So in addition to having multiple cultures, ambidextrous managers, and small autonomous units, MobilePay has shown they are prepared to act revolutionarily in order to stay innovative. This is, as Tushman and O'reilly state, a key factor in becoming ambidextrous (1996).

Organizational effect on data process

So it's clear that MobilePay is ambidextrous to some degree. But ambidexterity not only affects their level of innovation and agility, it also affects the internal processes. Looking back at the data process, it has four problems: The Gold-plated data warehouse, the Cowboy style, Excel queries, Core Bank as legacy systems.

Core Bank legacy

MobilePay's new revolutionized nature necessitated the development of the systems on existing infrastructure. With the quirky existence, a short-term strategy followed. Like Kim's airplane metaphor, they needed to build a new plane quickly (new product) and the engines were the Core Bank infrastructure. The engines would make the plane fly which was the most important part. After taking off, they realized the engines weren't suitable for the airplane they ended up building, they became too heavy: They were legacy engines. This ended up causing problems in many areas, but especially in the data process by complicating the data collection activity. The legacy engines are problem creators, but only because they weren't meant for the airplane that MobilePay ended up building. MobilePay choosing the legacy engines, instead of building their own, was because of their short term strategy.

Gold plated data warehouse

The radar on the airplane. BIS wanted to install radar but OPEX just wanted a compass so they could do basic navigation. The gold plated data warehouse had problems because expectations weren't aligned. MobilePay's lack of control structures meant the project was allowed to be initiated without clear documentation requirements and agreements. The startup mentality, without due diligence, ended up create problems for the project. Several factors combined to cause the data warehouse project to become so problematic. The pressure to launch MobilePay quickly affected their organizational nature. Their organizational nature had the mentality of a startup which resulted in a lack of due diligence when approaching new projects. The lack of diligence was acceptable for the product launch but crucial when it came to the data warehouse project, hence the problematic gold-plated data warehouse project.

The cowboy style and the Excel queries

The Fast Track and Excel queries were were different solutions to the same problem in the data process. They were both developed because they needed data to see where 'the airplane was going', again, using Kim's airplane metaphor. They were improvised solutions. Again, the short term strategy couldn't predict what tools they needed after the airplane took off. The radar (the

data warehouse) couldn't be installed as the plane was flying, so OPEX had to improvise solutions (Fast Track and Excel queries). Of course, the control tower (BIS) doesn't like someone flying a plane around without proper equipment. The organizational nature involved an ad hoc, startup-style mentality, that chose to disregard control measures and due diligence. This made ad hoc, startup-style solutions the only way to continue flying. Once again, the organizational nature indirectly caused data process problems.

The ad hoc, startup-style mentality and unique corporate culture was integral to MobilePay's quick development process and short time-to-market. But it ultimately caused problems in the data process.

External perspectives on a data warehousing environment

Comparing OPEX to the investigations of Cerqueira's (2015) *Lessons Learned supporting a Large-Scale, Real-world Production Data Warehouse/Business Intelligence (DW/BI) Environment*, we find that building and supporting the right data warehouse is no simple task. Comparing the data gathered from OPEX interviewees, similarities to the Cerqueira case are apparent.

Lesson 1 advises that "technically savvy subject-matter experts from the business are sometimes invited onto the DW/BI support team to share their business expertise" (Cerqueira 2015, p. 40). When asked about how they could improve the situation and their data warehouse problems, Dennis suggests the following:

> One solution was actually to get someone from [BIS] here that would build the whole structured data model. They'd sit with us a couple of weeks and together we could make some standard queries that would filter out the worst [data] and make sure there's no duplicates and other things like that. [...] Get someone out here that could help with the raw data dumps we get and build a mini datamodel on top. (Dennis interview, appendix)

So although Cerqueira suggests inviting a business expert to the support team, Dennis suggests moving a support team member (BIS) to the business side. Either way, the partnership benefits from the expertise the invited member can provide. Also related to lesson 1, from the perspective of DW/BI supporters – which in this case would be BIS – Cerqueira recommends that "team members each have a thorough grasp of the entire DW/BI process—from source system to information delivery" (2015, p. 40). Dennis' suggestion would help team members achieve thorough understanding of the process from system to report.

