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Case study in improving operations of a data-oriented company using Fractal Enterprise Model

Master's Thesis (15 ECTS)

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Abstract:
There are multiple ways of improving a company's operations, but the baseline for any improvement is a fundamental understanding of the company's structure. Modeling a company can provide the basis for change and improvement. This thesis aims to apply the Fractal Enterprise Modelling (FEM) technique and related software to support the improvement process of an IT company. As FEM is a relatively new enterprise modeling technique, there exists a need to test this toolset in a practical setting. The research was conducted in an actual company that aimed to find the most beneficial solution using limited resources.

In this thesis, we supported the business analysis process by using the FEM modeling technique. As a result, we designed a solution that improved the company's workforce efficiency and the effectiveness of the service provided. Using FEM allowed us to gain many additional benefits throughout the business analysis process, mainly improving the business process awareness by providing a holistic picture of the company. This clarity and awareness of organization structure and processes allowed us to find the business need that benefited the company most.

Secondly, through practical experience, we gained insight into the FEM modeling technique and gave guidelines to other companies that want to solve similar problems. We separated these guidelines into two groups: general guidelines that all can follow when implementing a business change in a similar context and guidelines that are more specific but still applicable in certain scenarios.

Keywords:
Fractal Enterprise Modeling, business analysis, process improvement

CERCS:
P170 - Computer science, numerical analysis, systems, control

Juhtumiuuring kuidas parendada admetele-orienteeritud ettevõtte protsesse kasutades *Fractal Enterprise Model* mudeleid

Lühikokkuvõte:
Ettevõtte protsesse saab parendada mitmel erineval viisil, kuid kõigi muutuste aluseks on hea ülevaade ettevõtte struktuurist ja seal tomuvatest protsessidest. Ettevõtte modelleerimine rajab baasi ettevõtte sisesteks muutusteks ja täiustusteks. Antud magistritöö eesmärk on leida lahendusi IT-ettevõtte protsesside parendamiseks ning katsetada *Fractal Enterprise Modelling* (FEM) põhimõtteid ja kaasnevat tarkvara selle protsessi toetamiseks. Kuna FEM on suhteliselt uus ettevõtte modelleerimise tehnika, siis on eksisteerib vajadus FEM-i katsetamiseks praktilise töö raames. Antud töö viidi läbi reaalses ettevõttes, kus eesmärgiks oli leida piiratud ressursse kasutades ettevõttele kõige kasulikum lahendus.

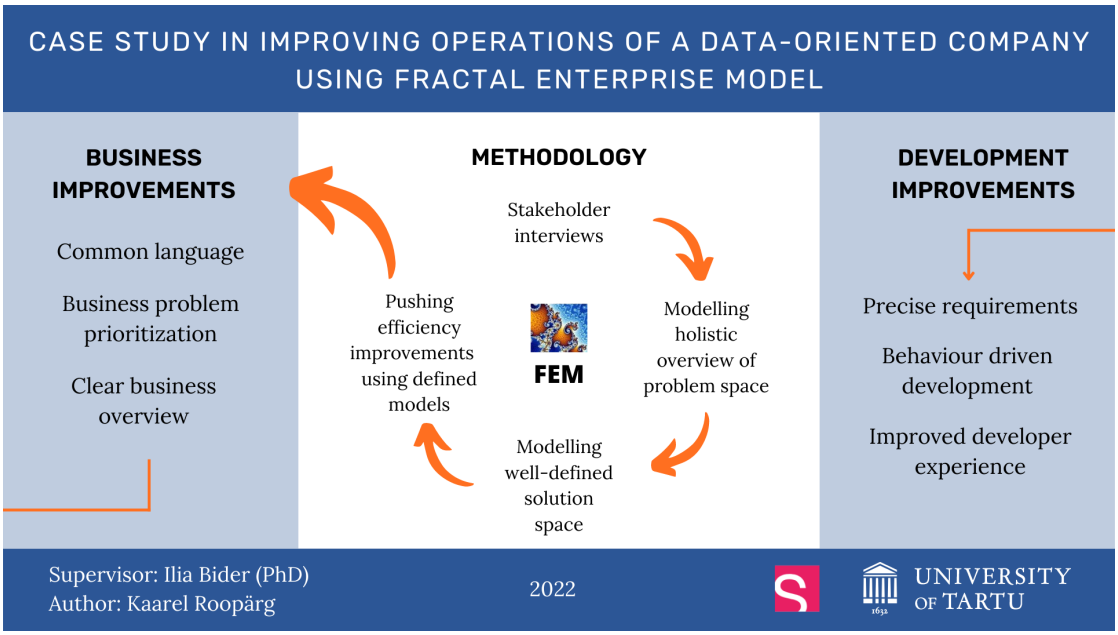
Selles töös me kasutasime kogu ärianalüüsi protsessi vältel FEM-modelleerimistehnikat. Selle tulemusena töötasime välja lahenduse, mis parandas ettevõtte töötajate efektiivsust ning tõstis pakutava teenuse tõhusust. FEM-i kasutamine andis meile mitmeid eeliseid kogu ärianalüüs protsessi vältel, pakkudes terviklikku pilti ettevõttest ning seeläbi parandades üldist äriprotsessi teadlikkust. See selgus ja teadlikkus organisatsiooni struktuurist ja protsessidest võimaldas meil leida ärivajaduse, mis tõi ettevõttele kõige rohkem kasu.

Teiseks, läbi praktilise kogemuse saime ülevaate FEM-modelleerimistehnikast ja anname juhised teistele ettevõtetele, kes soovivad sarnaseid probleeme lahendada. Eraldasime need suunised kahte rühma: üldised suunised, mida võivad jälgida kõik, kes soovivad rakendada ärimuutust sarnases kontekstis ning suunised, mis on konkreetsemad, kui siiski kohaldatavad teatud tsenaariumite korral.

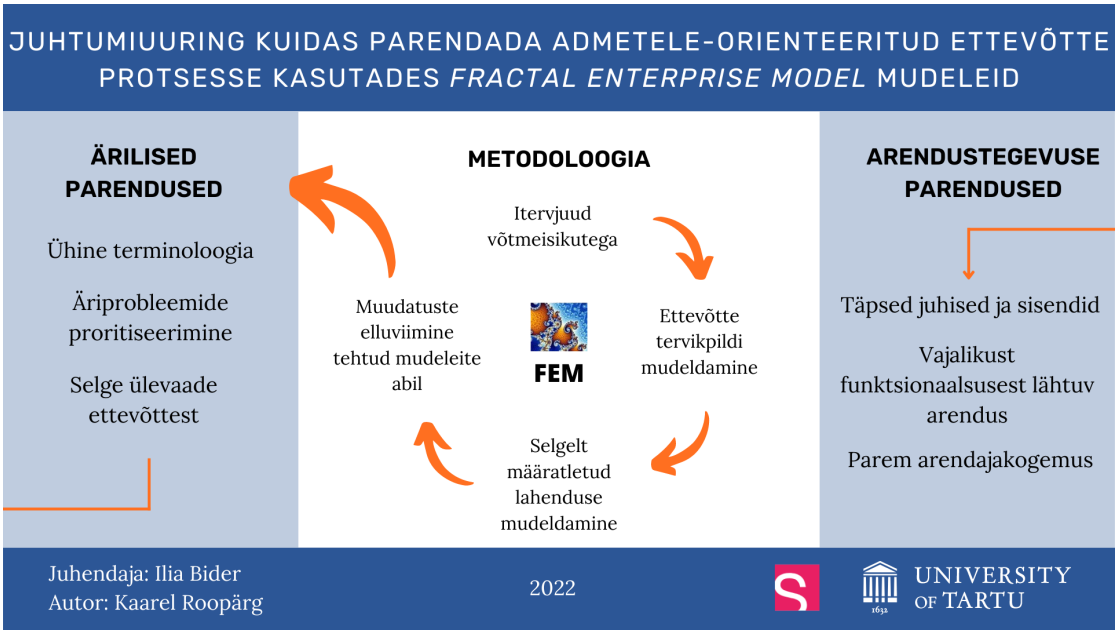
Võtmesõnad:
Fractal Enterprise Modeling, ärianalüüs, protsessi parendamine

CERCS:
P170 - Arvutiteadus, arvutusmeetodid, süsteemid, juhtimine (automaatjuhtimisteooria)

Visual abstract



Visuaalne kokkuvõte



Contents

1 Introduction

There are multiple different modeling techniques available for gaining insights into business processes. For example, BPMN [OMG11a] to describe process or data flows, or UML diagrams [OMG11b] for describing business assets and other numerous business-related information. This paper gives an overview of using the Fractal Enterprise Model [BPEJ17] (FEM) in the practical work of driving the improvement process in a data-oriented company. FEM is a relatively new method of modeling a company and has already been tested for generating business model innovation [BP18] and helping a company with digital transformation [LB21]. Although FEM modeling has been researched in an actual enterprise [[SBP19], [LB21]] there still exists a need to gather more practical feedback on the modeling technique and related software. This kind of experience can help to improve the FEM further and provide insights from a new angle.

This paper follows the general concepts of BABOK [IIB15] for organizing the business analysis process and uses some defined techniques to solve analysis problems. BABOK defines business analysis as a practice of enabling change in an enterprise by defining needs and recommending solutions that deliver value to stakeholders. The analysis consists of multiple knowledge areas, some of which we also use in this work: business analysis planning and monitoring, elicitation and collaboration, strategy analysis, requirement analysis, and design definition. We leave out the solution evaluation as the research only focuses on evaluating FEM as the primary tool to design and develop a solution and communicate findings and ideas to business stakeholders.

