Smart Service Engineering
Data Product Design

Collection of Case Studies
from CAS Course Participants

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CAS Smart Service Engineering - Data Product Design

The following questions are the in focus of the CAS Smart Service Engineering:

- How to develop or improve industrial services, products, and product-service systems based on artificial intelligence and data with added value for users / customers (value creation) and providers (value capture)?
- How to assess the mutual value creation quantitatively for supporting the decision to invest in the development of the services?
- How to find the relevant, user-specific value proposition for a data product?
- How to turn these value propositions into smart services or smart product – service systems?
- How to develop a sustainable service ecosystem and service business model for a smart service?
- Which aspects of data protection, law, and ethics must be considered?

https://www.zhaw.ch/de/engineering/weiterbildung/detail/kurs/cas-smart-services
https://data-innovation.org/smart-services/

Foreword

This informal ebook encompasses the short papers describing the case studies conducted by small groups of students during the CAS (certificate of advanced studies) Smart Service Engineering (Data Product Design).

At the beginning of the course, a sound understanding of the problem through the lens of service design thinking is at the core of the attention. As the course progresses, we bring in more and more data science driven approaches and look repeatedly over the fence into the field of data analytics without getting into the technical details. The CAS Smart Service Engineering (Data Product Design) consists of the following modules, which unfold over 16 days:

1. Module A "Smart Service und Data Product Design"
   This module introduces the principles and practices of Data Product Design, with a focus on how insights from artificial intelligence (AI) and data science can be leveraged to create value for stakeholders within an ecosystem—such as internal teams or external customers. An emphasis is placed on the integration of advanced AI techniques, particularly language-based methods, which significantly enhance traditional machine learning approaches.
2. Module B "Business Ecosystems und Models für Smart Services"
   This module is designed to show students how to develop service business ecosystems and economic business models for smart services incorporating AI-resources.
3. Module C "Practice-Workshop"
   In this module students are given the opportunity to apply the learning contents of the modules "Smart Service and Data Product Design" and "Data-specific Business Model Design" in a moderated way in a coherent case. The focus is on prototyping and testing of the mutual value creation concepts in data-driven business ecosystems.
4. Module D "Data Protection and Data Security"
   This module is designed to teach students the basics of data protection and data security in the context of Smart Service Design. We also have a special focus on data ethics in this module.

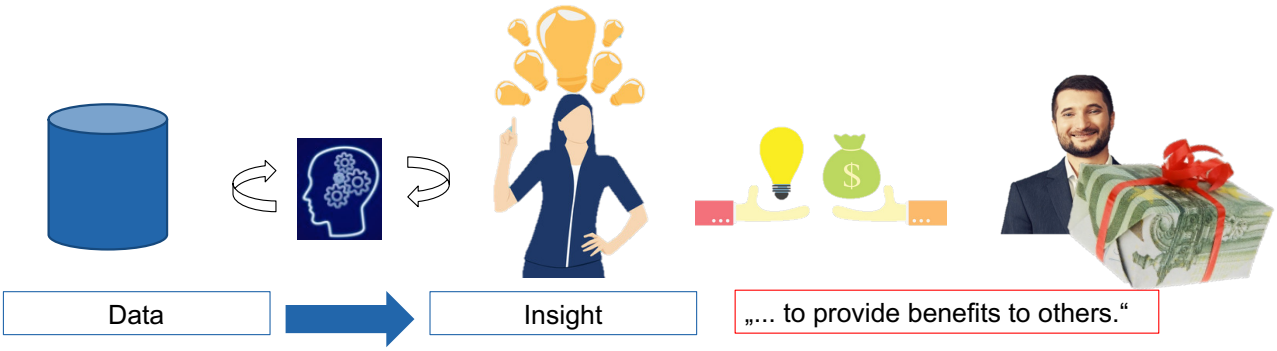
The ambition of the course is to convey the systematic methods of data-driven service design and engineering to the participants in a scientifically sound yet always directly applied way. To do so, the classes are split in small working groups at the very start of the course. The groups choose a real-world challenge which they want to support by design of a new AI- and data-driven service during the entire evolution of the course. The requirement was that the case should have the potential for a solution with a AI- or data-driven service and a B2B focus. The case studies are continuously developed across the four modules and the content taught in short theory blocks is continuously applied – from AI- and data-driven value design over business model design up to data ethics, data protection, and security.
The challenges are chosen by the participants themselves, and the service concepts are developed independently, whereby the course instructor is there to advise and coach. In this sense, this informal and “living” ebook has the character of a garage report and the papers are the work of the participants. I.e., the instructor has no claim or responsibility for their content. It is always fascinating to observe how the participants drive the cases with a lot of passion and professionalism and how service concepts are developed whose implementation in a real business can be of great benefit. A big thanks goes to the ZHAW School of Engineering for enabling this course, to the numerous industrial guest speakers, and to the members of the jury for their feedback in the elevator pitches. Many thanks also to *Ina Goller* for guiding us through the practical workshops and pushing our cases forward and to *Fabrizio Laneve*, managing director of the *Mobiliar Forum*, for enabling the workshop infrastructure.

The papers reflect only a small part of the concepts developed by the groups during the course and shall only allow a brief insight into the work without any aspiration to completeness.

The Importance of Smart Service Engineering

Which tasks or challenges of customers or users can be improved by smart (AI-/data-driven) services and how can these services be implemented in practice? With the spread of advanced technology over the last years, in particular AI, digitization has reached wide areas of society and the economy. Administrative processes are already largely digitalized and efficiently designed. However, the customer-centered development of solutions that solve relevant problems in the everyday life of users still has great potential. With the broad availability of AI, sensors, data, networks and cloud infrastructures, a basis is now available for this change, which offers new and scalable possibilities. The service benefits must be consistently oriented towards the users and customers and generate quantifiable added value for their business processes.

Data-driven service engineering focuses on the design and description of the customer's service ecosystem. In which contexts and ecosystems does the customer have to accomplish its jobs? What are the problem points ("pains") that a service can solve for the customer? So-called "value propositions" can be created for the customer. The processing and analysis of data helps both to identify suitable value propositions and to design their content.



A central concept in this approach is the **"Value of Solving Pains"** - a structured method to quantify how much economic value can be created by addressing specific customer problems. Rather than relying on vague assumptions, this model formalizes each pain point by its frequency and its financial impact. For example, if employees spend hours each week searching for information, the associated time loss can be translated into a concrete monetary value. A smart service that reduces this effort creates measurable value, which can be calculated by applying adequate methods discussed in the course.

This not only makes the business case for a service transparent but also supports defining the customer's willingness to pay—thus supporting value-based pricing. This approach helps prioritize service ideas with the highest impact and guides investment decisions with clear, data-driven arguments.

Properly and carefully designed smart services thus have the potential for mutual value creation for internal or external customers, for businesses, and for society as a whole.

Zurich, July 2025
Jürg Meierhofer

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The Course of the Year 2025

In 2025, the CAS Smart Service Engineering once again demonstrated the power of combining data-driven innovation with service design thinking. The four featured cases reflect the diversity and creativity of this year's participants, who tackled real-world challenges across industries—from healthcare and manufacturing to environmental sustainability and knowledge management.

A defining theme of this year's course was the systematic exploration and application of generative AI - particularly large language models (LLMs) – for value creation in services, as a powerful extension to established data-driven approaches. These technologies were not only discussed in depth during the modules but also actively integrated into several case studies. Participants examined the capabilities, limitations, and ethical implications of generative AI, and applied it to solve complex problems in knowledge retrieval, scheduling, and decision support.

- The first case, Smart Knowledge Assistant, exemplifies this approach by using LLMs to unify fragmented enterprise knowledge. The solution significantly reduces search time and improves accessibility - especially valuable in onboarding and offboarding scenarios.

- The second case, Smarter Warehouse, focuses on supply chain optimization for SMEs in the manufacturing sector. Leveraging IoT sensors and predictive analytics, the team created a system that enhances inventory transparency, reduces downtime, and enables more accurate demand forecasting - bridging the gap between ERP systems and real-time warehouse operations.

- The third case, BLUEbalance, presents a smart service for sustainable water usage in industrial cooling. By combining hydrological, meteorological, and geospatial data, the solution supports companies in complying with environmental regulations while optimizing resource use. The service also provides authorities with valuable insights for managing water concessions and ecological impacts.

- The fourth case, MedixPlan, tackles the complex challenge of hospital staff scheduling. The team developed an intelligent scheduling assistant that automates duty rosters, manages absences, and improves work-life balance for healthcare professionals. Generative AI was used to support dynamic rescheduling and optimize shift planning based on employee preferences and legal constraints.

All four projects were developed iteratively throughout the course, culminating in a two-day workshop at the Mobiliar Forum. There, participants refined their concepts, tested their value creation in complex ecosystems, and received expert feedback during two pitching rounds. Special thanks go to Ina Goller for her inspiring facilitation and to Fabrizio Laneve for hosting the workshop at this exceptional venue.

Smart Knowledge Assistant

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Yannick Wünn
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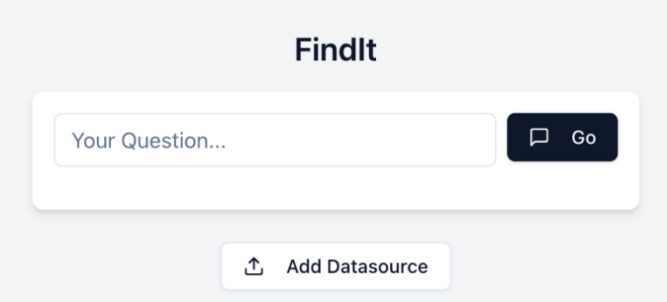

Abstract

This paper outlines the development of a smart knowledge assistant service aimed at reducing the time employees spend searching for unstructured information within organizations. The solution leverages existing large language models (LLMs) to extract relevant content from various systems such as ERP, PLM, SharePoint, and internal wikis. Using methods like the Value Proposition Canvas and a socio-technical ecosystem analysis, the team identified key customer pains and designed a value-driven concept to address them. Key pain points include time-consuming searches for information and scattered knowledge across systems, while value is created through faster access, improved efficiency, and reduced annoyance and frustration. Hypotheses regarding model precision, licensing preferences, and user value are defined and will be validated in potential future testing phases. A preliminary business case forecasts a break-even point in Q1 2029, assuming the acquisition of 18 SME clients, with positive cash flow expected by Q4 2027.

Key words
Smart Chatbot, Reduce Search Time, FindIt, RAG, LLM

1. Which Challenge Do We Solve?

SMEs struggle to store and access business-relevant data across different systems in a structured and efficient manner. Over time, as organizations began collecting more and more data, they introduced a variety of systems for different purposes. As a result, information is now scattered across platforms like SharePoint, ERP, PLM systems, document storages in the cloud, local drives, and wikis. When employees leave, a significant amount of knowledge is lost, and employees spend excessive time searching for information.

Solution:
FindIt integrates existing data silos and provides a smart, unified and structured access to relevant information using search, tagging, and summarization capabilities.

Service Ecosystem

The service ecosystem shows key actors as well as interactions/value flows between them.
Actors in this Service Ecosystem include:

- **Product Managers (PM)** are central knowledge holders responsible for creating, maintaining, and distributing information.
- **Employees (both onboarding and offboarding)** are key participants in knowledge exchange, either seeking access to relevant information or transferring it upon leaving.
- **Technicians** are technical experts who contribute operational knowledge and documentation, supporting the distribution of specialized information.
- **Document Storage Providers** facilitate data accessibility by hosting and organizing stored documents across systems like SharePoint, PLM, or cloud drives.

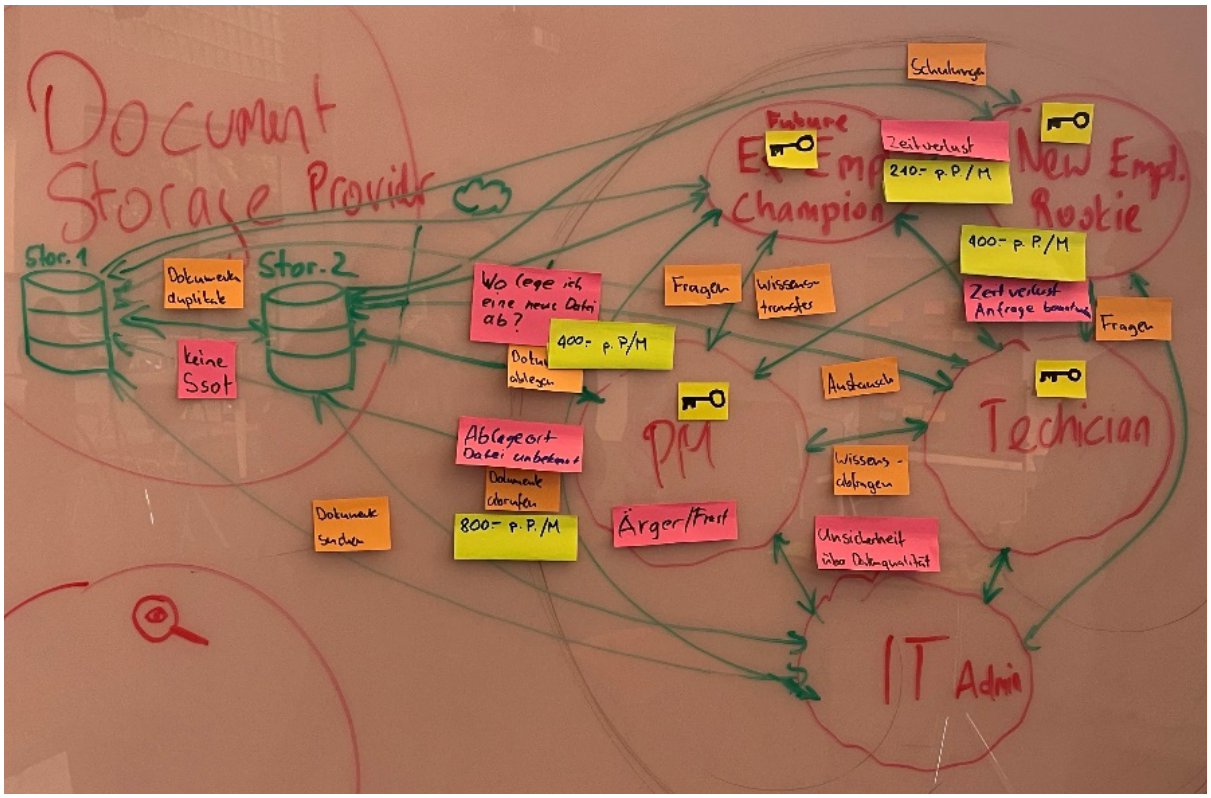

Figure 1: Ecosystem of current situation (without proposed solution)

Customer Insights from the Value Proposition Canvas

These key roles were identified through 18 qualitative interviews with product owners, salespeople, technical employees and engineers, which were conducted during the research phase. The

interviews helped reveal the most relevant actors within the service ecosystem and validated their specific pain points and information needs.

Key takeaways include:

- **Jobs to be done:** Customers need to efficiently access and manage internal knowledge, find documents quickly, and ensure continuity despite staff turnover.
- **Pains:** Users report losing time searching through various systems (e.g., SharePoint, ERP, local drives), facing frustration with inconsistent documentation, and experiencing knowledge gaps when employees leave.
- **Gains:** There is a strong desire for streamlined access to information, improved transparency, and time savings in daily operations.

These findings highlight the urgency and relevance of addressing knowledge management challenges in decentralized digital environments.

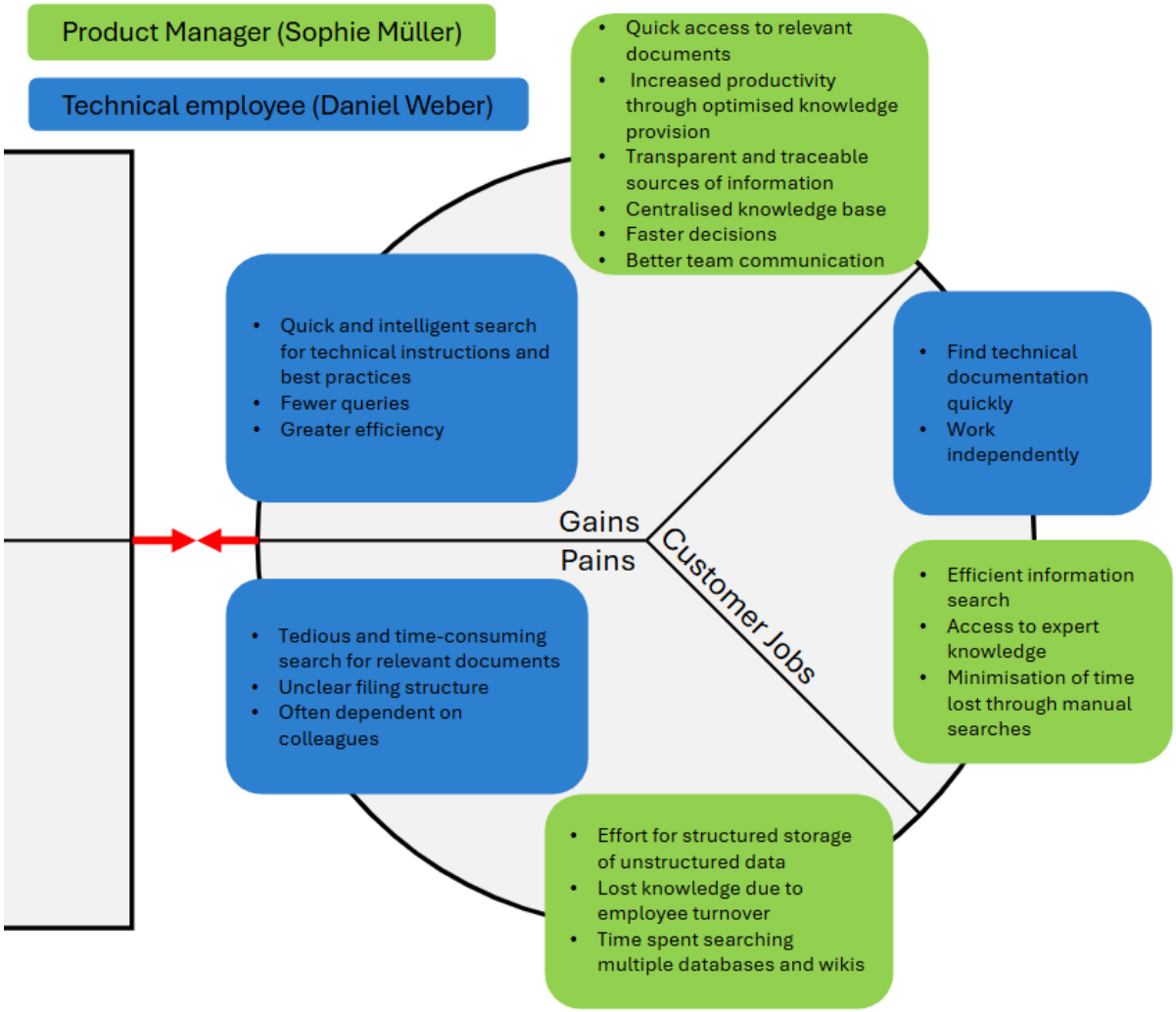

Figure 2: Own illustration based on the Value Proposition Canvas framework (adapted from Osterwalder et al., 2014).

Value of Solving Pains

In many companies the clearly defined folder structure is slowly falling apart due to multiple possible ways for team collaboration and their connected storage options.

The question of where to store a document created on the fly is no longer clear and requires time to search through existing folder structures. **[Pain2]**

Even more time, up to 1 hour per week, is lost for searching through all these databases to find specific files while the searcher already knows that these files exist. This includes asking coworkers for help as well. **[Pain1]**

When somebody is asking their coworkers for help, the person who is answering those questions is interrupted in their work up to half an hour per week too. **[Pain3]**

While knowledge transfer is easy to obtain from current coworkers, it becomes time-consuming when your coworker is no longer employed within the same company. **[Pain4]**

Frustrated employees get to the point where they change companies when working conditions deteriorate. **[Pain5]**
To keep the total value of pain realistic, only 10% of **[Pain5]** is addressed here.

According to our interview results, the time lost per week accumulated over the full year is significant. The following table shows the calculation for an SME of 50 employees with the assumption of turnover rate 10%, rate per hour CHF 200 and annual salary CHF 100'000.

Their **total annual pain of CHF 1'177'500** equals CHF 23'550 per employee, which is massive!

To be realistic, it will not be possible to reduce 100% of these pains but any improvement will pay back in the short term and scales with the number of employees as well.

Pain Nr.	Pain Name	Technical Description	Customer			
			Numerical Value Frequency (how many times per annum)	Impact CHF	Alleviation Factor %	Value of Pain CHF (annual)
Description Use Case: Assumption: SME: 50 people, turnover rate 10%, rate per hour CHF 200, average Salary CHF 100'000 / year						
	Total annual value	**sum over all pains**				1 177 500
1	Time lost searching databases and wikis for a document [due to unclear location of the file (while knowing it exists)]	Loss compared to knowing where the file is located 1h per week per person 50x1x52 = 2600	2 600	200		520 000
2	Effort for structured storage of unstructured data [where do I save a new file?]	Locations: - Cloud Drives / PLM / ERP / Wiki / HR Tool / Local Drives... 50x0.5x52 = 1300	1 300	200		260 000
3	Answering file location questions of co-workers [time lost to answer question]	Work interruption to answer storage location or validate file 50x0.5x52 = 1300	1 300	200		260 000
4	Lost knowledge due to employee turnover [person missing that knows where the data is stored]	Combination of lost detail knowledge and file location or state verification **Estimation: 25% loss** 5x 25% of 100 000 CHF	5	25 000		125 000
5	Employee turnover rate [Company reputation]	Leaving employees create hiring effort and expenses. **Estimation: 25% of salary** 5x 25% of 100 000 CHF	5	25 000	10%	12 500

Table 1: Value of Solving Pain Matrix (full pain value, but mostly without alleviation factor) (Meierhofer, Pascher & Wulf, 2025)

2. By which Data-Driven Service Approach Do We Solve the Challenge?

Value Proposition Canvas (with fit per element)

Based on the Value Proposition Canvas outlined previously, the identified issues, such as time-consuming searches for information, scattered data storage and loss of knowledge due to employee turnover, highlight the clear need for an intelligent, unified solution for accessing information. Our proposed service, FindIt, addresses these challenges by integrating existing company data sources (e.g. SharePoint, PLM and ERP) into a central, searchable interface enhanced by large language models (LLMs).

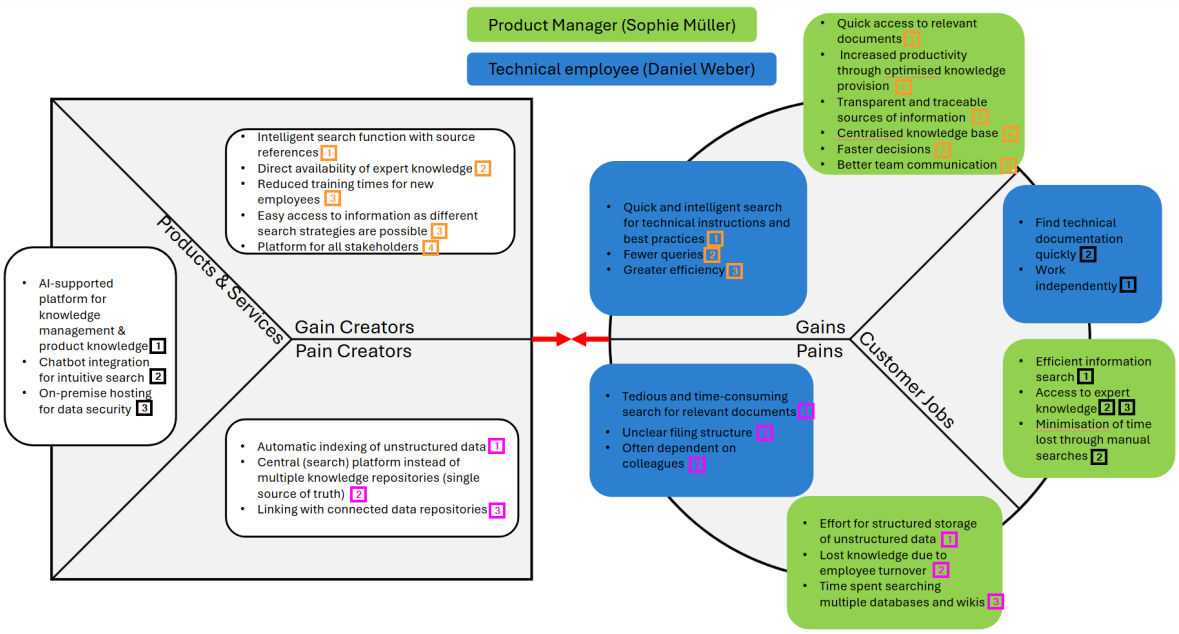

Figure 3: Own illustration based on the Value Proposition Canvas framework (adapted from Osterwalder et al., 2014).

Data & AI / LLM Use:

The solution leverages unstructured and semi-structured data from existing file storage and document repositories. This includes PDFs, Word documents, presentations, wikis, and system exports from tools like a PLM. A Retrieval-Augmented Generation (RAG) architecture is used to index and embed this content, enabling semantic search and context-aware retrieval. Furthermore, this architecture allows intelligent capabilities such as document summarization, automatic tagging, and referencing of original source documents. As Large Language Model (LLM) we use state-of-the-art Models, which can be fine-tuned if required.

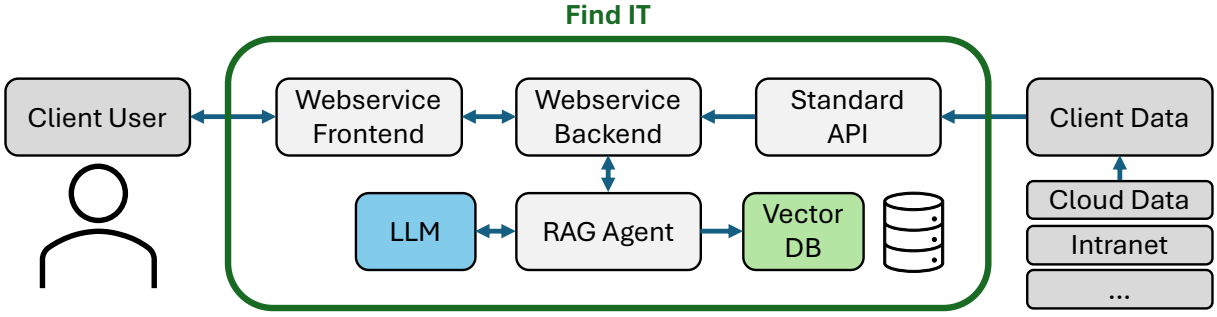

Figure 4: System Architecture (own illustration)

Customer Journey:
A plagued user discovers FindIt via peer recommendations. They sign up, connect data sources, and see instant summarized search results. Impressed by time savings and dashboards, they upgrade to a paid gold plan.

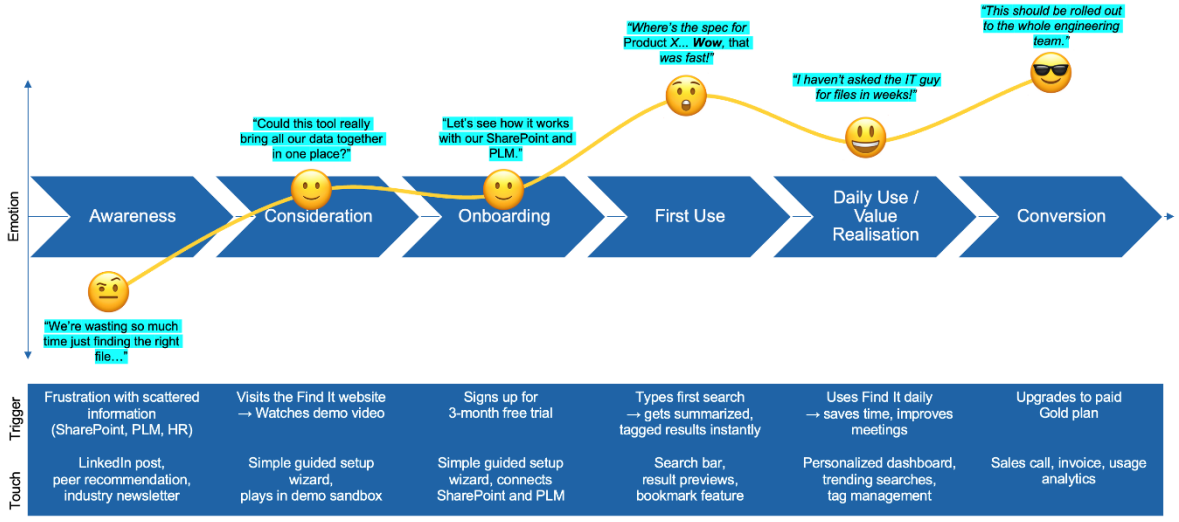

Figure 5: Customer Journey (own illustration)

Frameworks Applied:

It is important to situate FindIt within well-established smart-products research. In particular, we draw on the **Monitoring–Control–Optimization–Autonomy Model** (Porter & Heppelmann, 2014) to frame our design and to demonstrate how FindIt moves beyond traditional enterprise search tools.

We adopt this schema to structure the feature set and roadmap: logging query patterns and access metrics (monitoring), introducing results ranked by relevance (control), employing the LLM to summarize in-chat the file content (optimization), and ultimately, its core function, to autonomously categorize and tag the documents on behalf of the user (autonomy).
This framework is guiding our phased rollout of features and illustrating the business value unlocked at each maturity level.

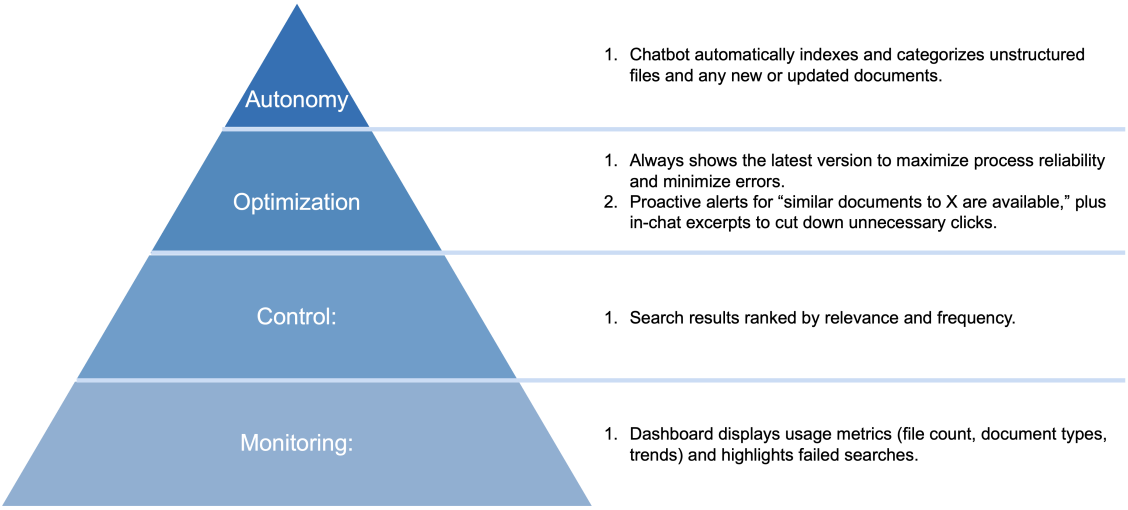

Figure 6: Functionality of our service by level (adapted from Porter & Heppelmann, 2014)

Social / Environmental Value:

The solution introduces a new digital system that consumes energy and therefore produces a small amount of CO_2 emissions. Based on estimated usage (50 employees, 20 prompts per person per day), the system generates approximately **5.84 kg CO_2e per year** through model inference (McCarthy,

2025) (Chandrakant, 2024), document indexing and storage (Chen et al. 2025). While the system does not directly reduce CO_2 emissions, its social and operational benefits are significant:

- Employees gain faster and more intuitive access to knowledge, independent of role or seniority.
- Frustration and time lost searching for information are significantly reduced, improving daily workflows.
- Increased job satisfaction.
- Onboarding time is shortened, making new employees productive sooner.

Although the solution adds to the company's carbon footprint, it enables the reuse of existing knowledge and prevents redundant effort, such as re-writing documents or repeatedly answering the same questions. This leads to time savings, reduced digital clutter, and a more sustainable approach to information management. Overall, the system offers clear social and operational value while keeping environmental impact at a minimum.

Annual Economic Value:

After applying the alleviation factors, the average 50-person SME can address **CHF 907'000** pain value. After subtraction of the cost for our service, the net value created will be **CHF 877'500**. This represents a cost reduction of **CHF 17'550** per employee per year.

Pain Nr.	Pain Name	Technical Description	Customer			
			Numerical Value Frequency (how many times per annum)	Impact CHF	Alleviation Factor %	Value of Pain CHF (annual)
Description Use Case: Assumption: SME: 50 people, turnover rate 10%, rate per hour CHF 200, average Salary CHF 100'000 / year						
	Total annual value	**sum over all pains**				907 000
1	Time lost searching databases and wikis for a document [due to unclear location of the file (while knowing it exists)]	Loss compared to knowing where the file is located 1h per week per person 50x1x52 = 2600	2 600	200	80%	416 000
2	Effort for structured storage of unstructured data [where do I save a new file?]	Locations: - Cloud Drives / PLM / ERP / Wiki / HR Tool / Local Drives… 50x0.5x52 = 1300	1 300	200	80%	208 000
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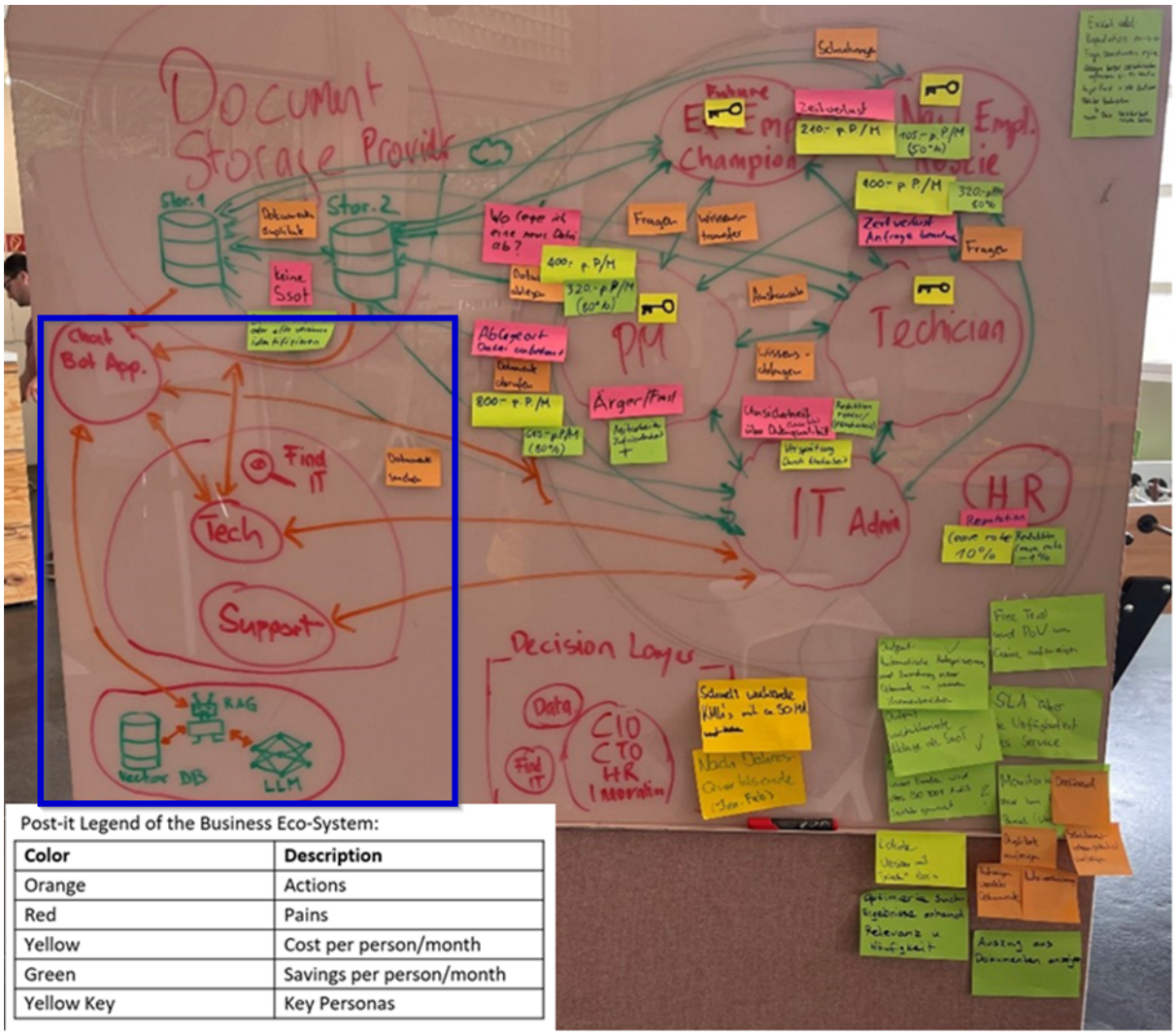
5	Employee turnover rate [Company reputation]	Leaving employees create hiring effort and expenses. **Estimation: 25% of salary** 5x 25% of 100 000 CHF	5	25 000	10%	12 500

Table 2: Value of Solving Pain Matrix (+alleviation factor) (Meierhofer, Pascher & Wulf, 2025)

3. What Does Our Target Service Business System Look Like?

Importantly, the method not only captures the value generated by solving previously identified customer pains (e.g., through easier access to unstructured data), but also highlights other value flows such as technical expertise, support services, and customer relationships. This systemic overview creates a shared understanding of how value is co-created across organizational boundaries and supports strategic decision-making for the further development of the service. Referring to Figure 1, the solution is indicated by the blue rectangle in Figure 10. The newly added connections are highlighted in orange.



Post-it Legend of the Business Eco-System:

Color	Description
Orange	Actions
Red	Pains
Yellow	Cost per person/month
Green	Savings per person/month
Yellow Key	Key Personas

Figure 7: Business Ecosystem (Author's own illustration)

Core Entities:

- **FindIt Company**: The service provider that develops and maintains the chatbot application.
- **Customer Organization**: The end user, which includes various roles like product managers, new employees, technical staff, and, on the decision level, the CIO, CTO, HR and Innovation drivers in the customer organization.
- **Cloud Provider**: Provides infrastructure and technical support for deploying and operating the service.

Key Roles & Interactions:

- The **Product Manager** acts as a central hub within the company, distributing and creating knowledge.
- The **Chatbot Application** is the interface for document storage and information search, used across multiple customer roles.
- The **new employee** needs a lot of resources from their predecessor (**future ex-employee**) during their induction.

Relationships:

- **Data flow** and **document storage** are essential connections between the FindIt Chatbot and customer systems.
- **Customer relationships** and potential collaboration foster continuous feedback and improvement.

Rough Business Case:

Our target is to acquire **18 customers** (average 50 employees) within the **first 3 years**. With an estimated **cost of CHF 1'750** (variable 1'200 + fix 550) versus **revenue** of **CHF 2'400**, we should achieve a **margin** of **27%** (CHF 650) per client (calculation based on 18 clients).

Variable costs per month are estimated based on single-user **LLM CHF 20** + **Database CHF 4**.

A **start capital** of **CHF 120'000** and only 50% workload on each of the 4 founders will bring this startup to **positive cash-flow in Q4 2027** and **break even in Q1 2029**.

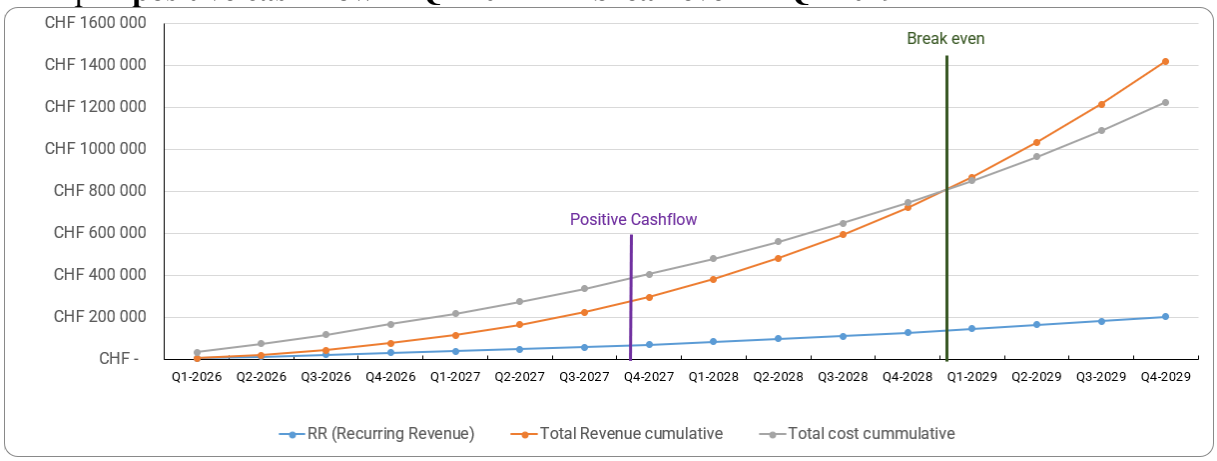


Figure 8: Rough Business Case

4. Discussion and Outlook

The core idea of making unstructured company knowledge easily accessible was well received by both students and jury members. The value proposition resonated strongly, particularly in environments where information is scattered across multiple systems, such as SharePoint, PLM, ERP, or wikis. The authors faced challenges in calculating CO_2 equivalents to communicate the environmental benefits of the solution in a quantifiable way. This limited the ability to highlight the sustainability impact as a differentiating factor in customer communications. The pricing model, especially the structure around the subscription model (bronze, silver and gold) and potential add-on costs have not yet been finalized. However, the current research and customer feedback provide a solid foundation to define a viable monetization strategy in the potentially upcoming development phases.

Critical hypotheses and outlook

To validate the market and technical feasibility of the solution, several key hypotheses have been defined:

- **Hypothesis 1: LLM Accuracy with Real Unstructured Data**
  We hypothesize that existing large language models (LLMs) are precise and relevant enough to extract useful insights from real, unstructured corporate data.
  How we will test it: Multiple LLMs will be applied to datasets from pilot customers, including sources like SharePoint, PLM, ERP, and internal wikis. The automated outputs will be compared to results found manually by domain experts.
  Success criterion: If 90% of the LLM-generated responses are rated as accurate and relevant by experts, the hypothesis is confirmed. This would provide strong evidence that LLMs are suitable for real-world business applications.

- **Hypothesis 2: LLM Model Comparison (Suitability and Performance)**
  We assume that established LLMs (e.g., GPT-4, Claude, Command R+) meet our accuracy and performance requirements.
  How we will test it: Using a uniform dataset and standardized questions, different models will be compared on key metrics: precision, reliability, understandability, and response time.
  Success criterion: If 90% of a model's outputs meet expert standards for correctness and relevance, the model will be considered suitable for integration into the final product.

These upcoming tests will be critical in further shaping both the product development and the go-to-market strategy. The outcomes will help validate technical feasibility and customer fit while informing the next phase of prototyping and potential investment readiness.