Lesson 2 involves the importance of understanding the organization. In the data warehouse project, there are several indicators of actors not understanding other departments in the organization. This lack of knowledge was evident in their failure to align expectations. Dennis felt that BIS do not fully understand the needs they have in OPEX and thus, priorities were not aligned. According to Cerqueira (2015), business users often have fundamental necessary needs. These fundamental needs seem to be overlooked by BIS, who focus on building a

gold-plated data warehouse instead of focusing on an early delivery of the most essential needs. The support team must pay “close attention to the users’ more fundamental necessities and how they need to use the system” (Cerqueira 2015, p. 41), and thereby not building unnecessary parts into the DW/BI. According to the case, one way to align priorities and ensuring business needs are clearly communicated, is with the use of SLAs and other types of documentation. Dennis explains, the documentation had not been sufficient, as OPEX have not been clear on their timeframes and specific needs (Dennis interview, appendix).

In lesson 3, Cerqueira acknowledges that business users are in need of responsiveness and urgency. There is pressure from high level managers demanding up to date information on the business, evident in Dennis’ statement:

> It’s not because we don’t want a fancy data model where everything runs like clockwork, I just can’t wait half a year. I have the bosses calling me all the time. So the dream is there, yes, but it just takes too long. (Dennis interview, appendix)

Right now OPEX have no data warehouse to work with. “A DW/BI solution is only as good as what the business user can do with it” (Cerqueira 2015, p. 41). Business users have increasing demands to responsiveness and urgency. “[T]he support team must acknowledge these needs and deliver what is expected” (Cerqueira 2015, p. 41). The business users are the focus of the DW/BI support and after all, the support team would not exist without them. Same goes for the relationship between OPEX and BIS as OPEX is paying for the development hours to BIS. In addition to a failure to align expectations, BIS has failed to adopt a user-centric approach.

Stage 5: Comparison between conceptual models and real world

The comparison between conceptual models manifested itself through discussions all throughout the research and writing period of this project. From the first drafts of a contextual model, to the final product there have been comparisons happening to improve the models. The empirical data was very limited in the beginning of the project so the process was quite confusing. But, through the construction of models and discussions, a better understanding emerged. By always remaining critical to of the current model and never assuming it to be perfect, we were able to improve the models a little bit a time. To illustrate this process, three different versions of the activity model is presented below:

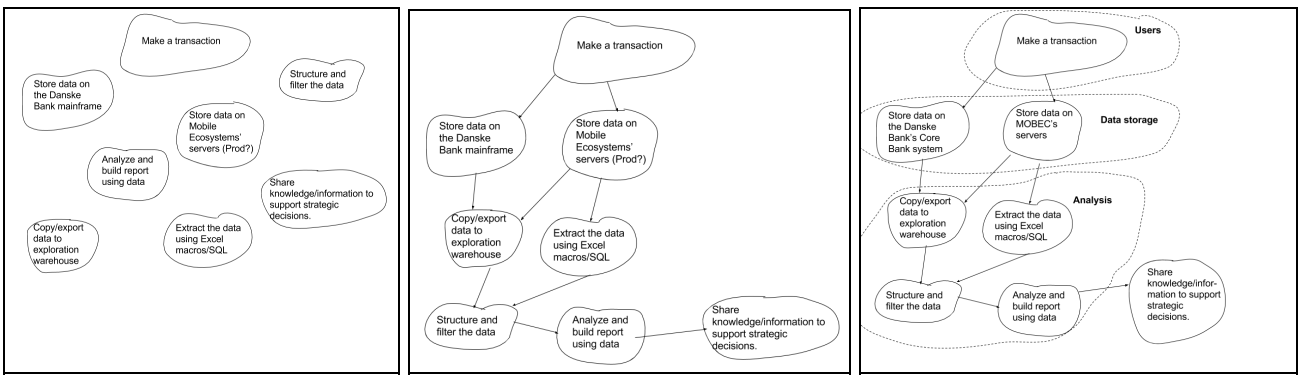

Figure 8: Different versions of the activity model

The models were continuously improved upon as more data came to light. An example of this is when an early draft of a data flow model[1] was sent to Dennis in order to correct any inconsistencies. He pointed out errors in the model increasing its accuracy.