This thesis belongs to the applied research category. Its goal is to test the FEM enterprise modeling technique and related software supporting it for improving an IT company heavily dependent on an in-house developed IT platform. More specifically, the focus is on finding a promising area for developing new IT functionality that can give rise to improvements with a relatively modest development investment. The testing is done on a business case of an actual company, and the project resulted in the suggestions being currently implemented in the company's IT platform. The main objectives of this thesis are to:

- provide a solution tailored to company needs that aims to improve the company,
- use FEM modeling software to support business analysis process,
- provide feedback about FEM based on gathered experience and give guidelines that other companies with a similar problem can use.

The thesis consists of 5 sections. In section 2, we briefly overview FEM and describe the business context. Then we linearly represent the business analysis process and describe FEM applicability where possible. Section 3 gives an overview of behavior-driven development and its connection to FEM. Section 4 reflects the experience of using FEM and gives guidelines for other analysts. The final section concludes the thesis.

2 Modelling the company

This chapter provides an overview of the physical process of modeling a company using FEM. We discuss the company's background, where the research occurred, the authors' previous connection to modeling and FEM, summarize the findings and methods used, and describe the whole process in detail.

2.1 Background

We conducted the research on an Estonian email marketing platform called Smaily. The author carrying out the practical tasks works in the company as a software developer. The company provides a marketing platform for clients who want to manage their email marketing campaigns in one place. Clients use the platform as a software as a service (SAAS) [Iod02] solution through the web interface. Smaily platform allows clients to manage their newsletter subscribers, create email templates, send out marketing campaigns, create landing pages and marketing automation, and get feedback and statistics about previous campaigns.

Numerous email marketing platforms provide similar services with various features, but the common component is sending out bulk email campaigns. The company is the number one email marketing service provider in Estonia and has over 80% of the market share [Sma]. Handling most of the emails sent in the country means the company has to handle vast quantities of data and users. Therefore the optimization issues rise in both the information technology and business aspects.

We can use multiple models to provide insight into the business environment and maturity of the company where the research took place. Describing the business in detail helps the reader put the methods used into context and decide if they can adopt the same techniques similarly. We can use the Business Process Maturity Model (BPMM) [OMG08] to describe the general maturity of business processes. The BPMM categorizes business process into five successive stages: *initial, managed, standardized, predictable*, and *innovating*. The company under focus has reached a *managed* stage where management stabilizes work in local units. Units in the same department work on similar tasks but might use different methods to solve problems.

We can use Business Analysis Maturity Model (BAMM) [DPC10] and Business Analysis Practice Maturity Model (BAPMM) [HA09] to describe the maturity of business analysis aspects. The BAMM represents business analysis maturity from two factors - scope and authority. BAMM shows three levels of maturity:*system improvement, process improvement*, and *business improvement*. The company doesn't have a separate business analyst position, and the executives share analysis work between themselves. With this project, we reached the *system improvement* level where analysis focuses on a single project and tries to improve a particular IT system. The project's scope is limited to a single improvement, and the project scope determines business analyst authority.

The BAPMM is a four-stage model where each successive level represents a higher level of maturity. BAPMM tries to assess the maturity of the business analysis discipline by describing the practical tasks of business analysis and categorizing them into four maturity categories: *BA awareness, BA framework, business alignment, and business/technology optimization*. As there is no permanent position for a business analyst in the company, we reach the *BA awareness* level. While conducting the research, we meet most of the *BA framework* requirements, but still, the second level is unreached due to the temporality of the project.

The BPMM managed level, BAMM system improvement level, and BAPMM business analysis awareness level indicate that we introduced the FEM models and techniques to a relatively new environment where previous systematic and strategic business analysis process management was missing. This research environment may provide insight for business analysts reading this paper on whether they can use FEM in companies where previous business analysis processes were missing, or the approach wasn't systematic.

Conducting business analysis in a company that focuses on digital technology requires multiple competencies from the analyst. Milani [Mil19] describes in detail the competencies required for the business analyst. Conducting analysis work while doing this research clearly showed the need for proficiency while communicating business aspects to IT and vice versa. The analyst in a digital technology company will engage in different meetings with people with diverse backgrounds. Communicating with customer support or sales personnel about technical solutions requires another language than speaking about the technicalities with CTO. FEM models help bridge the gap and perceptibly explain more specialized solutions.

Before this research, the author conducting practical tasks was unfamiliar with FEM modeling and its mechanics. However, the author is currently working for the company and was familiar with business internals regarding software development. This position has helped ease the understanding of the technical details required to model the company. This paper describes the process through the view of a novice modeler who has theoretical knowledge about business process modeling and analysis but has previously never conducted any practical projects with such scale. The aim is to get feedback on how much prior experience and training are needed to integrate FEM models with real-life business decision-making. Also, how much training and effort is required from the stakeholders to accept and start using those generated models.

At the beginning of the research, no one in the company had a holistic picture of the business processes and their interconnections. Hoverstadt states that: *"our capability to manage any organization or business situation depends directly on our understanding of the organization or situation and that in turn depends on how good and relevant our mental models are. We can't manage what we don't understand"* [Hov13]. To increase organizational business decision-making efficiency, we start by interviewing key personnel and model more general business processes. We have provided a small sample

of interview questions and their answers in Appendix I. We don't use these models to solve a specific problem. Instead, these models provide the basis for communication with different stakeholders, gaining a holistic picture, and planning further improvements.

2.2 Introduction to FEM

FEM represents business processes and assets in interconnected networks and can be viewed as a combination of enterprise model architecture and business process architecture [BC19]. FEM modeling joins assets with processes through predefined templates and continuously adds processes based on asset lifecycle. FEM focuses on defining the primary business process and mapping different required assets to run this process. These assets have methods to acquire, maintain and retire the asset or, in other words, processes to manage the asset lifecycle. This iterative mapping of processes, assets, and lifecycle produces a graphic representation of the whole company.

Before this research, business stakeholders were unfamiliar with FEM graphs and principles, and we did a similar introduction before using generated models to communicate business analysis results. The Fractal Enterprise Model uses business processes, assets, and relationships between those processes and assets to describe the business. The modeling process starts by defining the primary business process represented as an oval. We connect the process with different predefined business assets with a solid line. This connection means that a process is "using" an asset. Another type of connection that the process can have is to change an asset. We represent this change by a dashed line. This change is limited to three connections: *acquire, maintain* and *retire*. This iterative process of defining processes and assets is the core concept of FEM modeling and mapping the organizational structure.

Figure 1 describes the primary business process in a simplified manner and provides an overview of previously described FEM concepts. The primary business process of *"Send out email campaigns"* uses several assets, some of which have multiple functions. Users are the beneficiary and also a partner in the process of sending out email campaigns. We describe this kind of behavior with various asset types attached to the arrow pointing from *"User"* to *"Send out email campaigns*.

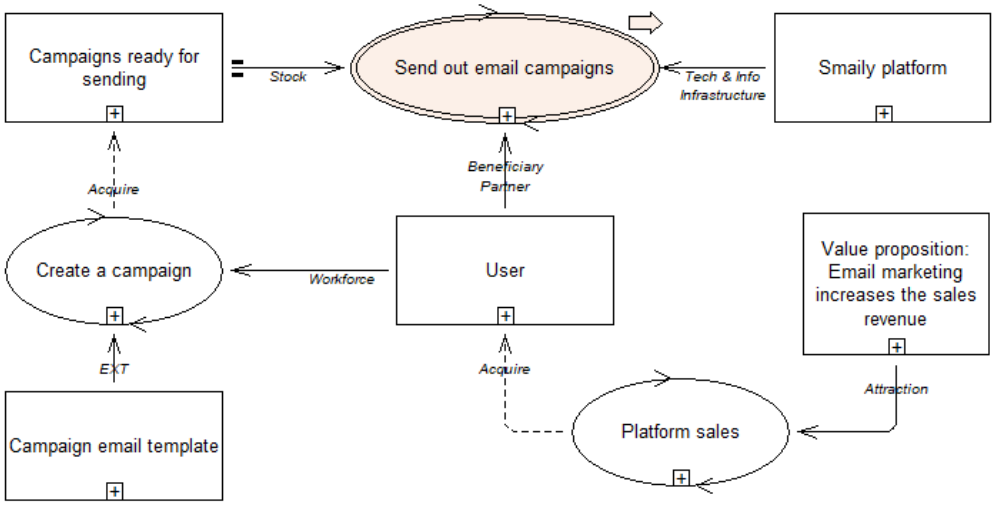


Figure 1. Primary business process

The process of changing an asset is visible when the *"Campaigns ready for sending"* is acquired by *"User"* running the process of *"Create a campaign"*. The *"Campaign email template"* is an execution template for creating a campaign, meaning that we use the template as rules that dictate the creation of campaigns. The stock type represents a unique asset we deplete every time we run a process. When we run the process of *"Send out email campaigns"*, we consume one of the campaigns from the stock of *"Campaigns ready for sending"*. The user is responsible for maintaining the supply of campaigns to run the primary process and using the *"Smaily platform"* as an infrastructure to run the primary process.

The connections between processes and assets are predefined and limited. A process can use nine types of assets: *workforce, partner, EXT (execution template), tech & infrastructure, stock, org. infrastructure and means of payment, beneficiary* and *attraction*. Labels on processes and assets are not predefined. This ambiguity in naming processes and assets allows us to use business-specific language when describing business internals. As we can see later in the research, clarity, and precision when documenting these processes, help us use *ubiquitous language* [Eva04] for building up a common, rigorous language between developers and the business side. We should now have minimal theoretical knowledge of understanding the models used in this work. Generating these models requires, in addition to theoretical knowledge, a toolset.