Authors summary

The authors benefited from their diverse individual expertise, which enabled them to collaboratively develop a smart service concept that was well received by both students and the jury. They recognized the value of applying structured methods such as the storyboard, business model canvas, and socio-technical service ecosystem, to create a shared understanding of the idea among team members and stakeholders. Additionally, they acknowledged the importance of hypothesis testing and a preliminary business case as essential tools for further development.

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The reference list was compiled and formatted in APA style with the help of ChatGPT, an AI language model developed by OpenAI, to ensure consistency and accuracy.

Smarter Warehouse

AK
DH
OP

Abstract

While enterprise resource planning (ERP) systems address a broad area in business operations, they often lack a specialized feature set for efficient management of the warehouse. According to Ghapar, F., et al (2023), most of the challenges in warehouse management can be linked to the root cause of limited visibility of the inventory.
A specialized warehouse management system (WMS) does address warehouse pain points more effectively than an ERP. It is a crucial component for businesses aiming to raise their overall performance by optimizing their warehouse operational efficiency and stock level as well as increasing market responsiveness by demand forecasting.
The promise of the Smart Warehouse is to deliver this visibility by collecting data from a widespread deployment of internet of things (IoT) technology around the warehouse. IoT is generally used to describe "a network consisting of appliances, meters, sensors and other components that can send or receive data." (ABB, 2023)
Our solution, proudly presented here as the "Smarter Warehouse", is designed specifically for small and medium enterprises (SME) in second sector and aims to level the playing field. Through advanced data gathering, real-time monitoring, and machine learning-powered predictive ordering, the system elevates operational efficiency and inventory accuracy. The Smarter Warehouse empowers SMEs with capabilities that were once exclusive to large multinational enterprises. Our core proposition is to enable smaller players to stay agile, competitive, and resilient in an increasingly data-driven global market.

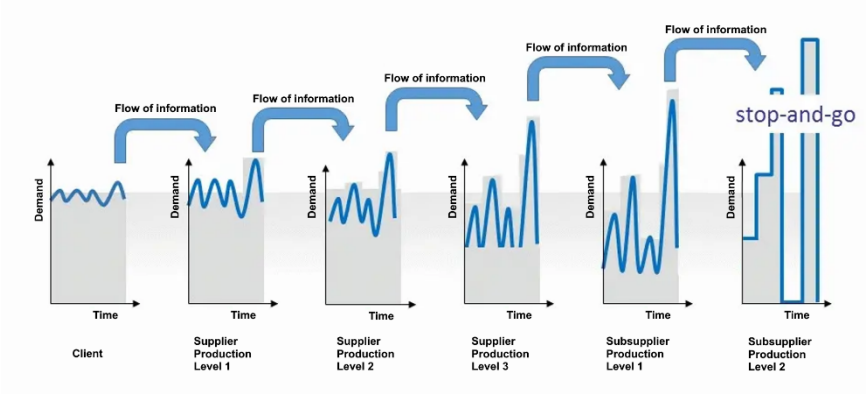
Key words
Warehouse Management, Supply Chain Optimization, Real-time Inventory Tracking, Data-Driven Inventory

1. Which Challenge Do We Solve?

Use Case

In modern supply chains, a lack of real-time inventory visibility and unreliable demand forecasting create significant challenges. These inefficiencies are especially critical at the interface between manufacturers and suppliers—where delays, miscommunication, and missing data directly impact operational performance and cost. In the situation below, nobody was aware that the parts were missing until they were needed for production. To make the situation worse, it was discovered that the parts have significant lead time.

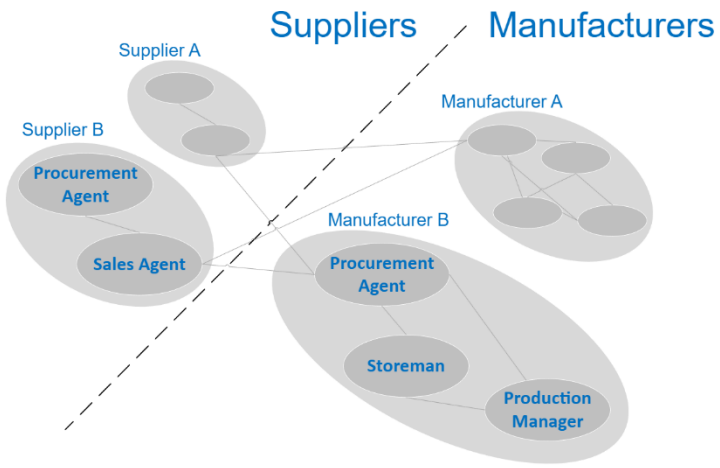
From a macroeconomic perspective, producers are typically also suppliers and vice versa. Ultimately, goods can take an arbitrary number of hops through different or sometimes even the same entities. The bullwhip effect describes the phenomenon where demand variability results in amplified distortions along the supply chain.



The bullwhip effect as illustrated by Dickmann, 2007 (labels translated by authors)

Ecosystem

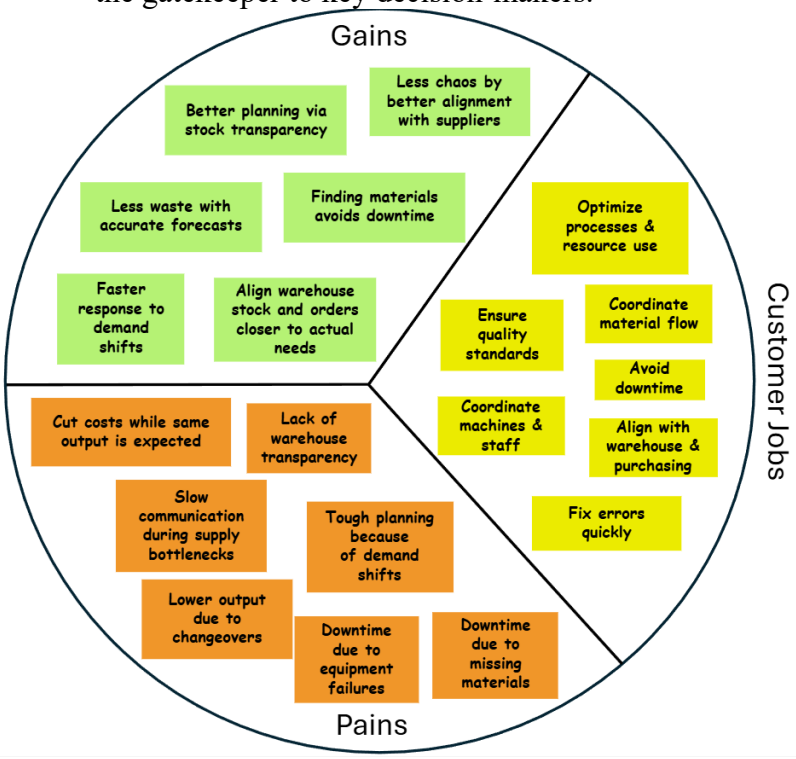
We gained the customer insights presented in this chapter by conducting 4 interviews among the relevant actors (Production Manager, Logistic Employee, Supplier and Supply Chain Employee). On the client side of our service is a producer with a local warehouse. A producer depends heavily on availability of goods to keep running assembly lines. A supplier is more than happy to provide these goods, but there are no insights shared upfront. The supplier may get to know about potential demand once a quote is requested or actual demand once a purchase order (PO) is placed.



High level ecosystem showing relevant entities and actors with their interactions

Below the selected customer profile of the production manager which we identified as

- the actor with the most significant pain points
- the gatekeeper to key decision-makers.



Customer profile visualized using the Value Proposition Model Canvas by Osterwalder et al., 2014

Production managers rely heavily on a continuous flow of materials to avoid downtime. Low inventory transparency and slow communication during material shortages are additional factors raising the challenges. More accurate demand forecasting would enable them to execute more precise orders on time. Next to downtime avoidance, there is room for additional gains for planning machinery and staffing.

Value of Solving Pains

Refined ecosystem with identified key actors, value flows and pains

Based on our surveys, we compiled a table of pain and gains (see below). It quickly became apparent that we could only partially describe the problem.

Pain Nr.	Pain Name	Technical Description	Customer			
			Numerical Value Frequency (how many times per annum)	Impact CHF	Allevation Factor %	Value of Pain CHF (annual)
	Total annual value	**sum over all pains**				7.230,00
1	Delayed delivery	loss of image, no reorder	0,10	20000,00	0,50	1000,00
2	Extra work	on weekends, Christmas, etc., employees 30 francs * 8 hours * 4 workers * 1.5 (surcharge)	4,00	1440,00	0,50	2880,00
3	Replacement of materials	replacement of materials (lost material)	1,00	1000,00	0,50	500,00
4	Replacement of materials	replacement of materials (expired material)	0,50	5000,00	0,50	1250,00
5	Storage space,	examples for a 20 m2 storage price 125 francs/m2, heating costs 15 francs/m2	1,00	2500,00	0,50	1250,00
6	Express searches	supplier extended compensation for additional work (depending on delivery size and frequency)	2,00	350,00	0,50	350,00
7	tbd					

Values of solved pains based on Meierhofer et al., 2025

The greatest challenge for any manufacturing company is an unexpected production stop. We have determined the frequency of such production outages in Switzerland from articles and statistics from Swissmem (2021) and the BFS (2024) (e.g. Swissmem, the Swiss Federal Statistical Office). Based on that data and expert insights, the following cost estimates have been derived for such downtimes.

The number of production halts has significantly increased in recent years due to global events such as the COVID-19 pandemic and the war in Ukraine (Minsch, 2022). These disruptions have skewed statistical averages upwards. For this reason, we have deliberately chosen a conservative approach in our estimations.

Our calculations are based on a typical company employing around 10 staff members in production and logistics. Employees in sales, research, and development are not included in this count. The indirect costs are the most difficult to estimate. These include contractual penalties, unproduced goods, lost revenue, as well as ramp-up costs for electricity and restarting machinery. We decided to consult industry experts (e.g. Swissmem or BFS).

Category	Description / Basis	Amount (CHF)
Direct Cost	Labor (CHF 63.62 × 8h × 10 workers)	5,090.00
Indirect Cost	Opportunity, penalties, restart cost	50,000.00
Total Cost per Day	Direct + Indirect	55,090.00
Downtime per Year	Average	3
Total Annual Cost	Cost per Day × 3 days	165,270.00
Share from Supply Issues	Estimated 70%	70%
Pain per Year	Attributed to supply/material issues	115,689.00

Annual value of solving pains

2. By which Data-Driven Service Approach Do We Solve the Challenge?

The Smarter Warehouse

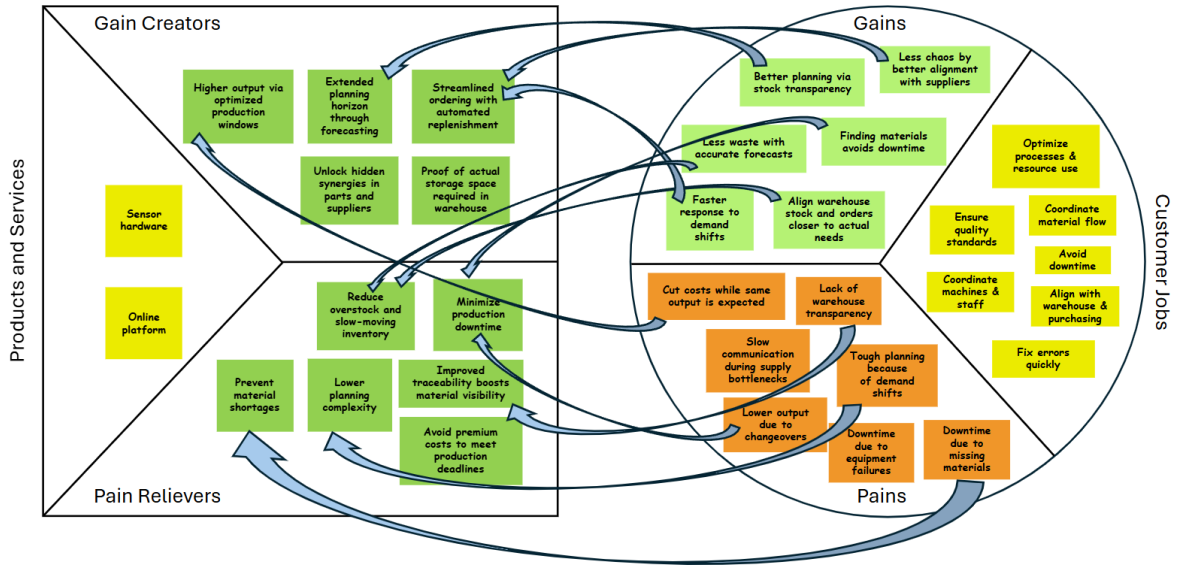
Revisiting the situation from before, the employee is forecasting demand using the Smarter Warehouse platform. No more emergency orders or shortages of parts, and the boss is happy and grateful!

Our solution utilizes IoT weight sensors to continuously monitor inventory levels at the producer's warehouse. By measuring weight and knowing the contents of each container, a reliable item count can be calculated. Inventory levels are available in real time at any time.

The market already offers proprietary vendor-managed solutions for C-parts, limiting our potential to create added value in that segment. Therefore, we have chosen to focus on B-parts for complementary services, where existing vendor systems are often in place but not fully optimized. In scenarios where no such vendor system exists, our scope could also be extended to cover both B and C parts.

The focus is on ensuring that the producer benefits directly from their own data. At the same time, inventory data can optionally be shared with suppliers to enable targeted collaboration. Recurring orders are automated through coordination between producer and supplier, reducing the risk of errors and ensuring a more reliable material flow. All collected data is aggregated and analyzed on a software platform.

Matching Expectations

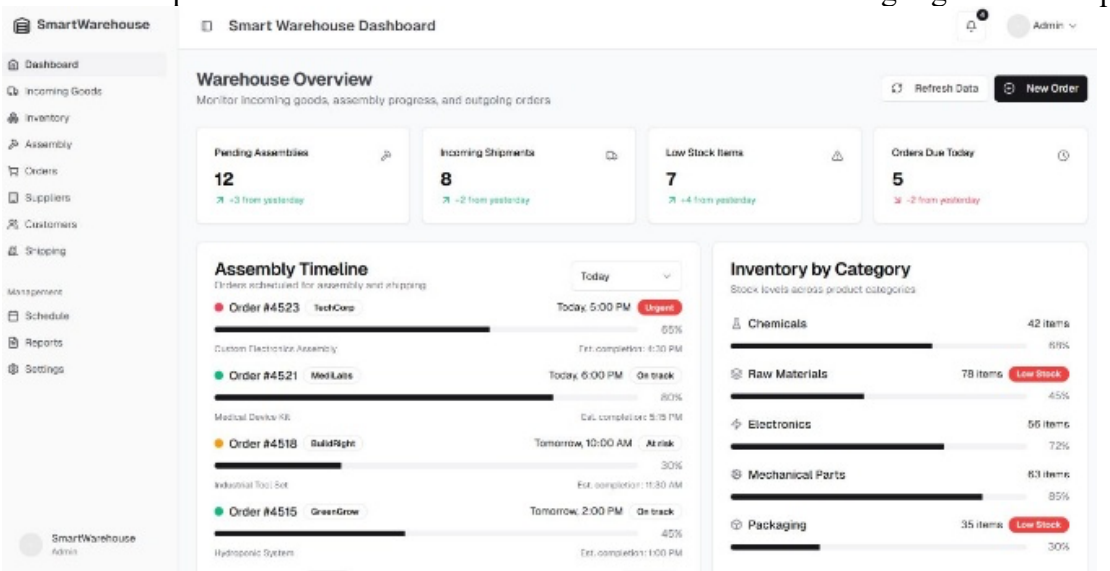


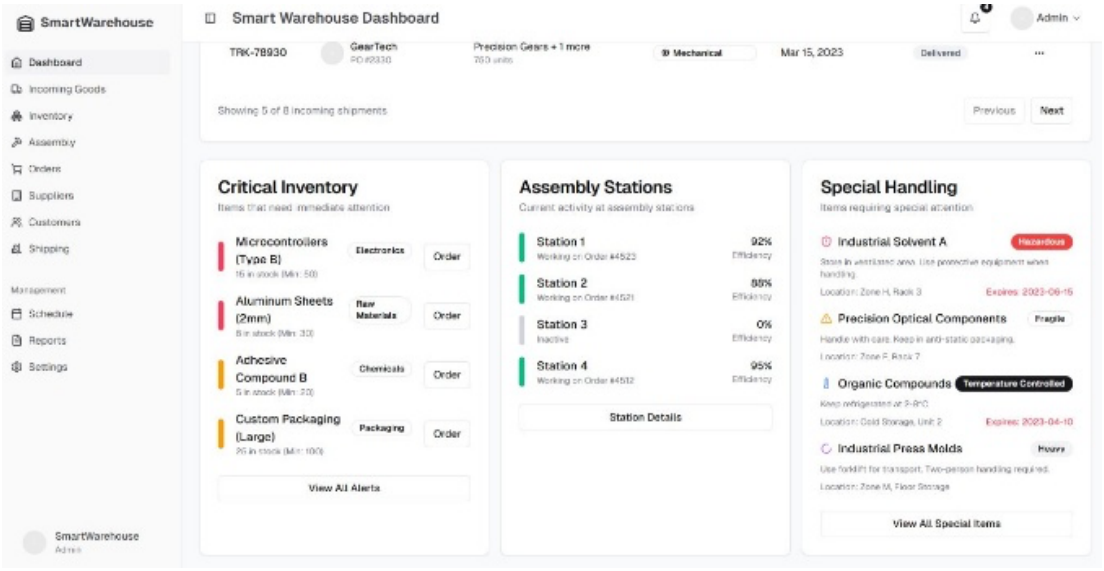
Value proposition matched to key customer profile or using VP Model Canvas by Osterwalder et al., 2014

The goal is end-to-end material transparency across all stages of the supply chain. This allows shortages to be identified early, production downtimes to be minimized, and the costs associated with unplanned rework to be reduced. Immediate benefits include increased output during production windows and simplified ordering processes. In addition, companies gain detailed insights into the actual storage space required.
Over time, the collected data enables more accurate material planning forecasts. This creates new synergies between material management and supply chain operations, paving the way for optimized collaboration.

Dashboard

A dashboard provides a clear overview of current stock levels and highlights areas requiring action.





Ecological values

The most significant values are served by having the right number of parts in the right place and on time.

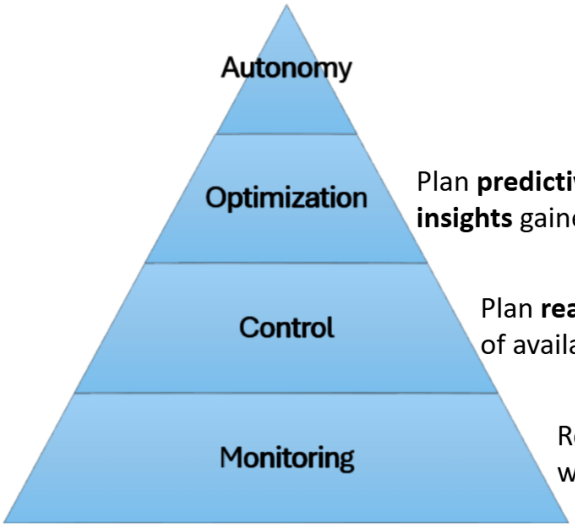
Optimized Delivery Processes	Reduction of Overstock	Downtime Prevention	Cloud Operation Instead of Local Servers
• Automated reordering avoids last-minute express shipments and their environmental impact	• Fewer slow-moving items mean less material and energy waste	• Avoiding missing parts reduces resource waste from frequent production stops and restarts	• Improved energy efficiency through consolidation in modern, optimized data centers

Social values

The values are primarily achieved by the increased transparency and control of stockpile.

Workplace Quality	Health & Safety	Equal Access to Technology	Resilient Supply Chains
• Automated routine tasks reduce administrative stress and boost job satisfaction	• Fewer physical trips through the warehouse reduce the risk of workplace accidents	• Predictive services and automation are accessible even to mid-sized companies	• Early detection of supply risks enhances supply security

Service value levels



Plan **predictive orders** for supplies **based on data insights** gained from warehouse flows

Plan **reactive orders** for supplies **based on** comparison of available stock to **manually defined threshold**

Real-time **visibility and tracking of** supplies in warehouse

Convergence of our service platform to levels of functionality by Porter & Heppelmann, 2014

Business Case

Our main customers are SMEs operating in Switzerland's secondary sector, meaning manufacturing companies rather than logistics centers. This gives us a potential customer base of approximately 5,000 businesses. Our goal is to achieve a market share of 10% within ten years of launching our company. Starting with 10 clients and aiming for 90% annual growth, gradually flattening by 8%, we believe this target is realistic.
We require an initial investment of CHF 620,000 to cover development and infrastructure setup. Operating costs, including staffing and production, are accounted for separately from this initial investment. These also include personnel and prototypes to demonstrate how our product works.
We plan to offer both our sensors and our dashboard/online tool as a service. The sensors are designed to be cost-efficient, with an estimated production cost of CHF 32 each. By leasing them at CHF 12 per year, we achieve a margin of 66% over an expected lifecycle of 8 years.

SMEs typically manage an inventory ranging from 500 to 10,000 items, depending on company size. For our calculations, we used a small manufacturing firm with 10 production employees as a model, estimating a lower-end inventory of 2,000 parts. We charge for both the sensor required for each part and its corresponding slot in our platform.
Per monitored part: CHF 5 for the tool + CHF 12 sensor lease = CHF 17 total per year. Based on these projections, the company would reach break-even after three years and become profitable by year five.

Year	Invest	Cost	Income	Profit/Loss	Cumulative
1	-625000	-720000	400294	-944706	-944706
2	0	-920000	550765	-369235	-1313941
3	0	-455000	956168	501168	-812773
4	0	-1200000	1522268	322268	-490505
5	0	-1225000	1894273	669273	178768

Estimated profitability over 5 years

Regarding the customer pain point of CHF 115,689 annually, we believe our system can address 50% alleviation of this inefficiency. According to our estimates, this would generate a customer benefit of CHF 23,315.09. We are confident that as the system collects more data over time, its efficiency will continue to improve, allowing us to resolve an even greater share of the problem.

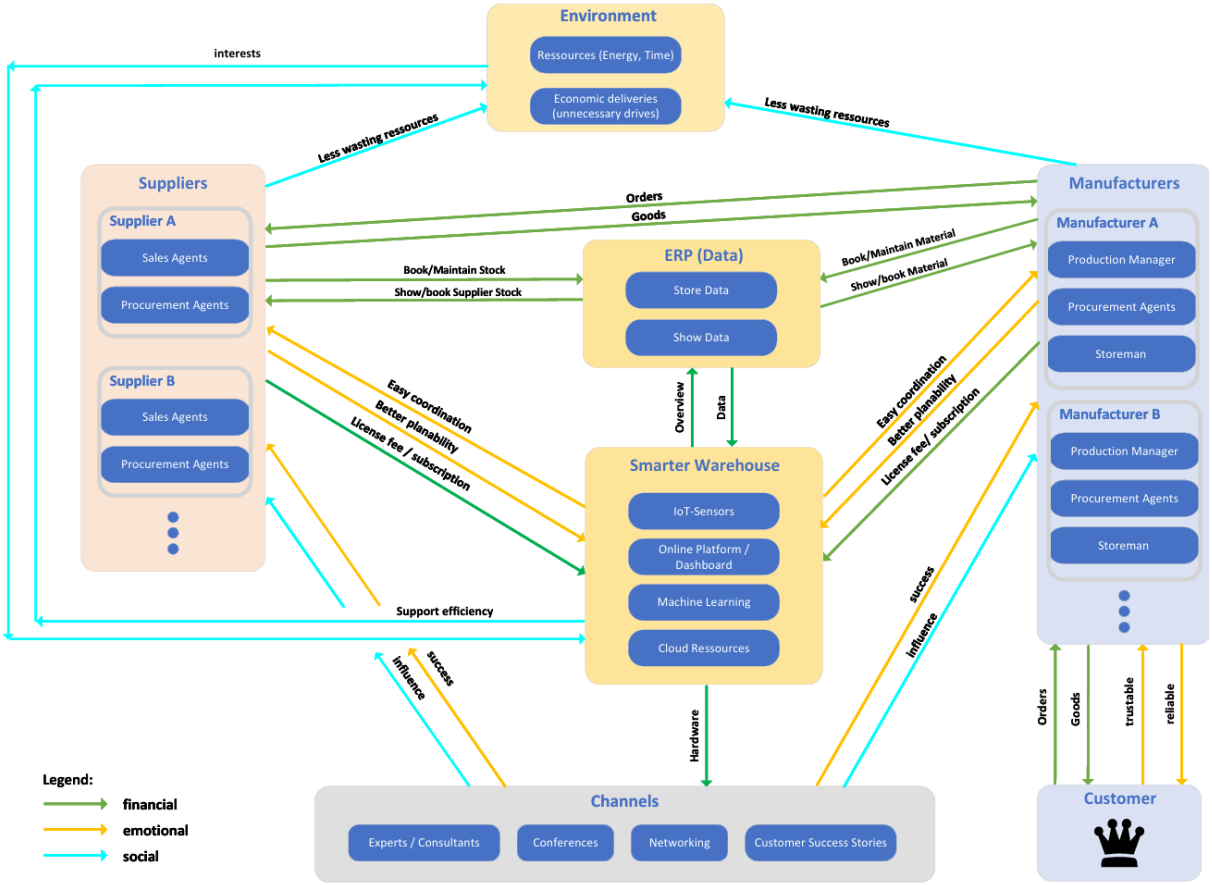
Description	Amount (CHF)
Pain per Year (50%)	57,844.50
Integration Cost (10 Years)	1,000.00
Service Costs (2000 Sensors)	33,529.41
Profit Customer	23,315.09

Customer profit analysis

3. What Does Our Target Service Business System Look Like?

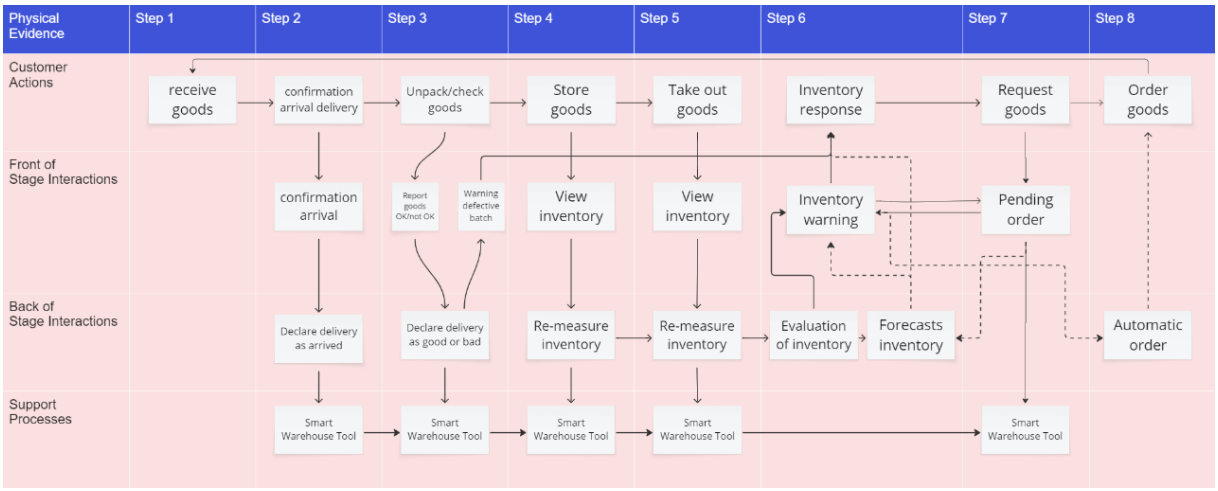
The service business ecosystem was built initially during our workshop, where the different actors are in with the according pain, value flows and value of solving of pains.
In comparison to the initial version, we matched the given pains with the value proposition of our solution. Additionally, we crossed out values of pain which our solution cannot address.

Taking this and visualizing other factors like financial, emotional and social value streams, the service ecosystem is looking like this:



We plan to involve ERP vendors and operators to get easy access to suppliers and manufacturers in the beginning, which would kickstart our business. After that, suppliers themselves may take on the role of partners, depending on the development of the project.

Our core technological resources include IoT sensors, machine learning, and cloud infrastructure. Built on these, our Smarter Warehouse software platform is a proprietary solution that integrates and utilizes these capabilities.
Our sales channels include trade fairs, expert and consultant networks and product demonstrations in our lab environment. After the first few acquisitions we will bring our customer success stories into marketing.



The service blueprint further clarifies how and where "Smarter Service" is used. Logistics receives the goods and signs them. Once they are in the system, the next levels, namely production and Supply Chain Manager (SCM), are informed. What happens if the goods are defective is important. The system informs the individual actors that there is a need for restocking, and they must respond. The dashed line describes how a fully automated solution would work. Even in an automated solution, this model still requires confirmation from an operator. This can be deleted at the customer's request. Logistics, production, and SCM are separate from each other in terms of active processes but connected to the system. The "back-of-stage interaction" "Evaluation on Inventory" is the connecting element. This enables individual departments to plan better and thus have greater planning reliability.

4. Discussion and Outlook

At the beginning of this project, we were uncertain whether a Smarter Warehouse platform could genuinely coexist alongside traditional ERP systems. One could criticize our endeavor as overly ambitious or an attempt to reinvent the ERP. However, over the course of our research and development, we have gathered substantial and compelling evidence to refute this concern. There is a gap between high-level operational systems and the physical realities of inventory and material flow on the shop floor. Through interviews with stakeholders, discussions with industry experts, and a review of relevant literature, we have found overwhelming support for a specialized approach to warehouse management.

While ERP systems became mainstream in the 1990s, the practical adoption of IoT-based warehouse technologies is a far more recent phenomenon. Although the concept has been around since the late 1990s, widespread affordability and mass adoption have only become possible in the past decade. The ongoing growth of IoT devices illustrates this evolution. According to industry

estimates (Sinha, 2024), the installed base (IB) has grown from approximately 11.3 billion in 2020 to more than 16 billion in 2023, and is expected to surpass 40 billion by 2030.

In conclusion, while nearly all SME today utilize some form of ERP, very few have critically addressed the need for a holistic, warehouse-centric system that integrates real-time data, machine learning, and intelligent automation.

As our concept for the Smarter Warehouse relies heavily on IoT-scale sensors, one of the primary constraints remains the high initial investment costs. The sensors are crucial for our service but also introduce significant upfront hardware and integration costs. This applies to both the development process and deployment to customer sites. Although the goal of this project was to design a smart service, our initial implementation leans toward a hardware-intensive solution. This presents a major challenge for the business model and may hinder budget-constrained SMEs from implementing. Another critical consideration is the sensor technology itself. Developing reliable, scalable sensors tailored to our needs is non-trivial and poses both technical and logistical hurdles. These are not off-the-shelf products that can simply be resold or distributed, which further complicates scaling the solution in its current form.

We briefly explored alternative concepts with potentially lower infrastructure requirements, such as using electronic gatekeeping systems at warehouse entry and exit points to track the flow of material. These could be enhanced with paper trail analysis, allowing the platform to process and match documentation rather than relying solely on sensor-based observations. While such an approach could significantly reduce the need for deploying large numbers of costly sensors, it would certainly introduce its own set of challenges.

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BLUEbalance
SUSTAINABLE WATER USAGE

F.Bartholdi , S.Büchi , A.Ille , S.Maselli
04.07.2025

Abstract

BLUEbalance is a data-driven smart service that enables the sustainable and predictable use of surface water for industrial cooling processes. The system responds to key challenges in water management, such as regulatory uncertainties, a lack of forecasting tools and inefficient data preparation processes. Industrial companies need a reliable basis for decision-making in order to reconcile ecological and economic requirements - BLUEbalance provides this through an intelligent model that uses hydrological, meteorological and geodata-based information.

The service enables automated reporting, efficiency analysis and site assessments through a user-friendly interface and minimally invasive integration of existing sensors. Companies benefit from cost savings, sustainability and regulatory compliance, while authorities gain data-based transparency and a useful basis for water use coordination.

The addressable market currently comprises around 200 existing water-coupled industrial plants in Switzerland and potentially companies near water from sectors such as pharmaceuticals, chemicals, food and metal processing. Additional services and international expansion are planned for long-term scaling. Risks exist in terms of data availability, model validation and data protection issues. The study recommends initial development as an internal company service with subsequent opening up to external users.

Key words
Water utilization, concession, sustainability, forecasts, planning security, natural energy, carbon dioxide footprint reduction, Industrial cooling, process cooling

1. Which Challenge Do We Solve?

BLUEbalance stands for a sustainable and more predictable use of natural resource water.

1.1 Use Case - current situation and challenges

The sustainable use of water resources is a key challenge for many companies and authorization authorities - especially when abstraction volumes must meet ecological, regulatory and economic requirements at the same time (OECD 2015, BAFU 2025). In today's practice, however, there is often a lack of reliable decision-making bases to efficiently reconcile these requirements. Companies need planning security for their industrial processes, but are confronted with strongly fluctuating framework conditions, for example due to climatic changes, seasonal fluctuations or divergent requirements. (NCCS 2021). A major problem in water management is the lack of clarity regarding future withdrawal options. The legal requirements are partly fixed (e.g. minimum discharges) and partly dynamic (e.g. in the event of competition for use or extreme weather conditions) - there is a lack of data-based tools to take these into account flexibly and with foresight. As a result, companies plan with uncertainties or invest in locations with limited development potential. At the same time, authorities must ensure enforcement and compliance with regulations - with high personnel costs and a limited database.

The environment also often remains under pressure in the current situation: without precise data on current and future water availability, the risk of overexploitation or conflicts of use increases - for example with fishing, agriculture or groundwater protection. Planning feasibility studies are usually carried out roughly, without a realistic assessment of long-term water availability. This affects not only industrial companies, but also energy suppliers, municipal planners and investors (Swissinfo 2025)

In this area of conflict, there is a lack of a networked and intelligent instrument that provides all parties involved with consistent, up-to-date and comprehensible information - and thus harmonizes both ecological protection interests and industrial usage requirements.

1.2 Ecosystem

The principal customer group contains all instances that are withdrawing water from a water body or might plan to do so. Mostly, these are individual companies or heating networks. Second, the authorities as owners of water bodies such as Cantons and the Federal Bureaus in Switzerland are key players in our ecosystem (Swissinfo 2025). The environment, a cluster of different natural and representative actors, plays a rather passive but very important role. It delivers value to all other instances and needs protection to limit the unwanted effects on the environment. Today, this ecosystem works, but there is a high potential for optimization of resource usage and a reduction of environmental impacts.

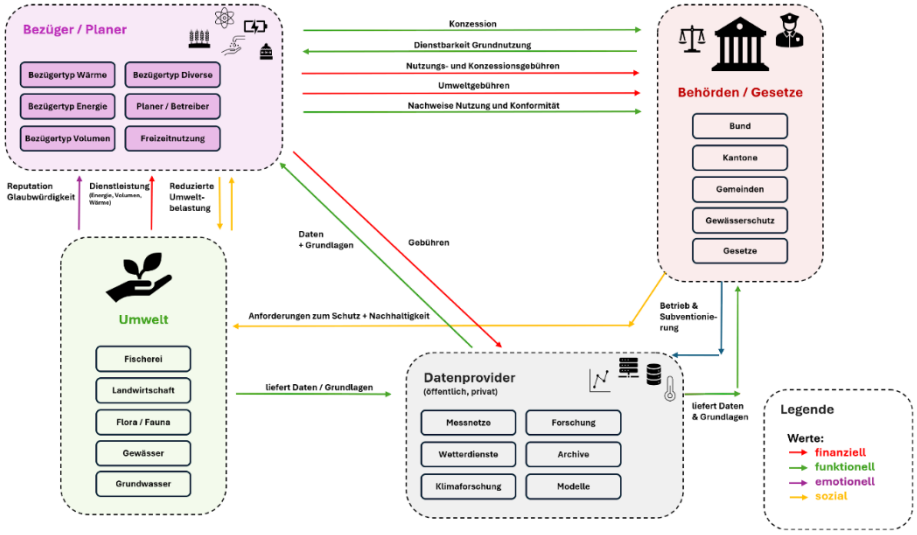

Figure 1: Ecosystem before BLUEbalance

1.3 Value of Pains / Pains and Gains

Customer Insights from the Value Proposition Canvas

The Value Proposition Canvas provides deep insights into the needs and challenges of our target customers. In order to assess the situation precisely, a total of five interviews were conducted in the areas of surface water use in order to be able to address the customer. The focus here is particularly on the responsible technicians, plant operators and product owners, especially regarding compliance with the Group's prescribed climate targets.

The most important findings include:

- **Tasks to be completed:** The customer needs a sustainable, clear solution that is both compliant with the authorities and sustainable.
- **Pains:** The regulatory requirements as well as consistent water quality and accurate forecasting. Very time-consuming processes for documentation and monitoring.
- **Gains:** Customers want a sustainable, cost-effective alternative to existing solutions. This should be state of the art and easy to use.

These results emphasize the urgency and relevance of the solution to be developed; a sustainable and stable solution must be worked out.

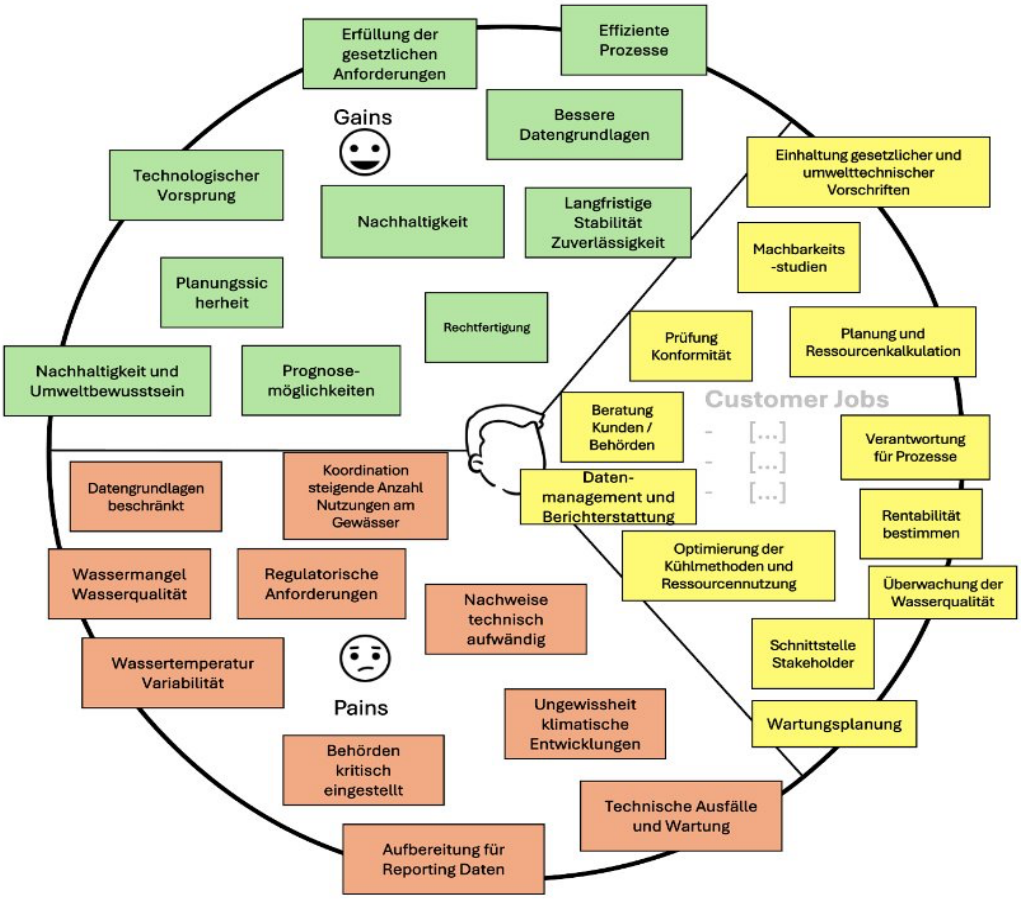

Figure 2: Value Proposition Canvas

Value of Pains

Based on the already known values or costs for energy utilization, it is possible to calculate relatively precisely how much the previous systems cost (Meierhofer, J., Pascher, N., & Wulf, J., 2025).

Pain Nr.	Pain Name	Technical Description	Customer		
			Numerical Value Frequency (how many times per annum)	Impact CHF	Value of Pain CHF (annual)
	Total annual value	**sum over all pains**			70.750 CHF
1	Use of external refrigerants (fresh water/waste water) Without maintenance and operation	If the temperature is already close to the limit value of 26 °C, the water cannot be used as a natural energy source. An alternative coolant must be used, which incurs additional costs for the company. The use of surface water also saves costs, as there is no waste water charge.Abwassergebühren entstehen.	5800000 m3/year	1.8 Fr./m3	10.44 MCHF
1b	Utilisation of surface water instead of groundwater	Utilising surface water is at least 10% more efficient than using groundwater. Topic: Energy costs	325000 m3/year (Power comsumption: 7300 kWh / Jahr)	0.35 Fr. / kWh	2555 CHF
2	If there is too much water in the Rhine, no energy can be generated (locks open)	In the event of heavy rainfall or storms, the energy from the watercourses cannot be utilised. The sluices of the waterworks have to be opened to cope with the water volumes. This results in a loss of unused potential energy. There is also a risk of damage to the system if you are caught by surprise.	20 days / year	(1/5 lost power) * (7 machines*6.7 MWh/machine) * 0.0674 fr./kWh = 632.20 fr.	12644 Fr.

Figure 3: Value of Pains for a company with an existing surface water cooling system

The values determined refer to a large pharmaceutical company that requires around 5,800,000 m3/year or an average of 660m3/hour of cooling water. The use of drinking water or treated water is cost-intensive, so calculate a factor of 5 when comparing surface water to treated water. In the CO2 balance, a factor of 3 is added here.

2. By which Data-Driven Service Approach Do We Solve the Challenge?

2.1 Value Proposition Canvas

Based on the value proposition canvas outlined below, the problems identified illustrate that the use of conventional media is a major cost burden for the company. Monitoring and documentation are also very time-consuming. Authorities-compliant use must be always guaranteed. Sustainability must be in line with the Group's climate targets, and a predictable solution must be made available to the user.

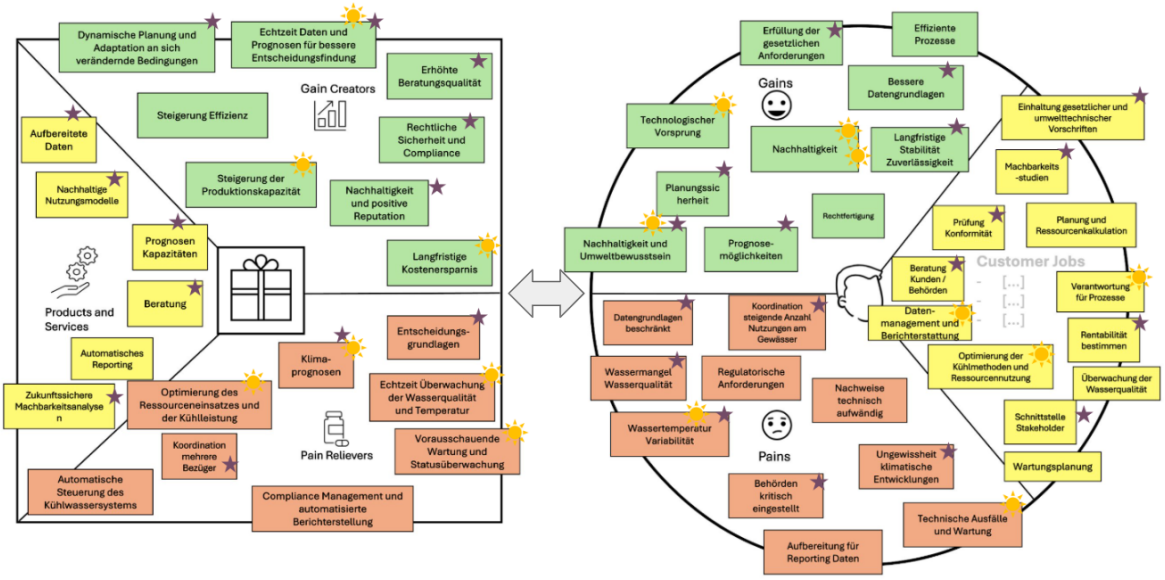

Figure 4: Value Proposition Canvas with BLUEbalance. Corresponding items marked with symbols.