When it comes to comparing models with the real world we have chosen to create a comparison matrix to gain an overview. The matrix is based upon all of the activities that have been described earlier in the analysis.

Activity	How does it accomplish its goal?	How is its performance identified and measured?	Is this activity any good?
Make a transaction	Users send funds to their peers and to businesses. Transactions are fast.	Dennis and Martin measure performance and use of the applications. They try to identify patterns and cause/effect relationships.	Yes, very effective. Most users are happy with the experience and MobilePay is generally regarded as a success because of this activity working so well.
Store data on Danske Bank's Core Bank system	Data is stored alongside all Core Bank functions, the only difference being a different letter in the transaction IDs.	Not quantitatively measured by OPEX.	The data is stored in a secure place. The existing infrastructure is *effective* but maybe not *efficient*. What it doesn't accomplish is storing the data in a *convenient* and *accessible* place. This activity complicates the rest of the whole process quite a bit: It becomes complex to extract the data again because the Core Bank system is so complex.
Store data on MOBEC's system	MobilePay specific data is stored in a production environment.	Not quantitatively measured by OPEX.	This activity is effective but because MobilePay is run on two systems, the efficiency suffers.
Copy/export data to exploration warehouse	From Core Bank some tables are transferred. From MOBEC, the fast track extracts MP specific data.	Dennis and Martin don't actively measure, but they know approximately how much time passes between each export. The hours BIS and MOBEC spend on MobilePay's requests is invoiced to MobilePay.	This activity works but it is controversial. BIS call this the 'cowboy style'.
Extract data using Excel queries	Martin's legacy workbook runs queries that copy tables from the production environment.	The activity's performance is not quantitatively measured but estimated by Martin.	This part does NOT work well. Firstly, the workbook crashes "every other time" (Kim & Martin interview, appendix). Second, it gathers unstructured data which is hard to work with. Thirdly, production environment access is generally

[1] The data flow model was later incorporated into the rich picture.

			frowned upon.
Structure and filter data	Dennis and Martin sort, link tables, clean up, filter, and pivot data.	The activity's performance is not quantitatively measured but estimated by the Dennis and Martin.	Dennis and Martin say it's a shame, but it's better that not receiving any data at all from BIS.
Analyze using data	The data is analyzed to transform it into information	The activity's performance is not quantitatively measured but estimated by the Dennis and Martin.	Not important (black-boxed).

Table 3: Comparison matrix

Stage 6: Define possible changes that are culturally feasible and systemically desirable

Solution 1: Documentation Task Force

A documentation task force should pick up where the data warehouse failed by writing three important documents in collaboration with BIS and MOBEC:

1. Service Level Agreement (SLA)
2. Operational Level Agreement (OLA)
3. Software Requirements Specification (SRS)

The task force would include representatives from the different departments, i.e. one from OPEX, as they are the actual business users, one from BIS, as they are the ones doing the development of a potential data warehouse solution, and one from MOBEC since they are the owners of the data. An executive sponsor would oversee the project making sure it gets funding and all actors are motivated to make the best possible solution. This task force would be responsible for proper documentation of requirements and expectations between the partners.

The first step for the task force is to evaluate the first delivery of the data warehouse before drafting the documentation. OPEX and BIS are to create SLAs between them. The SLA defines services to be delivered to a customer, in this case OPEX. It should include features such as contracted delivery times which would manifest in several milestone deliveries of needed data. The SLA should also include risk ownership and procedures for reporting problems, technical definitions, and ways to clarify responsibilities (Shacklett 2011).

An OLA should be created between BIS and MOBEC. Where SLAs are between a customer and the service provider, an OLA is between two internal support groups (Betz 2007).Therefore, MOBEC needs to provide access rights to, and support BIS so they can build and deliver the data warehouse for OPEX and fulfill their SLA.

SLA and OLA will define the responsibilities and timelines of each service and support provider. However, in order to fully support the actual user's daily tasks, a software requirements

specification (SRS) is also needed. There are many views on how to write the optimal SRS and going into a detailed discussion of pros and cons of use cases, user stories, and user tasks is beyond the scope of this report. What is essential, is that the SRS specifies both functional and nonfunctional requirements to a desirable level (Lauesen 2013)**.** These include, among others, the vision and background for acquiring a new system/solutions, explaining the actual needs of the user to perform daily tasks, data requirements, usability, early proof of concepts, and others.