We may notice *"+"* signs on the assets in Figure 1 and an arrow in the top right corner of the *"Send out email campaigns"* process. These are features of the FEM toolkit [BBP21] used in this research. FEM toolkit provides methods to draw architectural diagrams and patterns to make building models more systematic. FEM uses archetypes

for fragments from which we can build a particular model. An archetype is a template describing the connection between an asset and a process. Archetype defines the arrows, but the labels for processes and assets are missing. We invoke the archetype by pressing the ″+″ sign and selecting which connections we want to add. We can quickly add more details to a model by iteratively adding archetypes to processes and assets.

As we can use processes in a different context or multiple places in the same context FEM toolkit provides an option to create a "ghost" of an instance. A ghost is a copy of a sample that we can navigate using the arrow next to it. This feature allows us also to decompose a model by moving some of the complexity to a new diagram and referencing the transferred asset in the original graph. A combination of archetypes and ghosting makes the iterative work of modeling easier and improves the performance of the analysis process.

2.3 Generating holistic overview of the business

We start by describing a business, defining processes that are key to business success, and getting insights for improvements to be more effective. As the author conducting the research was unfamiliar with the FEM models, this process started with learning FEM modeling principles and installing the FEM toolkit [BBP21]. Multiple videos and articles explaining FEM modeling principles are available on the FEM website [Mod]. Author conducting the research used those resources to get the first idea of FEM principles.

No organizational schematics were available, and the modeling began with a planning phase to gain a holistic picture of the business. No single person had a holistic view of all business processes, and gaining a holistic picture was possible only through elicitating this information from each department's key stakeholders. We conducted eight interviews with different levels of detail with all key stakeholders, each lasting about one to two hours. The interviews were mainly about describing different positions in the company, listing departments and their responsibilities, the tools used by personnel, performance metrics, main processes, and how departments collaborate.

These interviews provided the first input for generating models describing the critical business processes and connections between departments and assets. Interviewing allowed us to overview complex processes in each department. How processes are connected between different departments was still unclear. Generating the first models based on the gathered information helped relieve this problem. We describe those connections with diagrams. Figure 2 illustrates the simplistic business overview model generated after interviewing process.

The diagram shows the primary process of sending out email campaigns and a list of other activities and assets required for this process to run. We leave out some finer details, such as the internals of each department, for reading clarity. There are three larger departments: IT, customer relations, and marketing, which somehow affect the platform sales. The marketing department is responsible for acquiring new users, the

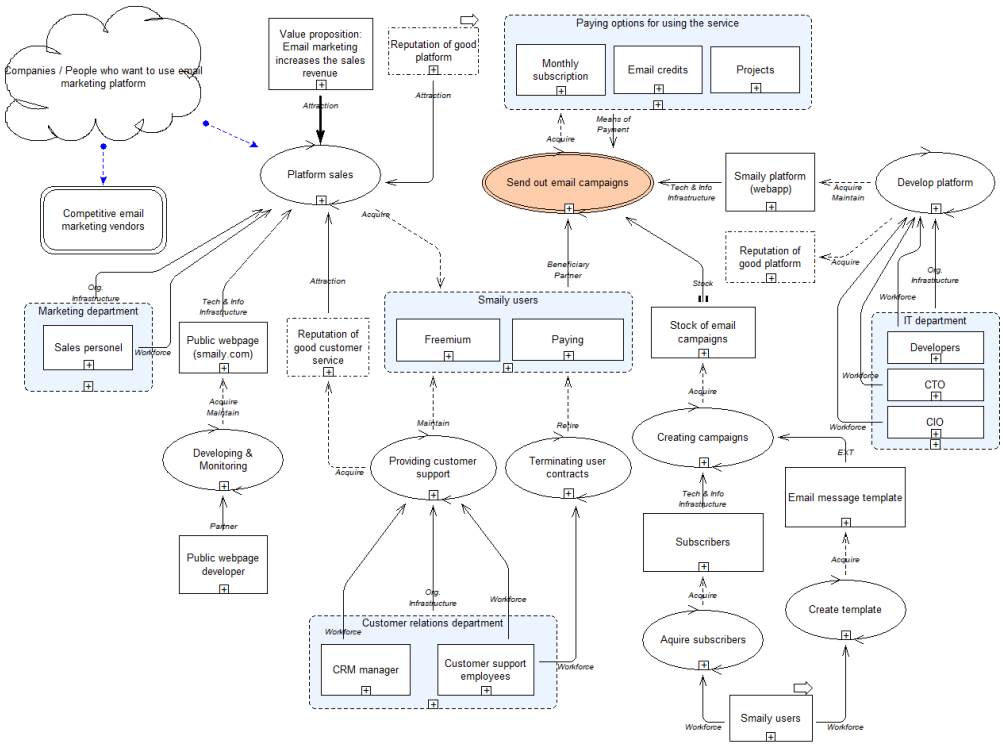


Figure 2. Simplified overview of the business

customer relations department is responsible for maintaining and retiring users, and the IT department is responsible for implementing new features and maintaining the service.

The diagram shows that the user does the central part of the work for sending out a campaign. They create email templates that are blueprints for campaigns, acquire subscribers and combine these two assets to create an email campaign. Users use the platform for marketing purposes and mainly to increase their revenue.

The company is responsible for obtaining those clients through platform sales. The sales personnel is the primary asset in acquiring new clients, but other departments support the process. Providing good customer service and platform functionality are the key attractions that make the sales process more performant. Increasing sales and amount of clients using the platform increases companies' revenue.

We used the gained knowledge from the interviews and generated overview models for each department. We do not focus on all developed models as they fall out of the scope of this research. However, all of the generated models have business value. Initial interviews also revealed some knowledge about the currently problematic processes that needed improvement. After seeing a holistic picture, defining the improvement project's change initiative and scope was more manageable.

2.4 Defining the business requirements

A holistic picture of the company allowed us to model different processes and departments' connections. When we initially didn't have any specific purpose for the generated models, we developed those models to gain a baseline for further work. Now, we are modeling connections between processes and departments, prioritizing finding a problem that provides the most significant improvement. Generating concise diagrams about the relationships allows us to better communicate with stakeholders and point to specific issues found. Also, the list of stakeholders we need to communicate with becomes apparent as the diagrams show the assets connected to the processes under focus.

We presented these overview models to concerned business stakeholders and decided where to prioritize further research. Created models helped communicate problem space better as we could point out the complex processes on the models. Also, observing how one change would impact other departments, connected stakeholders, and the whole business became much more straightforward. Solving a problem that improves the work of multiple departments enhances the entire company. The company's resources were limited, so we prioritized designing and solving a single problem rather than providing designs for all problematic places.

The author's initial idea was to generate dashboards displaying key business metrics for stakeholders to understand the business better. Those dashboards would have served two purposes:

- understand the current state better while using metrics as a baseline for strategic decisions and
- provide administrative tools for making tactical decisions influencing the current state.

Due to organizational needs, limited resources, and increased knowledge from holistic models, we narrowed the scope to solving specific problems. We made this change of plan partly due to organizational needs and the insight gained from modeling the holistic picture at the beginning of the research. The concept of dashboards and purposes remained the same, only the scope narrowed. Still, the use case changed from displaying general business metrics for stakeholders to displaying subscriber quality metrics for clients and deliverability experts. As the research evolved, multiple indications of which processes might need improvement emerged. We describe those general concepts here as they may be helpful for other analysts using FEM to design business change.

2.5 Decision on the intervention

During the first interviewing process and modeling a holistic picture of the company author also asked questions about what kind of solutions were missing and what kind of problems each interviewee had. This technique also resulted in mapping out possible improvement locations for each department. The author conducting the research generated

reports consisting of FEM diagrams and problematic sections described next to them. There were multiple options where to prioritize the improvement process.

One was to unify customer-support and sales department employees' tools and bring all communication to a single platform. The issue was that there are multiple communication channels, and managing information about a single client between them is error-prone. Another significant area of improvement was the functionality of how users can manage subscribers in their contact base. Currently, the users lack good tools to run this process by themselves, resulting in customer support constantly helping them.

From the development department, there was a request to increase the clarity in maintaining platform deliverability and therefore increase the reputation of platforms' delivery IP addresses. Major email service providers filter their inbound messages and order bulk email senders, such as Smaily, to follow certain principles [Goob]. Those email service providers (www.gmail.com, www.hotmail.com, www.mail.ru) also provide tools to monitor the reputation of your domain against their service. Figure 3 shows an example view from the postmaster tool describing the IP reputation [Gooa]. Higher IP reputation means that sent emails are more likely to arrive in recipients' inboxes.