2.2 Data, models and Usage

The foundation of our service is a predictive model that estimates surface water-based cooling potential for industrial processes by integrating hydrological, meteorological, and geospatial data. In the initial development phase, we rely on openly available datasets provided by authorization authorities. These include long-term river monitoring data (e.g., discharge, temperature, water levels), meteorological records (e.g., air temperature, precipitation, solar radiation), geospatial information (e.g., river network, digital elevation models, land use), and official residual flow maps relevant for legal and ecological constraints.

The key advantage of these datasets is their temporal depth and consistency. Many of them span multiple decades, with some records dating back to 1976. This enables us to train and validate the model across a wide range of hydrological and climatic events, including extreme weather scenarios, low-flow periods, and seasonal variations. The model is initially tested and calibrated on selected river segments, which serve as validation cases under different environmental and industrial conditions.

If predictive accuracy in specific regions proves insufficient, the model can be locally improved by incorporating additional data. This may include high-resolution datasets acquired from private providers or the deployment of dedicated measurement stations to collect real-time, site-specific data.

2.3 Customer Journey and Storyboard

As you can see from the ecosystem, BLUEbalance is a link between various players and agencies/ authorities. This results in various points of contact with potential users, whereby the use-case of data processing for an industrial company is shown below in Fig. 4 where the customer journey is represented by a storyboard. An industrial company that uses surface water for energy production or energy output prepares a report at least once a year to confirm that the concession is being complied with. The correct data preparation can take several days of work for a technical employee who is operating the system.

Figure 4: Story board of a plant operator

The contact points of the technical employee, the actual customer journey, are shown in Figures 3 & 4 of the storyboard. If the data preparation is taken seriously and the maximum values of the concession are not simply entered in the report, the preparation takes a long time and is a tedious data compilation. By interacting with BLUEbalance, i.e. using the tool, the system data is entered into a predefined data structure, and the report data is generated automatically.

There is no need to convert sensor data with possible flow volumes and different system temperatures. The tedious preparation of water and system data for creation is eliminated, and the technical employee saves a considerable amount of time. In the time saved, the employee can focus on checking and improving the control of the system.

2.4 Prototype

Building on the developed predictive model and data infrastructure, the prototype is deployed at a major industrial site with a substantial existing cooling demand using river water. The system provides the client with a user-friendly digital interface and integrated reporting tools. This setup enables plant operators to

continue manually managing their cooling operations while gaining data-driven insights into optimization potential.

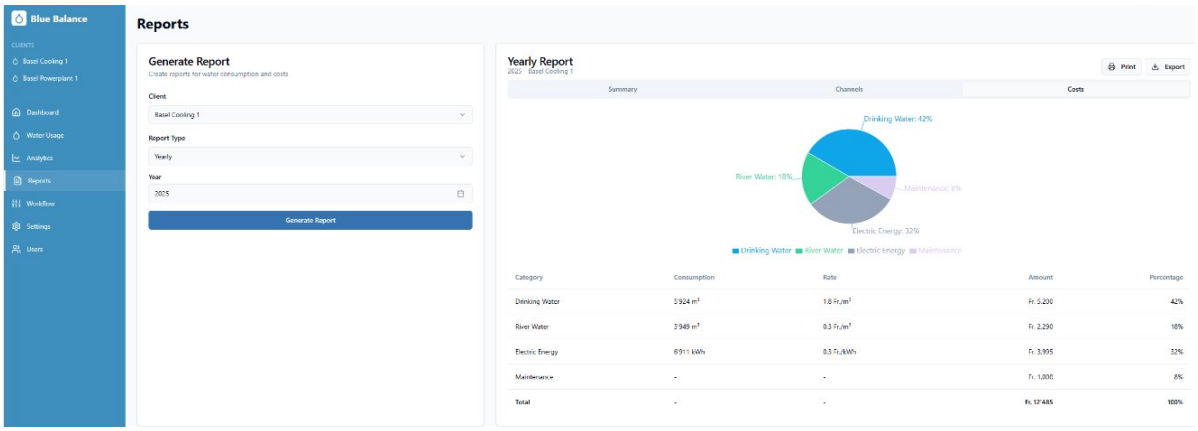

Figure 5: Plant Report and preview of the potential and saved cost's

The technical integration required for deploying the prototype is minimal. In most cases, it is sufficient to incorporate existing sensor data from the client's infrastructure. Specifically, flow rates and temperature measurements of the river water and any alternative cooling sources such as drinking water systems. These measurement points are typically already in place, and the integration involves only the secure provision of this data into our test environment. This enables immediate use of the reporting functions and allows us to assess and communicate efficiency gains clearly.

Through the digital interface, users receive real-time forecasts and scenario-based analyses based on current and predicted environmental conditions. The reporting functionality supports before-and-after comparisons, helping the client quantify potential water savings, CO_2 reductions, and cost efficiencies. In parallel, the integrated data feed allows us to improve model accuracy and tailor recommendations more precisely to the specific operational context. This low-barrier implementation creates immediate value by improving transparency and supporting informed decision-making without requiring changes to existing control systems.

2.5 Value Creation

Due to the current temperature increase of 2.9 °C above the average in Switzerland and the agreements on active climate policy (climate zero by 2030), the focus on sustainable energy sources and the use of sustainably produced energy is becoming increasingly topical. The switch from fossil and CO2-laden energy sources to sustainable producers will make it more difficult to use natural resources for energy efficiency in the future.

1. Cost savings

- Water procurement costs: River water (0,3 Sfr./m3) can often be cheaper or even free of charge compared to drinking water (1,8 Sfr./m3) or treated water.
- Energy consumption: River water usually has a relatively stable and cool temperature, which can reduce the energy required for cooling.

2. Environmental benefits

- Reduced freshwater consumption: Using natural water reduces the pressure on drinking water resources.
- Sustainability: Use of local water sources can be more ecologically sound if used sustainably.
- CO_2 emissions per liter:

  Surface water: approx. 0.3 to 0.5 g CO_2 per liter
  Groundwater: approx. 0.1 to 0.3 g CO_2 per liter
- *Conclusion:* Surface water emits approximately 1.5 to 3 times more CO_2 than groundwater during drinking water production.

3. Technical benefits

- Constant cooling temperature: River water often has a relatively constant temperature throughout the year, which can improve process stability.
- Avoidance of complex water-cooling technology: Direct utilization can reduce the complexity and costs of the cooling system.

4. Economic effects

- Reduced operating costs: Less treatment and energy consumption save money.
- Competitive advantage: Cheaper cooling water sources can reduce production costs and thus increase competitiveness.

Important:

The use of natural energy sources such as Swiss waters (energy, generation and energy effluents / groundwater and surface water) is currently only regulated at the municipal level or even regionally. There are no comprehensive temperature models, regulations, or verifications.

2.6 Different levels of service

In addition to creating reports for the companies, deeper integrations are also on the agenda as the application's autonomy increases. In addition to reducing the working time required to create the reports, this should also reduce the time required by the technician to operate the system. The time saved by the employee can be used to maintain the efficiency of the system through constant maintenance and inspection. Costs can be reduced by minimizing alternative energy sources while maintaining production.

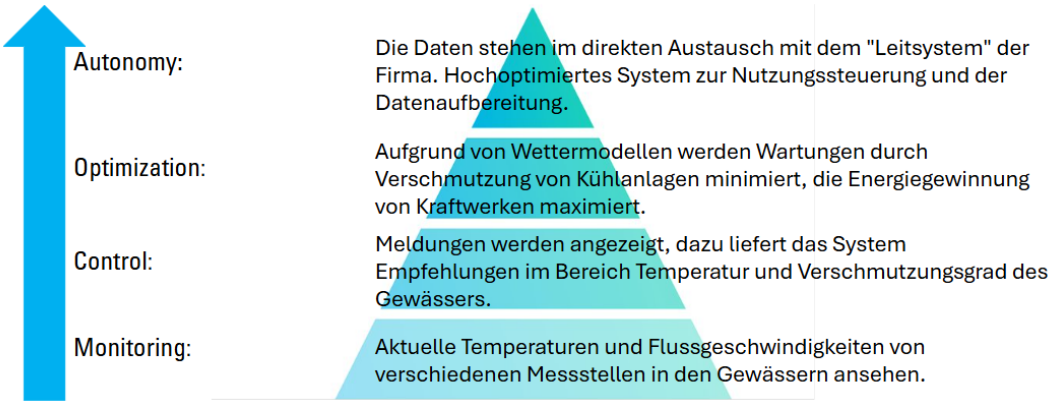

Figure 6: Functional levels of BLUEbalance based on (Porter & Heppelmann, 2014)

3. What Does Our Target Service Business System Look Like?

3.1 Mutual Value Creation

The Services of BLUEbalance will create mutual values: industrial users gain efficiency, sustainability, and cost advantages, while the service provider collects valuable operational and environmental data. These data enable further optimization for additional clients, serve as transparency tools for regulators, and support the planning and design of future cooling infrastructure. Through ongoing data-driven interaction, both parties co-create value enhancing industrial performance and environmental outcomes alike.

3.2 Business Model

By adopting or accompanying the above-mentioned processes and value flows, the business model is based on several pillars or so-called services. Based on the used and continuously expanded database and model configuration used by BLUEbalance, various pains can be solved, and gains can be created.

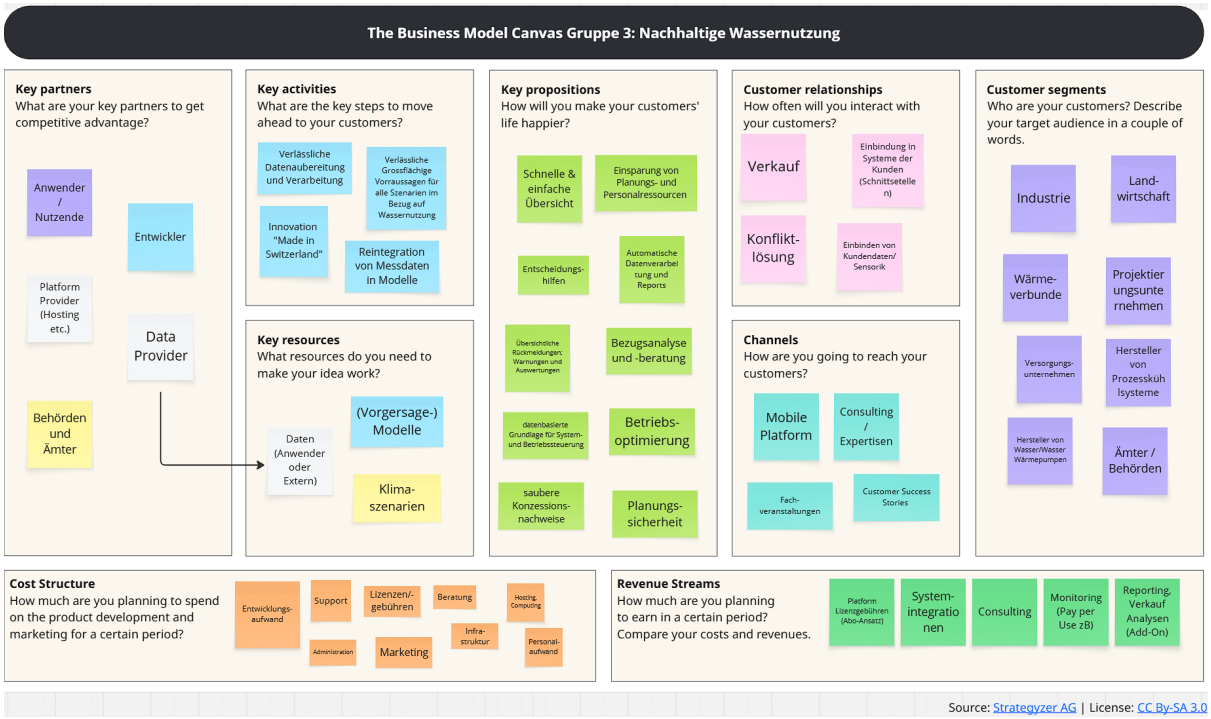

Figure 7: Business Model Canvas (Strategyzer AG, 2025)

As an example, a zoom on one of the possible service blueprints from BLUEbalance is shown below. Where it is important to note that this only represents one of the various services offered.

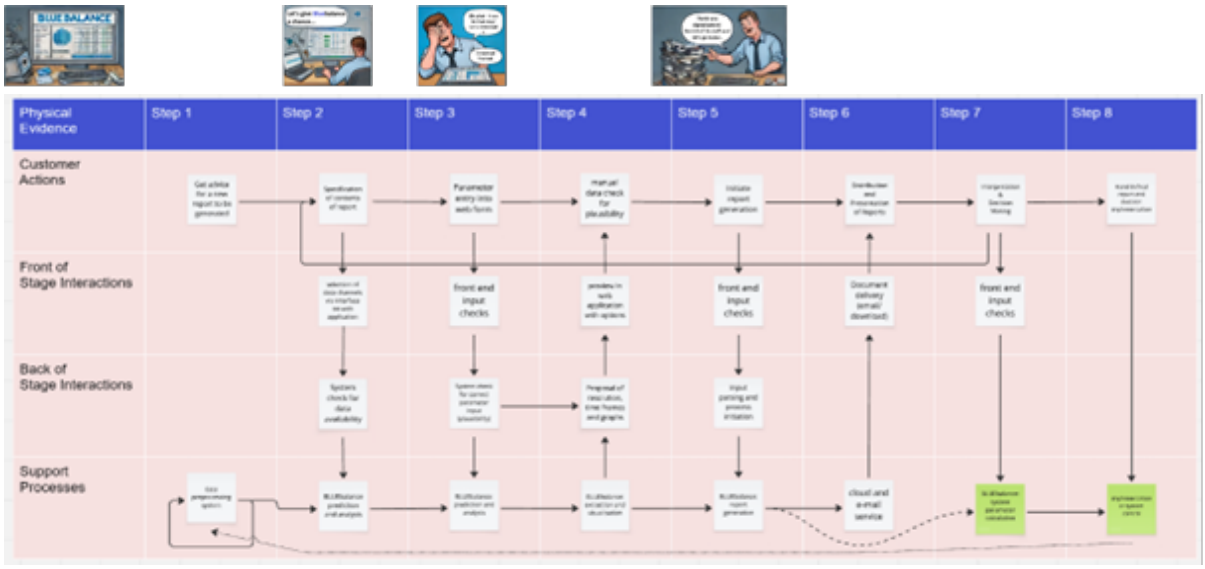

Figure 8: Service Blueprint with Moments of Truth from the Storyboard. Zoom to the Service “Reporting”. Adapted from Miro (2025)

3.3 Business Case

It can be seen from the Ecosystem that BLUEbalance is a partner of various companies and representatives. For the preparation of the business case, however, primarily only companies with systems for energy extraction or energy delivery to surface water were considered.
If the data from 2018 is studied, within the picture below, it can be seen that approx. 200 plants are in operation and therefore must produce annual reports for their concession.

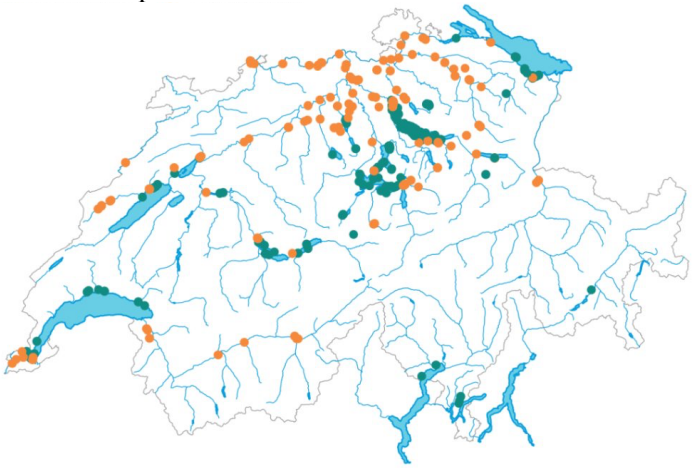

Figure 9: Concessionary systems with surface water (orange dots: using Rivers, using lakes), NCCS (2018)

In order to gain a further impression of potential customers, the number of companies operating in the pharmaceutical, chemical, food and metal processing sectors was examined. This figure is around 12,000 companies (BFS, 2018). The area covered by surface water in Switzerland is approx. 4%. Taking this figure as an example, statistically around 480 companies should be located near water and be able to use a plant for energy output or energy generation with the use of water.
The addressable market in Switzerland, including for new systems, is therefore not yet exhausted and a potential of services for new projects, efficiency analyses and reports are available.
Although the market potential in Switzerland for these services, like annual reports and license fees for using the model is limited. Rapid expansion into neighbouring countries needs evaluation. There is potential, but early scaling is necessary. Additional services should be offered to broaden the customer profile.

The following considerations were made for the financial business case:

- Each of the 3 co-founders brings CHF 100,000 start-up capital for the development and establishment of the company
- The system will be launched in Switzerland, the expansion of the system will begin in the second year with rivers that map the border to other countries. Later, customer acquisition can be extended to the DACH region.

The assumption was made that if a turnover of CHF 12,500/year can be generated per customer. According to the averaged “Value of Pains”, this is not even 20% of costs. This means that a positive EBIT can be generated from the 3rd year onwards.

Jahr	Kunden	Umsatz	Kosten	EBIT	Bilanz
1	12	150'000 CHF	308'500 CHF	-158'500 CHF	+141'500 CHF
2	25	312'500 CHF	410'500 CHF	-98'000 CHF	+43'500 CHF
3	50	750'000 CHF	630'000 CHF	+120'000 CHF	+163'500 CHF

Figure 10: Financial Business Case Plan

4. Discussion and Outlook

It was possible to find a case that helps the industry to secure the strategically important production sites in Switzerland. It turned out that the basis for pure data preparation represents a small part of the process chain and should not be neglected but should also be expanded.

Another sticking point is to examine how an expansion of the system across national borders can be represented. It needs to be clarified whether the BLUEbalance system can comply with data protection regulations and national requirements.

4.1 Riskiest Hypotheses

The reliability of the data basis and the correct forecasting models still need to be verified. It is currently not clear that the models are working correctly, as in addition to environmental influences, there are also situations in which waters separate two countries, and both sides use the natural energy from them.

The correctness of the database must be checked or at least clarified with the authorities. After verification, the model and the benefits can also be fixed! Despite the large number of installations in Switzerland, see figure in the business case, the use of an open application could make it easier to attract many customers. From a company's point of view, it could be critical to feed the system data into an external tool.

4.2 Discussion

During the development of this business idea, it became clear that the envisaged smart service can basically occupy a clear position in the ecosystem. The input and, above all, the output can be determined in a clear and comprehensible manner. However, it quickly became apparent that the business idea must be based on several pillars in order to generate a profitable and attractive offering. For example, it is not enough just to offer automatic reporting as a service. Accompanying services such as operational optimization, location evaluations for new water withdrawal sites and other services have an impact on various Pains and Gains and combine to form the overall BLUEbalance package. For this reason, a turning point was reached during the development of the case with the realization that BLUEbalance – at least in the start-up phase – must be developed as an internal service of a larger company. In this way, the service can be set up with more in-depth integration and solve many problems in advance, e.g. regarding data protection. Later on, the service can then be provided to external providers, which will ultimately reduce investment costs.

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Smart Planning in Hospitals MedixPlan

Lydia Peschel
Philipp Meier
Tobias Imhof

Abstract

Inefficient staff scheduling and coordination challenges in hospitals can result in high administrative burdens and operational disruptions. Senior physicians often spend up to 20 hours per month planning duty schedules, and many additional hours making phone calls and coordinating replacements when staff members are unexpectedly absent. Furthermore, employees are frequently required to check and update their duty calendars during their free time, while the overall scheduling process remains non-transparent.

To address these inefficiencies, MedixPlan introduces a smart, automated scheduling solution tailored for the healthcare sector. The software generates legally compliant duty rosters, taking into account individual employee preferences, availability, and specific skillsets. When a staff member is unavailable, MedixPlan automatically contacts qualified substitutes via the app — based not only on availability, but also on the required medical expertise and certifications for the role.

This paper presents how MedixPlan enhances hospital staff management by significantly reducing planning time, increasing transparency, and improving employee satisfaction. By streamlining the scheduling process and minimizing manual effort, MedixPlan allows senior medical staff to focus on patient care, while ensuring operational continuity and compliance with labor regulations.

Key words
Staff planning, automation, push notifications, work-life-balance

1. Which Challenge Do We Solve?

In many hospitals, staff scheduling is still carried out manually using Excel or outdated tools by high paid individuals like senior physicians without formal training. This leads to high administrative effort, errors, and little transparency. Replacing absent staff requires time-consuming phone coordination. Existing tools are often too complex and inflexible.

Senior physicians, among the hospital's highest earners, spend hours on planning instead of treating patients — a costly misuse of resources. Their time would generate significantly more value if invested in medical care rather than administration.

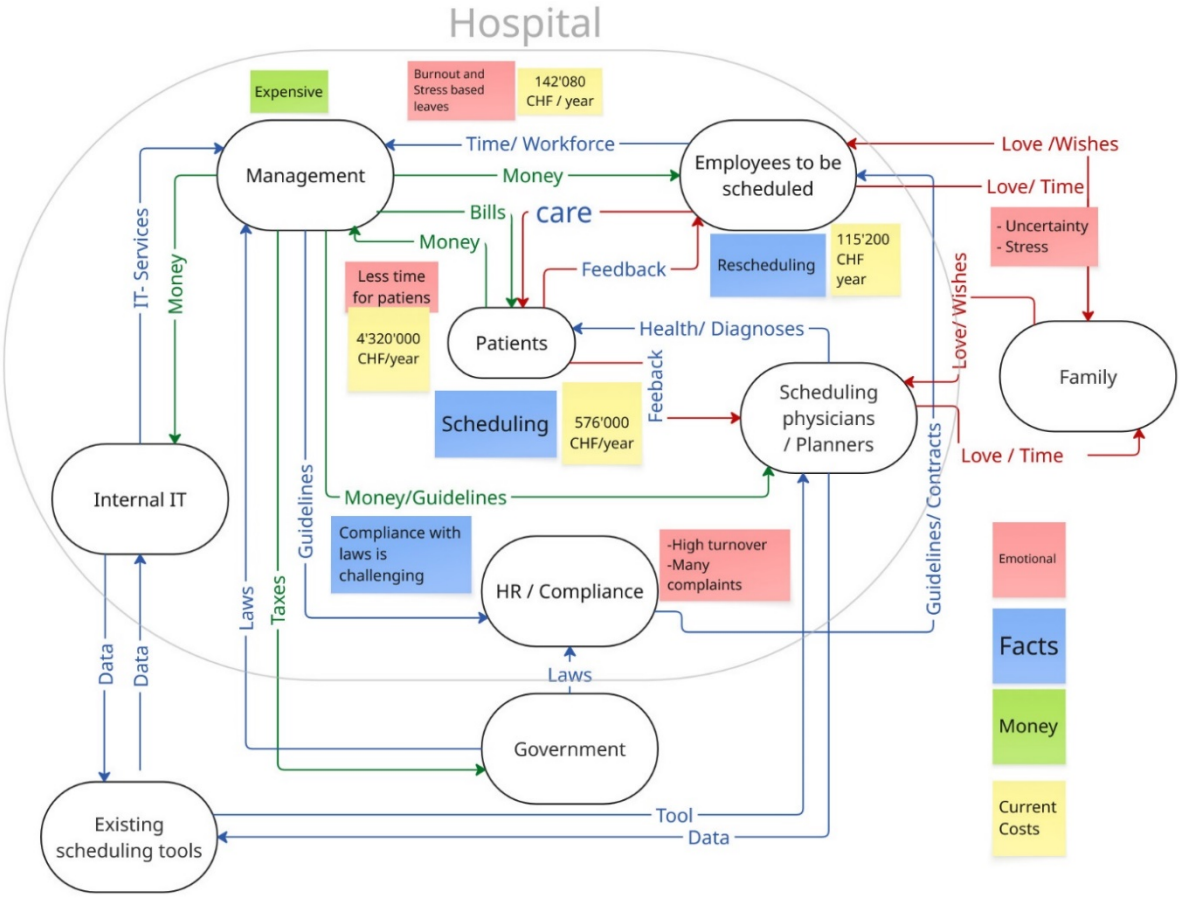

Figure 1: Ecosystem current situation

Beneficiaries

Our potential software should address the challenges of multiple beneficiaries.
Planners and scheduling physicians benefit from significantly reduced effort.
Staff members who are being scheduled gain easy access to their duty rosters from anywhere. The HR department benefits from reduced staff turnover,
and executive management profits from increased overall efficiency and higher financial returns.

Pains and Gains

We have conducted interviews with various roles of our customers, conducted web research on this topic and created the ecosystem, pains, gains in Figure 1 and Figure 2.
The interviews with several people from our customer group provided relevant insights into the various challenges and tasks they face in their day-to-day scheduling work. In this documentation,

we will focus on the two key stakeholder groups in the ecosystem: the employees who are scheduled, and the physicians and planners who create the duty roster.

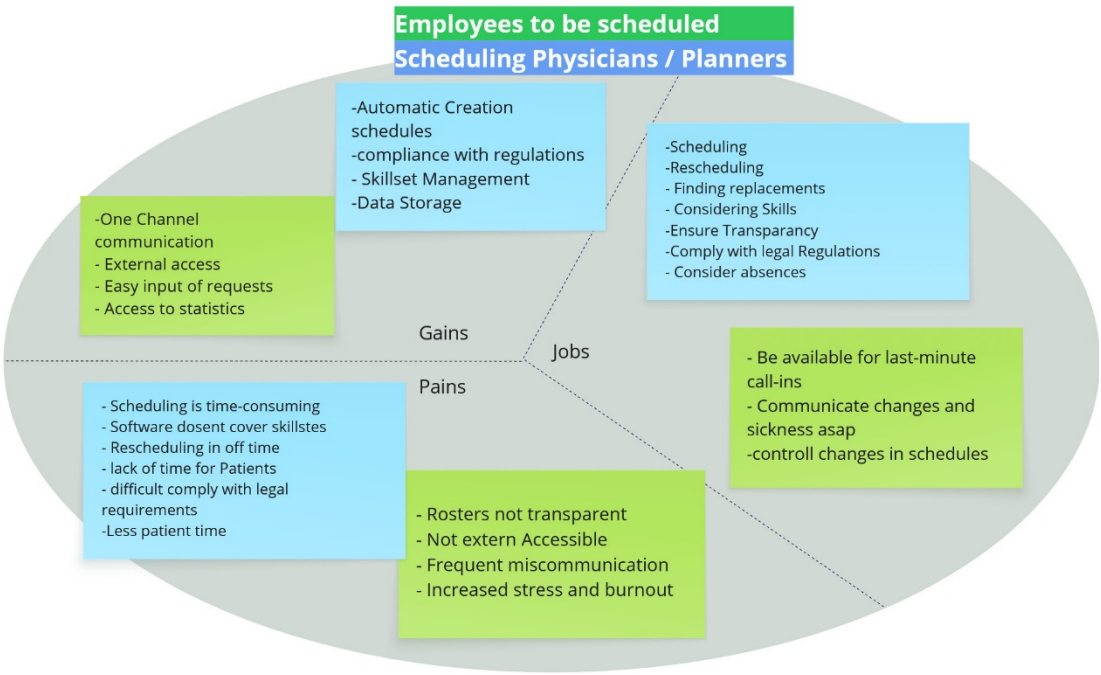

Figure 2: Own illustration based on the Value Proposition Canvas framework (adapted from Osterwalder et al., 2014).

Value of solving Pains

We have selected four defined Pains for the assessment of the "Value of solving Pains." Three of these Pains ("Scheduling is time-consuming," "Rescheduling is off time," "lack of time for Patients") arise directly from the additional administrative workload of the scheduling physicians/planners for the creation/update of personnel deployment plans. Additionally, there is the Pain "Increased stress and burnout" that occurs among employees. We see the greatest potential for reduction of these Pains through our solution.

The functions and services described herein are expected to generate substantial annual cost savings for hospitals. These estimated savings are detailed and quantified in the table below.

Tabel 1: Value of solving Pains (adapted from Meierhofer et al,,2015)

Pain	Parameter	Current cost	Parameter Alleviated	Future cost	Savings
Less Time for Patients from Senior Physisians	20h per month 15 persons per Hospital 1200 CHF per h	4’320’000.00 CHF p. year	1h per month 15 persons per Hospital 1200 CHF per h	18’000.00 CHF p. year	4’302’000.00 CHF p. year
Needed Time for Scheduling	20h p. month 15 persons p. Hospital 160 CHF p. h	576’000.00 CHF p. year	1h p. month 15 persons p. Hospital 160 CHF p. h	28’800.00 CHF p. year	547’000.00 CHF p. year
Rescheduling due to absence	4h per month 15 persons per Hospital 160 CHF per h	115’200.00 CHF per year	1h per month 15 persons per Hospital 160 CHF per h	28’800.00 CHF p. year	86’400.00 CHF p. year
Vacancy due to stress and burn out	14.8 h p. month 8 persons p. Hospital 100 CHF p. h	142’080 CHF per year	14.8 h p. month 2 persons p. Hospital 100 CHF p. h	35’520.00 CHF p. year	106’560.00 CHF p. year

2. By which Data-Driven Service Approach Do We Solve the Challenge?

Value Proposition Canvas (fit per ellement)

Based on the Value Proposition Canvas, and the pains and jobs clarified through the interviews, the tasks and functions of the MedixPlan software services have been defined to address issues such as lack of transparency and the time-consuming process of scheduling and rescheduling.

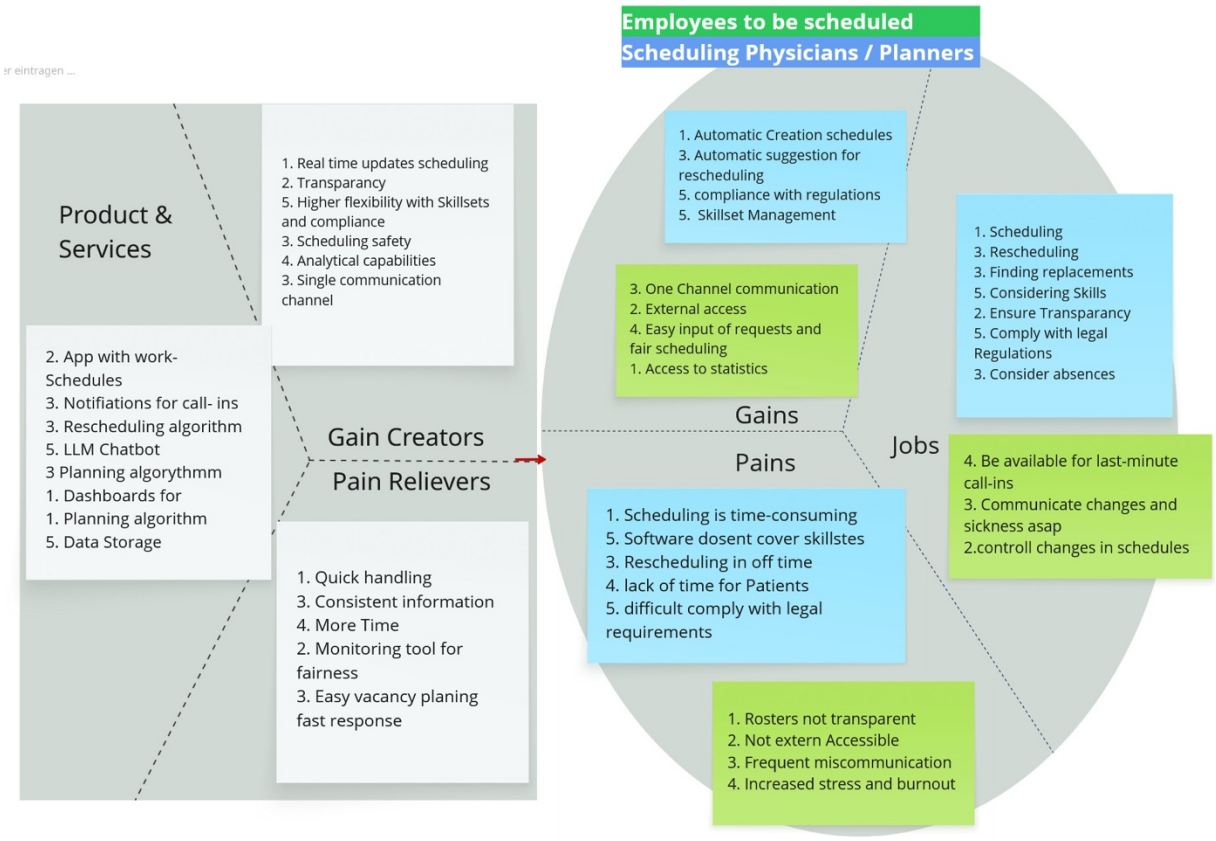

Figure 3: Own illustration based on the Value Proposition Canvas framework (adapted from Osterwalder et al., 2014).

Data and LLM

Medixplan leverages data regarding institutional work scheduling rules, personnel skills, contractual work hours, and statutory working time regulations from the HR department to conduct its functions.

Additionally, the currently used work scheduling can be imported in various data formats. If necessary, a Large Language Model (LLM) will provide the functionality needed. Furthermore, an LLM can be enabled by the user to support the creation of new work schedules from scratch, apply changes to the plans and input information like personnel skill sets or suggest training to increase flexibility of the staff.

We found statistics about work schedules to be a highly requested feature, therefore a suitable

storage system for both the work schedules and the reports will be created.

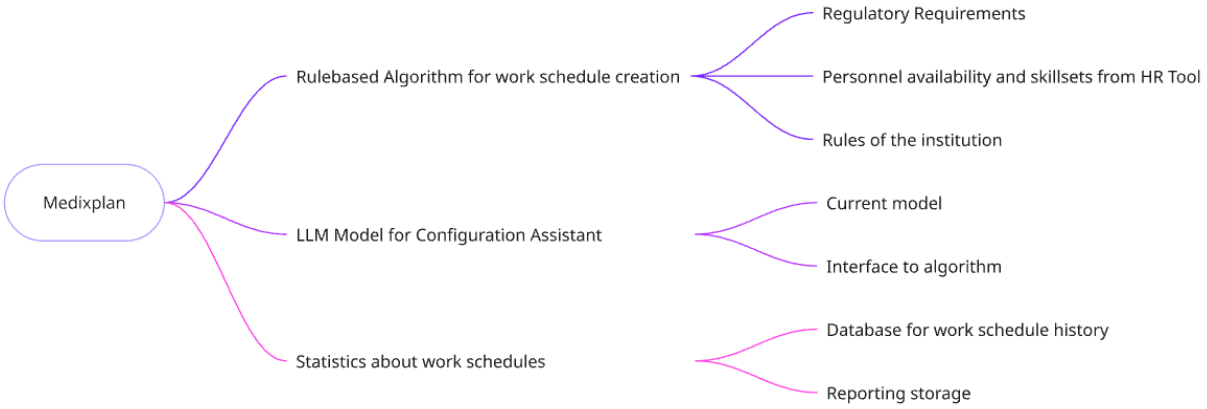

Figure 4: Self-created illustration of data techniques applied in service functions.

Storyboard

Our storyboard illustrates the advantage of MedixPlan in adjusting work schedule. In this case, it involves an employee who is unable to fulfill their work duties due to illness. Unlike current models, the supervisor does not need to actively search for a replacement. MedixPlan automatically contacts the most suitable employee based on its algorithm. The corresponding employee can independently confirm the work shift. The supervisor only receives a notification for information.

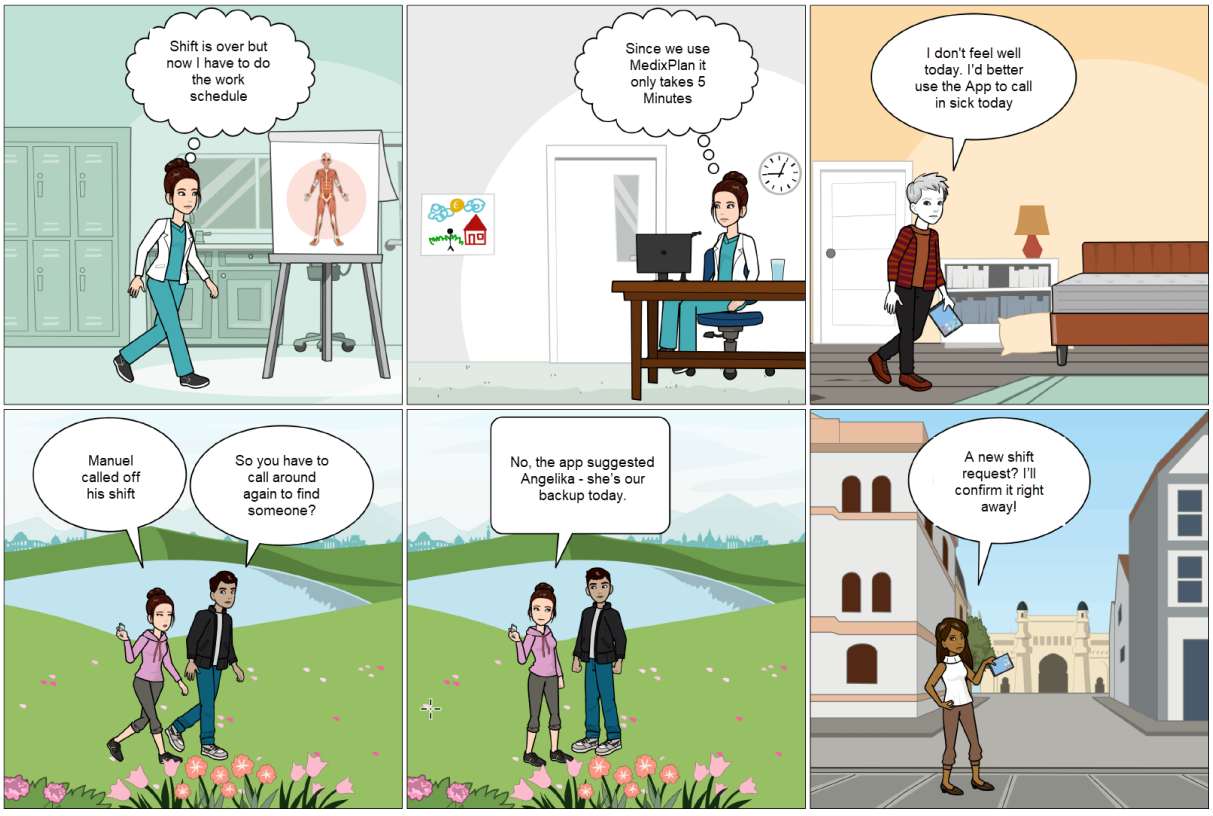

Figure 5: Self-created illustration of the storyboard

Environmental and Social Value

The implementation of our business idea does not generate any environmental value. It does not lead to a reduction in CO2. However, social value can be generated. The current situation in personnel planning is unsatisfactory for the parties involved. As a result, indirect costs arise from increased administrative effort, higher turnover, or the departure of qualified employees from the healthcare sector to more attractive industries. These indirect costs in healthcare must be financed

through health insurance premiums. Lower premiums would benefit the entire Swiss population accordingly.

Service Value Creation Levels

The current software programs only enable monitoring by manually creating shift plans and presenting them with a certain overview. MedixPlan will additionally provide options at the levels of control and optimization. It is designed to actively check recorded work assignments for double bookings and violations of labor laws (control). Moreover, the creation of shift plans according to the stored preferences of employees, as well as automatic adjustments (e.g., due to illness), will be possible (optimization).

Our software solution will feature a web interface for the planner and team to show the latest changes and upload new plans. As well as mobile apps to ensure distribution of requests and answers during automatic adjustments.

For future implementations we plan to integrate a Large Language Model interface for the planner, to help alleviate the manual labor of creating plans.

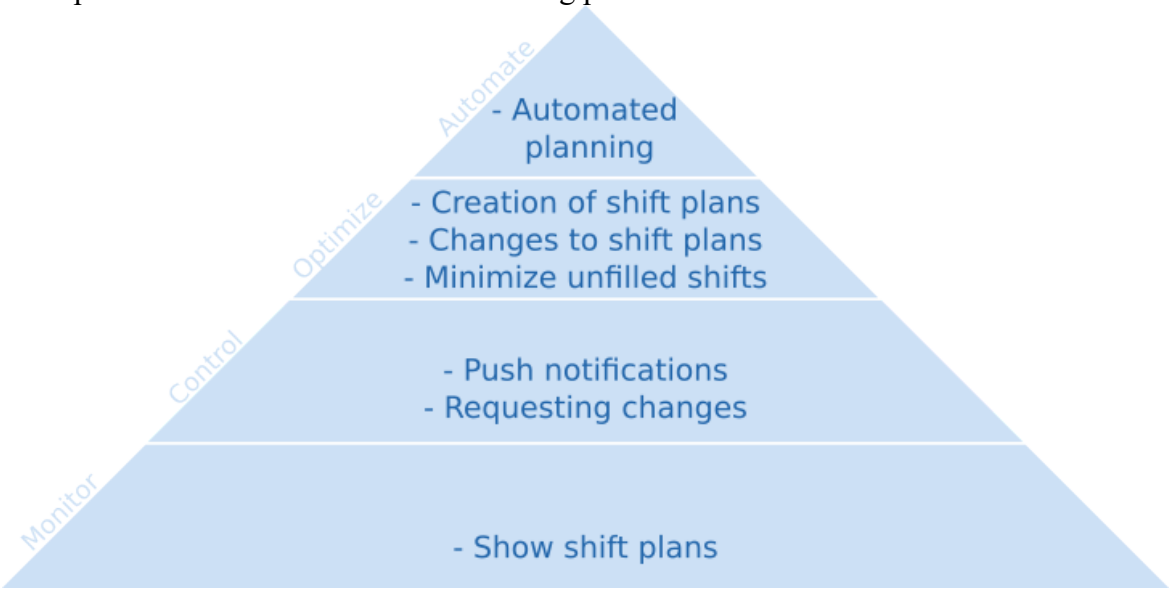

Figure 6: Service level functionalities based on (Porter & Heppelmann, 2014)

3. What Does Our Target Service Business System Look Like?

Target ecosystem

As already shown in Chapter 1, our target business system consists of various actors. Additional actors will now be added (displayed in pink color). On the company side, we have ourselves (MedixPlan), the provider of the time tracking software (Time Tracking Software) used by the hospital. As the central actor, the hospital itself remains. Additionally, the government plays a key role by setting the legal framework for staff scheduling, and the families of staff members influence work-life balance and emotional well-being.