How the analysis led to this solution
By examining the rich picture, it is apparent that there were issues related to collaboration between the parties. By formally defining their responsibilities, these issues should be alleviated, meaning the solution is systematically desirable. A potential weakness of this solution is its culturally feasibility. Formalities like SLA's are standard practice in most organizations, usually with one or more people working on it at a time. Considering the small size of MobilePay and its startup culture (Kim interview appendix), the time and resources may be scarce, meaning this solutions cultural desirability may be limited.

This solution should begin after the first delivery of the data warehouse which is expected in late May 2016. The task force should use the first delivery as a starting point, evaluating and analyzing it, and continue the project making sure it continues on a better track.

This documentation is vital if the data warehouse is to meet the right expectations in the future. The solution should be used as a basis to learn from shortcomings of the current data process, while continuing on a new, better path of development. The managers in MobilePay should acknowledge that the project was set off the wrong foot, lacking an SLA, an OLA, and a complete software requirement specification. In addition, the rest of Danske Bank should be able to learn from the missteps taken in MobilePay so documentation is key.

Solution 2: BIS Data Consultant

The second solution involves transferring an employee from the BIS department into MobilePay OPEX department as a consultant for a limited period. The consultant would be responsible for opening and maintaining compliant data channels as well as setting up automatic data validation through applications such as SAS. This would negate the need for the cowboy style fast track and instead make the fast track compliant with data security and quality assurance regulations.

Hiring a current BIS employee as a consultant would allow proper integration with the work environment and actually understand the needs of OPEX. In the past, the communication and expectations between different departments, in this case OPEX and BIS, have been sup-optimal. This temporary transfer could bridge the current gap as the transferred employee would bring knowledge and perspective from BIS while working closer with OPEX.

A consultant would take up far less resources than the full gold-plated data warehouse. To create an accurate business case would require a more detailed report but for the sake of the argument it is assumed that the solution would take three months of full time work. With a cost of 1200 dkk/hr and a 37.5 hour work week the consultant would cost about 585,000 DKK. In comparison, the gold-plated data warehouse had already cost MobilePay around [redacted] for just the first delivery of five (Dennis Interview).

OPEX would get improved access to data and quality control with data validation. the understanding of needs and future communication between the two departments would be improved. However, the solution is not without potential risks. The timeframe for a solution such as this could end up being longer than anticipated. There is also the risk of the solution not being as useful as intended. Data validation is an important element but the validation process is something that is already being done by the OPEX staff. The amount of time saved using the solution depends on the amount of time OPEX spend on data validation.

There are many aspects to consider but with support from a manager like Tonny T. Andersen or Mark Wraa, the high level of control and leadership would ensure success. It is crucial for any business case to be supported by a manager.

How the analysis led to this solution

Dennis said they had previously considered this as an option. In addition, evidence suggests employees of BIS have a lot of insight concerning the process of extracting data in adhering to the compliance rules of Group IT. BIS works with data transfers across all Danske Bank systems and as MobilePay systems run on the Core Bank system, their knowledge is invaluable to the data process. This supports the notion that a person from BIS would be able to set up processes compliant to data rules.

The rich picture helped spot issues which were marked with crossed swords, one of which was the cowboy style fast track. Having a full-time BIS consultant would improve the fast track by making it comply with data quality requirements and allowing for streamlined data channels.

In the Environment section of the CATWOE, Group IT compliance rules determine that a lot of the authorizations must be controlled by BIS. This slows the data process considerably but having a BIS consultant with direct communication channels to table owners would decrease the time to access rights.

Finally the PQR about BIS states that: “(Q) creating a solution that follows data quality standards and security protocols” is what BIS does. The analysis showed that BIS has the capabilities to make this solution possible, but the collaborative aspects were lacking.

Cultural feasibility and systematic desirability

The inspiration for this solution came from different parts of the analysis. Initially quotes by Dennis explained:

> A solutions proposal was in fact to get one of them [from BIS] out here. They are sitting and building the whole structured data model. We want them to come out and sit with us for couple of weeks so we could make some queries that would sort off the worst data like duplets and such. (Dennis Interview appendix)

From this quote it can be gathered that it is likely that the OPEX department could see the solution being feasible. In addition, the 3E's show shortcomings on efficiency. The improved speed of data validation and the streamlined data channels would correct the lack of efficiency.