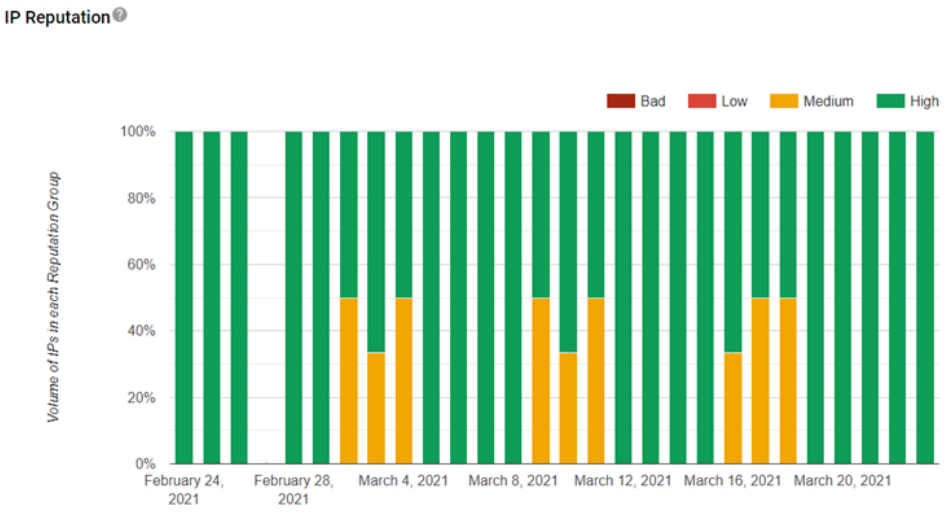


Figure 3. Overview of IP address reputation in Googles postmaster tool

After considering different options and researching their impact on the company, we decided with the executive board to move on with improving the user's capability to manage their contact base. We made this decision because delivery IP address reputation and contact base management process are interlinked. An interested reader can study this connection on the diagram in the thesis Appendix II. This improvement benefited both departments and also the overall company the most as good deliverability is one of the critical assets.

The main goals of providing improvements in the company were to:

1. reduce the workload of customer support employees and therefore rise the efficiency of the company
2. and increase the delivery IP addresses reputation and therefore increase the effectiveness of the service provided to the customers (more recipients will get emails in their inboxes).

The latter may also improve the company's reputation, thus making it easier to compete in the market.

2.6 Analysing processes and their responsibilities

The first indication of possible progress lies in shifting partner and workforce relations where the business stakeholders are considered the workforce. We observed a situation where the business stakeholders are workforce to a process they are not supposed to run. At the same time, the partner is the actual asset responsible for running the operation. This kind of behavior indicates that there should be a shift in responsibilities. In our case, the partner who is supposed to run the process doesn't have the capabilities to do it by themselves. Therefore, the process is handled partly by the organization's workforce increasing their workload. To switch the partner and workforce relationships, the partner needs to have the capabilities (EXT) to run the process for them to take over the work. Figure 4 describes the overview of such situation in business context. The user responsible for running the process doesn't have the tools to manage this process alone. They lack the functionality to *manage contact base quality*. Clients need customer-support personnel to do extra work for this process to happen.

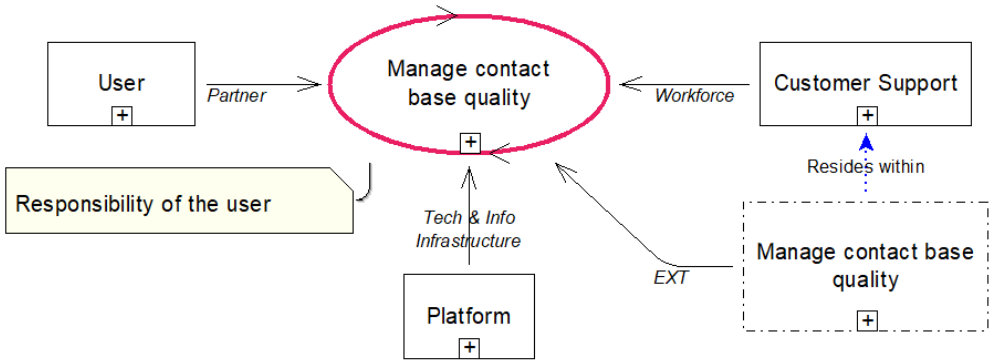


Figure 4. Customer support managing contact base quality

Our research found that the partner and workforce switch happened in *manage contact base quality* process. We identified this process through interviews with customer

support personnel and mapping the procedures where they interact. We can observe this change in Figure 5. When users have the capability to *filter contacts by quality*, they can manage this process alone and only need extra help in exceptional cases. This change reduces the workload of customer support personnel and switches the workforce and partner connections of the process.

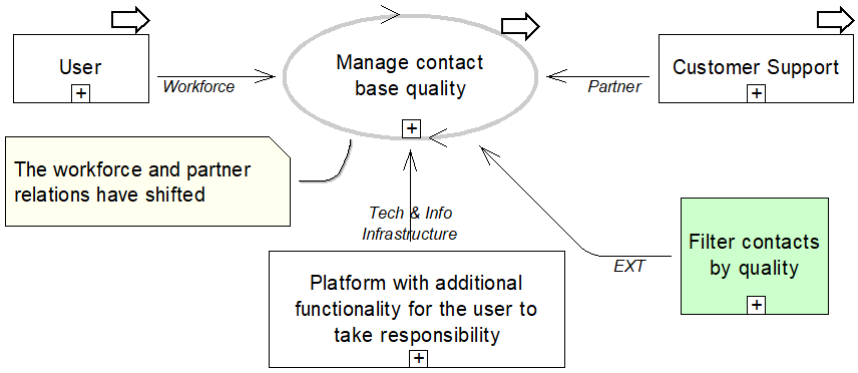


Figure 5. Switching workforce and partner relations

After the latest FEM modeling toolkit update (version 0.9), we can use border subclassing for differentiating between processes that the platform user should be responsible for and processes that the organization workforce should handle. We used the company's indicative pink color for marking processes that the organization is responsible for and gray color for processes that users should handle by themselves. Asserting that employees should not run gray-bordered processes can give insight into which processes need improving. After detecting such processes, we must figure out how to shift the workforce and partner relationships. Designing such a solution is very context-specific and should be evaluated for each case individually.

2.7 Users desire to take responsibility

In our case, users had to use the help of customer support employees to manage their contact base quality. Interviewing customer support employees revealed that users could and wanted to run this process alone if they had good tools. Simple processes, such as removing contacts who have not opened emails for some time, are currently possible. However, more complex scenarios required the help of external tools (Microsoft Excel, LibreOffice Calc etc.) or help from customer-support employees. After discussions with the business stakeholders, we decided that some users would want to take the extra responsibility of running the process alone. Other users would pay the company for a full-service solution, meaning customer support employees would still manage their

contact base quality for an extra fee. The improved tooling would have also allowed users to gain more insight into their contact base, which benefited both groups.

The transition would be impossible if the user does not want to take responsibility. In that case, other means should be introduced, such as introducing a fee or discontinuing the process. This decision is very context-specific and should be analyzed for each process individually. If there is a lack of interest for the user to take responsibility, then the project may fail no matter how good tooling we provide.

Further iterations and designs of contact base management processes also revealed an option to enforce users to manage their contact base quality. There could be penalties for sending emails to a low-quality customer base or damaging platforms' deliverability reputation. Also, limiting sending to only part of the contact base is an option. Users' desire to have the responsibility to manage their customer base and enforcing mechanisms inside the platform allowed us to shift the responsibility of the contact base management process towards users. When the transition is complete, users would have options to manage their contact base by themselves with adequate tools or pay for an extra service. Also, automation inside the platform will further reduce the user's work to keep the customer base healthy.

2.8 Automation

Another step forward in making the process more effective would mean we automate some of the work. This automation would help the user manage their contact base and shift the responsibilities towards the platform. The user doesn't have to run the process themselves but can instead define automation rules used to manage the contact base quality process. Figure 6 describes the change of tasks when we add automation to the process.

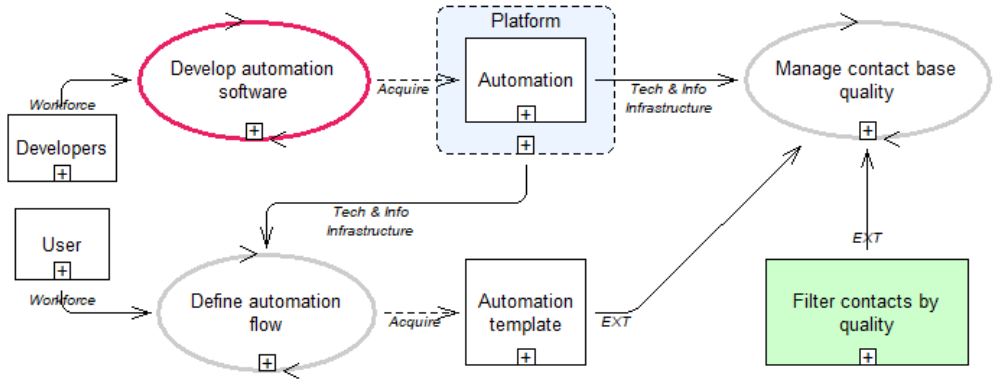


Figure 6. Automating contact base quality management process

The user now has to *define automation workflow* instead of running the *manage contact base quality* process by themselves. Implementing automation requires extra work from developers but provides standardized and predictable flows for the *manage contact base quality* process.

The final accepted change initiative for the analysis project was to reduce the workload of human resources (especially customer-support employees) by reducing their workforce connections throughout automation and generating capabilities for process partners to run the process by themselves. We focus on designing and creating tools that users can use for managing their contact base quality, allowing us to reduce the workload of customer support employees. We define contact quality metrics that users and platform deliverability experts can use for making strategic decisions. Users can utilize these metrics to decide on re-engagement strategies. Deliverability experts can utilize the same metrics to track potential deliverability problems and keep track of the overall state of users' contact bases. They must also be able to make tactical decisions such as prohibiting low-quality clients from sending emails.

2.9 Defining the future state

To change the business in a previously described manner, we need to define the future state accepted by all stakeholders. Previous research has proved that business change can be planned, modeled, and presented using FEM models [BP17, LB21]. The following section follows BABOK principles for defining a future state and describing conditions to meet the business needs. Those state representations are modeled using FEM and represented as graphs to stakeholders.