Within the hospital, key departments such as Management, HR/Compliance, Internal IT, and Scheduling Teams use the system to ensure efficient staffing, compliance with regulations, and cost control. At the individual level, scheduling planners operate the system, employees provide availability and receive their schedules, while patients indirectly influence staffing needs through their care requirements.

Non-human actors include the MedixPlan system, the time tracking software, and various data sources (e.g., absence data, legal regulations, patient information).

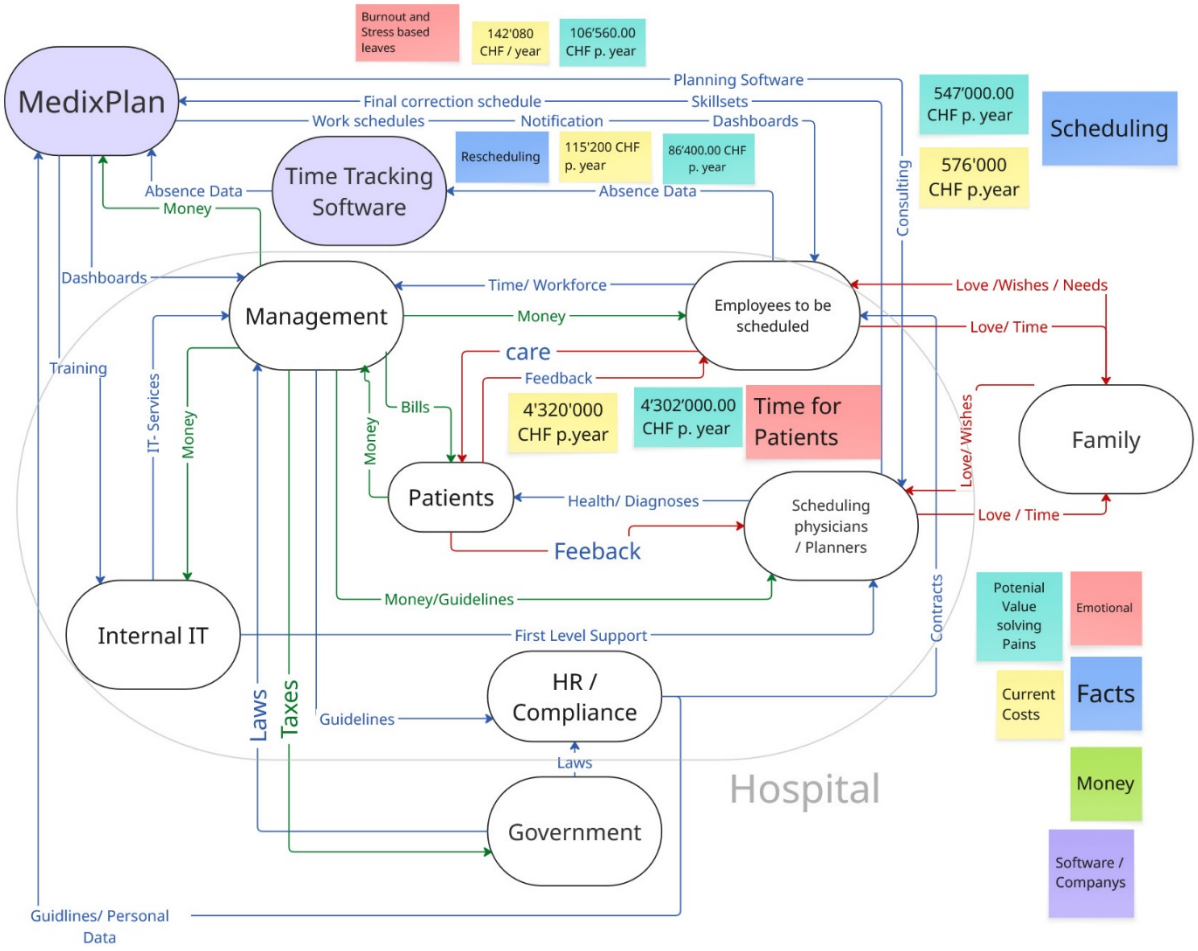

Figure 7: Ecosystem target situation (Updated Figure 1 with Medixplan)

Rough Business case

The users are provided with an interface to upload drafted work schedules from excel or pdf, saving manual conversion work. The work schedule is distributed to the team members via the app. The team members can then use the app to view the work schedules, request corrections, and call in sick. In this case, the app will offer the shift to colleagues one-by-one until replacement is found. For this functionality, we claim a price tag of CHF 15 per user per month for the app subscription. By this we share the estimated cost savings of distributing updated shift plans and rescheduling roughly 50:50 between the customer and Medixplan.
The customer can purchase a digital add-on to help with drafting the initial work schedule. For this functionality we claim a price tag of CHF 50 per work schedule, sharing the cost savings roughly 50:50. The cost savings in this case benefit the customer with the opportunity to treat additional patients and generate more income. We calculated the potential additional earnings to be > CHF 4'000'000 per year for an average swiss hospital.
With the Fixed Costs (server + salaries) remaining the same over a very long time and an estimated 50% conversion rate of users per hospital and an expansion of 1 new customer every 4 month, we estimated a break-even with

$$\text{Break-Even Point} = \frac{\text{Fixed Costs}}{\text{Contribution Margin Ratio}}$$

of about 9 months or our third customer.

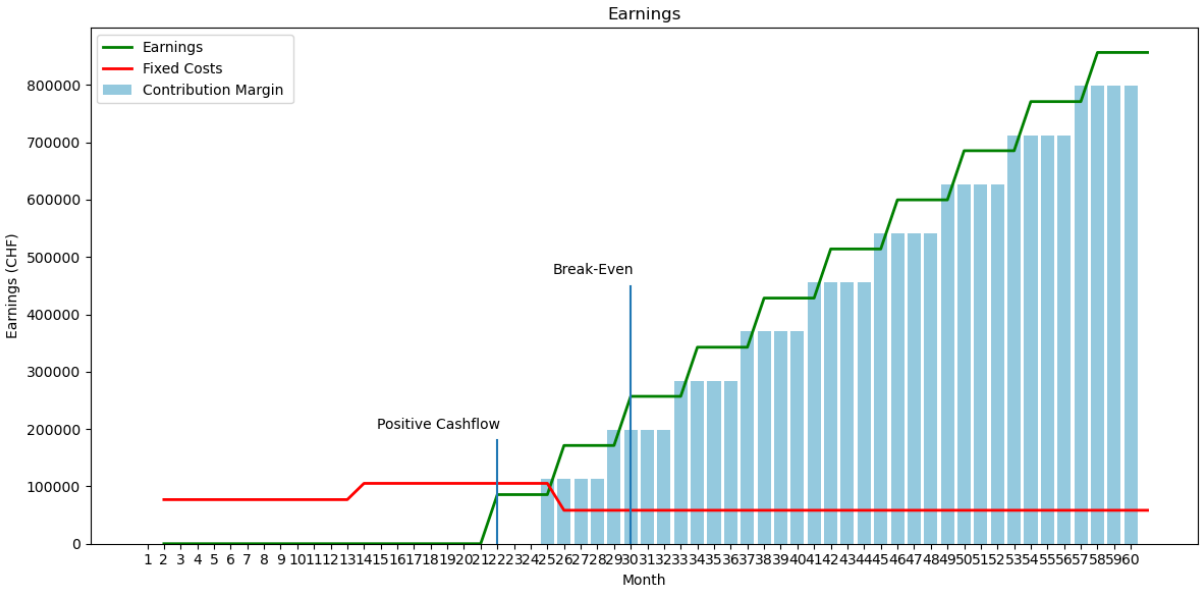

Figure 8: Cost and income chart including the break-even point

4. Discussion and Outlook

Our research and interviews with various employees in the healthcare sector have shown that there is a demand for an innovative software/app for staff planning. However, it could not be determined exactly how such a product must be designed. The relevant stakeholders are known and can be contacted directly (e.g., hospitals). However, it is still unclear whether and how many of these stakeholders will definitively decide on a collaboration or investment in our product. A corresponding commitment from the relevant stakeholders still needs to be established. Therefore, appropriate tests need to be conducted.

As part of the development of the business case, it became clear that an ongoing automated notification (via push notification) to the affected individuals in the event of necessary adjustments to the staff plan already generates significant added value. The creation of a staff plan will initially not be integrated into the app. These manually created plans still need to be uploaded for now. By focusing on push notifications, development costs can be reduced. Furthermore, a quick market entry and the generation of revenue are also possible.

In the next step, three hypotheses will be tested, which we consider important for the further development of the business case. However, their confirmation cannot be proven at this time. These hypotheses are:

- We believe that hospitals will pay for the product.
- We believe that we can convince all key partners.
- We believe that we can offer a lean, attractive solution.
-

The tests will be structured as follows:

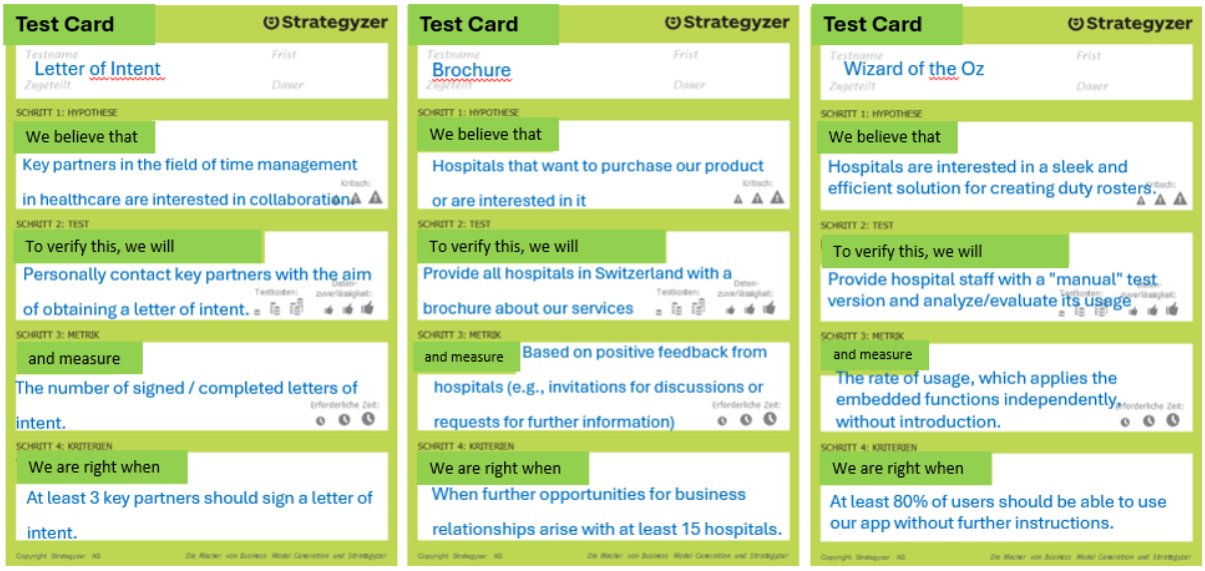

Figure 9: Business case test cards.

The results from the tests will be taken into account in the further development of the business case.

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The Course of the Year 2024

In 2024, we encountered four particularly intriguing cases. While not intending to prioritize them, they are presented in the following order:

The initial two cases pertain to the use of data in productive industrial contexts. The first paper examines how data can be made available to data scientists in B2B settings such for extracting more value of that data while saving considerable time and effort, while the second addresses further improves fraud prevention in financial processes.

- Data Aggregation and Enrichment
- Fraud prevention - Fraud Fighters

There were two additional cases focused on enhancing B2B processes through specific platform strategies. The third case pertains to match job offers with job seekers specifically for very specialized technical blue-collar jobs, while the fourth involves efficiency and sustainability for office management and office cleaning in facility management.

- Match Me if You Can
- Smart Office

The results described in these papers were achieved through extensive exploration, design, and conceptualization. The two-day Mobiliar Forum workshop further advanced the cases, with a strong emphasis on evaluating mutual value creation within the ecosystem. Special thanks to Ina Goller for her excellent moderation and to Fabrizio Laneve for facilitating the class's attendance at this wonderful workshop location.

The class had the opportunity to receive feedback from a distinguished expert jury, benefiting from their experience during two pitching rounds (following the development of the value proposition, including digital prototypes, and after the development of the service business system). We are deeply grateful to these experts for dedicating their time and expertise: Ariane Trammell, Jochen Wulf, Rodolfo Benedech, Simon Weisskopf (listed alphabetically by first name). Their insightful feedback was crucial in elevating the cases to the next level.

Data Aggregation and Enrichment

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Abstract

Over the last 10 years, the economic value creation through data processing has increased significantly. As a result, data science has become a non-negligible part of various industries. While data science focuses on solving problems based on available data sets, the preparation and documentation to even evaluate a problem is enormous. In terms of efficiency, people who can focus on processing rather than data collection and cleaning have a significant competitive advantage. This document presents the business case for a data aggregation and enrichment service. As a data scientist, one can request various data in a defined format and receive it properly processed and ready to use. While the data scientist can focus on solving the actual problem, the employer benefits from a facilitated and traceable data processing process and a better working atmosphere of the data-oriented employees. To address the wide range of customers, the service is available as a cloud-hosted application (service provider) as well as an on-premises cloud solution to protect the customer's intellectual property.

Key words
Data science, preprocessing, outsourcing

1. Which Challenge Do We Solve?

As of the 21 century we are witnessing the fourth industrial revolution. As history proves, a major result of each industrial revolution is a significant change of perspective, needs and values. In the case of the industry 4.0, the importance of data has reached a level where a major share of the global value creation is based on data processing and handling. Independent of the unique skillset of the involved people, the ability to acquire and retrieve usable data becomes a business performance impacting task.

By minimizing the time and effort spent on acquisition and retrieving clean and harmonized data, the focus shifts further towards value creation. Data driven project teams have, by definition, a high dependency on their ability to spend time and resources on processing data rather than getting them. By providing a service to aggregate, enrich and receive customized and harmonized data sets the baseline for a successful, validated and efficient process are given. In an ordinary data driven project team, the pains originated from data related tasks are given in Table 1. The hourly rate was calculated as % full time equivalent (FTE, 160 h / month). The financial impact of each pain is calculated as the product of Frequency (per Week), Duration (in hours), hourly Rate (% FTE) and affected participants. The result was extrapolated to show % FTE of a month. The assumptions for frequency and duration were made based on the deep interviews (see value proposition). Pains shown in italic are in the focus of the data aggregation and enrichment service.

Table 1: Cost breakdown of data-driven pains in a business context. Result given in % FTE extrapolated to a monthly interval. Values for Frequency and Duration were assumed based on interviews carried out for the value proposition.

Task	**Frequency / 40 h**	**Duration / h**	**Hourly rate / % FTE**	**Participants**	**Result / % FTE**
Repetitive easy task	*1*	*8*	*0.625*	*1*	*20*
Limited parallelism	2	1	0.625	1	5
Time-consuming alignments	2	0.5	0.625	6	15
Aquisition of data	*1*	*8*	*0.625*	*1*	*20*
Limited preparation of data provider	1	2	0.625	1	5
Limitation in access rights	*1*	*2*	*0.625*	*2*	*10*
Short notice consumption of resources	4	2	0.625	1	20

By using the proposed service, a data scientist who is tasked with a project must develop a good understanding of the problem to be solved. As a next step, the required data in terms of content, data points (resolution) and time interval must be specified. This request is entered into the service application. The service will now take care of putting the data in the requested format, enrich it with openly available data and return them including bibliographic information.

The data scientist can therefore focus only on the actual task.

Case Example

Angela is tasked with creating a model for predicting the number of travelers using a given train station. She has historic data sets as well as turnover data of local stores. The aggregation and enrichment service harmonizes the two different data sets, transforms them into a uniform resolution and properly labels missing data. In addition, publicly available weather data as well as labels for the specific week- and holidays are added.

Value Proposition

Our interviews showed that most tasks of a data scientist are visualizing selected data and collecting new data. Especially collecting and aggregating new or existing data is often time consuming. A web-based tool with quick building blocks where you can browse and search for data which might help you in your project and simply add to your project is very helpful. With the quick building blocks, you can easily modify the data to bring it in the right shape.

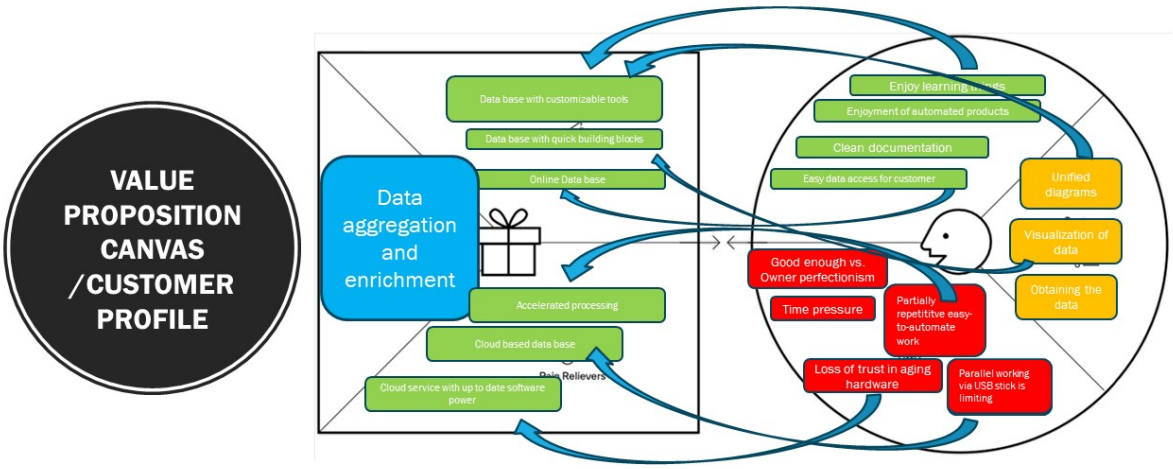


Figure 10: Customer pains, gains and jobs visualized as a Value Proposition Canva.

2. By which Data-Driven Service Approach Do We Solve the Challenge?

Between 19% - 50% of a data scientists time1 1is spent on finding the required data and cleansing it. However, the key competence of a data scientist is analyzing the data and creating information. This discrepancy between the key competences and the reality of the work leads to failed projects and dissatisfaction of the data scientists as illustrated in the story board below:

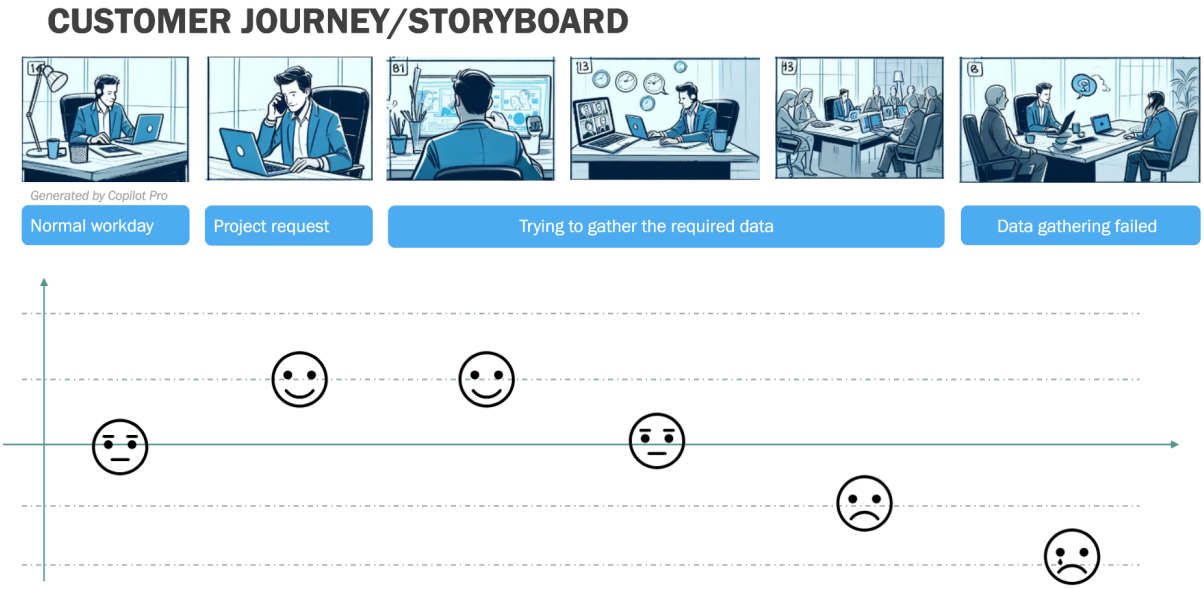


Figure 11: Customer Journey of a Data Science without our Service. Generated on 19.03.2024 with Microsoft Copilot.

[1] Data Prep Still Dominates Data Scientists' Time, Survey Finds. Anaconda. 2020

The goal of our service is to enable the data scientists to focus on their key competencies and reduce time consuming and tedious work. They can request the data they need, in the required format and only start their project when the data is ready. This is illustrated in the story board below:

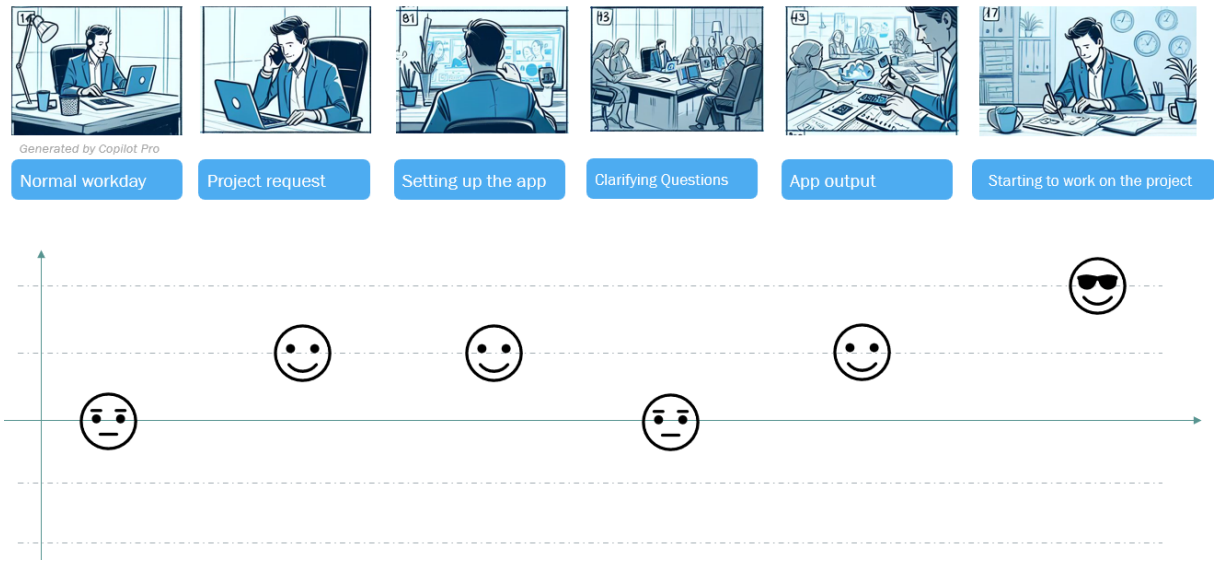


Figure 12: Customer Journey of a Data Science with our Service. Generated with Microsoft Copilot.

To illustrate the workings of the described service we created 2 prototypes: a digital mock-up showing the click flows from the perspective of the user illustrated below:

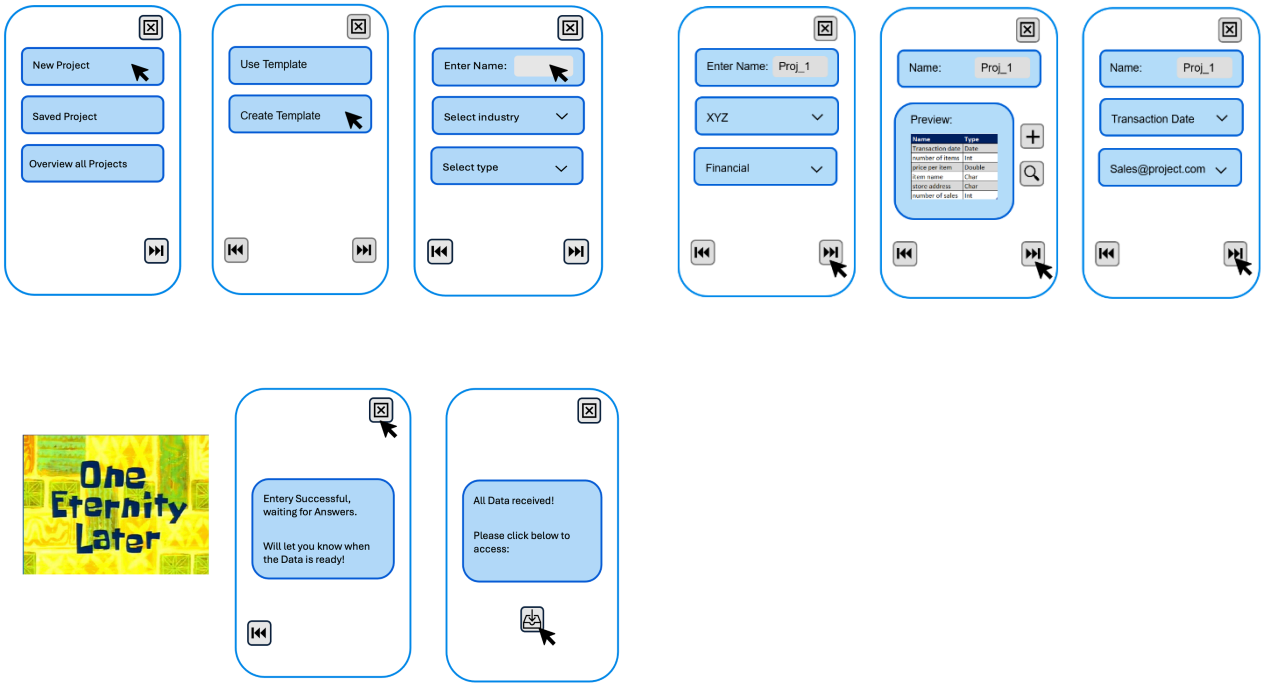


Figure 13: Testing the Data Aggregation Service with a clickable mock-up.

Thru an abstract prototype showing the mechanisms of our service. This prototype shows the data gathering from external providers as well as the cashflow generated. In addition, it clarifies the service as being a cloud-based offering:

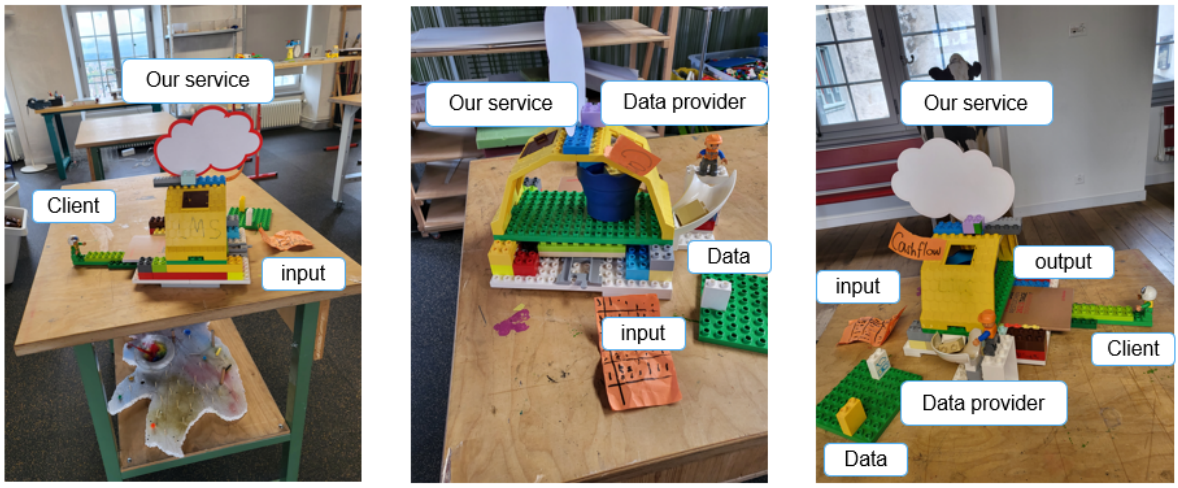


Figure 14: Abstract Prototype to visualize the data gathering and generated cashflow. Created with Duplo the 30.05.2024.

Our service will create at least the break-even revenue of CHF 1'344'000 per year. This break-even revenue is calculated based on the estimated costs of running the business and the assumed client acquisition rate. It is important to note that our service is highly customized to our clients and so is our pricing. Therefore, further breakdown of the pricing beyond the breakeven point were not deemed meaningful and will not be explored in this paper.

Table2: Overview of the variable and fixed costs.

Staff	480'000
infrastructure	100'000
Marketing	20'000
Total fixed costs	***600'000***

Various expenses	400
Transaction costs	200
Licensing costs	300
Total variable costs per client	***900***

Additional assumptions:

- Average costs per client: 4'000
- Client acquisition rate (at the beginning): 28 clients per month
- Average lifecycle: 3 years

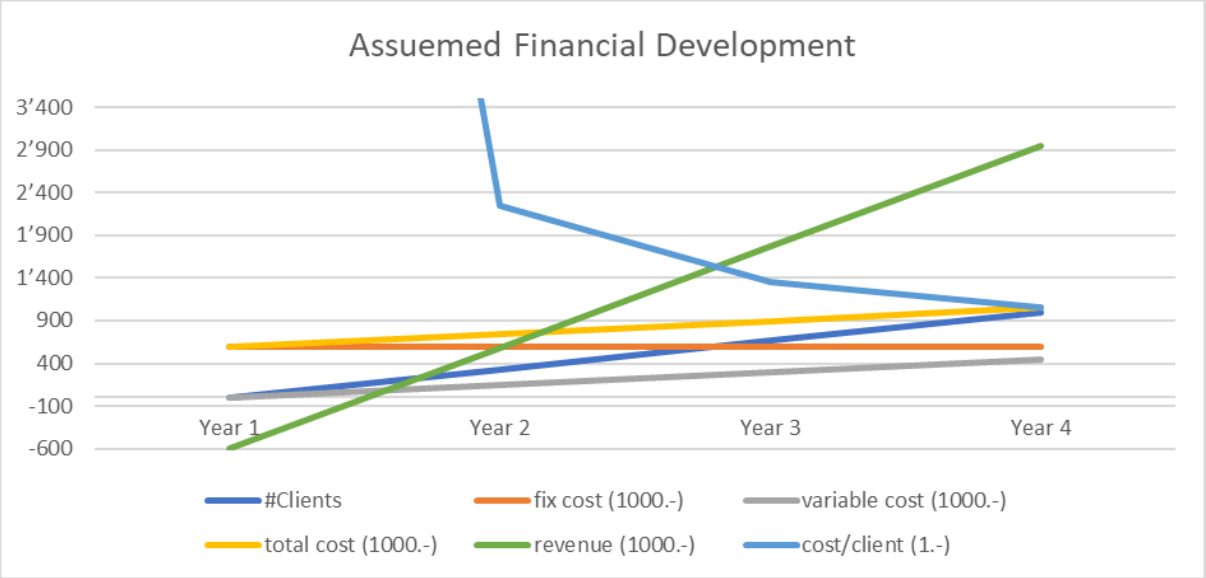


Figure 15: Overview of variable and fix costs in the business case.

Our service allows the data scientists to focus on their key competencies and this will lead to higher job satisfaction and significantly lower risk of bore-/ burnout. In addition to the above-mentioned social values our service reduces reoccurring data acquisitions through different clients.
This social and environmental benefits in addition to our business plan (economic values) show that our business is in the sweet spot between economic-, social and environmental value creation.
The CO2 emissions were quantified as a function of the total revenue. As mentioned above, the

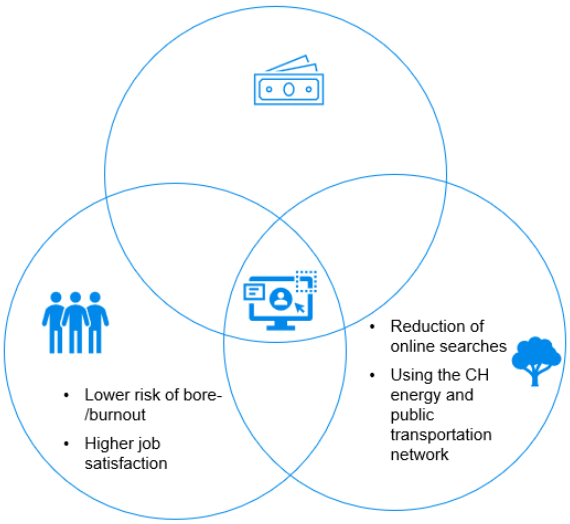


Figure 16: Social, economic an environmental benefits of using the Data Aggregation Service.

revenue per client is 4'000.-. If we take an upper estimate of 80g Co2/$[2]. We expect around 320kg Co2 per client. Which corresponds to a one-way flight Zürich-London[3]. The compensation price is around 38.-.[4]

[2] HEMPHILL, Libby; XING, Junjie; FAN, Lizhou. Comparing Costs for Cloud-based Data Archives. 2023.
[3] www.co2.myclimate.org/de/flight_calculators
[4] www.bafu.admin.ch

3. What Does Our Target Service Business System Look Like?

In constructing the ecosystem for our service, we first started with the macro perspective. In this visualization our service is colored green, our client is shown in grey, and the external data and service providers are shown in various shades of blue. The interaction between the actors is visualized with black lines.

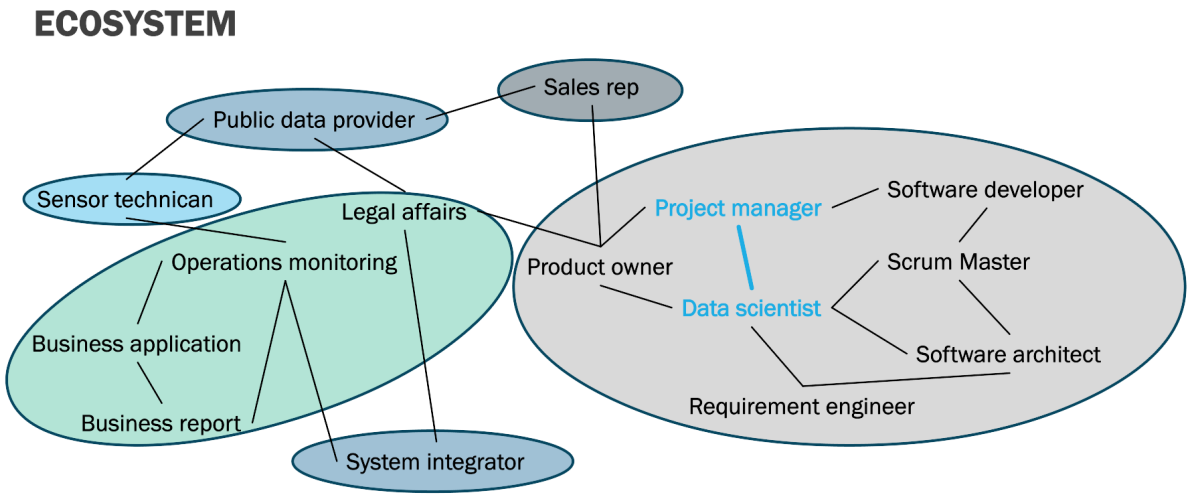


Figure 17: Macro perspective of the interaction between the actors visualized as an ecosystem.

In the next step we drilled down to 4 key actors and focused on their interactions, showing the value creation between these actors. Please note that we assumed a steady state which means the values created in this system sum to nil.

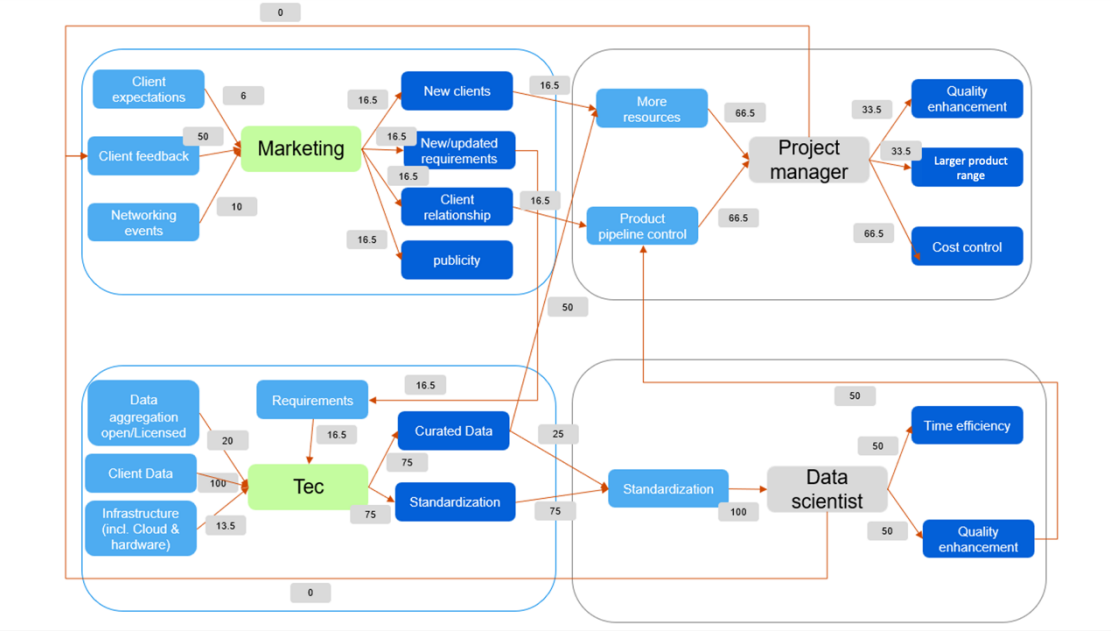
We selected the following 4 Actors:

- **Marketing department of our service (human actor):** tasked with acquiring clients and maintaining relationships with existing customers.
- **Our tec consisting of infrastructure and algorithms (non-human actor):** delivers our main service.
- **Data scientist (human actor):** Our target group for which we solve a pain.
- **Project leader (human actor):** in charge of a data project. The data scientist works for him.

The inputs are marked in light blue, the outputs in dark blue, the client in grey and our service in green. The value of each input / output is added to the connecting arrows and the unit used is KCHF. In this model we assume the client feedback being immaterial on the project manager and data scientist side, while being highly valuable for our marketing. Reason for this assumption is the low

time and effort required for the project manager and the data scientist to complete our standardized feedback forms.

Figure 18: Mirco perspective of the interaction between the actors and their costs visualized as an ecosystem.



Discussion and Outlook

Outsourcing data preprocessing and enrichment is an intriguing offer to many companies and data scientists and presents a high specialization potential which we can yield.

A marked interested is given. For an adequate estimation of the service viability some live test, a so called "Wizard of Oz[5]" test, must be performed to validate the assumptions of this business case.

In general, we see great potential for the business case to expand. As a central provider of data standards and complementary data sources we can act as a middleman between data users and extend our data library with data of our clients, which in turn could profit financially from sharing their data with others.

[5] Bland, David J., und Alexander Osterwalder. Testing business ideas: Mit kleinem Einsatz durch schnelle Experimente zu großen Gewinnen. Campus, 2020.

Fraud prevention
Fraud Fighters

Buck Martin
Pascal Wittmann
Raphael Josef

FRAUD FIGHTERS

Abstract

In the landscape of fraud prevention within credit card processors, Card Present (CP) transactions, which despite constituting only 17% of all transactions, contribute significantly to fraud cases. Consequently, there exist pain points demanding innovative solutions. Traditional methods fail to systematically verify the cardholder's possession of the credit card during a CP payment, resulting in financial losses, operational inefficiencies, and diminished trust among end users.

Our service offers a value proposition that uses cutting-edge technology and data analytics to mitigate fraud risks and deliver gains across the ecosystem. By leveraging geolocation (GPS) data from mobile phones running the credit card provider's security app, we introduce an approach to cross-verify the location of the mobile phone with the Point of Sale (PoS) during transactions. This real-time validation mechanism not only enhances fraud detection capabilities but also empowers processors to streamline operations, reduce false positives, and minimize customer complaints stemming from fraudulent activities. Furthermore, our service adds a sense of security, that results in end user satisfaction and trust.

The scalability and potential expansion of our solution to encompass debit cards present an opportunity for widespread adoption and impact across the European market. Therefore, this innovative approach not only addresses the immediate pain points faced by processors but also delivers enduring gains in operational efficiency, customer satisfaction, and industry-wide trust.

Key words
Fraud detection, credit cards, geolocation, mobile phone

1. Which Challenge Do We Solve?

The credit card market has a volume of 105 billion Euro in Germany and 32 billion CHF in Switzerland. Of these, around 82% are so-called Card Not Present (CNP) transactions, 12% are Card Present (CP) and 6% are ATM transactions.
The total fraud rate is around 0.02% of transactions, or around 0.03% of the value of transactions. Of these, CP fraud cases account for around 12%, and ATM fraud around 5%. We are concentrating on the 17% of total CP and ATM fraud transactions. (Source: Reference 1.)

There is fraud detection based on merchant locations, which is triggered when a card travels a large geographical distance in a very short time, e.g. used at 10 a.m. in Zurich, used at 2 p.m. on another continent, but there is currently no systematic check to see whether the card is in the possession of the cardholder.
The location of the mobile phone can serve as an indicator for this.

Our value proposition offers processors, i.e. the institutions that process the transactions and carry out the majority of fraud detection, a cost-effective way to significantly improve their detection rate for CP transactions using automatically recorded location data from the mobile phones on which the respective card provider app is running.

Unquantified additional benefit: Fraudulent wallet registration. It is also conceivable to offer this service for debit cards, which could address a European market with a transaction value of around EUR 5’500 billion with comparable fraud figures.

For the first few years, we are calculating our case for a national market in Switzerland, which is served by five processors that are our customers.

According to our interviews, the pain points of the processors or their fraud detection centers are mainly the detection rates and their reliability (false positives should not occur if possible), the disputes resulting from successful fraud attempts and the effort required to process them and the resulting financial losses. In addition, the lack of protection and the subjective feeling of protection of the processors' end customers are pain points that we can address. These end customers expect their transactions to be processed simply, very reliably and lightning-fast, while at the same time being very well protected without affecting the handling of the cards.

Value of solving pains

Pains	Impact value per case	Potential value per year	Expected value per year	Remarks
Administrative expenses (wage costs)	Vc,i = 3h * CHF 100.- = CHF 300 .-	Vc,p = 2'500 * CHF 300.- = CHF 750'000 .-	Vc,p = CHF 0.4* 750'000.- - CHF 0.02 * 750'000 = CHF 270'000.-	Assumption: 40% of fraud cases are detected, with a 2-5% margin of error.
Dispute fees	Vc,i = CHF 100.-	Vc,p = 2'500 * CHF 100.- = CHF 250'000 .-	Vc,p = CHF 0.4* 250'000.- = CHF 100'000.-	Assumption: 40% of fraud cases are detected
Depreciation	Vc,i = CHF 50.-	Vc,p = 2'500 * CHF 50.- = CHF 125'000 .-	Vc,p = CHF 0.4* 125'000.- = CHF 50'000.-	Assumption: 40% of fraud cases are detected
Total	Vc,i = CHF 450.-	Vc,p = CHF 1'125'000.-	**Vc,p = CHF 420'000.-**	

The calculated expected value of solving pain is 420k CHF per year per 1 mio. end customer, in case that 40% of the fraudulent transactions are detected by our service.