Dennis had this idea before so the solution is somewhat culturally feasible: "I mean get one of them out here to help with the raw data dumps we are getting and then build a mini data model on top of that" (Dennis interview, appendix). As mentioned, a BIS consultant would also help save time meaning an increasingly efficient transformation of input to output. In other words, the solution is systematically desirable. An executive sponsor would also help the solution's cultural feasibility.

The solutions can be implemented in conjunction as the Documentation Task Force focuses on the data warehouse, a long term solution, and the BIS Data Consultant is focused on setting up data channels and data validation, a short term fix. Both are culturally feasible and systemically desirable.

Stage 7: Action to improve the problem situation

After defining potential solutions, this stage defines implementation of said solutions. For a more clear methodological and theoretical approach to make change, literature suggests several. A popular approach is John Kotter's Eight-Step Change Model (1996):

The following table defines basic actions to implement each solution:

Kotter's steps	Solution 1	Solution 2
1. Establish a sense of urgency	This paper serves as the first step in creating a sense of urgency.	This paper serves as the first step in creating a sense of urgency.
2. Create a guiding coalition	The task force serves as the guiding coalition, facilitating collaboration between the actors and defining the project guidelines.	MobilePay and BIS should together clearly define the responsibilities of the consultant.
3. Develop a clear shared vision	The SLA, OLA, SRS are the vision for the data warehouse defined clearly and thoroughly.	The consultant's responsibilities and their purpose should be outlined.

4. Communicate the vision	It has to be assumed that not all actors will read the documentation, so concise material or a presentation are appropriate.	The outline of the consultant's responsibilities should be shared to both BIS and MobilePay staff.
5. Empower people to act on the vision	An executive sponsor should support the initiative so that people will follow their leadership.	Have consultant provide status reports to staff so staff are encouraged to support.
6. Create short term wins	Delivery milestones should be defined in the SLA, OLA, and SRS.	Outline partial delivery deadlines for consultant.
7. Consolidating gains and producing more change	Frequent deliverables to show people progress.	At the end of the consultant's term, hand over process documentation and onboard MobilePay staff.
8. Anchoring new approaches in the culture	Easy error reporting of the system e.g. through JIRA should be implemented and users should be made aware of error reporting procedure.	Encourage MobilePay staff to speak out about remaining or future shortcomings of the change.

Table 4: Kotter's 8 step model

Kotter's 8 step model summarizes the basic implementation strategy for both solution but this is not a complete implementation, merely an inspiration. The taskforce and the managers responsible for hiring the consultant should outline a full project plan.

Conclusion

The research design was guided by the following research question:

> *How does the organizational nature of MobilePay affect OPEX's data process and how can the shortcomings of said process be addressed?*

The goal of the report was to investigate the relationship between the organizational nature of MobilePay and OPEX's data process, as well as proposing solutions to overcome any potential issues. In order to answer the question, Checkland's Soft Systems Methodology (2000) provided a predefined structure to the research design. More specifically, OPEX was thought of as a soft system and the Seven Stage Model was used to clearly define the elements and issues of said system. The tools in this framework created the foundation for the analysis and the discussion. To discuss the results of the analysis, Tushman and O'reilly's *Ambidextrous Organizations* (1996) served as a basis for discussing one of MobilePay's strengths: their level of ambidexterity. Then the knowledge of MobilePay's organizational nature was used to examine how it affects OPEX's data process. In addition, comparing OPEX to Cerquirea's *Lessons Learned* (2015) aided in discussion and inspired the two solutions. Stages 5-7 of SSM were used to discuss the analysis findings, define the two solutions, and define actions to implement the solutions.

MobilePay had to move fast to launch their application to the market before their competitors. As a consequence, they abandoned the Danske Bank corporate culture and adopted a startup mentality, a semi-formal culture, and a short-term strategy. Together, the mentality, the culture, and the strategy make up MobilePay's organizational nature. The elements of the organizational nature affected the data process by indirectly causing the four problems: the problematic gold-plated data warehouse, the controversial Fast Track, the Excel queries, and the Core Bank legacy systems. The strategic decisions MobilePay made in the beginning, ended up complicating OPEX's data process by acting without diligence. The important lesson being: diligence is crucial, even if the environment demands agility, ambidexterity, and quick decisions.