After modeling the requirements and defining the scope, we model the shared understanding of the required future state. According to BABOK, future state modeling takes business requirements as input and produces three outputs: business objectives, future state description, and potential value [IIB15]. This research mainly focuses on communicating and defining the shared future state description we represent as FEM models. Defining business objectives that follow SMART principles and identifying the net benefit of the solution is not considered part of the research as they have less in common with the modeling techniques under study.

We mainly focus on changing capabilities, processes, technology, and infrastructure when designing the potential future state using FEM models. Defining missing elements on previously modeled diagrams show what kind of new systems we need to implement. We consider the future state accepted when all stakeholders influenced by the change agree on the latest state representation. We use this representation for defining behavioral requirements and for pushing development processes.

Defining the future state process is similar to current state modeling, but the purpose is different. We use previously accepted current state models to describe new features on top. This kind of modeling is iterative as the generated models are improved by closely

working with affected stakeholders. We start the process by brainstorming new solutions, interviewing stakeholders about their visions, prototyping possible solutions using FEM, and finally presenting them for approval. Different stakeholders can provide input from diverse backgrounds, and changes to the models are common.

We present only the simplified version of the final accepted model. Figure 7 displays processes and assets required for managing contact base quality from the user, deliverability expert, and platform perspective. Automations have been left out of the picture as they provide additional layer between *deliverability expert* and *manage clients sending authorization* process and *user* and *manage contact base quality* process. Also, we can add automation iteratively after implementing the first minimum viable product.

The fractal principles of the modeling toolset help see dependencies between processes and their implementation details. The interdependence of the elements becomes apparent when we add the assets necessary for the process under it and the assets whose lifecycle is affected by the process above it. Complex diagrams may become vertically stretched and difficult to follow when modeling more significant use-cases. Simplifying those processes and keeping only assets in the project's scope will reduce the visual noise when generating diagrams to explain certain aspects. Features and systems we must implement first are at the bottom of the graph, and processes using those features rise to the top. This behavior is ideal for choosing the order in which we implement the complete solution.

Following the Fig. 7 confirms that the first system we need to implement is *contact ranking model*. This asset (with a green background) is at the bottom of the graph and is responsible for generating *contact quality rating* and *contact base quality rating*. All other processes above use the quality rating information as execution templates (EXT). We can also observe that some processes (calculating quality metrics and filtering contacts) have *tech & info infrastructure* asset and no *workforce* asset. Process without a workforce means the platform handles the process, and we don't need physical assets to run those processes. We can also view this as part of automation and using infrastructure to reduce manual work.

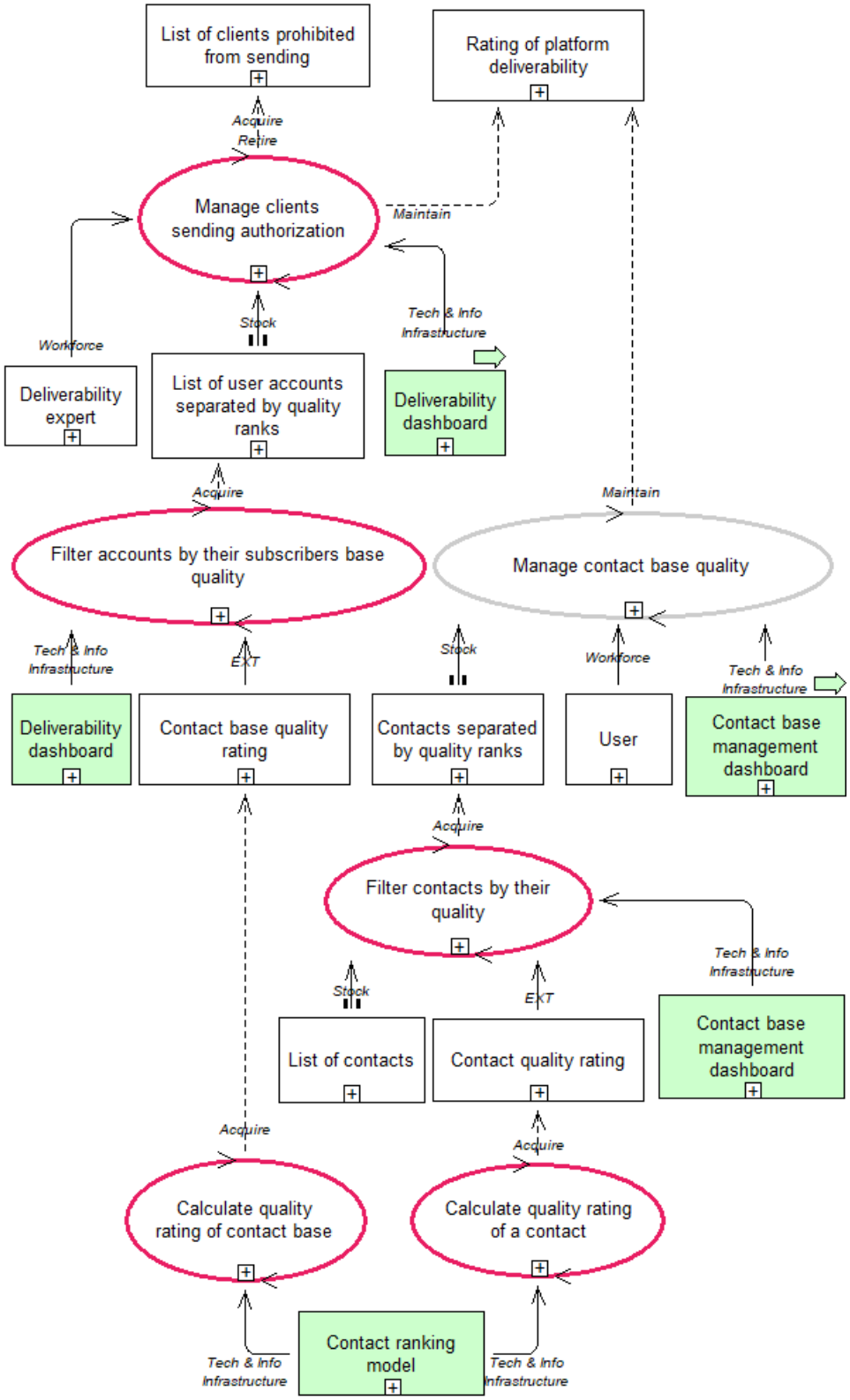


Figure 7. Simplified accepted future state

As we move up the chart to the following process of *filter contacts by their quality*, we see a currently missing technological solution - *contact base management dashboard* marked with a green background color. Keeping assets we need to implement with different colors gives us an overview of which parts of the solution are missing. There are three such assets in the diagram *contact ranking model*, *deliverability dashboard* and *contact base management dashboard*. Considering that the current figure is a simplified version of the real solution might create a misconception of the magnitude of the change. However, in real-life projects seeing lots of colored assets might provide insight into the extent of the change. This information may become valuable for determining the project length, cost and complexity.

We use *deliverability dashboard* and *contact base management dashboard* for two different processes - filtering and managing filtered results. Filtering processes provide a stock of objects for the workforce assets to manage. The *filter contacts by their quality* process provides a stock of *contacts separated by their quality ranks* and the *filter accounts by their subscribers base quality* process provides a *list of user accounts separated by quality ranks*. Therefore, we can use those filtered stocks of elements to make strategic decisions or define goals we want to reach. For example, observing changes in *list of user accounts separated by quality ranks* also provides information about the changes in the whole system. One strategic goal would be to increase clients' conversion from low-quality subscribers to clients with high-quality subscribers. Designing systems to monitor the conversion using system-generated metrics allows us to make strategic decisions and satisfies the first requirement for the dashboards.

The filtered asset management processes use the previously described filtered results. The *manage clients sending authorization* is just one example of the processes running on top of the filtered accounts with low-quality subscriber bases. When we added the capability to change the system's current state to the dashboard, we also satisfied the dashboard's second requirement - providing tools for making tactical decisions. When we observe the *manage clients sending authorization* process, we can see that the *deliverability dashboard* is a tool for the *deliverability expert*. The technological system is no longer used to automate this process, as it was for filtering, but to provide an interface. The authorization management process is manual and requires human resources (*deliverability expert*) and a technological system (*deliverability dashboard*) for the process to run.

When we have reached the state where all stakeholders understand and accept the shared diagrams, we move on to designing the change. There needs to be a connection between the business and technical domains for the expected implementation. We aim to use the generated models to define the behavioral business requirements that both technological and business sides can communicate. These behavioral requirements are the blueprints for software development and solution design.

3 Defining behavioral business requirements

This paragraph aims to describe using FEM models as input for defining requirements for technological change and information for the development process. We briefly introduce behavior-driven development, using ubiquitous language through the process, and discuss how to convert future state representations from FEM models into technical documentation and executable programs.

3.1 Overview of behavior-driven development

Behavior-driven development (BDD) is a set of software engineering practices that first tried to improve the test-driven development (TDD) principles and bring the business domain problems closer to actual functionality under test [Nor06]. Dan North invented the BDD in the mid-2000s, and TDD was "rediscovered" by Kent Beck in the 90s [Bec02]. The TDD principles state that the software developer first writes a failing test that describes a feature that the code should do. Then they write enough code to pass the test and refactor it to ensure maintainability. This technique allows the developer iteratively add functionality while knowing that previously written code still works.

However, the question remains whether the functionality described in the test matches the business expectations. The technical unit tests may become so implementation-oriented that they lose the connection with the behavioral functionality that the stakeholders are expecting. Are we focusing on the feature that stakeholders require for the first iteration, or are we adding extra functionality? How do we name our test to reflect the underlying problem? What should we test, and where to start? These are some of the questions the BDD approach tries to solve and therefore assess that we are building the right thing and building things right. Figure 8 illustrates these principles [Sma14].