2. By which Data-Driven Service Approach Do We Solve the Challenge?

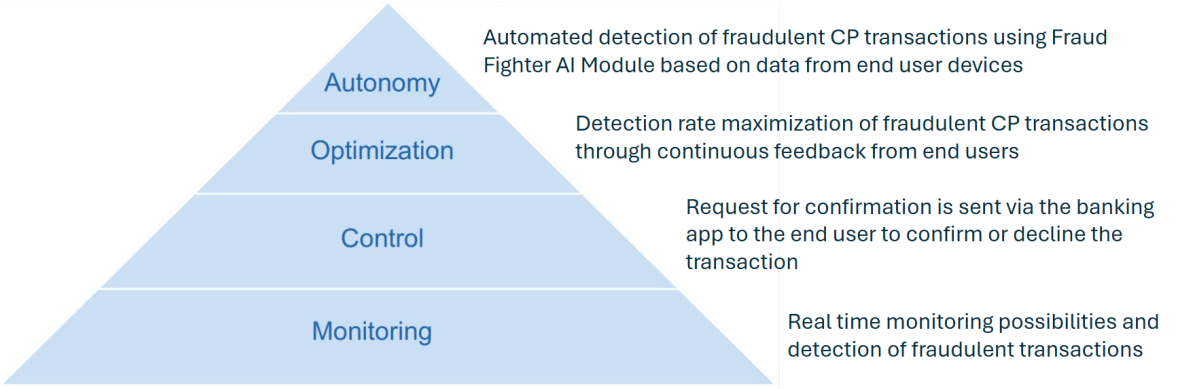
Value proposition

Our value proposition alleviates several pain points faced by our customers (processors):

- By collecting and making the end customers location data accessible, and comparing this data with the location of the PoS (point of sale) in a CP transaction, it can be determined with a certain degree of probability whether the transaction was truly initiated by the cardholder, who is also the owner of the mobile phone with the card processor's or issuer's security app installed.
- If the location of both devices matches well, it can be assumed that the card and phone are owned by the same person.
- If the location of both devices does not match, there is a certain chance that the card has been stolen, lost or cloned. The probability that the use of the card is an attempt at fraud is relatively high.
- If the end customer has no reception during the purchase process, we can use the last known location to assess whether the distance traveled is plausible.
- The processor therefore has the option of deciding directly whether the transaction should be blocked or whether the end customer should be informed of the suspected case via push notification and asked to authorize the transaction.
- The time component is crucial for this to work. The end customer (card user) should not be affected as much as possible during the purchase process.
- The advantages for the customer (processor) are:
    - Reduction in complaints, which are very time-consuming and expensive to process.
    - Reduction in unnecessary card blocking due to fewer false positives. The avoided replacement saves costs and the end customer can use their card continuously.
    - Push notifications make calls by agents or, if they cannot reach the customer, letters unnecessary and the entire process is significantly accelerated, thereby significantly reducing the risk of further fraud attempts.
    - Improved real security for the end customer and thus a reputational gain o Improved perceived security for the end customer and thus also a reputational gain.
    - Since the processors or issuers (have to) bear the losses under certain circumstances, there is also a relatively large potential for savings here.

Data usage

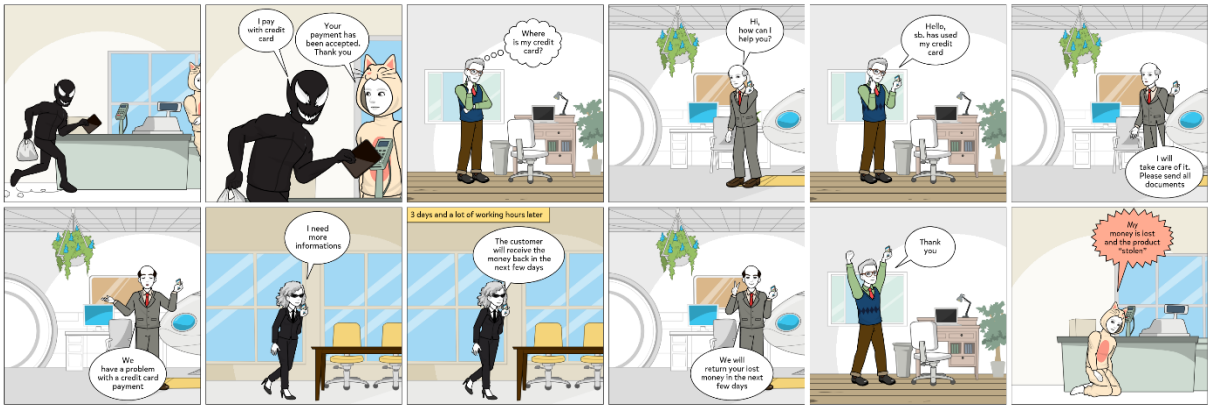
We leverage the localization data of the end user's performant and highly available smart phone to compare the last known location of the smart phone in real-time with the credit card payment attempt. The end user must consent to the use of the location data before the service can be signed up. The level of functionality as seen below can be achieved.



Storyboard and mockup

Current Situation

A person's credit card got stolen and without realizing it the thief uses this credit card in the stores close by to buy stuff. This is possible because no security pin for payments up to CHF 80.- is required. After some time has passed the credit card owner notices the loss of the credit card, but it was already too late and financial damage has occurred. After a laborious and longwinded process with the credit card processor, the money may be refunded to the credit card owner, but for the retailer and processor it usually means a complete economic loss.

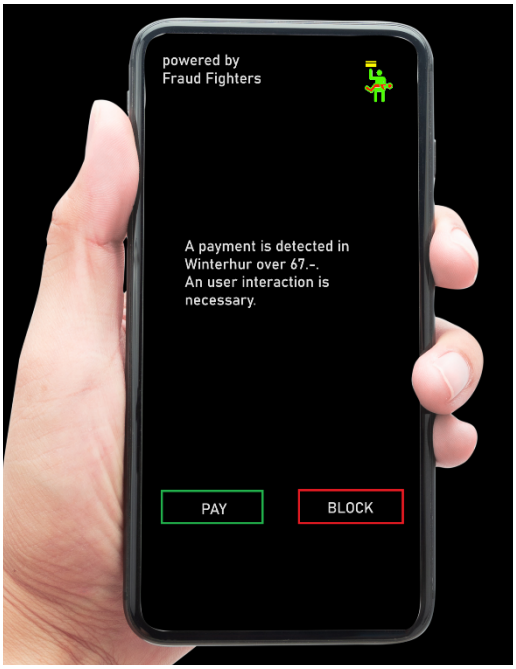


Situation with fraught fighter solution

The same theft of a credit card occurred, but in this situation the credit card owner is benefiting from the fraud fighter's service that was purchased by the person's smart credit card processor. With the use of this service the geo-location mapping of the fraudulent payment attempt to the end users smart phone location triggered an immediate alarm and the fraudulent payment attempt was declined at the terminal before any financial damage could have been possible.

Processors security app interface

In case of unclear payment attempts (e.g., a family member that uses the card during holidays), the credit card owner will be informed via the processors security App Interface and can choose if the payment should be approved or declined.



Annual economic value

Service Patterns

The following service patterns are applied to provide a flexible and transparent price model for the credit card processor that allows efficient scaling and optional additional cost only apply if a fraud attempt is suspected and the optional AI Module is used.

- A basic yearly **subscription fee** that depends on the number of end users of the customer. Subscription cost of 120 kCHF per 1 Mio. end users / year.
- **Pay Per Use** for the call of Fraud Fighter's geo-location service via API are offered at an attractive price. The processor pays a price of 1.1 Rp. per geo-location API call.
- Optional **Add-on** offering API calls from Fraud Fighter AI-Module at a premium price. The processor pays a price of 2 Rp. per AI Module API call.

Business plan

Our target is to acquire a processor in the first year with at least 1.5 mio. credit card users, after that we plan to win a new customer each year. An expansion into the European market is worth striving for due to its market size.

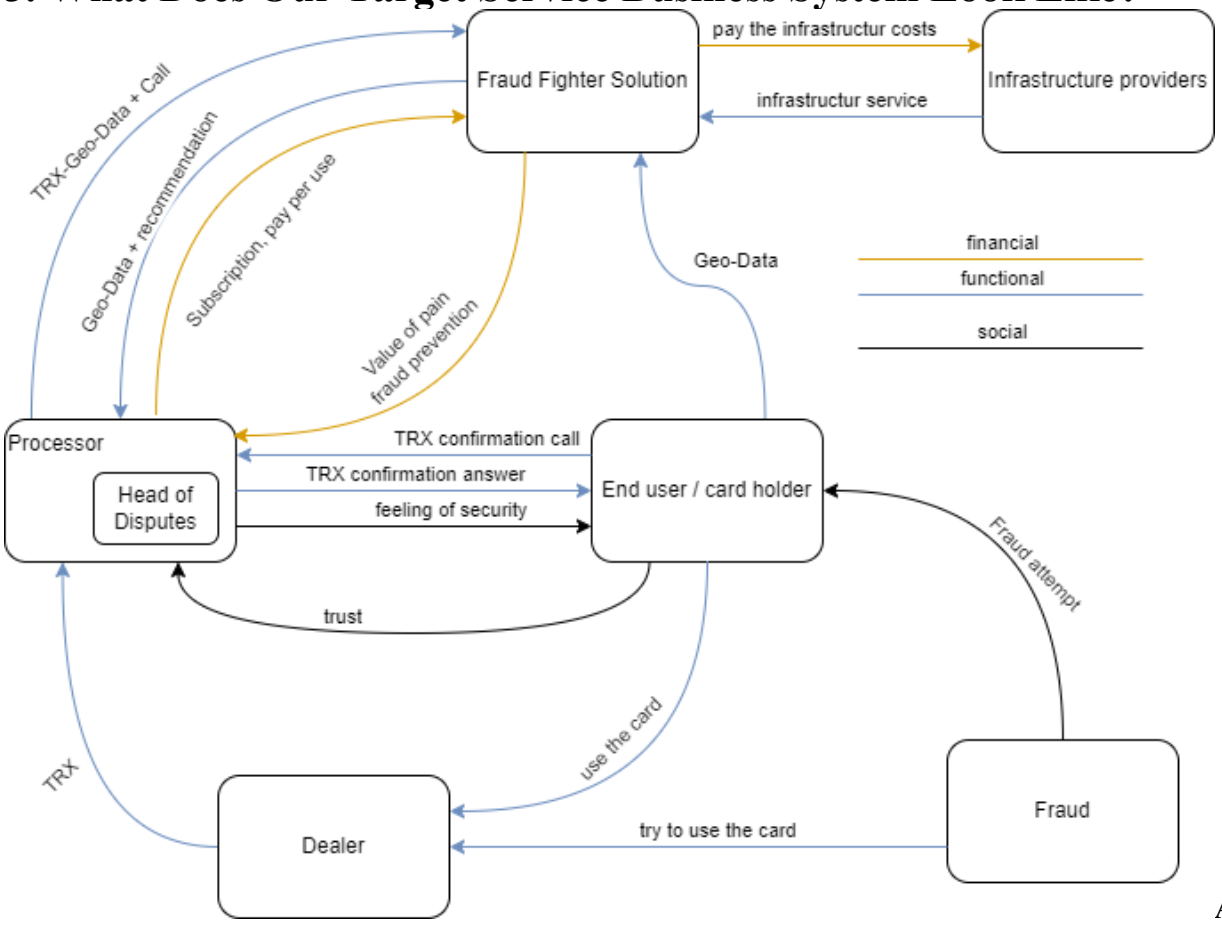
The yearly business result consists of the revenues earned from the three service patterns subscription, pay per call and add-on, and subtracting the total costs of staff, capex and opex. For the number of API calls an assumption of an average of around 13 mio. CP transactions per million credit card users. The AI Module in this calculation is used in 30% of the transactions. Mutual value creation is important, deriving from the value of pain the customer will be able to gain a financial benefit of around 118k CHF with our solution after all costs are paid.

Year and mio card users	N+1 (1,5)	N+2 (3)	N+3 (4)	N+4 (5)	N+5 (6)
Result	**169.657**	**491.314**	**681.752**	**912.190**	**1.142.628**
Revenues	**511.857**	**1.023.714**	**1.364.952**	**1.706.190**	**2.047.428**
Subscription	180.000	360.000	480.000	600.000	720.000
Pay per Call	214.731	429.462	572.616	715.770	858.924
Addon: AI Module	117'126	234'252	312'336	390'420	468'504
Total Cost	**342.200**	**532.400**	**683.200**	**794.000**	**904.800**
Staff	240.000	240.000	300.000	320.000	340.000
Capex	50.000	80.000	100.000	120.000	140.000
Opex	52.200	212.400	283.200	354.000	424.800
Fin. Value Customer	**118.143**	**236.286**	**315.048**	**393.810**	**472.572**

Social value outcomes

- **Employment**
  With our solution we promote Job enrichment at the credit card processor enabling employees to free up time and focusing on more complex and rewarding cases.
- **Safety and emotional value**
  The fraud fighter service provides a sense of safety towards the end customer and may prevent stressful situations.
- **Relationship**
  Satisfied end users will strengthen the relationship with its credit card processor and therefore increases the reputation of the processor.

3. What Does Our Target Service Business System Look Like?



At the center of our ecosystem, our customer is the processor and, more precisely, the “Head of

Disputes" actor. Our solution has an indirect influence on our customers end customers. From our point of view, the social influences are in and out of the cardholder.

When it comes to financial flow, we have limited ourselves to the financial flow for our solution. For this reason, the financial flows in and out of us as the actor. The exact financial data is described in the previous chapter. It can also be seen that our customer receives a reduction in his pain for paying for our solution. To complete the financial flow, we have added the infrastructure provider. According to the previous chapter, our major expenditure point also arises from the infrastructure provider. As soon as our solution scales, the expenditure on the infrastructure will increase.

When looking at the functional flows in focus, it is clear that the use of cards, the transport of the TRX data and the GEO data are crucial. The interaction of these functional flows shows the connection between the various actors. For this reason, "fraud" is also included in the ecosystem, as this generates the pain. The quantification of the "fraud attempt" is shown in the first chapter. To further promote understanding of card use, we have also included the merchant. The merchant has no direct influence on our solution.

Hypothesis and test cards

Source card templates: (Osterwalder et al., 2014)

According to our hypothesis prioritization matrix the most important hypothesis is that we believe to deliver high quality position data. To achieve this matter the customer must consent to the use of the location data before the service can be signed up. This hypothesis test can be conducted as seen in the three test cards above, a first test with the help of an online survey was already conducted successfully.

4. Discussion and Outlook

What worked?

The interviews with the individual actors and the development of the ecosystem worked quite well after we had excluded all parties that were not directly relevant.
The storytelling of the use case was a bit difficult, but the complexity was manageable.

The interviewees on the processor side (Head Operations, Head Fraud and Disputes) in particular were able to name their pain points very precisely and thus help us to design the customer profile very precisely.
This in turn helped us to design the value generation and the business case, although we had to make many assumptions due to corporate secrecy or rely on publicly available statistics.

Testing the riskiest hypothesis was also relatively easy to do, especially since the entire use case depends on the question of whether the credit card users make their data available to our service. Refining the test in several rounds is a natural choice and can be carried out in the last round together with the first customer.
In the financial sector, reputation and trust are certainly essential factors and by gaining a feeling of security, we can certainly strengthen reputation.

What didn't work well?
We had challenges calculating the ecological impact because, on the one hand, the resulting CO2e amounts are insignificant and only scale up over time. On the other hand, the technical progress in IT is so fast that an estimate of the CO2e emissions from the use of AI based on today's technology will no longer be valid in a few years. Just a peek at the expected values of the recently announced Blackwell chip by NVidia shows that such a prediction would be inaccurate.

What remains to be done?
In the financial sector, data protection and IT security are two of the most important issues of all. In the envisaged setup, we are compatible with the current legislation of Switzerland and the EU. In addition, we can even comply with the current industry standard PCI DSS 4.0. However, this would have to be certified in order to be considered a selling point. Furthermore, certain documentation regarding data protection would still need to be created.

When it comes to IT security, we rely on the cloud provider. If our customers demand additional security mechanisms, this could have an impact on the calculated costs and worsen the business case. This should be checked with one or more customers before a concrete price offer is made.

The technical solution's detailed design must also be finalized. Therefore, collaboration should be sought with at least one customer in order to avoid as many teething problems as possible. In particular, the performance under load and the connection to the customer app could be optimized before “go-live”.

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Match Me if You Can

V.Z.
T.P
P.S.
L.S.
J.D.

Abstract

The average Swiss SME, with roughly 100 employees in various blue-collar sectors, has a staff turnover rate of about 15% resulting in a yearly cost of vacancy of around CHF 180'000. The primary factors leading to vacancies are mismatched job/employee pairing and the challenge of reaching the right candidates in the active and passive job market within a short period of time.

As an established recruitment agency, we have data from ten years of job advertising and a pool of candidates who are looking for or open to new placement. Our matching algorithm matches profiles of potential candidates within minutes, where human resources would take days, allowing us to address this cost of vacancy issue. Through feedback cycles with our customer's team leaders and salaried employees, our recommendations will improve over time leading to reduced attrition and lower cost of vacancy and time to hire.

Our unique selling proposition focuses on blue-collar workers, rapid matching capabilities, and enhanced candidate experience without the usual noise from headhunters. Focusing on the blue-collar sector, being close to the customer base and providing spam-free notifications for jobseekers is what differentiates us from services offered by big professional social media platforms such as LinkedIn, Facebook and Slack. Our service is financed by businesses seeking new employees and is free of charge for jobseekers.

Key words
Recruiting 4.0, Robot Recruiting, Job-Matching, Active Sourcing

1. Which Challenge Do We Solve?

Small and medium-sized enterprises (SME) encounter significant challenges in managing the financial impact of employee turnover. Our focus is on Swiss SME in blue-collar sectors with an average of 100 employees. It is estimated that these SMEs lose approximately CHF 180'000 annually due to an estimated 15% rate of employee turnover. It can be observed that blue-collar employers and employees tend to lack well-established professional networks in comparison to those of white-collar employees. This presents a challenge for both employees and employers in terms of connecting and potentially building new professional relationships, such as those leading to employment or business partnerships.

The primary beneficiary: Human Resources Department at SMEs

Our well-established recruitment agency has already attained a substantial customer base within the blue-collar Swiss SME segment. Furthermore, we have identified the human resources department as one of the most significant actors in the challenge we are attempting to address. We conducted in-depth interviews with HR from Swiss SMEs and questioned them about their jobs and pains. From these interviews, we learned that the biggest challenges lie in minimizing the financial and operational impact of unfilled positions in the company. The essence of these interviews was then distilled into our customer profile and value map.

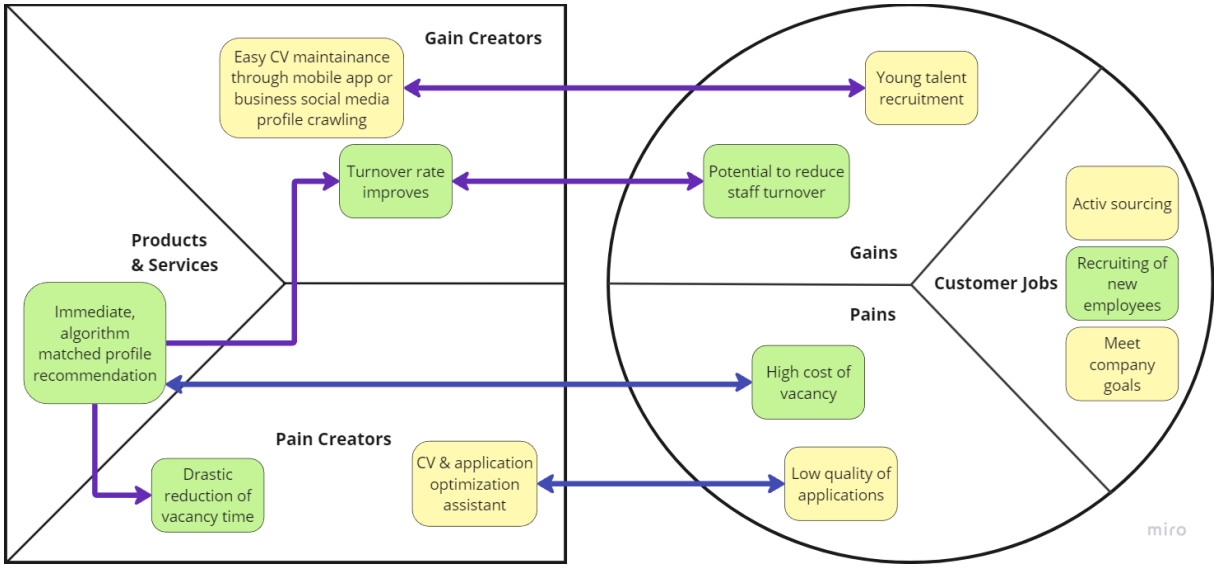

Figure 1: Gains, Pains, Jobs (Value Proposition – Customer Profile)

Identifying the biggest pains, filtering for highest potential impact and our capability as a service provider have led us to focus on a single pain – the cost of vacancy.

Given the 15% turnover rate, an average of two months to fill a vacancy and an average loss in profit of CHF 6'000/month per employee: The cost of pain per year is CHF 180'000 (= V_c). Our service cuts the base of this cost in half, mostly by reducing the time of vacancy, and adds charges of approximately CHF 40'000 resulting in CHF 130'000 instead of CHF 180'000 annual cost of vacancy. The average annual value of solving this pain is CHF 50'000.

Notation: It should be noted that the cost of hiring is largely determined by the number of working hours contributed by staff members. The data obtained from different interviews varies considerably, making it challenging to accurately calculate the cost of pain.

2. By which Data-Driven Service Approach Do We Solve the Challenge?

Our service efficiently and directly connects Swiss SMEs facing very high vacancy costs with befitting blue-collar jobseekers. The use of our “Match Me”-algorithm allows companies to reduce the financial impact by minimizing the cost of vacancy. To identify profiles of jobseekers that best fit job profiles, we cluster the profiles of jobseekers based on the skills and experiences stored in the CV, job references, preferences stored in their profiles and feedback from companies that have already been in the application process with candidates. In the following subsections, we will detail our Data-Driven Service by presenting a storyboard and mock-up.

Storyboard

A Swiss SME, which is already suffering from the current shortage of skilled workers, receives another resignation from an employee. They already have many vacancies that have been open for a significant length of time. This situation has been intensifying in the Swiss blue-collar sector for years. Companies want a more efficient way of recruiting and an easier way of finding suitable candidates. Our solution will save them time, money and assist stressed employees by avoiding the problems shown below in the storyboard.

Figure 2: Storyboard of the situation before our services have been established

Mockup

Companies that have a basic account with us can benefit from our "Match me"-algorithm in the overview of their job ad dashboard. The number of matches per job advertisement in the searched region are displayed below that advertisement. The HR employee can view all anonymized candidates who initially match with just one click. This ensures that candidates are perceived by companies based on their qualifications, without any prejudices. In the final step, the HR employee can contact the candidate directly with the integrated chat function for an introductory meeting.

Link to Mockup - Video

Figure 3: Mockup

Annual Economic Value

On our user-friendly platform, employers can post jobs and view matches, and jobseekers can maintain profiles and receive notifications. SME customers pay a "base subscription" fee for basic account and an additional fee based on our "pay per match" model. Seeking to be equal opportunity, candidate profiles will not show data that could be used for discrimination until the customers pay for the match. Candidates should be selected based on qualification and not on name, skin color, gender, age or appearance. As a "digital add-on", customers can buy social media campaigns for job profiles with a low "match rate" to increase visibility and attractiveness among candidates. For our clients, this business model is transparent and affordable, helping them to avoid high up-front costs and giving them the opportunity to “try it out”. With these modular products, we as a company can have scalability while remaining flexible for future services.

As can be seen in the figure below, we will start with a lower "price per match" for the first year and pursue a market penetration strategy. Sales will therefore cover our costs with a small profit. Beginning in the second year, we will increase our prices annually and can therefore expect an increase in turnover with strong growth.

	Description	Year 1	Year 2	Year 3
Assumption	Number of customers	100	160	300
	Average job advertisements per customer and year	15	14	12
	Average number of matches per job posting	5	4	3
	Average matches required per customer and year	75	56	36
	Number of potentially sold matches	7500	8960	10800
Product Price	Individual price per match	50	60	80
	Individual price basic subscription per customer	6'000	6'000	6'000
Revenue	Revenue from sold matches per year	375'000	537'600	864'000
Costs	Fixed costs	500'000	400'000	400'000
	Variable costs	400'000	320'000	600'000
	Annual Economical value (α · N ≥ Fix + β · N)	975'000 ≥ 900'000	1'497'600 ≥ 720'000	2'664'000 ≥ 1'000'000

Figure 4: Annual Economic Value

3. What Does Our Target Service Business System Look Like?

The Service Ecosystem

Within the broad workforce ecosystem, we have identified three primary contributors to the service ecosystem of job placement. The main actors (providers & clients) are illustrated and described below. Of the 15 defined value flows, value flows 1 and 2 have emerged as the most relevant.

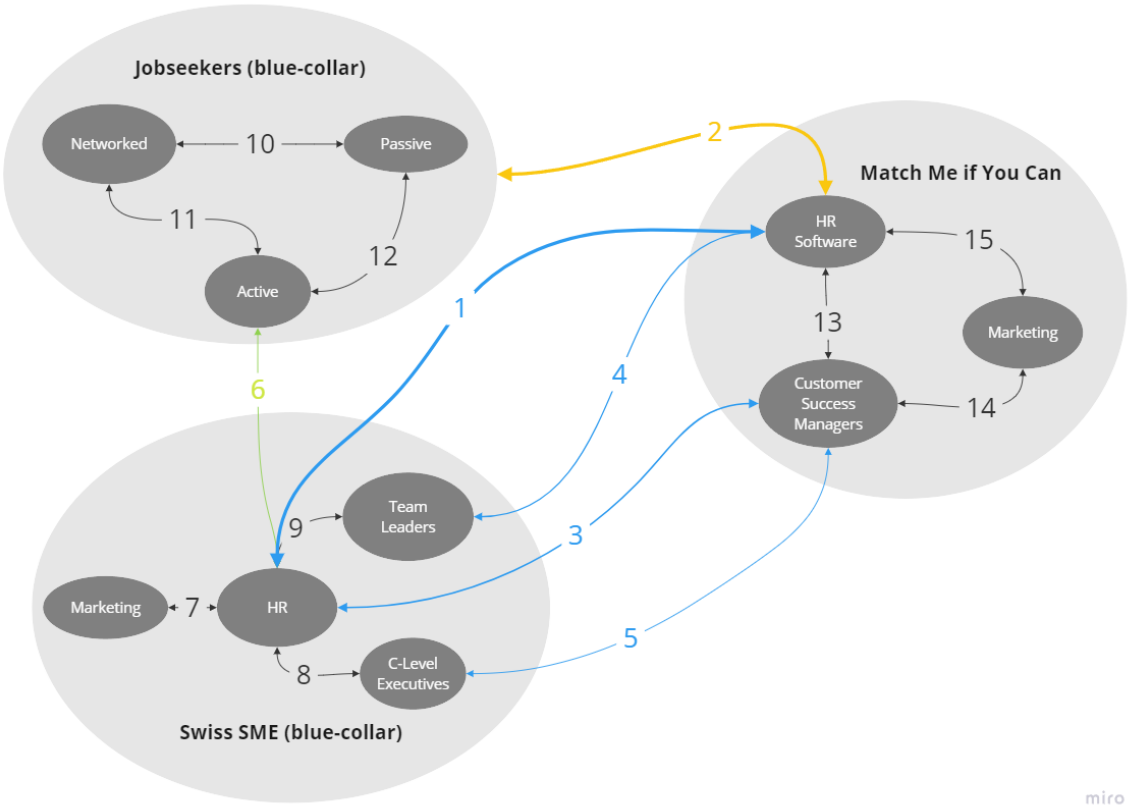

Figure 5: Service Ecosystem

Most Relevant Value Flows

Number	Values
1	**Functional:** matching-algorithm **Emotional:** reduction of stress and frustration, no longer feeling alone with the problem
2	**Financial:** "data as payment" by job seekers who maintain high quality profiles **Functional:** Manage matched connections **Emotional:** No annoying spam from job ads, that do not fit

Figure 6: Value Flows

Service Blueprint

In the figure below, we have visualized the Service Blueprint. This blueprint outlines the process from the initiation of a job advertisement, through the matching of suitable candidates, to the launch of social media campaigns and the closure of the job advertisement. Throughout the process, we identified three Moments of Truth, shown in light blue below.

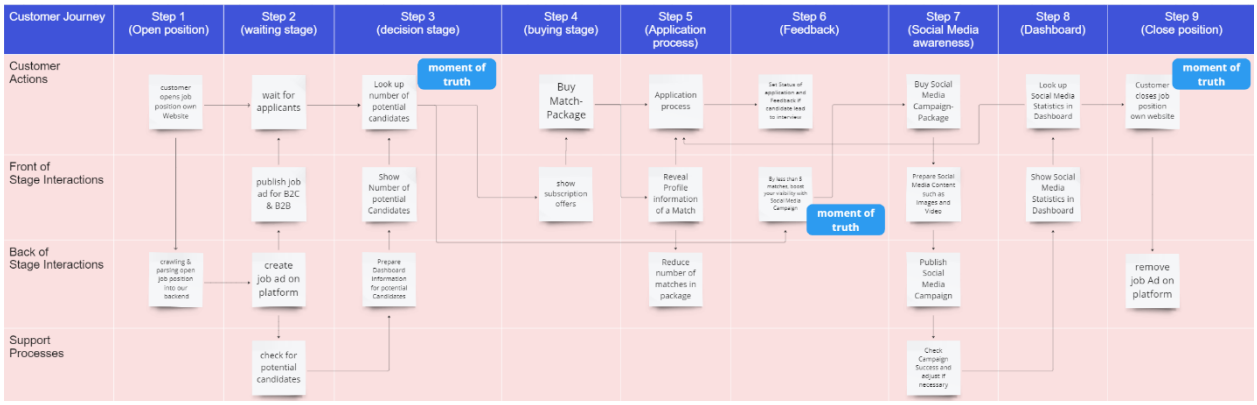

Figure 7: Service Blueprint

Business Case

As an established recruitment agency, we have data from ten years of job advertising and a pool of candidates who are looking for or open to new placement. This allows us to address this cost of vacancy issue as described above in "Which challenge do we solve?". Our customer's HR departments provide us with job advertisements, which make our platform attractive to applicants.

Our platform aims to provide blue-collar jobseekers with a rich selection of appropriate, targeted job advertisements. Generally, blue-collar workers do not have profiles on professional social media sites, yet they seek ways to find a better fitting job even when not actively looking. We offer them the capability of automatic profile creation by uploading their CV. Suitable matches trigger automatic notifications. Knowing that we take care of that need, they are willing to open and maintain a professional profile on our platform and be notified when a company actively announces interest in their profile. From an emotional perspective, we provide jobseekers with a platform that exclusively offers tailored job opportunities that match their qualifications and career aspirations without the need to actively search or face irrelevant job ads. No spam from headhunters who play the numbers game by contacting as many candidates as possible to find a few who will respond and be willing to work with them (whether they fit the job description or not). In return, the high number of jobseekers on our platform should enable us to connect Swiss SMEs with excellent, qualified candidates.

At the core of our service is a well-developed matching algorithm, intended to serve as intellectual property. We utilize a robust, data driven "Match Me"-algorithm that quickly aligns job profiles from employers with the ideal candidates in our pool. Our "Match-Me"-algorithm matches profiles of potential candidates within minutes instead of days of human processing. From an emotional perspective, our software aims to reduce stress for HR personnel. We minimize the cost of vacancies by speeding up the recruitment process, ensuring better matches that can lower the time to hire, thereby saving money and reducing operational disruption. Through a decade of recruitment data and feedback cycles with our customer's team leaders and salaried employees, our recommendations improve over time, leading to reduced attrition and lower cost of vacancy. A contributing factor is the regular and continuous refinement of our algorithm based on this feedback. Our recruitment strategy is based on a more selective approach, whereby a limited number of individuals are identified by our algorithm as being suitable for the role in question.

In relation to the UN's sustainable development goals, we have identified three areas where we can contribute. The first is Gender Equality. However, we took this a step further to include equal opportunity for all. As previously stated, we only show the qualifications of the candidate before a match is purchased, no personal information. Secondly, enhanced employment satisfaction and stability in the blue-collar workforce contributes to better economic stability and personal well-being for employees which fits into the category of Decent Work and Economic Growth. Finally, we are taking Climate Action in comparison to a traditional headhunter. In the traditional model, candidates must travel to the headhunter's office, where they are often sent to interviews for positions that do not match their qualifications. The carbon footprint is significant when this process is repeated several times by multiple candidates. We are an online platform with high matching accuracy. This will reduce travel several times over per candidate, reducing our carbon footprint.

4. Discussion and Outlook

Our group collaboration and brainstorming sessions have been the cornerstone of our progress. The team's collective input enabled us to find consensus on our use case, providing a solid foundation for our service design. The journey to a unified vision of our service's exact design was not without its challenges. Initially, our concept lacked focus and was broadly defined, leading to a prolonged phase of alignment. The constructive feedback we received after our initial pitch helped us to refine our approach. This pivotal moment led to the refinement of our strategy, which focused on the Swiss market, targeting SMEs, and catering to the blue-collar sector for candidate sourcing.

The next step is to examine our framework of assumptions in greater depth and provide more detailed information. Furthermore, there is a pressing need to clarify the algorithm's mechanics. As we progress, it is crucial to conduct a comprehensive analysis of the test results. The insights gained will inform any necessary recalibration of our model, ensuring a robust and market-ready service offering prior to a full-scale launch. This is important not only to uphold our service promises but also to ensure fair and unbiased candidate selection, which is a commitment we stand by firmly.

As we look to the future, our commitment to continuous improvement and responsiveness to market feedback will guide our iterative development process. We recognize the dynamic nature of our industry and the importance of staying agile. Our roadmap includes ongoing validation of our business case, enhancement of the algorithm's performance, and a relentless pursuit of exceeding customer expectations. With a dedication to innovation, we are poised to make impactful strides in the market.

Smart Office

Abstract

The management and execution of office cleaning in Switzerland is a mainly manual labour and has a low to non-existent degree of individualization. This results in a significant amount of unnecessary labour. This is where the Smart Office system comes into play. Smart Office offers an innovative system that consists of sensors and corresponding management software. Using the sensors, the usage of office spaces, sanitary facilities, and kitchenettes can be monitored. This ensures that only the used areas are cleaned, leading to considerable time and cost savings. Cleaning companies can use this increased efficiency to offer more cost-effective services, thus gaining a competitive advantage. These cleaning companies can create offers based on a "pay-per-use" model, which optimizes costs for the end customer (facility manager).
Through the direct processing of feedback from completed cleaning tasks via the app, Smart Office automatically and immediately provides a unified and transparent reporting system for all contractual parties. This reduces discrepancies and facilitates the resolution of potential conflicts. In this way, Smart Office revolutionizes cleaning management by using resources more efficiently and thus lowering operational costs.

This smart service achieves a return on investment for cleaning companies within 15 months of use.

Key words
Smart Office, Smart Cleaning, IoT, Efficiency, Sustainability

Authors:

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Guido Tobler
Simon Butscher
Christoph Josef

1. Which Challenge Do We Solve?

Currently, offices are cleaned regularly, regardless of whether they have been used or not. This leads to unnecessary efforts and costs. To illustrate the environment in which Smart Office operates, a minimalistic network was created and visualized in Figure 1.

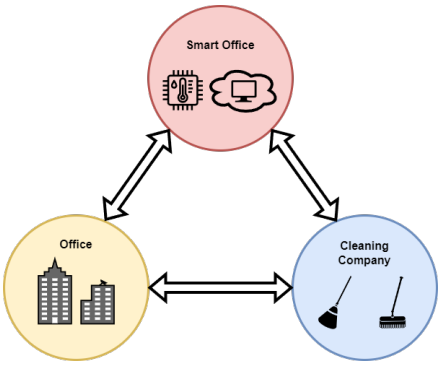

Figure 1: Smart Office network. Source: Own representation.

To highlight the problems and challenges in this context, a Value Proposition Canvas was created. In Figure 2, the Value Proposition Canvas illustrates the pains, gains, customer jobs, and the resulting pain relievers, gain creators, and products and services.

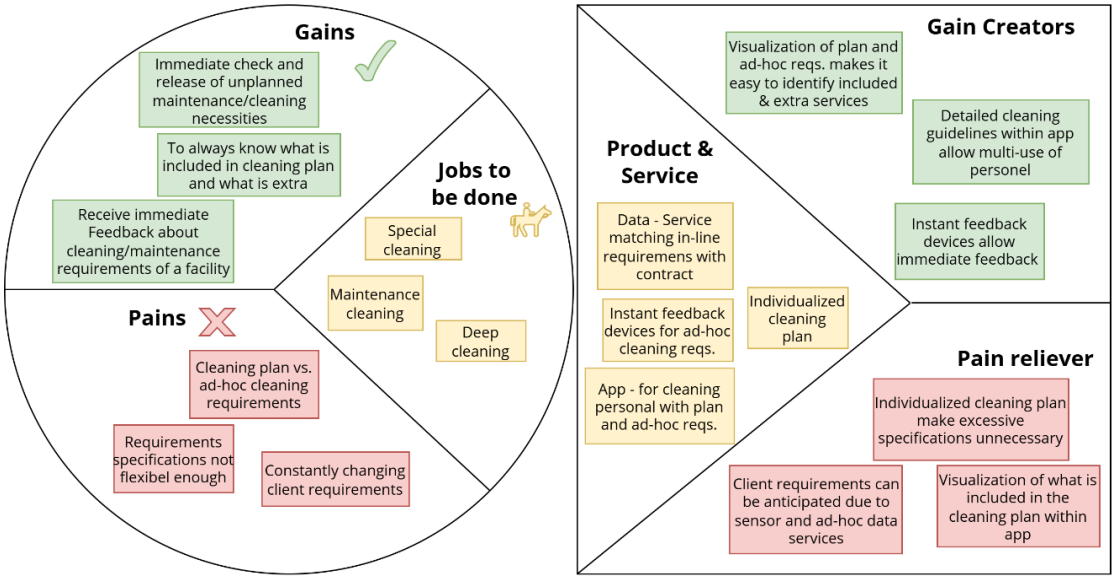

Figure 2: Value Proposition Canvas. Source: Own representation.

The biggest challenges with the created Value Proposition Canvas often lie in the realm of corporate culture and organization. So far, cleaning contracts have consisted of detailed specifications and checklists, precisely defining the intervals, timing, and methods of cleaning the premises. With Smart Office, the contracting parties now could create much more dynamic contractual frameworks. The focus is on the effective use of the premises rather than rigid adherence to checklists.
This innovative approach to contract and specification design can be met with scepticism or even rejection. These challenges are addressed by offering Smart Office customers/prospects a cost-effective trial operation.

2. By which Data-Driven Service Approach Do We Solve the Challenge?

Sensor

A sensor is placed at each workstation. The sensor product from Smart Office includes the following sensor functions:

- Presence sensor
- Temperature sensor
- Light sensor
- Humidity sensor
- Input button

This data is recorded, stored, analysed, and processed in the Smart Office cloud. Based on the contract between the cleaning companies and the facility manager of the office to be cleaned, the usage indicator changes from green to red. The main variable here is the contractually agreed usage time, at which a sensor changes from green to red. Depending on the room and its usage, different usage times are defined. A green-marked sensor indicates that the usage time until the next cleaning has not yet been reached. A red-marked sensor indicates that this sensor requires cleaning. Below is an illustration of a sensor in both green and red states.

Green state

Red state

Software

Figure 3: Tablet for the cleaning staff. Source: Own representation.

The cleaning staff carries a tablet with the Smart Office software solution on their cleaning trolley. These devices provide a clear overview of the upcoming tasks and a routing through the offices/workspaces to be cleaned. The cleaning employee can see the stations that need to be cleaned on the tablet. By acknowledging the cleaning status directly through the sensor at the

workspace or in the Smart Office App, work reports and proofs of cleaning can be automatically generated.
In Figure 3, the authors have depicted this. Additionally, work instructions could be directly provided to the cleaning staff via the tablet. Work instructions such as cleaning solution mixing ratios, for example. This facilitates training as instructional content can be delivered directly in practical application.

3. What Does Our Target Service Business System Look Like?

In Figure 4, a service blueprint of the cleaning process using Smart Office sensors has been elaborated. It includes the story of a cleaning staff member during the cleaning process under Customer Action. The service blueprint illustrates how the collected data flows.

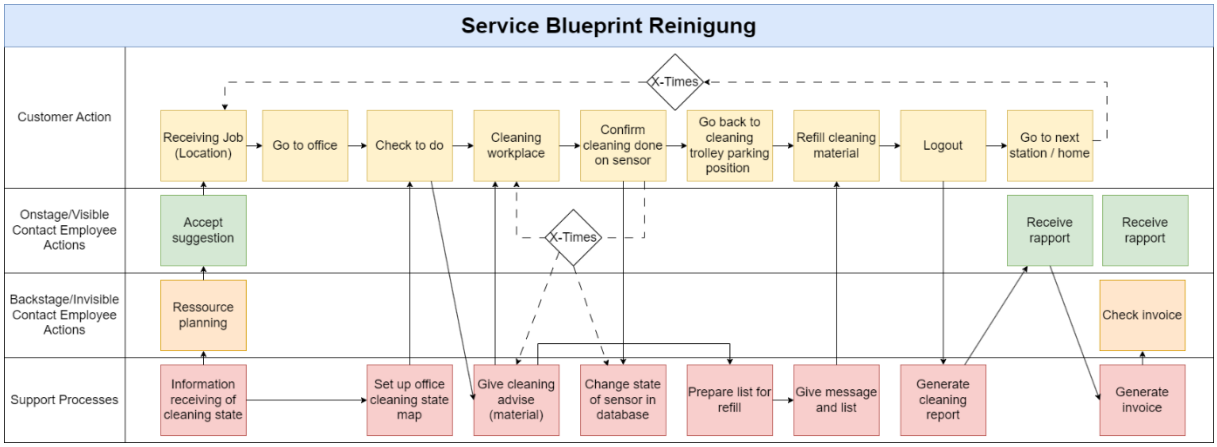

Figure 4: Service Blueprint. Source: Own representation.

To describe the business model in more detail, the Business Model Canvas was applied and illustrated in Figure 5.