To help MobilePay overcome the shortcomings caused by the organizational nature, two solutions were presented: The first solution is to create the Documentation Task Force whose responsibility it will be to evaluate the first release and afterwards create a proper SLA, OLA, and SRS. By grouping one employee from respectively BIS, MOBEC, and OPEX, with an executive sponsor, this solution will properly align expectations between the departments and ensure success in the future development of the data warehouse. The second solution is to hire a Data Consultant from BIS to become a part of OPEX for a limited time. The consultant's responsibility will be to open and maintain data channels for OPEX, and to set up automated data validation. Both solutions should mitigate the conflicts the organizational nature caused in the data process.

Despite causing some issues in the data process, MobilePay's organizational nature should not be compromised because it is hugely beneficial to their success. Although being diligent is crucial, the organizational nature does not have to be compromised. This point is important to the future of MobilePay and should be treated as such. This report has investigated the effect a lax organizational nature has had on the data process, but without the right measures, conflicts in the future may not be limited to internal processes. After all, there are 2.9 million users placing their trust in MobilePay.

Reflection

While working with the data collected, we often found ourselves debating technical things, such as "*how* do they store the data?", "*how* is the data transferred from the POS?". In reality, we were limited by our own technical knowledge, but at the same time, we concluded that it was not necessary to fully understand. We had to accept that we would not understand every single technical part of MobilePay's systems.

The NDA limited our investigation considerably. We couldn't conduct a thorough investigation of the innovation process even though that seemed very interesting. We also couldn't write any kind of CSCW project because we weren't allowed to observe people's use of technology.

Nevertheless, we found an important problem area that we could investigate using only interviews: the data process.

Method and theories

Applying SSM and other theories

SSM does not explicitly suggest bringing in other theories or methods. However, we chose to involve several theories as we felt that the research and comprehension became enriched this way. SSM isn't a perfect method, but rather serves as a well-defined, widely accepted tool to investigate complex problems. We encountered moments where SSM seemed limiting for instance, Stage 7 which was so limited we had to use other models to support and structure our research, hence the use of Kotter's 8 step model.

BPMN

At first we expected to include Business Process Modeling Notation 2.0 (BPMN) to map the process of extracting data. However, throughout our interviews with representatives from OPEX, we came to the conclusion that the process was way too loose and ad hoc for BPMN. BPMN is suitable for prespecified, rigid processes. It is a tool for logical and repetitive processes and "good for creating overview of "ideal" process flow and automating routine processes" (Hildebrandt 2015 p. 10). The current data processes were found to be very ad hoc, and not standardized or formalized. Using the Soft Systems Methodology several situations and problems were mapped and described through diagrams, making BPMN all the more unnecessary.

Governance

As we realized we would investigate data processes, we imagined that governance was going to be a large part of the report. We expected to be able to examine more about how decisions schemes and control methods play a part of MobilePay. However as more interviews were conducted it became clear that the organisation is quite loosely controlled, and there weren't much info to obtain on the subject. As a result, the decision was made to turn away from governance. If further research was to be done it could be interesting to look into Danske Bank's governance and examine where some of the control measures of the 'old' bank could benefit MobilePay.

Amount of interviews

As time passed by, we realized how much effort we had to put into arranging interviews. As described in our data collection, we were guided from one employee to another, in search of finding an interesting topic to investigate. Thus, we felt that a lot of time was spent on finding the core of our focus. As we started analyzing the information we had been given from the interviews, it was obvious that more interviews with other stakeholders would be interesting.

Such a stakeholder could be a representative from BIS. It could also be interesting to talk with somebody working in MOBEC. We are aware that we have only been given one side of the story, and inputs from the “opposing” side could perhaps enrich the analysis and discussion. Even though we thought we got a sufficient amount of data from OPEX, if more time was available, we would no doubt pursue more interviews from BIS and MOBEC. The issue being that every interview adds more knowledge that has to be synthesized and shortened to fit in the report.

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Appendix

Removed to comply a non-disclosure agreement