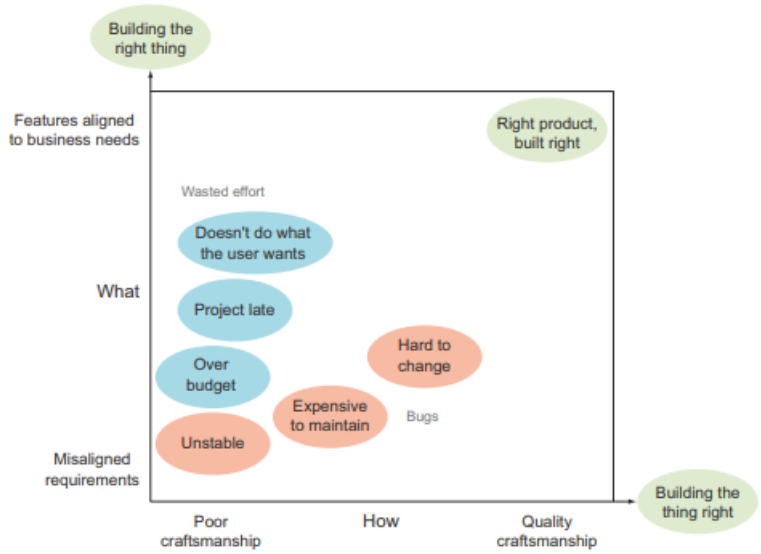


Figure 8. Successful projects must both build features well and build the right features

We assure that we end up with the right product when we have aligned features with the business needs and have quality craftmanship when implementing these features.

For the business side to communicate with the development, they need to agree on a common language. BDD's first versions describe this common language as story templates with multiple scenarios. These templates explain the behavior in an easy-to-understand language and provide common functionality examples. These documents describe the problem's context and define the acceptance criteria. The first story templates looked in the following form:

```
Title: [title for the story]

As a [actor]
I want to [functionality]
So that [benefit]

Scenario: [description of user story]
  Given [initial context]
  When [an action that triggers scenario]
  Then [expected behavior]
```

This kind of notation evolved into a syntax called Gherkin [WH12]. Gherkin is similar to the syntax described above but adds extra keywords and specifies how one should format the behavioral specification. The uniquely defined syntax allows tooling to run on top of the documentation. Using tooling to generate tests from the requirements provides the input the developer is looking for and changes ordinary documents into an executable specification. This executable specification gives the team living documentation, progress reports, and common terminology across the domain.

In this research, we are not focusing on describing how to add the capability of using these generated documents for automating the development process. Numerous libraries and tools provide the functionality of merging specification and test documentation into a whole. These tools allow the creation of executable tests in multiple programming languages and depend on the development team's existing toolset. Development teams may choose to opt-out from using Gherkin specification as an executable and use the syntax as a clear and detailed input from the business side. As the toolset differs from company to company, we focus on creating the initial documentation in Gherkin syntax from FEM models. This documentation provides the basis for digital change, and teams can pick their preferred toolset for implementation.

3.2 Modeling behavioral requirements

We have reached a state where we have modeled the expected future state and generated models that all stakeholders accept. The next step would be to provide the company's development team input to start working on the implementation. One option would be to pass the generated models directly to the development team and let the system architect figure out the diagrams' expected behavior and implementation designs. This approach, however, may not provide enough clarity about what the business side expects. We should elaborate on what the business needs and define acceptance criteria or requirements so that developers can use it as input for implementing the change. We can only succeed in the company's transformation by providing aligned requirements and correctly implementing them. Therefore, we use those generated models to aid us in writing high-quality acceptance criteria for initiating the development process.

When we use Gherkin to describe the expected functionality, the business analyst needs to be able to write specifications in Gherkin. This requirement adds to the responsibilities that the business analyst must be aware of and raises the threshold of which business analyst is suitable for the company. While writing a Gherkin specification, we need to translate previously generated models into behavioral specifications. The language we use while defining the specification should only describe the system's behavior, not technical implementation details. This restriction decouples the analyst from knowing the technical details behind the code and allows to use simple, understandable language while writing scenarios. A specification written this way is understandable to all stakeholders and should not change unless the business requirements change.

There are many commonalities between BDD principles and FEM models. BDD is driven by describing the system's expected behavior, and FEM is driven by describing processes in a company. The expected behavior influences the procedures inside the company, and vice versa, gives us a hint that the models we designed before can provide the basis for developing further specifications. The narratives drive the stories in Gherkin specification. Every behavioral requirement should have a reason behind the actions. We could write a narrative from the business context like that:

```
As a user
I want to manage my contact base quality
So that I constantly maintain high email opening rates
```

We could use a process and two assets to describe the same narrative in a FEM. Figure 9 describe the same sentence in a graphical format. We add the *manage contact base quality* (functionality) from the narrative as the process, then add the *user* (actor) as the workforce, and finally, add the *maintain high opening rate* (benefit) as the execution template.

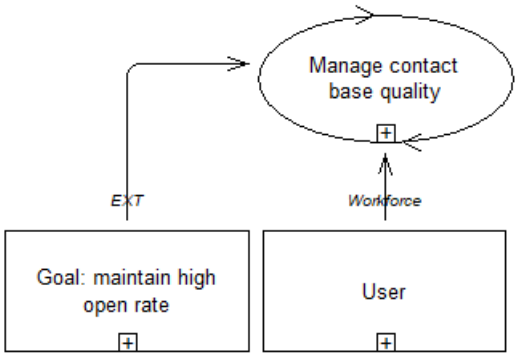


Figure 9. Narrative described in FEM

Models on varying levels of detail describe different goals for the exact stakeholders. Purposes defined in higher models are broader and generally describe the stakeholder's goals. Detailed models describe goals in a specific context and are more expressed and exact. When we return to the level of the primary business process illustrated in Figure 1, we can see the user's primary goals while using the platform. There could be multiple primary goals, and goals may differ for different clients, and modeling all of them is the business analyst's responsibility. We can define the single primary goal described in Figure 1 in Gherkin like this:

```
As a user
I want to send out email campaigns
So that I can increase my sales revenue
```

We can see that mapping generated models to a story and developing models from those stories can be a two-way process. We can use the existing knowledge of business behavior and create narratives that we can model or use models to describe the actual intentions for assets. The latter functionality is helpful if we develop complex models whose motivations are initially unclear.

When we go deeper into defining the internals of *manage contact base quality* process, we can use the created models and expected behavior to describe the underlying business rules and explain them with scenarios. The rules we define in the specification should match the real-life constraints the business is following. We look into the process of generating a specification from the accepted state and give an example of writing a Gherkin specification from the model.

Figure 10 describes one of the underlying processes we require for managing the contact base quality process. Figure 7 illustrated that we need a stock of *contacts separated by quality ranks* to run the *manage contact base quality* process. We now

look into this asset, define the available categories, and specify how the *contact base management dashboard* behaves when running the *filter contacts by their quality* process.

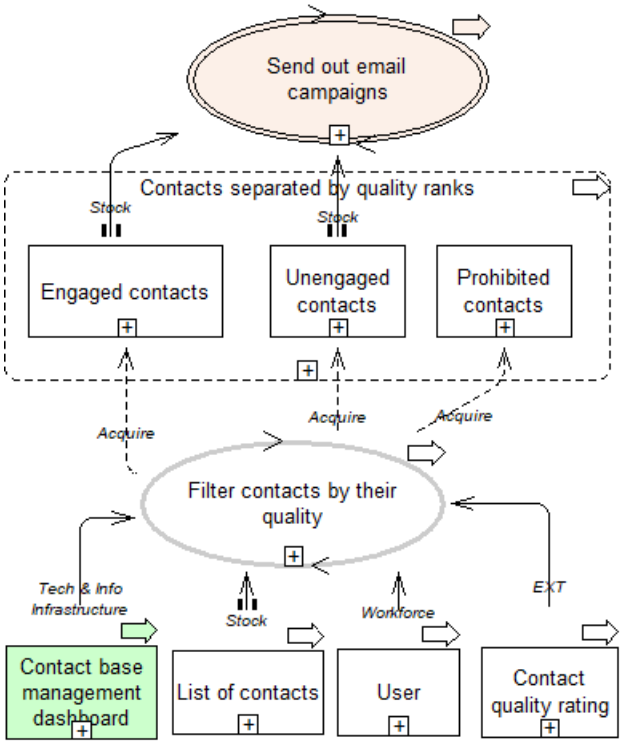


Figure 10. Fitlering contacts by their quality

We redefined the *contacts separated by quality ranks* as a group of assets instead of one. This can be seen as a rectangle with a dashed line surrounding *engaged contacts*, *unengaged contacts* and *prohibited contacts*. We can also now exactly see the categories that the filtering process produces. Previous connections had remained the same with the *filter contacts by their quality* process, but we are using ghosting to represent the same assets. Another new feature is that we use filtered contacts differently when sending email campaigns. We can't *send out email campaigns* to the *prohibited contacts*. We can only use *engaged contacts* and *unengaged contacts* as a stock for running the *send out email campaigns* process. Next, we look into generating a Gherkin specification based on the new knowledge.