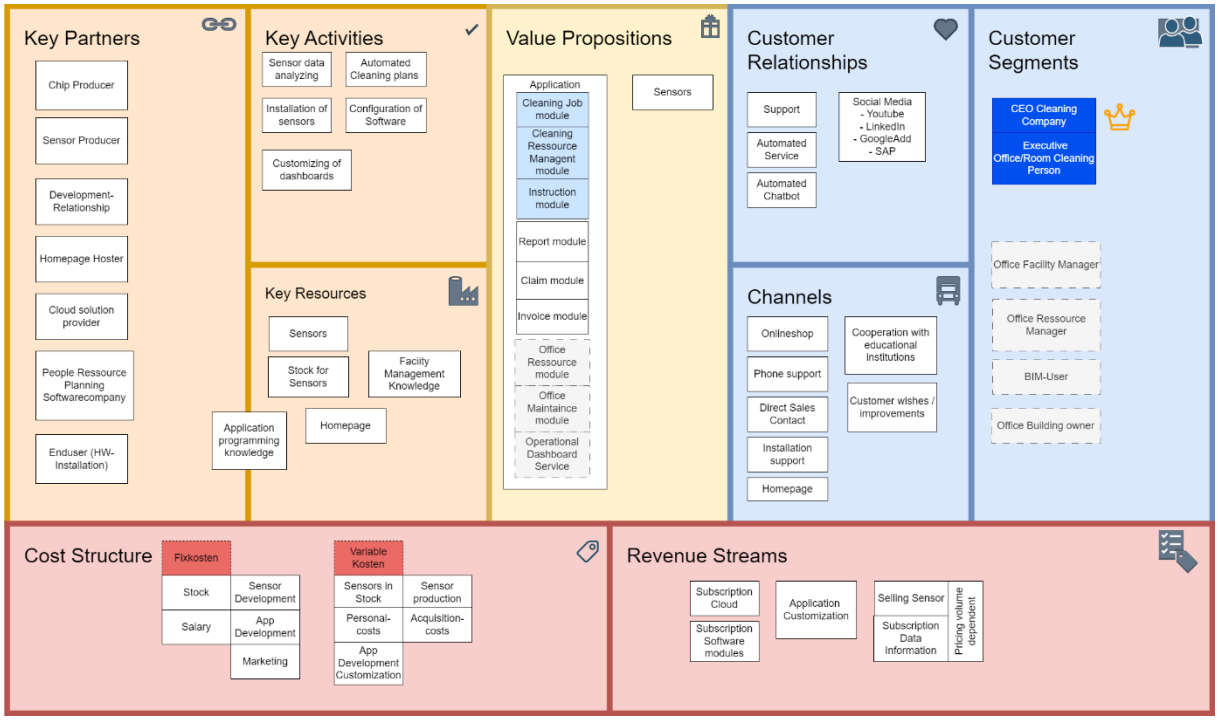

Figure 5: Business Model Canvas. Source: Own representation.

The main customers are the cleaning companies, to whom the Smart Office software is provided under a subscription model. The largest expenditures initially lie in software and hardware development. Key partners include software developers and manufacturers of Smart Office sensors.

4. What does it cost?

To demonstrate the financial value, the Smart Office solution was compared with conventional office cleaning using a Confusion Matrix (Table 1).
Assumptions are made for the cost basis. It takes 8 minutes to clean 8 office spaces, including their proportionate infrastructure. Therefore, 7.5 office spaces can be cleaned per hour. The hourly rate for a cleaning specialist is estimated at CHF 35.00. Cleaning materials are estimated at CHF 2.40 per office workstation. Thus, cleaning one office workstation costs CHF 7.00. First, the 4 cases are described.
Without Smart Office, the cost of cleaning each office workstation is CHF 7.00.
In Table 1, the Smart Office sensor solution is in use.

		True Class	
		Positive	**Negative**
Predicted Class	**Positive**	**TP** Workstation used: Yes Sensor: Red → Cleaning takes place Cleaning cost: CHF 7.00 Cleaning cost savings: CHF 0.00	**FP** Workstation used: No Sensor: Red → Cleaning takes place Cleaning cost: CHF 7.00 Cleaning cost savings: CHF 0.00
	Negative	**FN** Workstation used: Yes Sensor: Green → No cleaning takes place Cleaning cost: CHF 0.00 Cleaning cost savings: CHF 7.00 Consequence: Complaint	**TN** Workstation used: No Sensor: Green → No cleaning takes place Cleaning cost: CHF 0.00 Cleaning cost savings: CHF 7.00

Table 2: Confusion matrix. Source: Own representation.

Based on conducted interviews, there are often complaints in the current cleaning industry. Complaints generate personnel and administrative effort and resolving them can be time-consuming. The number of complaints when using the Smart Office solution can be reduced due to traceability. It is assumed that these sensors indicate the correct state with a reliability of 98%. Due to the increase in the possibility of mobile work, a utilization rate of 60% is assumed. Thus, due to the occurrence of TN with 40%, when the Smart Office sensor solution is used, up to 40% of cleaning costs can be saved.

In addition to the economic savings, the use of Smart Office also results in ecological savings. Below, an office with 50 workstations has been calculated as an example and presented graphically in Table 2.

Cost items **Savings in CO2 Equivalents**

Travel costs of 50 km		**10.00 kg**
Cleaning agents and materials		**16.00 kg**
Water (0.35 g/l)	(0.35 g/l)	0.02 kg
Cleaning agents	(1.5 kg/l)	0.03 kg
Cleaning materials	(50x of its own weight)	15.50 kg
Total		**26.00 kg**
Total per year		**312.00 kg**

Table 2: Savings in CO_2 equivalents. Source: Own representation.

In addition to the calculated 40% savings in cleaning costs, the ecological aspect should not be overlooked. As evident in the previous listing, the main ecological savings are in travel distances, cleaning agents, and materials. By using the sensor solution from Smart Office, around 300 kg of CO2 can be saved per year.
Furthermore, social benefits were discussed, and these were also critically evaluated. Since only the used workstations are cleaned, less time is required for cleaning, meaning, that in the context of the overall facility management market, fewer jobs may be needed. On the other hand, the Smart Office system solution lowers the barriers to entry for qualified personnel. For example, linguistic barriers, which often exist in this industry, can be more easily overcome. This makes it easier for cleaning companies to recruit suitable personnel. The Smart Office system can also be used for employee training, providing new employees with tailored training as needed.

5. Discussion and Outlook

Throughout the entire development process of Smart Office, numerous ideas have emerged that have the potential to further improve and expand this smart service. The challenge was initially to focus on the essentials.
Furthermore, a glimpse into some of the ideas that could be integrated into the Smart Office solution is ventured:

- **Use of AR tools:**
Instructions for employees can be projected onto the environment.
- **Office Management:**
Efficient management of office resources, room occupancy, and communication.
- **Office space usage and allocation:**
Intelligent allocation of workspaces based on individual needs and availability.
- **Office supplies management:**
Automated inventory management and reordering of office supplies.
- **More flexible working hours:**
Cleaning services can be adjusted throughout the day as needed.

These ideas are just the beginning - we are excited to see how "Smart Office" will continue to evolve to meet the needs of our customers.

The Course of the Year 2023

We had again four very interesting cases in 2023. Without wanting to prioritize the cases, they are put into a sequence here:

The first two cases revolve around the subject of health management, with the first paper focusing on a B2B processual level with efficiency potential and the second on a personal on the topic of personal fitness:

- KOMET - Smart Cost Approval Process
- Trainder – Find your personal trainer near you.

There were two more cases centred on improving B2B processes by specific platform approaches, with the third one in the field of equipment maintenance and the fourth in financial client advisory:

- FIX-SIDEKICK
- TellMe

There was intense exploration, design, and conceptualization for attaining the results described in these papers. Again, the cases were brought a considerable step further in the two-day ***Mobiliar Forum Thun workshop*** with a strong focus on assessing the mutual value creation in the ecosystem. Many thanks to ***Ina Goller*** for her excellent moderation of this workshop, and many thanks to ***Fabrizio Laneve*** for enabling the class to attend this wonderful workshop location.

The class had the chance to receive feedback from a ***high-profile expert jury*** and benefit from their experience in two pitching rounds (after the development of the value proposition including digital prototypes and after the development of the service business system). We would like to express our gratefulness to these experts here for dedicating their time and experience: ***Ariane Trammell, Fabrizio Laneve, Ina Goller, Jochen Wulf, Melissa Stucki, Nadine Charlon*** (alphabetically by first name). Their challenging feedbacks were essential for driving the cases to the next level.

KOMET - Smart Cost Approval Process

within the framework of Article 71 a-d KVV

MG
DW
JT
FD
MB

CAS Smart Service Engineering – ZHAW 2023 - Jürg Meierhofer

Abstract

In order for drugs to be reimbursed by the compulsory health insurance (OKP), they must in principle be approved by Swissmedic and listed on the so-called "Specialty List" (SL) of the Federal Office of Public Health. In individual cases, however, Articles 71a-d of the KVV provide for an exception: under certain conditions, medication-reimbursement via the OKP can be made by means of cost approvals, even if the criteria of the "usual reimbursement pathway" are not fulfilled. However, this exemption leads to higher costs and longer processing times due to manual processing of each case - while at the same time the number of cases has continued to rise in recent years.
The following presents a solution that addresses this circumstance and the associated challenges. Therefore, the application "KOMET" is developed, which, among other things, ensures that the data entered for a cost approval request by service providers is complete. Furthermore, a variety of data is being utilized to enhance the process for cost approval to reduce the overall process time. Benefits from the use of the solution are shown for all parties involved.
In summary, the solution offers a variety of benefits for users and provides the opportunity to reduce costs for service providers and insurers and will significantly reduce the processing time concerning cost approvals within Art 71 a-d KVV, which is critical for the service user and moreover create an emotional and social value.

Key words
Art 71 a-d KVV, health insurance, process optimization, cost approval, reimbursement

1. Which Challenge Do We Solve?

For various health services, applications must be submitted to statutory health insurers for a review of cost coverage (= cost approvals). These can be, for example, inpatient services such as planned acute hospital stays or rehabilitation but also physiotherapy and - this is the area we want to take a

closer look at - medicines covered by article 71 a-d of the KVV (Krankenversicherungsverordnung). That's millions of applications a year across all sectors. There is a wide heterogeneity in cost claims received by the insurance company which makes it difficult to triage some of these to the right places within the companies (cf. Kägi et al. 2020, p. 11). This also concerns applications in the area of Art. 71 KVV dealing with medication which is not yet approved for the Swiss market or is to be used for an off-label use. Furthermore, the patient's indications concerned are mostly severe, chronic or rare diseases so they need rapid treatment and "cost certainty". Various time and resources consuming assessment steps must be taken before a reimbursement decision can be made.
The biggest "painpoint" in the process is the manually performed triage of applications within the insurance, incomplete data and unstructured receipt of the cost approval applications which lead to inquiries. Up to now, all channels of communication and a variety of data formats are being used, whereby the tools of the medical service providers, which are also very different, are diverse and the willingness to voluntarily standardize is limited.

The quantity structure comprises approximately 50'000 Art. 71 a-d KVV cases in 2023 which each need roundabout 210 minutes processing time (cf. Helsana Standpunkt 09/2022 p.8 f., Kägi et al. 2020 p.11, own interviews). Digital optimization of the process could save a third of the time in various process steps. This results in a saving of 108 CHF per case. A digital tool implemented at five major insurance companies within 3 years can reach up to 20,000 cases, resulting in cost savings of CHF 2 million.

2. By which Data-Driven Service Approach Do We Solve the Challenge?

Value proposition
The elaborated solution focuses on the main pain points presented above. It has a positive impact on every actor in the ecosystem and generates not only functional and financial values but also, since every cost approval stands for a human patient, emotional and social values.

The biggest impact will be with the insurance company. The solution strongly supports the processes involved and improves them in terms of functionality and simplicity. The cost claims will appear structured, uniform and complete. This saves time for the responsible employees in every step of the process. In addition, the tool fulfils the triage process and provides a sound basis for the downstream decision-making processes. This contributes to faster, more reliable and broad-based processing. Since the process becomes more transparent and faster in the future, the company will benefit not only financially but also from social acceptance and reputation.

On the other hand, the medical professionals and hospitals will benefit from the clearly stated requirements and the transparent process. They know immediately how much information is needed for an approval to be complete and do not have to worry about finding the right contact point at the insurance company. Because historical data are collected, they can review their past cost approvals and always know the status of the current request. As the approval is complete at the time of submission, there is a noticeable time saving as there are no recalls to be made by the insurance company. Furthermore, the emotional benefit of a more transparent and reliable process for the medical partners and their patients should not be underestimated and can generate a high value.

Data used
Primarily, our tool needs to store the information on what is needed for a reimbursement request in order to be complete. This procedure aims to prevent or at least minimize subsequent queries from

the insurer towards the applicant. The data from the application itself is then stored and transferred to the corresponding health insurance company for further processing of the request. These are the data required for an initial version of KOMET with basic functionalities.

In later phases, it is conceivable that additional data could be incorporated into our service. Once KOMET is integrated into a health insurance company's internal systems, decision data related to the reimbursement applications can be stored. This decision includes, firstly, whether the request falls under Article 71 (triage process as described in previous chapters), and if so, how the application was evaluated.

Through the usage of machine learning algorithms, over time, using previous decision data, a decision support system can be generated within the tool to assist the health insurance company's employees. This sophisticated technology can help reduce the time needed for the triage and the evaluation itself by giving suggestions to the employees.

In the following two figures, a rudimentary mock-up of our KOMET tool can be seen. Figure 1 displays the browser-based plattform for doctors, where they can submit their applications. The tool ensures the completeness of the applications. Moreover, the status is readily available during the whole process.
Figure 2 illustrates the mock-up on the insurance side, where insurance employees can view and process the received applications. In a future vision of the tool, automatic triage of the applications (Article 71 or not) and decision recommendations will also be incorporated.

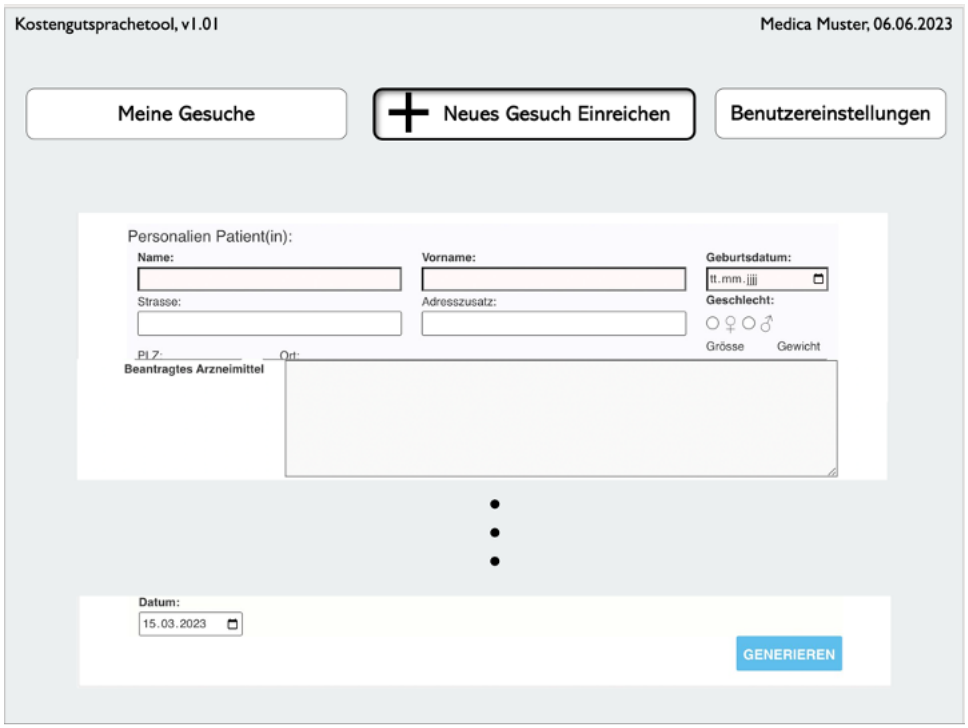

Figure 1: KOMET Mockup for doctors

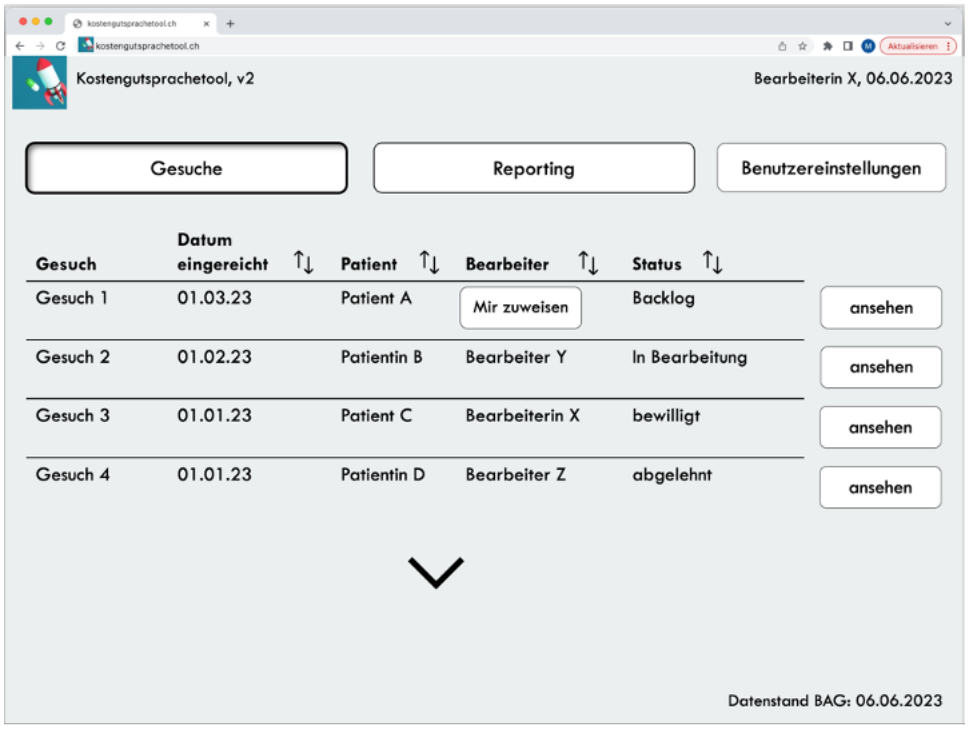

Figure 2: KOMET Mockup for Insurance

3. What Does Our Target Service Business System Look Like?

Service ecosystem
The most important partners in our service ecosystem are the corresponding employee in the insurance company, their medical advisors and, of course, the medical professionals and hospitals that form the starting point for any cost claim (see Figure 3). The insurance companies are the most critical partners because they must accept the service and, more importantly, have to be willing to pay for it.

For reasons of scalability, cost efficiency and security, we are aiming for a cloud-based solution. Therefore another important player in the system will be a provider for the technical ecosystem and integration of the data into the internal systems within the insurance company and the hospitals. With the collection of historical data, analytical services, such as recommendations, will not only be possible but will also generate a high utility value. In addition, the tool could generate regular data transmission to the regulator, the Federal Office of Public Health, which will also lead to leaner processes and more transparency.

The tool will also play an important role within the pharmaceutical industry and across research and development departments. It will create a more transparent cost structure for downstream negotiations and make the process overall fairer for patients waiting for their medicine.

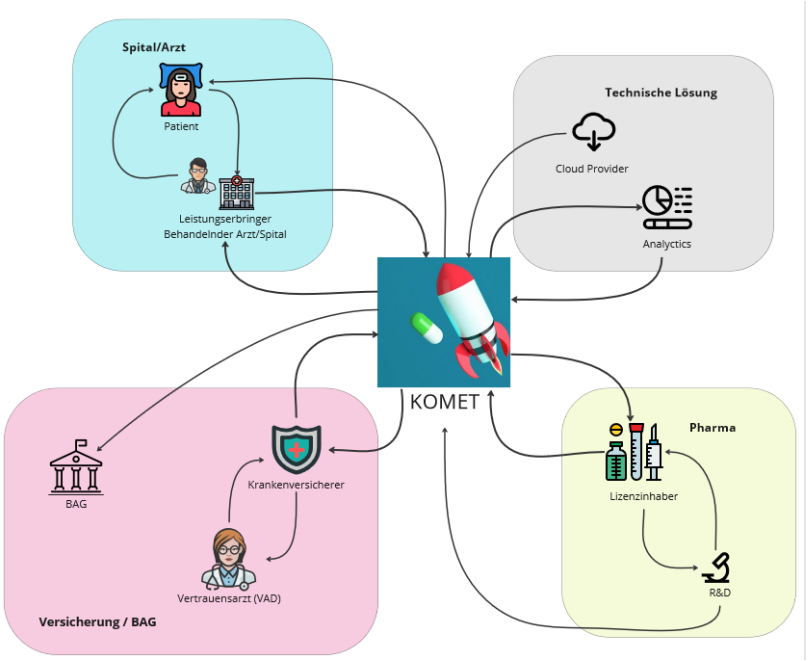

Figure 3: Service Ecosystem

Mutual value creation

Considering the mutual value creation and the different value flows among the different actors, all dimensions of value are enhanced by the KOMET service. In Figure 4 a variation of the ecosystem is pictured.

A functional value is created at every stakeholder in the business ecosystem. This is mostly created by time savings at all points, but also by an optimized process and thus a better lead time, enhanced data and decision-making quality.

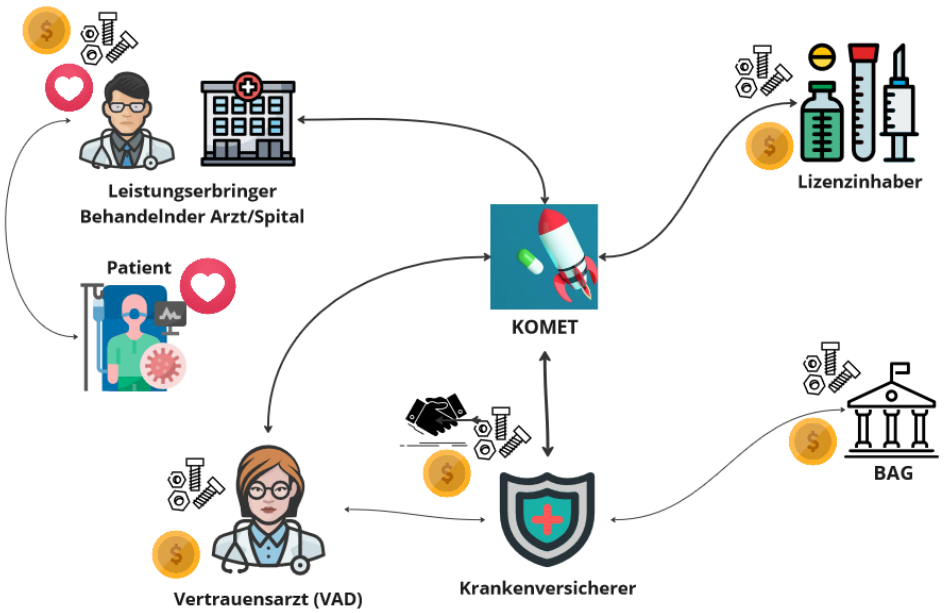

Figure 4: Mutual value creation in the KOMET ecosystem

The financial values are largely created by time savings, as a big part of the job currently requires employees. Medical service providers also profit from a lower financial risk: in some cases the hospitals take over the risk of reimbursement and start with the treatment straight away. A social

value may be an image improvement on pages of the health insurance. The cost approval on medication is a highly emotional topic as it often correlates with severe diseases. If it was possible to accelerate the confirmation and also improve an equal treatment, it would be positively perceived by patients and the public in general. Emotional values are likely to be found on the side of medical staff and the patient. In critical times waiting can be hard to bear. The waiting will be shortened and patients can feel more safe and well cared for.

The business case is based on assumptions which are derived from face-to-face interviews and market research (see chapter 1). The total addressable market currently comprises approximately 50'000 cases. The share of KOMET-cases is estimated to be 20'000 in the third year (five major insurance companies). On the cost side the KOMET-setup would mainly be personnel costs (three employees). With additional license fees, web and data security services the expected costs are approximately 300'000 CHF per year. Installing usage based-pricing model and a high price strategy, a target price of 75 CHF can be charged per case. This price is set between the lowest price which covers the costs of KOMET (cost based = 15 CHF) and the maximum savings achieved by the insurance when using KOMET (value based = 108 CHF). Values are also non-financial, but hard to quantify (equal treatment, image, emotional value). Acquisition costs might be high (approx. 4'000 CHF), but once KOMET is implemented, a customer lifetime is (ceteris paribus) several years long and the customers are unlikely to quit (10%).

4. Discussion and Outlook

Applications for reimbursement under Art. 71 a-d of the KVV have experienced a steady increase over the past ten years. The rapid development of biopharmaceutical research will further reinforce this trend and further increase the importance of Art. 71 as a pragmatic way of accessing new, life-saving therapies. In addition, with the increasing cost pressure on the Swiss healthcare system, the demand for efficient processes is growing.

The research on the process of reimbursement under Art. 71 and the interviews conducted with the various stakeholders in our ecosystem have confirmed that there are major challenges at the communication interface between the applicant (health care provider) and the insurance companies. Incomplete applications and the resulting questions to the applicant were confirmed as the biggest inefficiency in this process.
Because the completeness of the application relies heavily on the contributions of health care professionals, they have been identified, along with insurers, as key players in our service ecosystem. The inclusion of healthcare professionals in the business model resulted in a business model that resembles a two-sided market.

Collapsing the uncertainty
The initial focus on the insurance companies led to great uncertainty about the value creation for health care professionals. Since health care professionals are a key actor in the service ecosystem, creating value for them became the most critical assumption.

Based on the interviews conducted, it was assumed that the provided value of the solution would be a streamlined application process that fits their current workflow. To collapse the uncertainty of this assumption and create evidence on desirability and feasibility of the solution a 3-step approach as described in figure 5 was proposed.

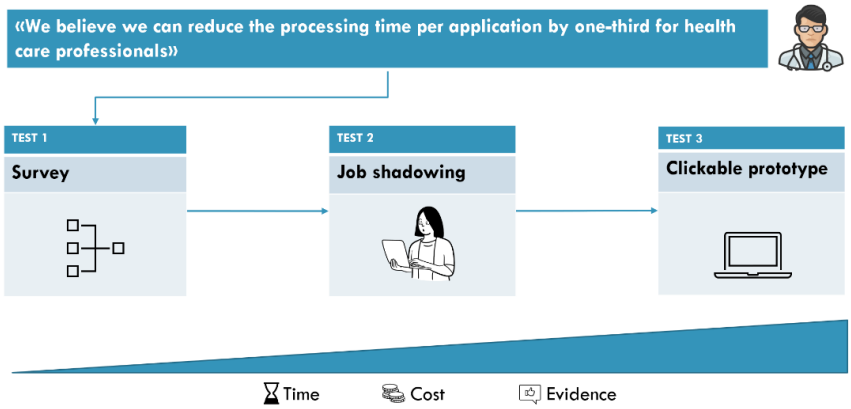

Figure 5: Hypothesis testing procedure

Surveys and job shadowing will mainly provide evidence for the benchmark time currently needed to file an application and to increase the knowledge about the current workflow. A clickable prototype is then used to validate the desirability of our solution in the actual use environment.

Go to market strategy

To bring our solution to the market, a go-to-market strategy consisting of two pilot installations is being proposed. One at a university hospital and one at a larger insurance company in Switzerland. The insurance side will be approached first with a concierge service, where the insurance company is enjoying the value of structured and complete reimbursement application while the whole service is manually done in the background. This will allow us to confirm the viability of our business model and generate initial revenues to partly cover the development costs for an MVP (minimum viable product).

Figure 6: Vision of graphical user interface for health care professionals

Subsequently, the hospital side will be addressed with an MVP containing all findings from the previous hypothesis tests. The pilot installation will be conducted in the oncology department, as it is responsible for a large proportion of all reimbursement claims with the possibility to further scale the product to other departments.
Subsequently, replacing the concierge service with the MVP will further reduce operating costs and allows us to develop additional value-adding features for process automation or decision support.

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Trainder – Find your personal trainer near you

Timm Geibel
Victoria Schröder
Franco Barmettler

Abstract

Nachfolgend beschreiben wir eine fiktive Anwendung, welche dem Gesundheitsbereich zuzuordnen ist. Durch Interviews mit verschiedenen Personen haben wir erkannt, dass seit der Corona-Pandemie die Zahl der Fitness-Studio-Besucher die älter als 35 Jahre sind, stark nachgelassen hat. Um diesen Teil der Bevölkerung wieder vermehrt für körperliche Aktivitäten zu begeistern, wollen wir eine App-Lösung entwickeln, durch welche sie die Möglichkeit zum Sport und die erforderliche Motivation erhalten. Ebenfalls sollte sie flexibel genug sein, damit die Nutzer ihrem Training, ihrem Job und ihrer Familie die nötige Zeit widmen können.

Unsere Lösung zielt in erster Linie auf die Vermittlung von Personaltrainern und Privatpersonen. In einem zweiten Schritt können Räume gebucht werden. Die Terminplanung sowie das Marketing für die Personaltrainer laufen über unsere Anwendung. Die Trainingspläne der Nutzer sind ebenfalls stets verfügbar, was bei einem Trainerwechsel das aufwändige Anamnese-Gespräch und das Probetraining erspart.

Für das Training erhalten wir eine Vermittlungsgebühr, welche unsere Kosten deckt und einen Gewinn generiert. Für die User läuft es nach dem Pay-Per-Use Prinzip. Sie zahlen nur, was sie effektiv beanspruchen. Nicht wie bei einem Fitness-Abo, bei dem sehr viele Leerläufe und unnötige Kosten anfallen.

Falls wir damit Ihr Interesse geweckt haben, können Sie gerne auf den nächsten Seiten mehr dazu erfahren.

Key words
Personal Training, Fitness, Gesundheitswesen

1. Welche Herausforderung lösen wir?

Das körperliche Wohlbefinden durch regelmässiges Training zu erhalten, bringt vielseitigen Nutzen mit sich. Man ist leistungsfähiger im Alltag, weniger anfällig für Krankheiten und geht mit einem guten Gefühl durch den Tag.

Seit der Corona-Pandemie klagen Fitness-Studios darüber, dass die Altersgruppe der über 35-Jährigen stark zurück gegangen ist. Wir haben uns nun mit dieser Zielgruppe befasst und uns überlegt, wie wir diesen Teil der Bevölkerung dazu bringen können, mehr und regelmässig Sport zu treiben.

Durch Interviews konnten wir unter anderem feststellen, dass die Personen dieser Gruppe wenig Zeit haben und viel Wert auf Flexibilität legen. Sie sind oft stark ausgelastet im Job und haben Familie. Sie wünschen sich jemanden, der sie motiviert und antreibt. Sie brauchen Instruktionen um richtig zu trainieren und erhalten dieses Wissen gerne persönlich. Für diesen Service sind sie auch bereit, etwas mehr zu zahlen. Die Business-Partner welche diese Bedürfnisse abdecken können, sind Personaltrainer.

Wir haben uns intensiv mit dem Schweizerischen Verband der Personal Trainer und einzelnen PT's unterhalten. Die Pains in dieser Gruppe sind Platzmangel, Finden von Neukunden, Marketing und das Networking untereinander.

In unserem Anwendungsfall befassen wir uns mit dem Verknüpfen von Anbietern und Konsumenten im Bereich Personaltraining. Mit Hilfe einer Plattform mit persönlichen Profilen der Nutzer können "Matches" generiert und innert kürzester Zeit Trainingstermine und Räumlichkeiten gebucht werden.

Was sind die effektiven Vorteile? Die Personaltrainer sparen Zeit im Bereich Marketing und Neukundenakquise. Die Terminplanung findet in der Anwendung statt und ist einfach zu bedienen. Die Vor- und Nachbearbeitung von Trainingsplänen wird ebenfalls vereinfacht und ist jederzeit verfügbar. Der Zahlungsverkehr läuft sicher über TWINT. Die Personaltrainer sparen bis zu 23% der Zeit bei jedem Meeting. Bei einem gut ausgelasteten Trainer sind das in der Woche bis zu Sieben Stunden, die er zusätzlich zur Verfügung hat.

Nach dem "Match" mit einem Trainer oder einer Trainerin kann in einem zweiten Schritt eine Räumlichkeit gebucht werden. Wenn der PT über ein eigenes Studio verfügt, kann man auf dieses zurückgreifen. Falls nicht, können zum Beispiel Fitness-Studios oder Hotel-Fitnessbereiche aktiviert werden, welche gerade eine ausreichende Kapazität aufweisen. Die Raumanbieter können so ebenfalls von zusätzlichen Einnahmen profitieren und eine gleichmässige Auslastung erreichen oder vorhandene Leerzeiten füllen.
Auf der Plattform erhalten die Personaltrainer Rückmeldungen und Bewertungen von den Usern. Auf diese Weise können sie ihr Ansehen und Ihre Popularität steigern und wiederum mehr Kunden gewinnen.

Die Anwender, nachfolgend auch LDTW's genannt, profitieren von der Möglichkeit sich spontan zu einem Personal- oder Gruppentraining zu entscheiden. Das Verknüpfen oder auch "Matchen" ist Anwenderfreundlich und Intuitiv und kann kurzfristig erfolgen. Während dem Training erhalten sie die persönliche Instruktion und die Motivation welche sie brauchen um ihre Ziele zu erreichen. Für das Nutzen der Anwendung geht eine Gebühr von 2.5% der Kosten für die Trainingseinheit an uns.

2. Mit welchem datengesteuerten Service-Ansatz lösen wir die Herausforderung?

Wie im vorherigen Kapitel bereits angedeutet, werden unsere LDTW's aus verschiedenen Gründen immer wieder vor Probleme gestellt. Unsere Kunden haben oft das Problem, dass sie nicht wissen, wie anfangen, wo anfangen, eine Zeit zu finden in der sie und ein Trainer frei sind, sich zu motivieren, oder ein passendes Angebot für ihre Wünsche zu finden.

Dies sind nur einige der 'Pains' unserer Kunden (LDTW's- Leute die trainieren wollen) und die mit Trainder, einer App zum schnellen Verbinden von LDTW's mit Trainern, Gruppen und auch Trainer unter sich vereinfacht werden soll.
Trainder bietet ein schnelles und einfaches Konzept, bei dem über eine Handy Applikation das betreute, bzw. geführte Sportmachen unterstützt werden soll. Dabei gibt es allerdings verschiedene Konzepte, die alle mithilfe der App ermöglicht werden.

Für LDTWs:

1. Die Trainder Schnellmatch Funktion:
Nach dem Erstellen eines Profils und der Möglichkeit persönliche Ziele einzugeben, kann per Schnellauswahl 'geswipet' werden. Vergleichbar ist dies mit einer Funktion von Tinder, bei der über Swipen festgelegt wird, wer einem gefällt. Hier wird mit Personaltrainern geswipet, die in der Nähe Trainings anbieten. Wenn dessen Spezialisierungen und angebotenen Zeitslots mit denen des Kunden übereinstimmen, kann direkt ein Training gebucht werden. Man trifft sich in der vereinbarten Räumlichkeit und legt direkt los. Den Preis für die Stunde legt der PT vorher fest und ist ohne versteckte Kosten für den Kunden ersichtlich.

2. Die Wiederbuchfunktion:
Hat dem LDTW das Training beim PT gefallen, kann über die App ein neuer Termin vereinbart und direkt mit dem Kalender des PTs abgestimmt werden. So stellen wir sicher, dass die Kunden konstant beim Training bleiben und auf möglichst einfache Art Kontinuität in ihr Training bekommen. Noch dazu wird das Terminfinden erleichtert. Ein Rating kann nach dem Training für den PT abgegeben werden und soll zukünftigen LDTWs dabei helfen, gute Trainer zu finden.

War das Training nicht zufriedenstellend? Es findet sich schnell ein neuer PT, welcher vielleicht besser zum Anforderungsprofil des Kunden passt.

3. Die Räumlichkeitsfunktion:
Nach dem Matchen mit einem PT fällt auf, dass dieser noch keine eigenen Räumlichkeiten besitzt und auf Fitnessstudios oder Hotelgyms angewiesen ist. Über eine zusätzliche Funktion werden Studios in der Nähe aufgezeigt und können ausgewählt werden.

4. Gruppentraining Events:
Insbesondere am Anfang, um die Popularität der App und die Aufmerksamkeit zu steigern, werden Gruppenfitness Events stattfinden. Hierbei wird über eine Kartenfunktion aufgezeigt, wo und zu

welchem Zeitpunkt bestimmte Fitnessgruppentrainings verfügbar sind. Beispielsweise wird ein Gruppentraining Yoga im China Garten durchgeführt. Uber die App kann man sich schnell einen Platz reservieren und direkt über TWINT bezahlen.

Bisher wurde nur auf die LDTWs detailliert eingegangen und gezeigt, welche Funktionen in der App verfügbar sind, um sie zu begeistern. Aber auch auf die Pains der PT wird geachtet.
Die oben beschriebenen Funktionen der App sollen den PT helfen, schnell und einfach neue Kunden zu akquirieren, offene Termine einfacher und schneller zu belegen, ihnen die Organisation zu vereinfachen, ebenso wie das Marketing.

Insbesondere für neue Trainer, die vielleicht noch nicht viele eigene Klienten haben, ist der Service extrem wertvoll. Eine weitere Möglichkeit ist das Verbinden von Trainern mit anderen Trainern für gemeinsame Workshops und Austausch von Wissen.

5. Die PT zu PT - Funktion:
Hier verbinden sich die Trainer untereinander, können sich abstimmen und austauschen um Expertise zu sammeln oder eigene Workshops anzubieten.

Die Funktionen der App decken somit viele der ‘Pains’ unserer Kunden ab und helfen dabei, Leute zu verbinden.

Welche Daten nutzen wir und wie (durch welche Analyseaufgaben) helfen sie?

Ein Teil der verwendeten oder verwendbaren Daten kommen von den Usern direkt, seien es die PTs, die LDTWs oder Räume, die zur Verfügung stehen. Diese werden hauptsächlich bei der Registrierung aufgenommen und nur unter Zustimmung der User verwendet.

Grundsätzlich können die erhobenen und eingespeisten Daten aufgeteilt werden in:

LDTW’s:
Leute-die-trainieren-wollen können bei der Registrierung Angaben über ihr Alter, Fitness-Level-Zustand und andere hinterlegen. Dies ist ein ‘kann’ und nicht ein ‘muss’, vereinfacht allerdings das schnellere Verbinden mit einem Trainer.

Trainder App:
In der App gibt es eine Kalenderfunktion, die vor allem den Trainern zugutekommen soll und diese dabei unterstützen, ihre Termine zu koordinieren.

Räume:
Raumanbieter wie Studios oder Hotels müssen über die App ihre Ausstattung und Standort zur Verfügung stellen. Im Idealfall könnte auch die Auslastung der Studios aufgezeichnet werden.

Werbung:
Über das Rating der Trainer, bis hin zu gezielter Werbung für Klienten werden Daten aufgezeichnet, bzw. Falls zugestimmt, genutzt.

Über die zum Teil von der App erhobenen Daten wie Standorte oder auch von den Usern eingepflegte Daten, ergeben sich Möglichkeiten, diese auch aktiv zu nutzen.

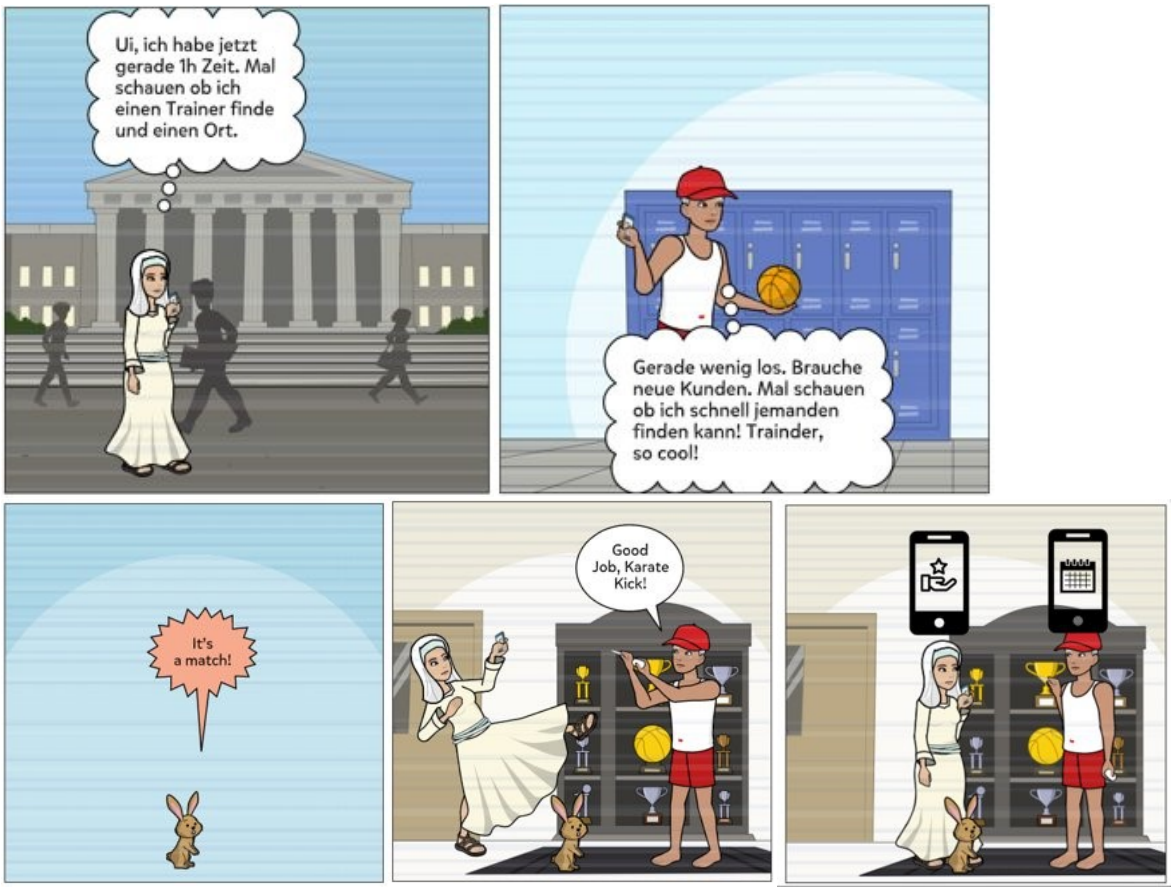
Über die Standort- und Kartenfunktion können Auslastung und Hot Spots erkannt werden. An welchen Orten wird der Service am meisten genutzt und wo bietet es sich an, neue Spots zu eröffnen. Außerdem können über die App Prognosen getroffen werden, wann Stoßzeiten sind und welche Räumlichkeiten am besten genutzt werden.

Daten der Nutzer müssen sehr vorsichtig behandelt werden und dürfen nur unter Einstimmung dieser für Werbezwecke verwendet und weitergegeben werden. Das gleiche gilt für die Kalenderfunktionen und Terminbuchung der PTs.

Trotzdem kann über die App Oberfläche Werbung verbreitet werden und so können beispielweise Nahrungsergänzungsmittelhersteller ihre Produkte, oder Fitnessketten mehr Aufmerksamkeit auf sich ziehen.

Durch das Erheben und Aufzeichnen der Auslastung der App und beispielsweise verfügbaren Räumlichkeiten, kann gezielt Werbung für Studios oder Ernährungsprodukte gemacht werden.

Wie sieht ein Low-Fidelity-Prototyp unseres Dienstes aus?



Im Comic soll auf einfache Art erklärt werden, wie die App im Grunde funktioniert. Eine Person hat Zeit und Lust zu trainieren, geht online und startet die Suchfunktion. Gleichzeitig ist ein PT gerade online, da er ein freies Zeitfenster hat und dieses gerne lukrativ nutzen würde. Über die App wird ein Match kreiert und sie werden miteinander verbunden. Preise und Lokalität werden besprochen und schon kann trainiert werden. Anschließend wird über die App ein neuer Termin gefunden, das Training bewertet oder falls man nicht zufrieden war, ein neuer Trainer gesucht.

3. Wie sieht unser Target Service Business System aus?

Mit Trainder werden die Akteure entlang der Wertschöpfungskette in einem dynamischen Ecosystem vernetzt. Somit wird den Akteuren ermöglicht eine komplementäre Leistung im Sportbereich für die Kunden anzubieten.

Bild 1. Trainder Service Ecosystem

Im Trainder Ecosystem sind sechs Hauptakteure, resultierend aus einem «Customer Insights Research», identifiziert: LDTW's, Personal Trainer, Raumanbieter, Versicherungen, Personal Trainer Netzwerk und Werbepartner. Trainder als Plattform orchestriert dabei die Zusammenwirkung der einzelnen Akteure.

LDTWs (Leute, die trainieren wollen) sind Endkunden, die die Nachfrage nach Sport bzw. Sportaktivität kontinuierlich generieren und die Dynamik vom Ecosystem anstossen. Oft fehlt es LDTW's an der Expertise im interessierten Sportbereich und der Zeit, diese aufzubauen. Die Personal Trainer (PT's), als Wissensträger im jeweiligen Bereich können diesen Service den LDTW's durch die Vernetzung im Trainder App anbieten und somit den direkten Zugang zum Kunden gewinnen.

Die stetig wachsende Nachfrage nach Trainingsflächen bei den PT's identifiziert den Raum-Flächenanbieter als weiteren Akteur im Trainder-Ecosystem. Dabei handelt es sich um Fitnesscenter, Hotels mit zum Teil leerstehenden Fitnessräumen sowie weiteren Raumverwaltern, die die Fläche auf Stundenbasis für Sportaktivität durch die Anbindung im Trainder vermieten.

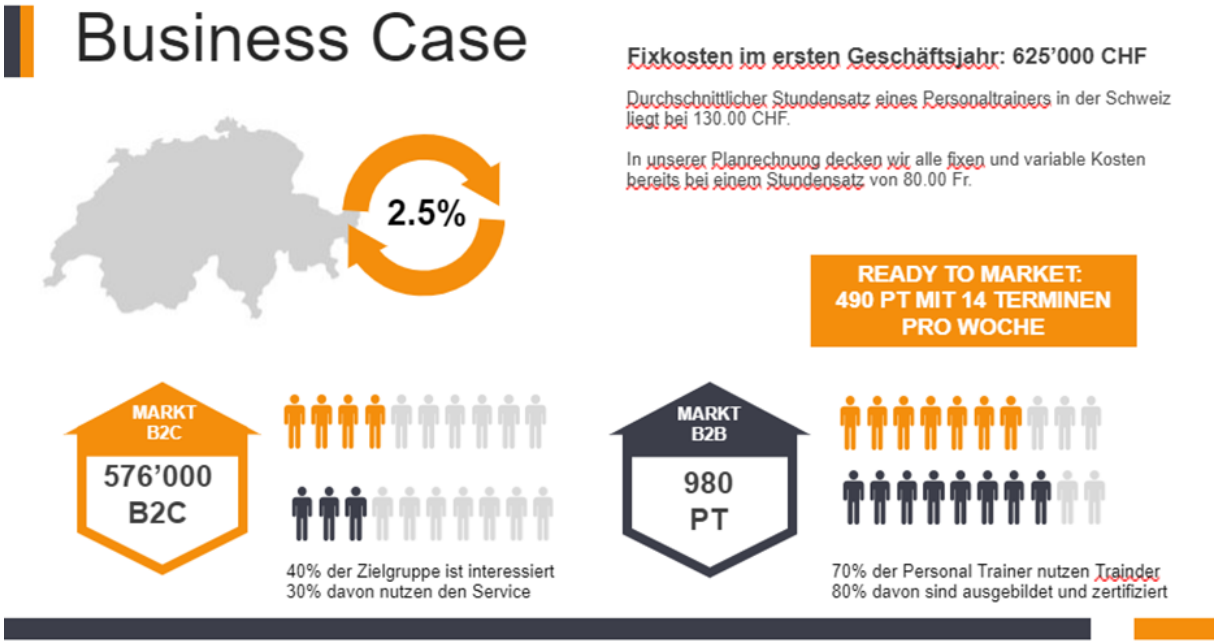
Personaltrainer-Netzwerk als weiterer Hauptakteur stellt eine vernetzte Community von PT's dar. Durch die Vernetzung der PT's wird die Erbringung vom Service «Train the Trainer» ermöglicht. Dabei geht es um die PT's die die Kompetenzen, je nach Nachfrage auf dem Markt oder für die Trainder Zertifizierung erforderlichem Wissen, aufbauen.
Die Versicherungen, z. B. Krankenversicherung, als weiterer Hauptakteur im Trainder-Ecosystem bietet den LDTW's und PT's die Kostenbeteiligung und Zertifizierungen an. Im Gegenzug gewinnt die Versicherung die Möglichkeit die Krankheitskosten durch das steigende Gesundheitsbewusstsein zu minimieren und neue Zusatzprodukte anhand von Daten, wie Sportpensum, Sportart, Ernährung, Rating (bei PT's) etc., zu launchen.
Durch die Kooperation der Werbepartner im Ecosystem, wird die gesamte Customer Journey aus einer Hand bedient, z. B., die Werbung der Fitnessausstattung (Raumverwalter, PT's und LDTW's), Ernährung (PT's und LDTW's), Event (PT's und LDTW's). Für Trainder, bietet Werbepartner die zusätzlichen Einnahmenquellen, die in die Weiterentwicklung der Plattform einfliessen.

Der äussere Rand im Trainder-Ecosystem stellt Drittanbieter von digitalen Lösungen und Plattformen sowie eventbasierten Förderprogrammen dar.

Die Kartenanbieter, wie z. B. openstreet map, googlemap, zusammen mit GPS (Global Positioning System) und IPS (Indoor Positioning System) ermöglichen die Ortung, Positionierung und Navigation im Trainder. Mit Raumbuchungssystem erfolgt die Buchung und Verwaltung der gemieteten Räume. Durch die Verknüpfung der E-Tailer im Trainder wird ein bequemes online Einkaufserlebnis, für. Z. B Lebensmittel, Bekleidung, etc. sichergestellt.

Alle Transaktionen, wie Terminbuchung beim Personal Trainer, Raummiete, Einkäufe etc. erfolgen via TWINT. Die Erschliessung der Eventdienstleister im Ecosystem ermöglicht, die Organisation von Sportevents mit dem Ziel die Sportcommunity auszubauen. Mit WBT (web basiertes Training) wird eine Schulungsplattform für die Online-Seminare und Trainder Zertifizierung realisiert. Der Staat als Lieferant der Gesundheitsförderungsprogramme und SPTF (Swiss Personal Trainer Federation) als Lieferant von Qualität und Förderung von Personal Trainer in der Schweiz stehen für Qualitätssicherung und Transparenz im Personaltrainer Markt.

Der Trainder Business Case baut auf einer B2B2C (Business-to-Business-to-Consumer) Beziehung auf, in der die Personaltrainer über Trainder den Zugang zu Kunden, den LDTW's erhalten.



Die Haupteinnahmen werden durch 2.5% der Transaktionskosten bei den angenommenen gebuchten Stunden generiert. Ausgehend von 576 000 potenziellen Kunden (LDTW's) und 980 Personaltrainer in der Schweiz mit einem durchschnittlichen Stundensatz von 80-130 CHF, werden alle fixen und variablen Kosten bereits bei einem Stundensatz von 80 CHF gedeckt.

Abhängig von der Anzahl der erreichten Kunden und der Kauffrequenz werden die zusätzlichen Einnahmen aus der Kooperation mit Werbepartnern und der Raumvermietung für die Trainingseinheiten erzielt.

4. Diskussion und Aussichten

Was hat funktioniert?
Die Befragung der Zielgruppen und die Recherche war sehr aufschlussreich. Die Personen aus der Zielgruppe sind sehr offen mit Ihren Bedürfnissen und wissen, was sie wollen. Auf diese Weise konnten wir viele Informationen erhalten, welche unserer Anwendung die schlussendliche Form

gegeben haben. Durch Interviews mit Fitness-Studio-Betreibern und der Präsidentin des Schweizerischen Personal Trainer Verbands bekamen wir eine vertiefte Einsicht in die Branche und über die Entwicklung des Fitness-Bereichs in der Schweiz.
Die Bedienung der Anwendung war erst sehr komplex, bis wir die Lösung von Tinder adaptierten. Durch dieses Intuitive Bedienen ist die Anwenderfreundlichkeit stark erhöht worden.

Was hat nicht funktioniert?
Auch wenn Trainder ein steigendes Gesundheitsbewusstsein durch regelmässiges Training fördert, ist eine Quantifizierung der emotionalen Werte noch nicht möglich. Fraglich ist auch, ob die ursprünglich anvisierte Zielgruppe der LDTW's "Ü35 " Trainder als eine APP mit Matchmaking Funktion konstant nutzen wird, weil der doppelte Verwendungszweck (dual use) und "Top of Mind" der Dating Apps den Aufbau und Image vom Trainder negativ beeinflussen können.
Zusätzlich kann die Swipe Funktion, die ja primär auf dem Vergleich der Profilbilder basiert, eine bestimmte Personengruppe benachteiligen bzw. eine hohe Hemmschwelle für die App Nutzung bilden.
Die Personenprofile von LDTW's und PT's enthalten ausserdem schützenswerte Personendaten, wie z. B. Gesundheitszustand, Sportpensum, Bilder etc. die durch die stetig steigenden datenschutzrechtlichen Anforderungen besonders geschützt werden müssen.
Die Vermietung der Räume auf Stundenbasis erfordert eine integrierte online Zutrittslösung und ein Raumbuchungssystem, was mit besonders hohen Kosten verbunden ist. Diese Kosten können erst ab Erreichung der konstant steigenden Userzahlen getragen werden.
Politisch ist auch die Rolle der Versicherungen als Partner im Trainder, vor allem in Bezug auf die Orchestrierung der Gesundheitsförderung durch Trainder, schwierig einzuschätzen.

Was muss noch gelöst werden?
Letztendlich ist das Potential der App und der damit verbundene Service fast grenzenlos. Durch Erweiterungen und neuen Ideen können immer wieder neue Werte entwickelt werden, die es den Usern einfacher macht, Sport zu treiben.

Allerdings ist die App zum Scheitern verurteilt, wenn nicht genügen PT's und vor allem LDTW's die App Nutzen. Bei ausgiebigen Diskussionen wurde die Erkenntnis deutlich, dass das Hauptaugenmerk auf die LDTW's gelegt werden muss. Ohne diese, bricht das ganze Ökosystem im Endeffekt zusammen, da davon ausgegangen wird, dass sich relativ schnell die Anmeldung der PT's in Relation mit den Usern verhält.

Die Frage ist wie viele Leute wirklich an der App interessiert wären und wie wir sie dafür begeistern können?

Hier ist es wichtig den Einstieg in die App lukrativ und schnell für die LDTW's zu ermöglichen. Die Idee wäre über die Gruppentrainings die Aufmerksamkeit und Resonanz der App zu erhöhen. Durch Bezahlung und Organisation von PT's, die über die App Gruppentrainings organisieren und auch Werbung/Mundpropaganda machen, soll jeder neue App-Nutzer 5 freie Trainingseinheiten bekommen. Das Projekt würde in einem Ballungszentrum, in diesem Fall Zürich, starten und sich sukzessive in der Schweiz ausbreiten. Das bedeutet, dass die ersten zwei Monate alle Trainingseinheiten im Raum Zürich Stadt abgehalten werden würden.
Nach Ablauf der Probefrist und der Auswertung der Ergebnisse, würde das Projekt sich dann auf weitere Schweizer Großstädte ausbreiten, wie beispielsweise Bern, Genf und Basel.

Zuerst muss die Bekanntheit der App erhöht werden. Dies ist mit einem grossen Kostenmehraufwand verbunden, ohne dabei mit grossen Einnahmen zu rechnen. Im ersten Jahr wird mit App Entwicklung und Aufbau der Infrastruktur ein Kostenaufwand von ungefähr 700k CHF gerechnet. Erst ab dem dritten Jahr wird ein Gewinn erwartet.

Mit diesem Punkt wird auch ersichtlich, welches Problem noch relativ schwierig vorherzusagen ist. Ist der Service finanziell überhaupt lukrativ genug, oder ist es nur eine gute Idee, für die die meisten Leute nicht bereit sind zu zahlen?

5. Referenzen

Interview-Partner
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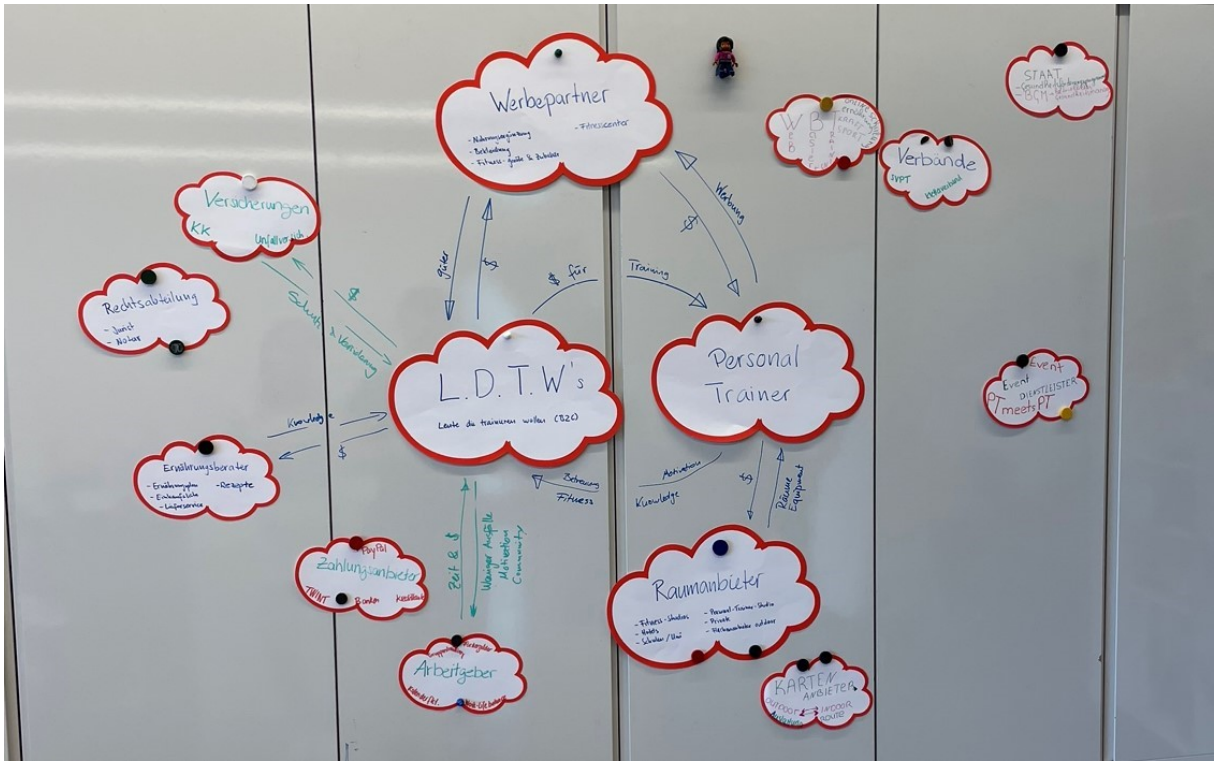


Business-Eco System aus Workshop Mobiliar Forum, Schloss Thun

FIX-SIDEKICK

Welti Larissa
Bamert Laura
Hu Jimmy
Weber Patrick
Oehrli Christian

Abstract

Machine failures and component breakdowns in producing industries can result in revenue losses, prompting the establishment of on-call organisations (Pikett-Organisation). However, training on-call staff to address diverse machine failures proves challenging. This paper focuses on a producing company with 250 employees or more, operating in three shifts. A three-level on-call structure exists, with first-level responders, on-call engineers, and second-level support, who additionally have regular job responsibilities. The process involves the nightguard notifying the first level on-call engineer, who retrieves paper-based alarm sheets and attempts to resolve the issue. If unsuccessful, the first level contacts an on-call engineer, who identifies the appropriate second-level support. This approach often results in inefficiencies, including simple issues being resolved by the second level resulting in unplanned absences of personnel due to resting time regulations.

To address these challenges, the FIX-SIDEKICK application is introduced. It empowers first-level on-call engineers, by providing comprehensive information and connections immediately accessible. The application offers digital alarm sheets, a machine database, and tailored troubleshooting guides, enabling first level on-call to quickly access pertinent details and improve the troubleshooting process. By leveraging FIX-SIDEKICK, first-level on-call engineers can reduce response time and minimize reliance on second-level support. This paper explores the benefits of this approach, including increased efficiency, improved shift planning, reduced financial losses, and enhanced productivity in the producing industry.

Key words
Safety, alarm, on-call engineer, machine, failure

1. Which challenge do we solve?

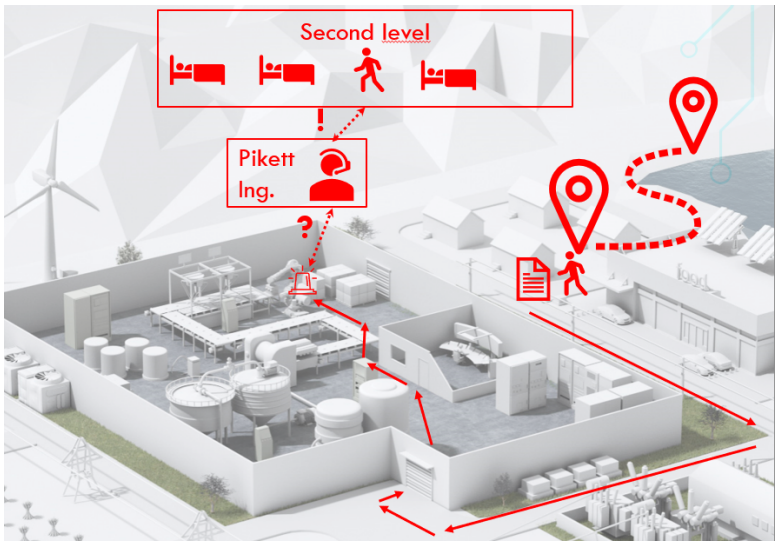
On-call organisations, a needed but challenging job

In the producing industries machine stops due to failures or component breakdowns amount to roughly 10% of the annual revenue [1]. A considerable loss of income. To counter the impact of a machine failure companies often set up an on-call organisation that will react on machine failures when the operators are not present.

We are looking at a producing company that has 250 employees and more. They run production on 3 shifts. The machine fleet is diverse in age and technology level. This makes it close to impossible to train on-call staff to resolve all possible failure modes. Thus, the on-call organisation has a three-level structure. The first level responder, an on-call-engineer and the second level support. All involved have their regular jobs in the company and serve additionally in on-call

organisation. For example, the people in the second level are operators of the machines and support the first level as specialists on their equipment.

The common scenario for the on-call organisation starts with the nightguard detecting a malfunction alarm on a machine. They call up the first level on-call, in this example we name him Sandro. He drives to the company and fetches the paper-based alarm sheets at the portier. Then Sandro must find the machine and try to first resolve the malfunction using the alarm sheets. If he struggles the next step for Sandro is to call the on-call Engineer. The Engineer looks up who of the second level support is an operator of the affected machine and calls them into action. Sandro will now wait in the dark factory until the second level arrives.



As described above Sandro must grab first analogue information in the form of the alarm sheets and must navigate through the vast machine halls to find the affected equipment. If he is not coincidentally familiar with the malfunctioning equipment, he has a low chance to resolve the case without involving the second level. For the second level however, the resolution is often simple, and he might feel deprived of his sleep for no reason. Furthermore, due to the laws and regulations about resting times the second level might not attend his planed shift therefore, creating a headache for the shift leader and the company in the end.

With the FIX-SIDEKICK application we aim to empower Sandro to resolve machine failures on his own, giving him all needed information and connections at the tip of his finger. He will be able to reduce his time in action with little to no involvement of the second level support.

What concrete pains should be tackled by this FIX-SIDEKICK application and how valuable are they from the producing company's point of view?

Based on interviews with production companies there were identified several pains in connection with on-call services to resolve failures or component breakdowns of a producing machine. Four pains are selected below as the most relevant:

1. Additional journey by the second level-support to the plant required
2. Additional path needed because they don’t carry the whole equipment to resolve the problem
3. Trainings for know-how-transfer for complex production machines
4. Rest time (labor law) -> unnecessary operations lead to employee absence

To quantify how valuable the pains are in the producing company prospective there are several parameters to be defined, as the following table shows. The corresponding values are based on the interviews carried out.

Parameters for the pains "additional journey", "additional path" and "rest time"	**Value defined based on interviews (On average)**
➢ *Parameters for "additional journey" and "additional path"*	
How often do such problems occur in one year	3-times per week / 156-times per year
How long does a journey to the place of the accidence take	30min
What is the hourly rate of an employee	125 CHF per hour
In how many operations is there an additional path necessary for collecting further equipment	In 2 of 3 operations (In 104 of 156 operations per year)
➢ *Parameters for "rest time"*	
How many operations are unnecessary of the total 156 operations per year	50-times
How many hours does an operation take	4 hours
What is the hourly rate of an employee	125 CHF per hour
➢ *Parameters for "trainings"*	
Expenditure of time for training preparation	20 hours à 4 instructors
Expenditure of time for executing trainings	8 hours à 20 apprentices

All those pains cause total costs of 220'00 CHF on average, which can be avoided by using a smart support-application like FIX-SIDEKICK. A detailed calculation will be presented in Chapter 3.

2. By which Data-Driven Service Approach Do We Solve the Challenge?

FIX-SIDEKICK helps turn pains into gains in multiple dimensions. A guidance tool will help Sandro navigate his way through the plant, put the knowledge at his fingertips and simplify the troubleshooting process by providing dynamic step-by-step instructions for the affected machines. During the entire process, Sandro is accompanied by a digital guardian that monitors his location and activities and will report any critical incidents to the nightguard or emergency services, so he will no longer worry about his personal safety during lone working situations. In more complex cases, where the expertise from the second level is still needed, the remote assist functionality can let the specialist see the situation from the comfort of his own bed almost instantly and provide instructions without the need to drive to the plant themselves. By knowing the status and criticality of each incident, the guidance tool can automatically triage the cases and assign the correct second level support to the technical without the need for an on-call engineer. At the end of his duty, the effort for Sandro to document the incident, filing subsequent orders, sending out reports, etc. has been effectively reduced as most steps have been automated. Sandro must only answer a few questions to the final solution and review the report before he can head back home.

Solution	Pain Reliever	Gain Creator	Value Dimension
Guidance tool	-Simple alarm sheet structure -Avoid searching the affected machines	-Easy-to-understand instruction -Largely automatic report creation and documentation -No need for on-call engineer	Functional, financial
Guardian	Lone work problem solved	No need for second level as observer	Emotional, financial
Remote assist	Remove wait time for second level	-Avoid costs for journeys to plant	

		-Avoid unplanned absences of second level	

While Sandro is working his way through the step-by-step process and a decision tree in the background, analytics will search and determine the most probably causes from a knowledge database. The knowledge database is initially fed with historical data from past incidents that the company already holds and is continuously expanded with data from every new incident that is automatically generated with the inputs from Sandro. By tagging potentially safety-critical tasks, the guidance tool will use sensor data from the mobile device to analyse the movement of Sandro and send out alerts whenever unusual behaviour is detected.

3. What Does Our Target Service Business System Look Like?

Rough business case (long-term financial development)

BUSINESS CASE (long-term financial development)

Year	2024	2025	2026	2027	2028	2029
Result (Profit / Lost)	-171'600	-10'000	128'400	318'000	285'000	315'000
Total Revenues	**100'000**	**345'000**	**585'000**	**935'000**	**1'155'000**	**1'415'000**
Subscription: Price * #-Companies	25'000*2	45'000*6	45'000*10	45'000*16	45'000*20	45'000*24
Pay per Use: Price * Trans.	50*300	50*900	50*1500	50*2500	50*3000	50*4000
Add-on: per additional modul	15'000*1	15'000*2	15'000*4	15'000*6	15'000*7	15'000*9
Total Costs *	**271'600**	**355'000**	**456'600**	**617'000**	**870'000**	**1'100'000**
Personnel costs	240'000	320'000	400'000	540'000	780'000	1'000'000
Operating expenses	31'600	35'000	56'600	77'000	90'000	100'000
Break-Even	-171'600	-191'600	-53'200	264'800	549'800	844'800

* Variable costs are marginal and therefore not for the rough calculation considered

Break-Even after 3.3 years

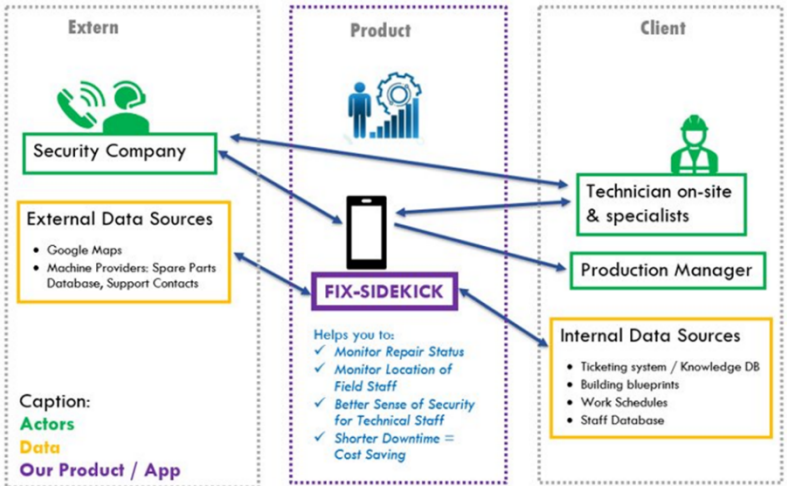
The basis for a business case calculation is the market potential of this FIX-SIDEKICK application. Target companies are larger producing companies within Switzerland with 250 employees or more. In context of this smart application, this is called the “Total Addressable Market” (TAM) [2]. According to the Swiss Federal Statistical Office there are 1’500 companies which belong to this category [3]. As potential customers up to half of the 1’500 companies can be reached by the FIX-SIDEKICK application (“Serviceable Available Market” - SAM) [2]. A typical conversion ratio from potential customers to real customers stands at 4% [4]. That means it can be expected that a total of 30 companies can be acquired as customers (“Serviceable & Obtainable Market” – SOM) [2].

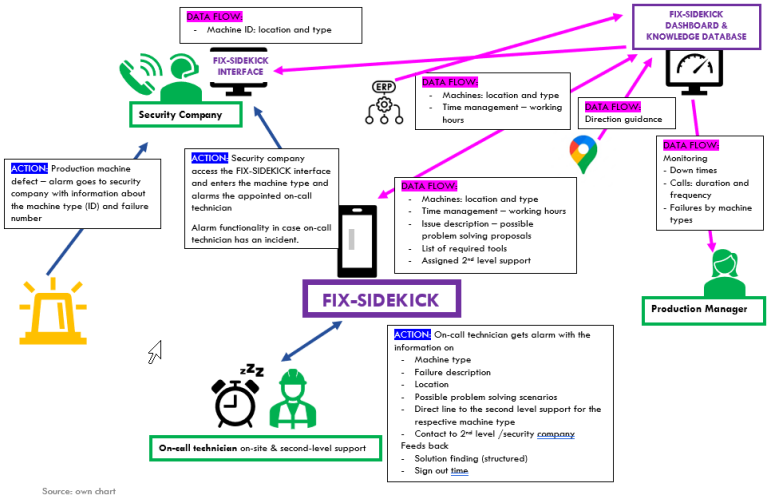
During the year 2024 the plan is to acquire two customers in sequence for pilot projects to test and further develop the application in a real practical environment. In contrast, the application fee is reduced for both pilot-customers. In the upcoming years it is expected that the customer base can be expanded constantly to reach 26 customers by 2029.

The cost base is mainly driven by personnel costs for developing the FIX-SIDEKICK software product. Starting in 2024 with 3 FTEs (full-time-employees), the personnel base will increase over the year as more customers need to be supported. By 2029, it is expected to have 10 employees on the payroll. Operating costs include renting IT-Infrastructure, office spaces, performing marketing campaign as wells as purchasing hardware.

Over 6 years the business case sums costs of 3.7 Mio. CHF in contrast to revenues of 4.5 Mio. CHF, what results in a profit of 0.88 Mio. CHF or 21% marge. The break-even-point will be reached after 3.3 years.

What is the service ecosystem of our new service?





Source: own chart

In general, one of the biggest challenges in the FIX-SIDEKICK Ecosystem are the interfaces to the various data sources such as digitization. In most companies there is no dedicated data governance unit in place – this makes it difficult to raise the need to structure the required data and set aligned master data and the work is time consuming. Each company has different sources and systems which makes quick and easy implementation challenging. In addition, most of the knowledge is stored in the "employee's brains". Start thinking about building a structured way for knowledge transfer is for sure useful for many companies, considering loss of time (money) and knowledge.

Company data

Data source	Format	Challenge	Value
Digitalization of the paper-based alarm sheets	PDF to digitized format – base for the knowledge database	Time consuming to bring into a structured format	Quick access to existing knowledge
Production machines: blueprints and exact location (building, production hall)	SAP or other system (depending on company)	Interface to FIX-SIDEKICK - Different systems depending on the clients	Easy location and identification of the machines. Trackable/ historical failure reports by machine
Knowledge Database / Incidence-data	Various sources (eg. Existing ticketing system) such as alarm sheets, internet or “human knowledge”	Reporting of the failures and taken measures in a structured format Documentation of the incident solutions by the	Centralized database with failures and solutions - On a long- term certain pattern of failures might be identified
Time sheets	Depending on the application used by the client	Data flow existing time tracking systems and FIX-SIDEKICK	Easy tracking of the working hours

External data sources

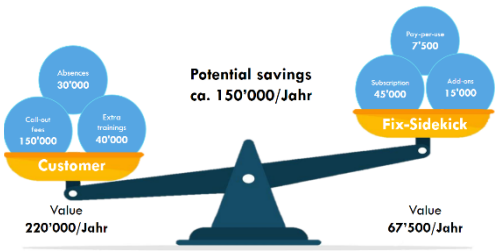
Data source	Format	Challenge	Value

Google maps	KML-Format	Only valuable for building locations but not inside the buildings	Quick access to buildings if company has various locations
Production machine providers	Various	Order system for spare parts is different for each company Machines are usually customized – not one fits all. Providers usually do not provide fix-instructions	Automated order of spare parts by technician – time saving

Human actors

Persona	Knowledge	Challenge	Value
On-call service employee	Depending on year of experience	Can feel controlled by the tool Needs to consciously enter the solution path in FIX-SIDEKICK to enhance the usability	Quicker problem solving
Second level support	Specialist for specific machine types		Know-how-transfer Less calls when solution can be found easily
Production Manager	Depending on technicians	Effort to implement FIX-SIDEKICK in the team	Transparent and trackable incident cases Knows where and how long on-call employees need per incident Better planning Decision base for new machine purchases
Security company	No technical expertise – can judge on severity of the alarm		Certain alarms might not be critical, and FIX-SIDEKICK can avoid unnecessary calls Opens field for additional clients with access to FIX-SIDEKICK interface

Mutual Value Creation



The value of solving pains consists of a significant reduction of expenses in three main categories: call out fees of second level technicians, expert trainings and costs of unplanned absences of personnel. In case of Sandro's employer (a company with around 1'500 employees), these expenses amount to a six-digit number. On the opposite side, this value is captured via a subscription and pay-per-use model with optional add-ons. In that case, the potential savings far outweigh the cost of the FIX-SIDEKICK.

Value Capture	**Value**	
Subscription:	**45'000**	Base annual price
Pay per Use:	**50**	3x/week (156x/year)
Add-on:	**15'000**	Per module
Value Creation	**Value**	
Total	**220'000**	
Call-out fees	90'000	0.5h * 125.-/hr * 156 call-outs

Collect equipment	60‘000	2/3 of all deployments
Complex machinery	20‘000	Training 20h / 4 technician at 125.-/hr
Advanced training	20‘000	Training 8h / 20 technicians at 125.-/hr
Absences	30‘000	10x avoidable deployments / 5 technicians at each 500 CHF (4h*125.-/hr)

4. Discussion and Outlook

What will properly work?

This application will provide a benefit to the user by digitalizing the so-called “Alarm sheets” into a decision-tree guidance. Although those Alarm sheets should be a step-by-step guide, those documents are in some cases very complicated and include several pages. That means that the user, who is not an expert for every machine, is overwhelmed. Therefore, we believe digitalization in form of a decision-tree where the user will be guided through possible solutions is very helpful and is quite feasible.

What will be a challenge?

A nice feature we consider in the application is a knowledge database, which delivers smart proposals for solving the problem. In addition to the Alarm sheets, they should deliver more precise solution proposals based on Analytics. However, this feature depends on the availability of valuable “incidence-data” as well as on its data quality. First challenge is to get such valuable data from the company. In this context, it will be also a challenge to integrate a smart documentation-feature into the application where the first level-support and/or second level-support can smartly document what they have done to solve the problem without investing a huge effort (otherwise the documentation will not be done reliably and neatly).

What remains to be solved?

There are three hypotheses which are determined to be critical to the success of FIX-SIDEKICK.

Scope	Hypothesis
Desirability assumption	We believe that the use of smart technology will provide personal safety at work for users (employee safety)
Profitability assumption	We believe that our product will more than triple the fees paid of a minimum of CHF 40k
Feasibility assumption	We believe that the efficiency of the on-call service in troubleshooting our customers' equipment will increase by 50% thanks to our product

The desirability assumption will be measured by interviews. For the assumption hypotheses to be accepted 80% of the interview partners must classify FIX-SIDEKICK as more efficient and safer for existing processes in their company.

The profitability assumption will be measured with a clickable prototype. For the assumption hypothesis to be accepted the average fault clearance in minutes must be reduced by 50%.

The feasibility assumption will be measured with the concierge method [5]. For the assumption hypothesis to be accepted 80% of the customers must state that they felt more confident and faster in fault clearance.

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TellMe

Dominique
Emre
Jonas
Marcel

Abstract

Traditionally, client advisors in financial institutions have struggled with the time-intensive process of creating customized meeting materials. This often leads to limited personalization, and reduced effectiveness during client interactions.

TellMe disrupts the traditional approach of investment advice by leveraging AI and advanced algorithms. It enhances the productivity of client advisors, improves the quality and customization of investment advice, and provides clients with a personalized and understandable experience. The service's continuous learning and improvement ensure ongoing refinement of recommendations based on client feedback, outcomes, additional information, and data.

The introduction of this smart service offers financial institutions a powerful tool to expedite and enhance the preparation process for tailored and customized client meetings. By curating customized investment products, leveraging large language models in combination with data analytics and automation, client advisors can deliver more personalized experiences to their clients, improve positive outcomes with the investment advice, and hence achieve competitive advantages in the financial services industry.

Key words
tailored and customized investment advice, Finance industry, large language model (LLM)

1. Which Challenge Do We Solve?

TellMe aims to revolutionize the way banks provide investment advice to their clients by leveraging advanced artificial intelligence (AI) algorithms. It addresses the challenges faced by client advisors in terms of time-consuming client meeting preparation and the need for high-quality and customized investment advice.

Fig. 1 – Storyboard recap illustration of our service TellMe.

Fig. 2 – Client Advisor's Pains – Gains – Jobs

During our interviews with client advisors from various types of banks, including cantonal banks, large universal banks, and private banks, we discovered that one of their primary pain points is the time-consuming nature of client meeting preparation. They need to keep up with financial markets,

trends, market sentiment and the stand of the bank opinion to provide valuable investment advice. However, gathering and analyzing information from various internal and external sources is a labor-intensive process. TellMe wants to automate this data collection and analysis, significantly reducing the time and effort required by client advisors.

Another challenge in investment advice is the quality and customization of recommendations. Existing investment content is often complex and not easily understood by clients with varying levels of financial literacy. TellMe wants to address this issue by assessing their financial literacy levels, investment knowledge, and language preferences. This information forms the foundation for tailoring advice and recommendations to each individual client.

The automation of data analysis and content curation frees up client advisors' time, allowing them to focus on higher-value tasks such as client interactions and strategic decision-making. Tailoring investment advice to each individual client's profile and language preferences fosters trust, strengthens client relationships, and leads to higher satisfaction and loyalty. Empowering clients to make informed investment decisions could also result in more frequent trades, generating higher transaction revenues for client advisors.

By using TellMe, a medium-sized bank with 500 client advisors can expect time savings of approximately 30 minutes per interview. Assuming an average of 40 interviews per month per advisor, this translates to 20 hours of potential time savings per month.

Considering an average hourly rate of 120 CHF, the bank stands to save a substantial amount. The monthly cost reduction can be calculated by multiplying the hourly rate (120 CHF) by the number of potential time savings per advisor (20 hours per month) and the total number of advisors (500). This results in a monthly saving of approximately around CHF 1.2mn financial benefit for the bank.

2. By which Data-Driven Service Approach Do We Solve the Challenge?

2.1 Value creation

TellMe creates value by supporting client advisors in the financial industry with an individual interview guide for each of their client. The interview guide will be tailored to the client's financial literacy levels, investment knowledge, and language preferences. By using TellMe in the interview preparation process, the client advisors are saving valuable time, which they can use to focus on higher-value tasks such as client interactions and strategic decision-making. Hence TellMe enables them to meet and exceed the expectations of the clients as well as their supervisors and stakeholders, by enabling the client advisors to focus on their core strengths "exclusive advice and support for their clients" is an important pain reliever.

TellMe generates value in all dimensions:

- Functional value (quality):
  - **Efficiency / time savings**: by automating time-consuming tasks during client meeting preparation.
  - **Customization**: by tailoring investment advice to each individual client.

- Social and emotional value:

- **Trust and relationship building:** fostering trust between clients and advisors by providing personalized and understandable investment advice.
- **Client empowerment**: by making complex financial concepts more accessible for clients.

- Economical / Financial value:
  - **Revenue generation**: increasing advisor revenues by improving customization of advice leading to more frequent trades by clients.
  - **Cost reduction**: enabling client advisors to serve a larger client base without sacrificing the quality of advice by efficiency gains.

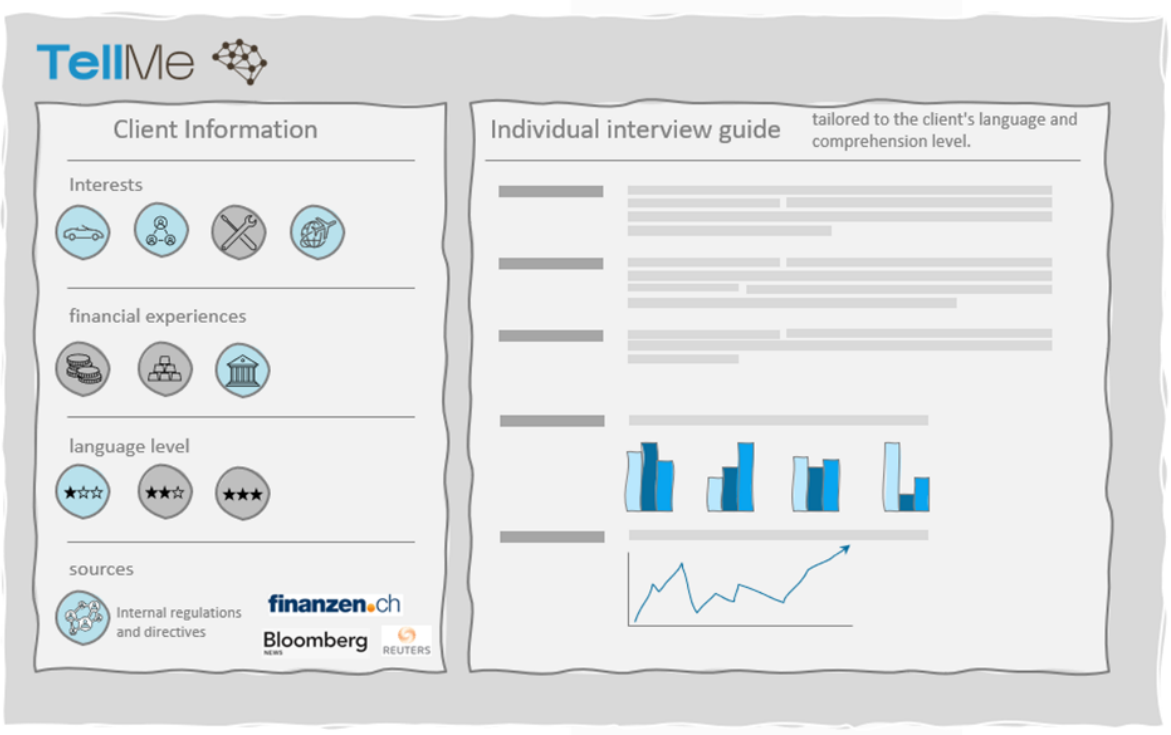


Fig. 3 – a sketch of our service TellMe.

2.2 Leveraging data

TellMe is based on a pre-trained large language model (LLM). The pre-trained LLM is further fine-tuned with specific data from the investment centre of the banks as well as publicly available data (open data) and specific financial news input. The LLM is further fine-tuned with a language comprehension model, to address the client's language preferences.

The client advisor will provide TellMe with the necessary, anonymous client information (financial literacy levels, investment knowledge, language preferences, etc.). This data is analysed with our specific LLM for his financial institute and generates the individual interview guide, tailored to the specific financial literacy levels, investment knowledge, and language preferences of the end-customer. The interview guide is presented to the client advisor in a clear and easy to understand dashboard.

3. What Does Our Target Service Business System Look Like?

3.1 Service Ecosystem

Our ecosystem combines state-of-the-art cloud-based services with traditional solutions to meet the needs of our customers effectively. We offer advanced technologies like AI-powered generative models and large language model services, along with secure cloud storage.