The Gherkin specification describing clients managing their contact base quality, and specifically the processes described in Figure 10 is the following:

```
Feature: Managing contact base quality

    As a user
    I want to manage my contact base
    So that I constantly maintain a high opening rate

    Rule: Should filter contacts into three groups: prohibited,
↪   unengaged and engaged

        Scenario: Filtering contacts by their quality
            Given there is a list of contacts
            And each contact has a quality rating
            When I filter the list of contacts by their quality
            Then contacts are separated into three groups: prohibited,
↪   unengaged and engaged

Feature: Sending out campaigns

    As a user
    I want to send out email campaigns
    So that I can increase my sales revenue

    Rule: Should prevent sending email campaigns to prohibited contacts

        Scenario: Prohibit sending campaings to prohibited contacts
            Given there is a list of contacts with quality ratings of:
            * Prohibited
            * Unengaged
            * Engaged
            When I send out a campaign
            Then the campaign is not sent for prohibited contacts
```

We have defined two features to describe the behavior of the designed system. We use features to group describing different parts of the main functionality. We use *manage contact base quality* as one feature and *sending out campaings* as another. These are more extensive functionalities involving many assets and multiple subprocesses. We know that the filtering is part of the managing processes and therefore can add the rules regarding the filtering under the *managing contact base quality* feature. We define a rule for each feature component:

- should filter contacts into three groups: prohibited, unengaged, and engaged
- and should prevent sending email campaigns to prohibited contacts.

Both of the rules have one scenario. We consider these scenarios an example of the business rule, aiming to illustrate the behavior. Scenarios are bound to the processes that we previously modeled. The first scenario describes the behavior of *filter contacts by their quality* process, and the second represents the functionality of *send out email campaings*. The scenario consists of a list of steps beginning with the keyword *Given*.

We use the assets required to run the process in this step. For the first scenario, the inputs are the *contacts list* and *contact quality rating*. The scenario regarding sending has the input of a *list of contacts* with various quality ratings. Next, the Gherkin language uses the following keyword: *When*. *When* describes the process, and we can use the processes in the model as the basis for wording the block. Finally, we finish the scenario with the *Then* keyword that describes the results. We can use the assets where the process affects the asset lifecycle for the filtering scenario. Or use the omitted input to describe limitations in sending campaigns.

This research mainly generated specifications from the accepted future state models, but we could also invert the process. We could use the existing Gherkin documentation when designing new models. We also found that these specifications and models complement each other and can be used to find missing caps while developing a change strategy. In the end, the specification and created models should match in a way that both describe the behavioral rules of a company.

After converting future state models, we have acquired a specification reflecting the future state that the development team can use as input for their work. When we are careful when designing models and using clear names for assets and processes, we benefit from unifying business terms and the underlying code. When we talk about the same thing everywhere using the exact naming, it becomes clear what we are referring to regardless of the context. For example, when we use different words such as *banned* or *forbidden* instead of *prohibited*, we face a problem where the day-to-day terminology becomes distant from the language used in the code. As analysts, we should use a single term to express the same asset and define those terms within our models. We can enforce the same language through the models using FEM toolkits ghosting functionality. Using ubiquitous language, as suggested by Evans [Eva04] while designing the models and the domain gives us the benefit of using the same terminology throughout the company. With time this terminology will become more and more accurate.

4 Reflections on the usefulness of FEM and FEM toolkit in the project

This paragraph describes the experience of using FEM to support the business analysis process in an IT company. We look into the benefits the author noticed while using the FEM modeling technique and give guidelines for readers who might be using FEM in a similar environment.

4.1 Main observations

We now have a state where we have a clear overview of the business need, designed a future state and acceptance criteria, and defined behavioral specifications for the development team to start implementing the solution. As the solution implementation is still an ongoing process, and we have reached the stage where we no longer actively use the FEM toolkit in our work, we can give feedback on the system under test - FEM.

We can view the usefulness of FEM on many levels. Some of the usefulness results in the implemented solution. We can measure this improvement in the reduced workload of customer support employees and increase the platform's delivery addresses reputation. However, as the project is still ongoing and yet to be implemented, we can not give feedback on the success of the implementation. We can describe the experience and improvements caused by using FEM modeling during the analysis process. These are the main observations:

- **FEM allowed seeing a holistic picture of a company.** The first output we received from FEM modeling was the holistic picture of the company and the connections between different parts. FEM is an ideal tool to quickly generate and communicate this bigger picture when the company has no holistic overview of the business processes and assets. After gaining a holistic picture of the company, it was much easier to define business change initiatives and project scope.
- **FEM had a shallow learning curve.** FEM diagrams are easy to implement and read by all parties, making communicating and discussing different models easy. As a novice analyst, it was pretty easy to implement business domain concepts in graphical format and communicate those models to people who had previously not seen such diagrams. FEM models allowed to communicate challenging technical topics to people who did not have a technical background. Also, we can use those models to provide a baseline for interviews or discussions. Following a graph while interviewing people can provide an excellent structure and ensure we do not forget some essential steps.
- **FEM helped to determine the project scope.** During this research, we noticed a change in the initial project scope. We switched from implementing dashboards for organization overview to a specific dashboard for monitoring users' contact base

quality. We introduced this change because FEM models helped find the actual business need and shift the work to a more necessary problem. Key stakeholders quickly analyzed the holistic models, which led to finding the currently most essential business need. Department executives are more aware of their problem space and how their department connects with the whole company. This awareness also propagates to their decision-making capabilities and benefits the entire company.

- **FEM allowed seeing extensive usage of assets.** FEM helped understand the connections between departments and different processes extending the department borders. The most contributing factor to this was the "ghosting" ability of the FEM toolkit. Using the same cloned assets cross-models allows us to analyze which assets and processes depend on each other. This research found that the customer support employees had too many obligations and were running tasks that were not their direct responsibilities. Examining the processes in which customer support assets participated led to the discovery that they are mainly helping customers who cannot run that process by themselves. FEM toolkit allows finding such insights faster as the visual overview is cognitively more manageable.
- **FEM provided insight into the complexity of the project and feature implementation sequence.** We used FEM subclassing to determine the unimplemented assets and processes needed for the improvement. This feature gave us a graphical overview of which parts we needed to implement first and provided hints on the project's complexity. Project management is more efficient and manageable when we have a clear vision of the changes and their implementation sequence.
- **FEM models provided context for requested features.** FEM diagrams made it easier to describe wanted functionality and convert ideas accepted by the stakeholders into development tasks. Those diagrams also help provide developers context around the functionalities they implement. This broader overview is a very beneficial feature as the context is the key to a correct implementation.
- **FEM helped to determine behavioral system requirements.** As FEM is highly process-oriented allowed us to use those generated diagrams to determine behavioral requirements. This behavioral specification was understandable by developers and business stakeholders and was the baseline for pushing development and project implementation. When we use behavioral specifications generated from FEM diagrams as acceptance criteria, the project output matches the output wanted by stakeholders. The connection between generating Gherkin specifications directly from FEM models or vice versa needs further work. During this research, we manually developed the specification from models. Models helped a lot as they provided most of the input required to describe a feature. Further research on this topic could probably lead to automating generating behavioral specifications from FEM models. Automating this step would enhance the analysis pipeline even more and reduce the time required for implementing a new feature.

4.2 Guidelines for using FEM

After some initial adjustments, the goal of this applied research became to test the applicability of FEM and the FEM toolkit for improving an IT company in a particular context, as outlined in the introduction. Based on our experience, we can conclude that FEM and FEM Toolkit are quite useful for solving the outlined problem. We can suggest the following guidelines for using FEM for any company that wants to solve a similar problem:

1. Build a model that explains how the software company operates (using FEM).
2. Find problematic places in operation, for example, the processes requiring extra staff resources (interviewing, making calculations, etc.)
3. Decide in which way the problem can be solved.
4. Model future state and highlight the assets to be developed (using FEM).
5. Define requirements on new functionality needed to be introduced in the platform (using an additional tool, in our case, we used Gherkin syntax)

Besides the general procedure, our project has revealed some other guidelines that can be useful for other companies.

1. Firstly, ensure that assets that are supposed to run a process are running those processes. We noticed that company employees are running processes they are not responsible for, causing them to do extra work. Shifting the workforce and partner relations allows for freeing companies' resources. This can be generalized in pattern based on Figure 4 and Figure 5 which is represented in Figure 11. However, keep in mind that the user must want to take the responsibility of running the processes by themselves prior to implementing new features.
2. Secondly, we noticed that it is helpful to generate a behavioral specification based on FEM models. This extra step allows forwarding FEM diagrams clearly and understandably to the development team, who has to implement new functionalities. FEM models provide the context around new features, while behavioral specification defines the acceptance criteria and builds the basis for the development process. This step also allows business terminology to propagate into the codebase unifying the terminology used throughout the company.

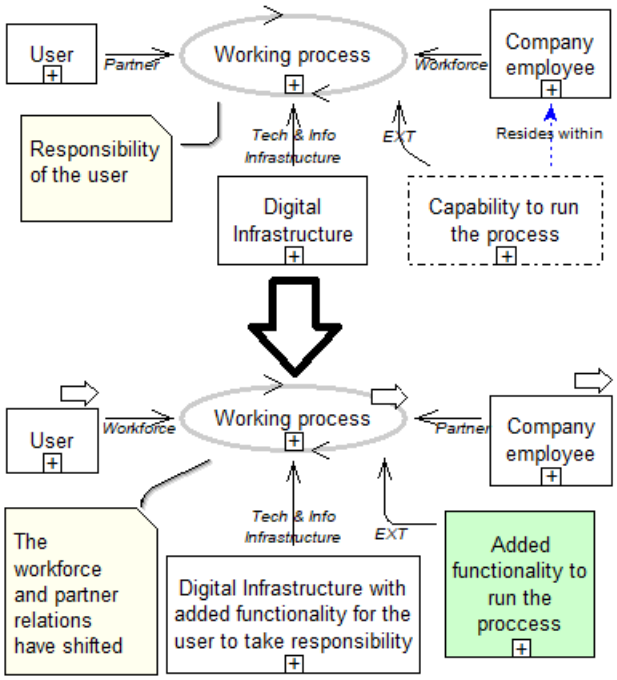


Figure 11. Adding additional functionality to meet responsibility relations

5 Conclusion

The main objective of this thesis was to conduct practical work on improving the operations of an IT company using the FEM modeling technique. First, we aimed to enhance a data-oriented company with limited resources seeking to design a change strategy through a business analysis process. Secondly, to use the FEM modeling toolset throughout the analysis process and provide feedback and new insights on the FEM toolkit and its capabilities.

During this research, we conducted practical work on finding and implementing a change in an Estonian email marketing company called Smaily. We interviewed company employees, generated a holistic overview of the company, analyzed the business requirements, defined a business goal that could improve the company the most, designed a solution for the problem, and used FEM models and toolkit throughout the process to gain feedback for this enterprise modeling technique.

We saw that we could introduce FEM models to a relatively new environment where previous systematic and strategic business analysis processes were missing. FEM is applicable for use in an IT company that operates its platform and manages the development by its resources.

We also provided general guidelines for analysts planning to use FEM in an IT company that develops an in-house platform. Analysts can follow the described general procedure while designing new changes. We also gave additional guidelines that may become handy for analysts facing similar issues as us - for managing processes responsibility and providing input for development teams for their work. In this thesis, defining behavioral specifications based on FEM models was a manual process without standardized templates, mainly driven by the author's previous experience. Future works can consider researching this connection further and seek to automate this process.

In conclusion, FEM is a powerful tool that can be used throughout the design phase of the business improvement process in an IT company. We have managed to improve the efficiency of a company by designing a change that optimizes the workload of the company's personnel and improves the effectiveness by increasing the rating of platforms' delivery infrastructure. Using FEM allowed us to gain also additional benefits, such as understanding the business processes and their connections better and determining the complexity and implementation sequence of the project.

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Appendix

I. Partial set of interview questions and their answers

AUTHOR : **What are the main tasks regarding monitoring the platform's deliverability?**

CTO : We have to monitor different parameters of the whole system, but the main component of good platform deliverability is keeping the delivery IP address reputation high. High IP address reputation guarantees that our emails will arrive in subscribers' mailboxes. Also, we monitor if some of the IP addresses have become blacklisted. When this happens, we must address the problem and try to get those addresses out as soon as possible. We also monitor global spam reporters such as SpamCop and reports received by the feedback loop.

AUTHOR : **How much collaboration do you have with other departments?**

CTO : One of the biggest areas of cooperation with other departments is providing information about accounts and the system state. Customer-support employees may ask questions about specific accounts or pass technical questions they received from clients. Sometimes clients also ask why there is a longer delay between scheduled campaigns and messages arriving in subscribers' mailboxes. Then I investigate the problem and provide feedback. When there are more significant tasks or requests from other departments about improving the system, we usually generate an ASANA task. More prominent clients may also write directly to me, but we prefer the first communication through customer support.

I also work closely with CIO, but these technical plans seldom leave the IT department. We make decisions about the next projects and what are the most critical parts of the system that need attention.

I also work with a data analyst who provides aggregated information about the system deliverability and user accounts quality. We segregate accounts into different ranks and monitor when some become problematic. We also work on automating the process and designing machine learning models.

We also have meetings with the head of marketing, CEO, and head of customer relations to discuss where the company and market are moving and our following strategic plans. These meetings usually happen once a quarter.

AUTHOR : **What kind of tools do you use?**

CTO : For IP address rank monitoring, I use different postmaster tools. Each larger ESP has their own tool (Gmail, Outlook, MailRU). HetriX Tools allows monitoring if any of the IP addresses have become blacklisted. This tool will generate a report for each day I receive via email. For answering system questions, I use different MySQL queries. Some of those are automated but mainly I have to run manual

queries against the system to get answers.

AUTHOR : **Describe the contact base quality management process.**

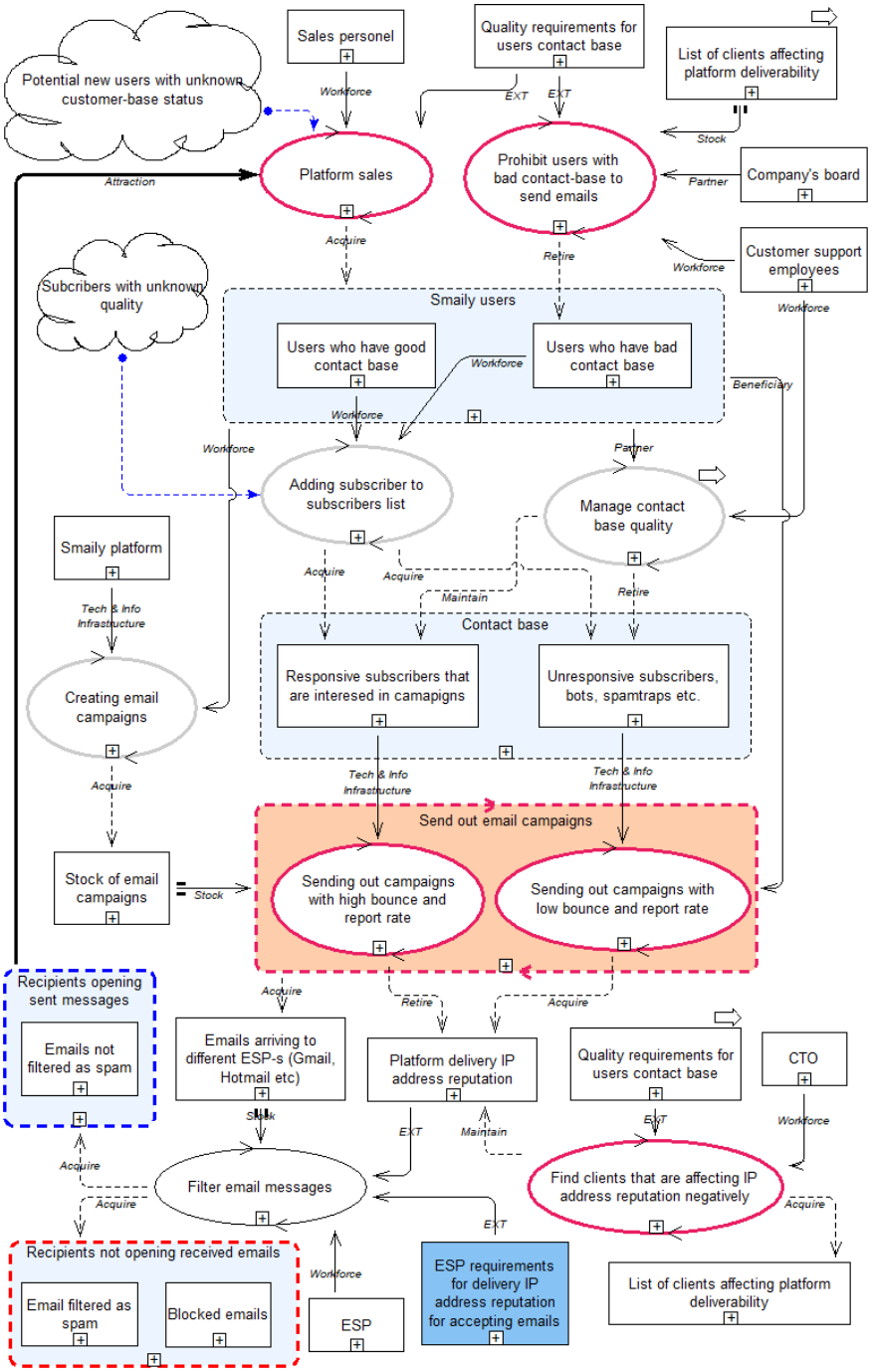
HEAD OF CUSTOMER RELATIONS : The main goal of contact base management is to eliminate subscribers who are no longer active, whose email addresses were inserted by robots, or are otherwise unresponsive. Such low-quality contact bases also affect our platform deliverability and are terrible for the company's reputation. Our clients are not just interested in sending out emails, but they want to maximize the opening rate. It is essential that emails arrive at the subscriber mailbox and are not marked as spam or otherwise blocked.

When we clean the contact base from low-quality subscribers, we receive a list of contacts from the CTO or data analyst. There are two types of contacts - ones that could be reactivated by sending a reactivation campaign and faulty ones. We remove faulty ones without sending a reactivation campaign. These might be @info addresses or emails entered by bots. For the other half, we try to reactivate them by sending a confirmation email that they are still interested in campaigns. When they do not respond, we remove those subscribers also. These might be inactive email addresses or people whose interests have changed.

AUTHOR : **How are users acquiring their subscribers?**

CUSTOMER SUPPORT EMPLOYEE : They all have various methods of acquiring subscribers. Some of them who have websites use forms on their pages that add subscribers to their contact base. Some collect subscribers on their webshop by having a subscription option on either the shopping cart or the billing page. Some users get subscribers for specific events or courses that require prior registration. And then use the gathered subscribers to send them course materials or slides after some seminar. Some might collect subscribers in a physical form. Subscribers might fill out a registration form with a checkbox to include them for a subscription after issuing the customer card in a shop. Also, subscribers might opt out of the previous subscription. For example, you might be interested in offers for child clothing only for a limited time. When they are no longer interested, they unsubscribe from that mailing list.

II. Platform deliverability and contact base quality connection



Single user contact base quality affecting delivery IP address reputation and therefore the whole platforms deliverability

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Kaarel Roopärg
20/11/2021