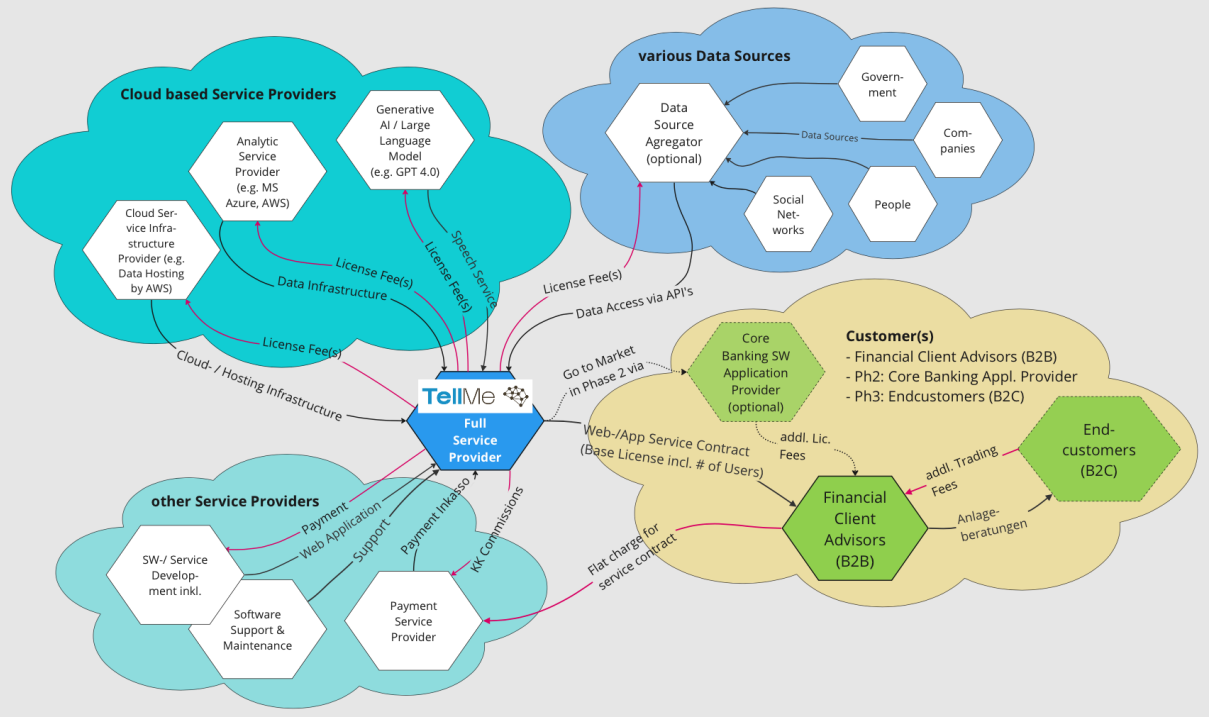


Fig. 4 – TellMe service ecosystem

Initially, our primary data sources are financial institutions, which enable us to provide accurate and personalized investment advice. As we grow, we will expand our data collection to include information from various sources. This includes gathering input from client advisors, accessing databases, utilizing APIs, and incorporating other relevant data. By expanding our data sources, we aim to offer comprehensive and insightful services that meet the changing needs of our customers.

In addition to these modern services, we also include traditional elements in our ecosystem. This involves partnering with trusted providers for software development, maintenance, and support, as well as integrating a reliable payment module from a reputable payment service provider.

3.2 Value Flows

By providing the web application software-as-a-service (SaaS) platform to client advisors, the following relevant key value flows will result between TellMe, the client advisors and their end customers:

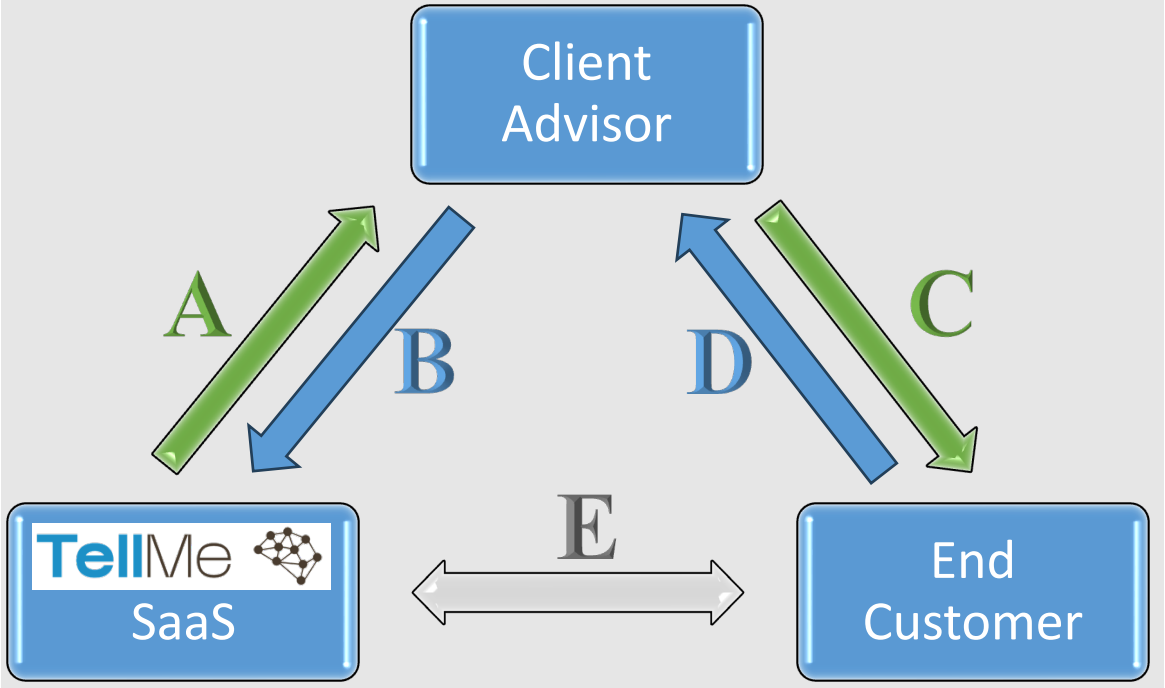


Fig. 5 – TellMe Value Flows

A. Value flows from TellMe *SaaS to client advisor:*

- Software Platform: TellMe provides a robust and user-friendly web-based platform to its client advisors, enabling them to efficiently prepare their end customer meetings with customized investment advises.
- Updates and Enhancements: TellMe regularly releases updates and enhancements to its platform, ensuring the client advisors have always access to the latest features and improvements.
- Technical Support: TellMe offers customer support services to assist client advisors in resolving technical questions, answering questions, and providing guidance on using the platform effectively.

B. Value flows from client advisor to TellMe*:*

- Basic subscription- and user package fees: Customers (banks) pay an annual basic subscription- and user package fees to TellMe for accessing and utilizing the service. These fees contribute to TellMe's revenue, allowing us to continuously further develop and improve the platform.
- Feedback and insights: Customers provide feedback, suggestions, and insights to TellMe based on their experience with the platform. This information helps TellMe identify areas for improvement, prioritize feature development, and enhance the overall user experience.

C. Value flow from client advisor to end customer:

- Customized advice: Client advisors can provide their end customers with customized advice, which is tailored to their preferences and expectations and hence easily understandable for them.

D. Value flow from end customer to client advisor:

- Trading fees: End clients will increase their investment engagements and generate more trading fees for the client advisors and their banks.

E. Value flows between TellMe *and end customers:*

- Although it is not yet foreseen that our SaaS will also serve end clients (B2C) with tailored advice for a private subscription fee, it's considered a possible expansion stage.

3.3 Business Case

The benefits and potential return on investment (ROI) of TellMe as a SaaS, aims to provide client advisors with a scalable, cost-effective, and user-friendly advisory solution, reducing time-consuming script preparations for their end customer meetings and increasing trading fee revenues thanks to tailored, customized advises.

a) **Problem statement** – TellMe currently faces challenges related to service-, software development in a highly regulated market and with brave first mover clients.

b) **Proposed solution** – The proposed solution is to develop and offer a SaaS, where client advisors can access and utilize TellMe's software applications through a web browser. The platform will leverage cloud infrastructure, allowing for scalable and reliable software delivery without the need for customers to manage their own servers or perform complex installations and integrations with core banking solutions. It will offer a user-friendly interface, regular updates, and seamless integration with other systems at a later stage.

c) **Benefits and ROI analysis**

– Economies of scale: By adopting a SaaS model, TellMe can benefit from economies of scale by centrally managing and maintaining the service platform.

– Increased accessibility and scalability: The web-based platform enables client advisors to access the service from anywhere, using any device with an internet connection.

– Enhanced customer experience: The platform's user-friendly interface, regular updates, and seamless integration capabilities enhance the overall customer experience. Customers can quickly adopt new features and benefit from enhancements.

– Continuous revenue stream: The SaaS model provides a recurring revenue stream for TellMe, as customers pay an annual basic- and user package fee for accessing and utilizing the platform. This revenue stability enables better financial planning, investment in product development, and long-term growth.

– Data analytics and insights: The web-based platform can collect valuable data about customer usage patterns, preferences, and trends. By leveraging analytics and data insights, TellMe can optimize the platform, enhance the service, and tailor offerings to meet future customer needs even more effectively.

d) **Implementation plan**

– Platform development: Identify the required features, functionality, and technical requirements of the web-based service. Develop a robust and scalable architecture using modern web technologies and cloud infrastructure.

– Security and compliance: Implement robust security measures to protect customer data and ensure compliance with relevant regulations, such as data privacy laws and industry standards.

– Scalability and performance: Design the platform to handle high user loads, ensuring optimal performance and responsiveness during peak usage periods. Conduct load testing and performance optimization to guarantee a seamless user experience.

– Training and customer support: Develop comprehensive training materials and resources to educate customers about the platform's features, functionalities, and best practices. Establish robust customer support channels to provide timely assistance and address inquiries or technical issues.

e) **Risks and mitigation**: Implement robust security measures, including encryption, access controls, and regular security audits, to mitigate the risk of data breaches and unauthorized access.

f) **Conclusion**: Implementing a generative AI, large language model based TellMe service has the potential to revolutionize financial services client advisory, leading to improved end customer satisfaction, substantial cost reductions in preparations, and increasing trading fee revenues for the financial institutions.

Business Model Patterns

As mentioned before, the business model patterns mainly consist of subscription fees. In addition to the fees, separate add-on services can be licensed. The financial institution benefits with this from variable offerings per user and can adapt the user subscription to its needs.

	**Subscription**	• The financial institution pays an **annual basic fee** for access to the service. • In addition, there is a fee **per user package** with a cap on the number of queries per user.
	**Add-on**	• various extras are offered as add-ons, for example o Additional sources (Bloomberg, Reuters, …) o Additional language model (multilingualism)

Table 1 – Business Model Patterns

4. Discussion and Outlook

TellMe aims to address the challenges faced by client advisors in terms of time-consuming client meeting preparation and the need for high-quality and customized investment advice and propose a potential solution using an LLM-based assistant system to improve communication between advisors and clients, save time and effort for the client advisor and increase the efficiency of documentation of advisor-client exchange.

The journey of this work involved several steps and considerations.

4.1 Most Important Hypotheses

1) **TellMe allows to reduce the preparation time for client interview:**
   TellMe targets a significant reduction in preparation time for client advisors by identifying tailored finance products based on user preferences. With an empirical study, the actual time savings should be measured. We are aiming for a minimum of 30-minute time reduction in the meeting preparation process. Validating this hypothesis establishes the TellMe as a valuable tool, by significantly reducing the time and effort required by client advisors.
2) **TellMe increases the understanding of the client for finance products:**
   To demonstrate that TellMe increases the end-customers understanding of investment advises using financial literacy levels, investment knowledge, and language preferences, the following performance indicators (KPIs) can be considered:
   a) Time Spent on Explanation: Compare the time required for explanations using different language models to determine efficiency and effectiveness.
   b) User Feedback and Satisfaction: Gather client feedback and satisfaction ratings to gauge their perception of the system's effectiveness.
   c) Number of Follow-up Questions: Track the decrease in follow-up questions or clarification requests, indicating improved information comprehension.

These KPIs provide quantitative and qualitative data to support the TellMe's efficiency in enhancing client understanding.

4.2 Next Steps

Proof of Concept

The next steps revolve around conducting a proof of concept through a user research approach, focusing on a language-based finance advisor. Participants will be recruited to create various language levels, allowing for the adaptation of financial advice according to their specific language proficiency. The performance of users will be evaluated using these different language levels, and the gathered data will be used to assess the effectiveness of the concept. Following the evaluation, the service team intends to approach banks and decision makers to quantify the value that the LLM-based assistant system can bring to both banks and advisors. In this process, a select group of cooperating banks will act as pilot users, providing valuable insights to further enhance the service.

Integration in Core banking systems

The work includes plans to integrate the TellMe service into core banking systems, streamlining workflows, reducing manual effort, and facilitating seamless data exchange. By leveraging core banking systems, the assistant gains access to comprehensive financial data, providing more accurate and personalized recommendations.

Users will be able to execute trades directly through the platform with customizable automation levels. They can receive advice and assistance while maintaining control over investment decisions. Automatic order placement based on predefined parameters will ensure timely trades.

Additional functionalities such as shadowing successful clients will enhance collaboration and education within the platform. Data privacy and security are prioritized as the service expands, with careful handling of anonymized user data.

The service aims to create a user-friendly platform that empowers clients, combining extended services, core banking integration, trade execution, and innovative features.

Usage for other domains:

Furthermore, once the effectiveness and advantages of the service have been proven, it can be expanded for use in other domains. Domains such as data privacy, tax consulting, law enforcement, and more share a similar pain point where clients require a domain-specific language to make informed decisions. The TellMe can be adapted and utilized in these domains, providing clients with the necessary language understanding and content comprehension for proper decision-making.

5. References

- https://towardsdatascience.com/how-to-use-large-language-models-llm-in-your-own-domains-b4dff2d08464
- R. F. Lusch, St. L. Vargo, Service-Dominant Logic: Premises, Perspectives, Possibilities, Cambridge University Press, 2014

The Course of the Year 2022

We had four very interesting cases in 2022. For one of them, it was decided not to publish the paper for internal reasons. Yet, it was a very sophisticated and well elaborated case, too. Without wanting to prioritize the cases, they are put into a sequence here:

Against the background of the potentially challenging energy supply situation in the near future, two of the projects focus on this issue in the B2B building sector:

- Honeycomb: Smart Energy Management for Buildings Workplace User Experience
- Smart Energy: Our ambition is to disrupt the property insurance market.

Additionally, there was a very interesting case tackling the highly complex question of data platforms for maintenance services in manufacturing:

- Smart Plant Systems

There was again very high engagement by the participants this year. The cases were developed and sharpened over numerous design iterations and in the two-day *Mobiliar Forum Thun workshop*. Many thanks to *Ina Goller* for her excellent moderation of this workshop, and many thanks to *Fabrizio Laneve* for enabling to class to attend this wonderful workshop location.

At two distinct moments in the development, i.e., after the development of the value proposition including digital prototypes and after the development of the service business system, the participants presented their cases to a high-profile ***expert jury*** consisting of industry representatives, entrepreneurs, and scholars. We would like to express our gratefulness to these experts here for dedicating their time and experience: *Fabrizio Laneve, Ina Goller, Lukas Schweiger, Marc Rennhard, Melissa Stucki, Nadine Charlon, Rolf Günter* (alphabetically by first name). Their challenging feedbacks were essential for driving the cases to the next level.

Honeycomb
Smart Energy Management for Buildings

Camillo, Karolina, Oliver, Rico, Xaver

Abstract

Energy optimization in buildings has become increasingly important in the present world. High energy prices, climate change, ESG reporting requirements and sustainability certifications demand our buildings to be more energy efficient. The need to improve energy performance of buildings in Switzerland is substantial. More than one million buildings are in urgent need of energy-related renovations.[6] Moreover, up to 15% of a building's energy consumption can be saved only by optimizing the installed technology [7]. The technology needed to achieve this is now available on the market. Buildings can generate and store their own energy. However, new comprehensive solutions are just emerging. The upcoming regulations[8],[9] as well as the growing societal awareness regarding energy, fossil fuels and CO2 emissions affect the real estate sector. Building owners and facility managers are looking for competent partners who can cope with the increasing complexity of energy systems and who can operate their buildings in the most efficient way - both economically as well as ecologically. With our product, Honeycomb, we provide smart energy management for buildings. It is a data-driven service that helps property owners and facility managers to measure and optimize the energy performance of their buildings.

Key words
Energy management, energy transition, smart building, energy optimization, sustainability

[6] "Den Angaben auf «Das Gebäudeprogramm» zufolge sind mehr als 1 Million Häuser nicht oder kaum gedämmt und damit energetisch dringend sanierungsbedürftig, drei Viertel der Gebäude werden heute noch immer fossil oder direkt elektrisch beheizt." https://www.raiffeisen.ch/casa/de/immobilien-sanieren/sanierungsplanung/sanierungsstau/energiestrategie-2050-interview.html

[7] Energate Messenger Schweiz: "Bfe Sieht Gebäude Als Die Kraftwerke Der Zukunft" Mario GRAF, 03.03.2022 "

[8] Swiss Energy Strategy 2050 https://www.bfe.admin.ch/bfe/de/home/politik/energiestrategie-2050.html/

[9] Revision des CO2-Gesetzes 2022 https://www.bafu.admin.ch/bafu/de/home/themen/klima/recht/totalrevision-co2-gesetz.html

1. Which Challenge Do We Solve?

Energy management in buildings is changing due to two main factors. On the one hand, environmental awareness is increasing and customers, investors and the government are demanding proof of ecological management of resources. On the other hand, increases in energy prices are forcing companies to be more cost-efficient.

Energy optimization is a challenge for everyone involved. Companies are already suffering from a shortage of skilled employees and are often missing expertise in energy optimization. In most buildings, the infrastructure to collect the data required to make informed decisions about energy does not exist. If it is available, there is still no way to process, report and analyze it effectively.

Figure 1: StoryBoard in short

Our Customers

Based on 10 semi-structured in-depth interviews with different stakeholders in the field of energy and property management, we concluded there is no single customer segment that we can address. People responsible for energy management work on the side of building owners, portfolio managers, facility managers or major tenants. We identified three main personas: building owner (figure 2), major tenant and facility manager, each with slightly different motivations, pains and gains. Although the role of energy manager is not always explicit, it can be one person or a department, there is always someone in charge of energy bill with an incentive to optimize it. These people are our potential customers.

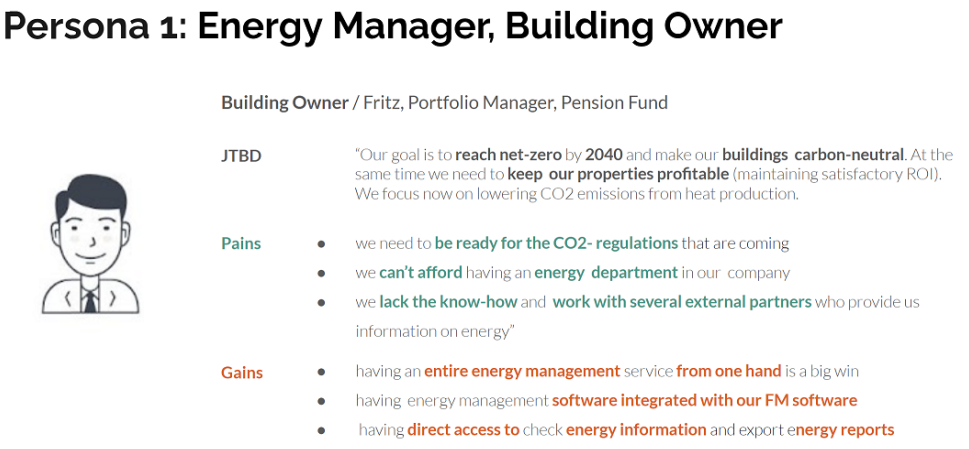


Figure 2: One of Personas, Customer Segment: Building Owner

2. By Which Data-Driven Service Approach Do We Solve the Challenge?

Honeycomb creates value by supporting customers with easy-to-understand advice on how to optimize energy use in their properties, as well as taking care of the day-to-day energy optimizations automatically. This enables them to meet and exceed the expectations of their stakeholders. Enabling our customers to focus on their core strengths is an important pain reliever. At the same time, Honeycomb allows the energy manager to comply with SLAs mandated by their (internal or external) customers and gives planning security to their customers.

We generate value in three dimensions:

- Functional: Energy Monitoring and Optimization
- Financial: Saving of Energy Costs
- Economical & Social: Reducing CO2-Foodprint & Obtaining Sustainability Certification

From The Value Proposition To The Service

Figure 3 shows the service overview. Honeycomb services cover the areas of generation, consumption and storage of electricity, water, heat and waste. Data from existing or new sensors is used and is combined with further data from other customers and from publicly available data (Open Data). The data is analyzed using state-of-the-art algorithms to generate optimization suggestions tailored to the specific building and customer requirements. The data is then processed and presented to the customer in a clear and easy to understand dashboard (figure 4).

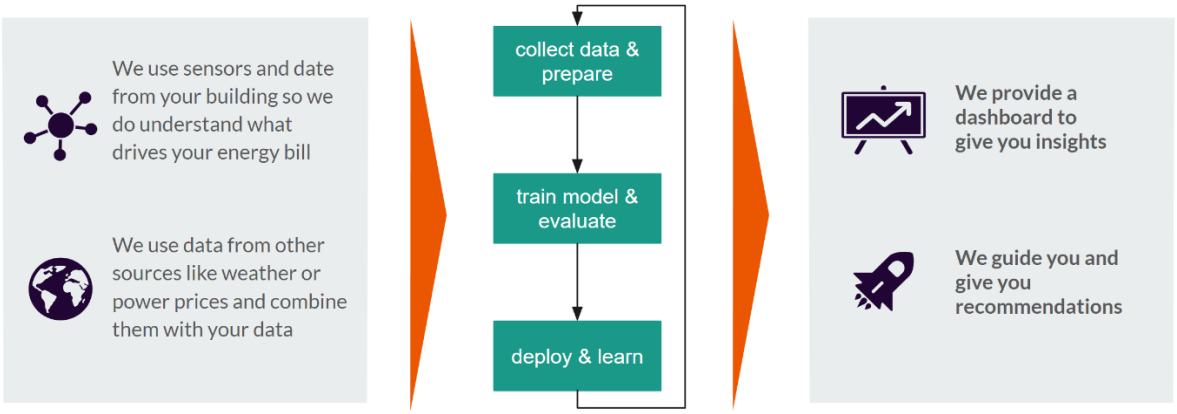


Figure 3: Service Overview

Three Areas For Optimized Energy Consumption

Recommendations generated by Honeycomb cover energy optimization for short as well as long term improvements. The dashboard shown in figure 3 represents a possible overview of all services. Short term solutions can be implemented automatically by Honeycomb or with minimal manual effort, such as changing the temperature or deactivating unused devices. For improvements that require planning and financing, such as for example improving insulation or installing photovoltaic panels, Honeycomb will calculate the business case, including required investment, amortization and NPV.

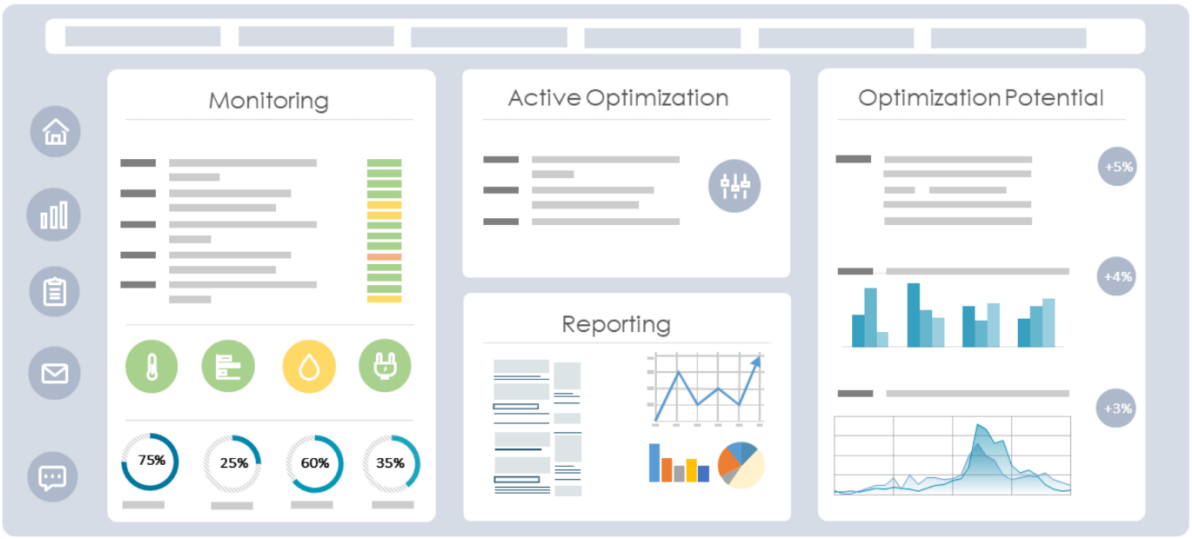


Figure 4: Smart Energy Management Dashboard

The service consists of three components. In the first area, the consumption is shown. This gives the customer an overview of all relevant figures at any point in time and they do not have to collect or prepare them manually. In the second area, simple optimizations are done automatically, and the savings are shown transparently. In the last area, suggestions for possible optimizations are provided. To have an overview of investments and savings, a slide controller is implemented. This allows dynamic comparison of values with each other in real time. If required, improvements can also include certifications by 3rd parties (e.g. Minergie).

The service falls into the Asset Efficiency Service (AES) classification[10]. While there are some processes that can be automated and are run entirely through the service, there are still key processes that are run with and by the customer. At the same time, while consulting and diagnostic are an important part of the service, most of the value lies in the promised performance of the building in regard to energy.

[10] Kowalkowski, C., & Ulaga, W. (2017). Service strategy in action: A practical guide for growing your B2B service and solution business. Service Strategy Press.

3. What Does Our Target Service System Looks Like?

To be able to provide the service, different actors make up the ecosystem. These range from sensor manufacturers to capital providers. Figure 5 shows the service ecosystem for overview purposes.

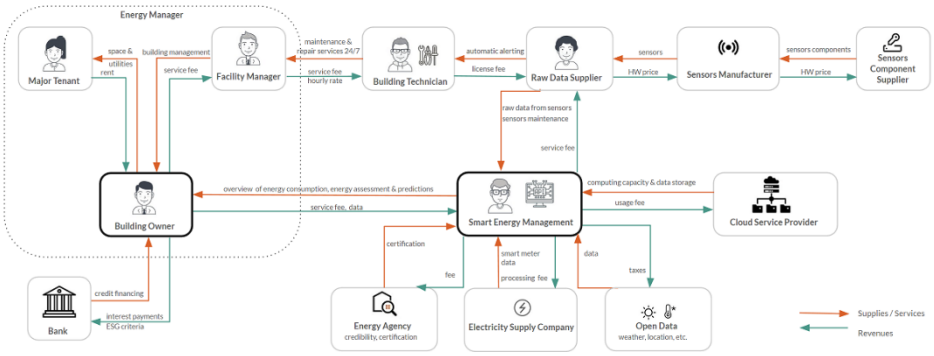


Figure 5: Overview of the service ecosystem

Create And Capture Value For And From Our Customers

In figure 6 the value capture and value creation are shown. We offer our customers monitoring and short-term as well as long-term optimization. With our complete package, customers no longer have to worry about energy management and they can focus on their core responsibilities. They always have an overview of the consumption and control over the optimizations. They can also save costs through efficiency gains and achieve their sustainability goals.

The monitoring is paid as subscription. For the optimization proposals, a one-time fee is due depending on the amount saved, and consulting is billed per hour. In addition to the payment, another important value is received; the data from the customers allows us to further optimize our model and the service can be improved over time.

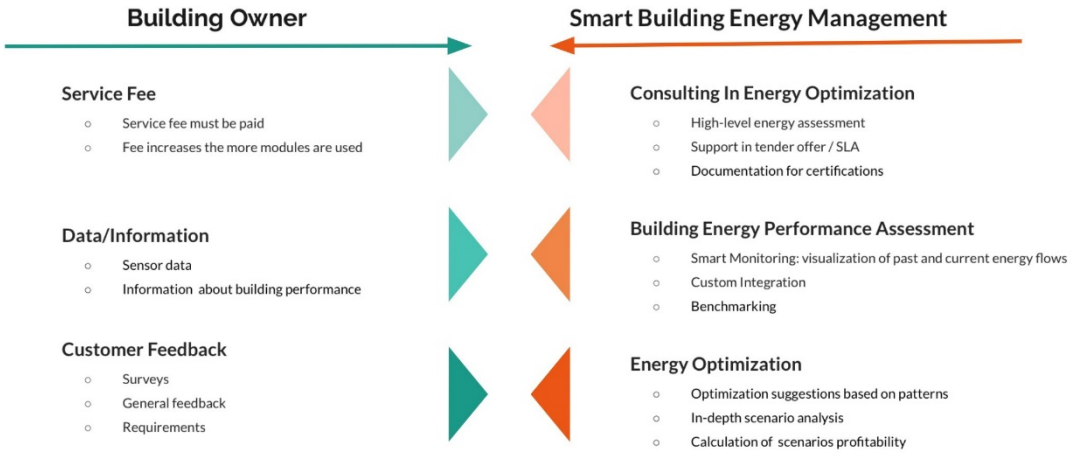


Figure 6: Value Capture and Value Creation

Providing The Solution With Help From Partners

We rely on several 3rd party providers for our service. To get the data we need, we work with sensor manufacturers. We also obtain data from the electricity supplier and other public data. We pay a service fee for some of these. Customer data is stored in the cloud and a fee per usage is paid. We cooperate with experts in energy consulting to provide one solution for our customers but with the experience and knowledge of our whole ecosystem.

4. Discussion and Outlook

We presented our service to several potential customers and received positive responses. It became clear that there is a real need for such a service and that the solution has great potential. The clients were interested in having all energy related topics covered by one provider. For some parts of energy management there are already solutions on the market. However, we provide a unique and integrated solution with dashboard, reporting and recommendations in terms of CAPEX and OPEX. We can answer the most important questions from our customers and support them on their journey towards better management of energy consumption in their buildings.

One Role For Multiple Functions

We encountered many different constellations among companies. In some, the person responsible for energy was part of facility management. In others, decisions are made by the owner or tenant. There are also companies where responsibilities for energy management and sustainability are split between different departments. Because of the different structures, it was difficult to identify one specific customer type. Therefore, we settled on the role of responsible for energy management as the customer for our solution.

Verifying The Hypotheses With Our Customers

We are confident that our service can fit with customer needs. To validate our assumptions, we formulated a series of hypotheses (figure 7), which we aim to test before or during release. They include: “there is a motivation to optimize energy among potential clients”, “we can meet the expectations for optimizations” and “we position ourselves correctly financially”.

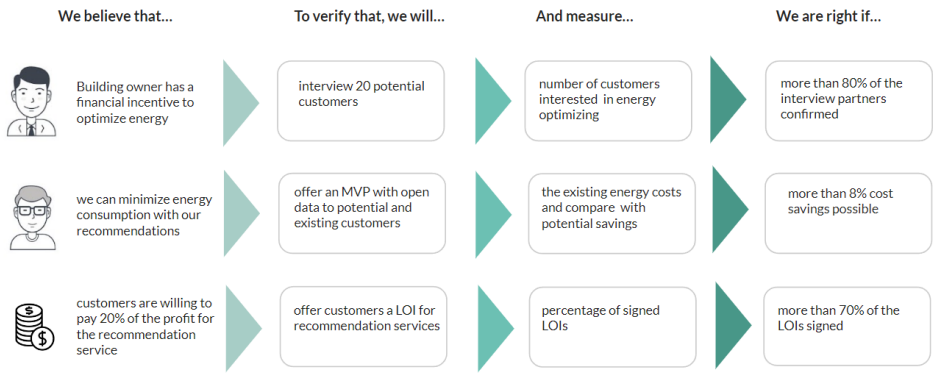


Figure 7: Hypotheses

How We Plan To Enter The Market

We plan to enter the market through consulting. This allows us to build relationships with potential clients without requiring a long-term commitment from them. In this way we can gather experience and customer data. Initially, the model will be created using only publicly available data. As more data from buildings becomes available, the models are refined continuously. We saw that some potential customers are already working with sensor manufacturers. This opens a further entry opportunity through cooperation with them.

Smart Energy

Our ambition is to disrupt the property insurance market.

Team Overview
Ebru Dulak
Fabio D'Elia
Markus Konz
Melanie Sauerbier
Stefan Hegetschweiler

Abstract

Protection against lack of solar irradiation

Insufficient solar irradiation can put solar panel owners under immense pressure. To protect them from financial losses resulting from this threat, the spinoff Smart Energy has developed an innovative index-based insurance service, focusing on small insurance companies, which in turn can offer this service to their customers.

Key words
Sustainability, renewable energies, reinsurance, smart energy, energy price stability

1. What challenge are we solving?

We aim to disrupt the property insurance market with a platform supporting a product innovation related to renewable energy. The product innovation is to protect a shortfall of energy production, caused by unfavorable weather conditions. A shortfall can be calculated based on historical data of radiation in combination with geo data.

Small insurance companies have the pressure to grow based on product innovations and according to our conducted interviews, they only have limited resources that can be invested into technology. Most insurance companies as well as customers have a strong interest in renewable energies and the solar business premium volume increase is 600% in the last 10 years. The market is a highly profitable niche with a loss ratio of approximately 56% (source: Swiss Re).

In general, solar production is subject to strong fluctuations. The daily production and effectively gained power vary per day and depend on the weather conditions. Bad weather periods can strongly influence the energy gained.

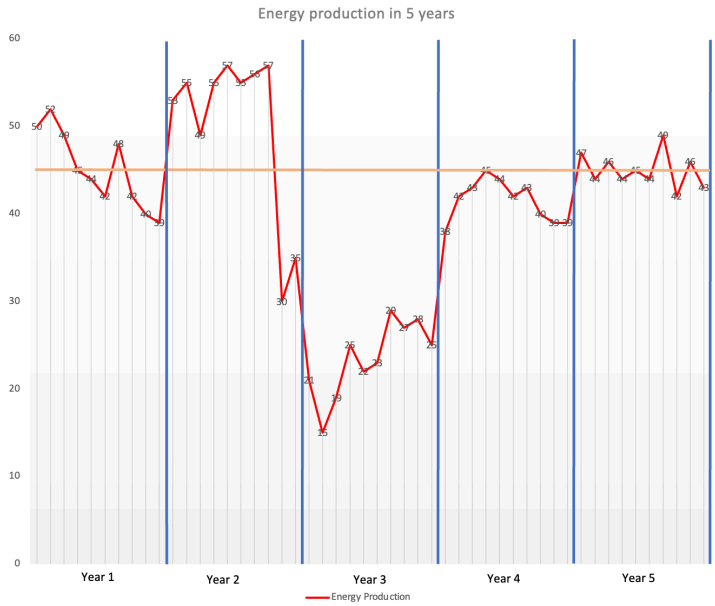


Figure 1 - Energy production

The example shows the energy production over 5 years on an aggregated daily basis. In this example, the years 1 and 5 are average and year 2 indicates an overproduction. The years 3 and 4 are below expectations.

A solar panel owner invests in the technology by calculating the expected average energy that needs to be produced by the system so that no additional energy has to be purchased on the market.

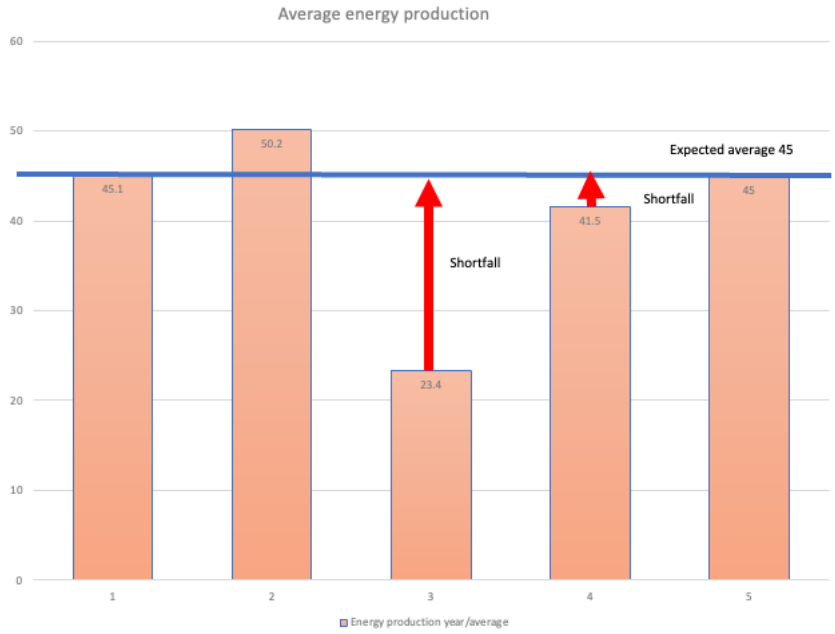


Figure 2 - Average energy production

The example above shows an expected average of 45 kWh produced energy and a shortfall in the years 3 and 5. The owner has to buy energy on the market to compensate the shortfall and with that, suffers from a financial loss. At the same time, the amortization of the investment continues and will even increase over the years.

Our offered data service contains radiation data of the last 50 years for regions and with that an index can be produced to calculate the probability of a shortfall in the next 50 years.

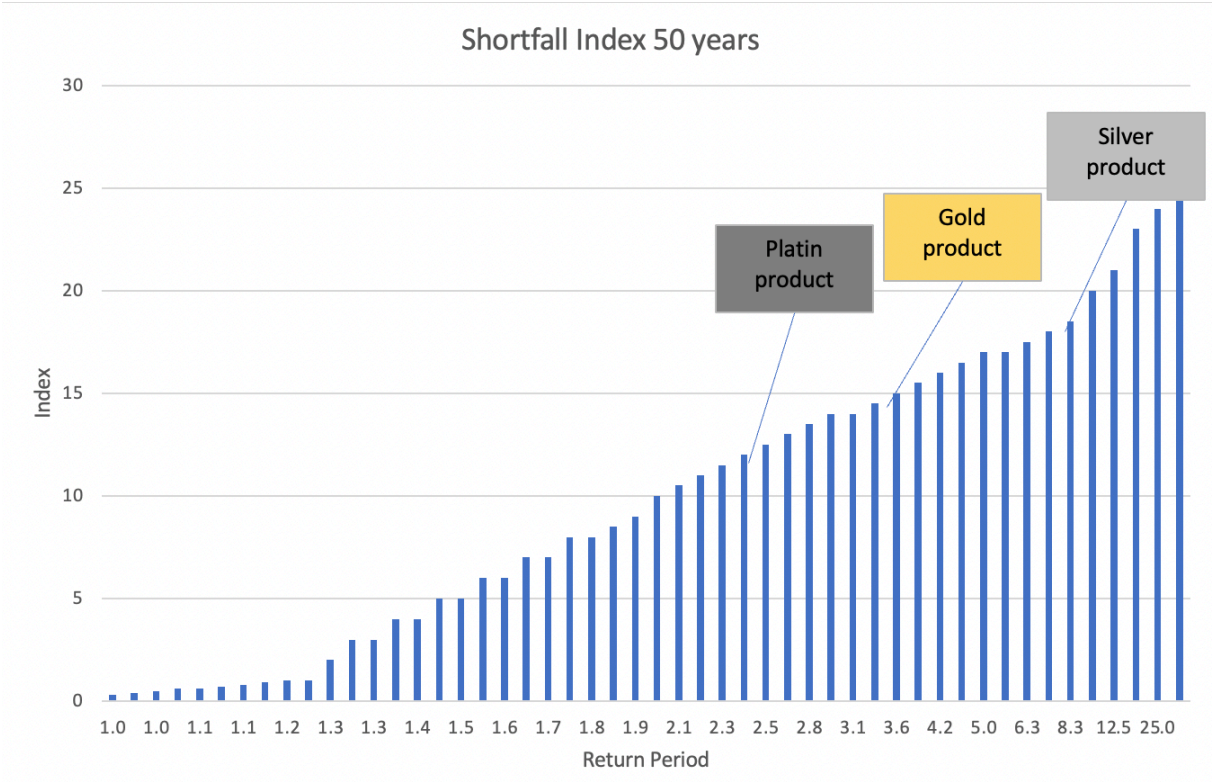


Figure 3 - Shortfall index

The example given shows how products can be designed. A 'platin product' is designed in such a way that the shortfall is paid out every 2.4 years, while a 'silver product' is paid out every 8.3 years. The difference between the 'gold' and 'silver product' is that even smaller shortfalls are more often covered and with that, more regular payouts reduce the gap between expected average and effectively produced energy. The insurance company can design its products according to its own preferences and the customers' needs. The shortfall can be paid out automatically e. g. after one year. The energy costs are agreed annually between the insurer and the policyholder to calculate the financial loss.

Small Insurance companies can benefit from product innovation by reducing their RnD (Research and Development) activities and benefit from faster time to market. Low implementation costs help testing a target market and the end-to-end solution provided covers the full lifecycle.

2. Which data-driven service approach do we use to solve the challenge?

Two value creation logics are present in our business ecosystem (figure 4). Between the final customer and our clients (the primary insurance companies) exists the classical *goods dominant logic* (GDL), in which the customer transfers their own risk to the insurance company for a premium payment which is higher than the expected loss of the customer. This risk transfer is either agreed between customer and insurer directly or via a broker or agent. This is, in many markets, a prerequisite for banks to grant loans. Therefore, the banking industry is an important partner for the insurance companies. However, between Smart Energy and the primary insurance company the value creation follows a *service dominant logic* (SDL), in which Smart Energy assists the client in their own value-creation processes. We exchange technology, data and expertise for fees, market access and market knowhow. This allows the clients to enter into new markets faster with more innovative products at lower costs, while Smart Energy benefits from the local market expertise and access to local customers.

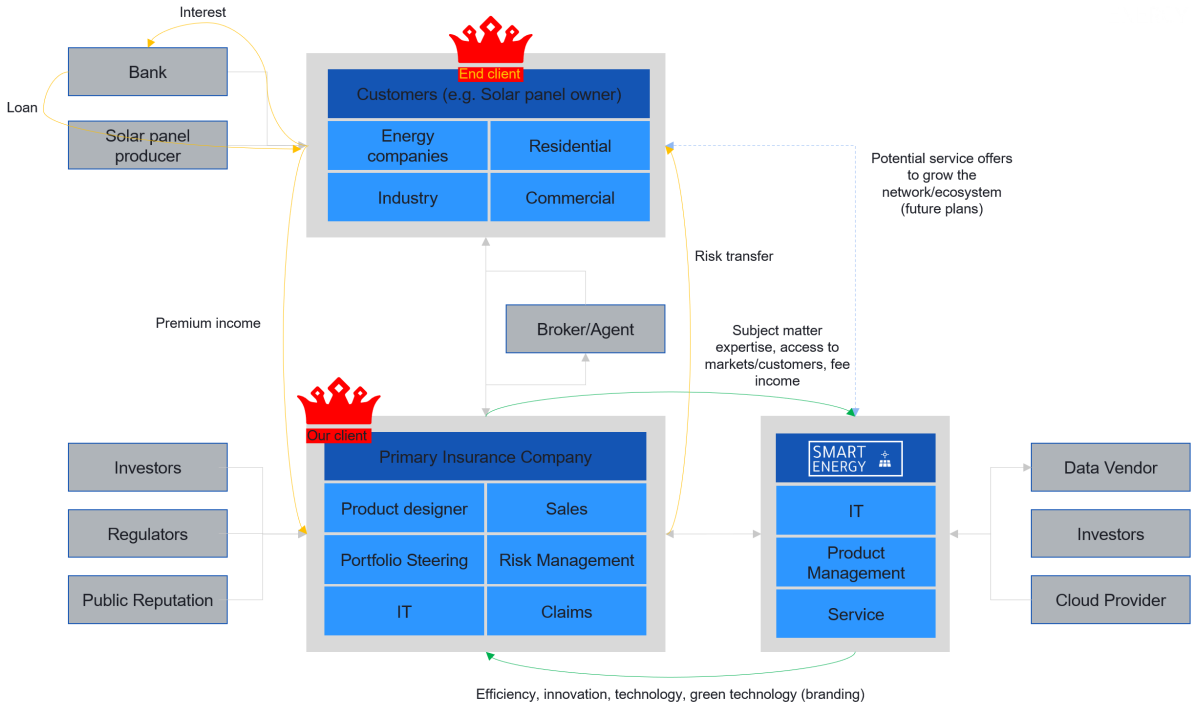


Figure 4 - Business ecosystem and partner network

Our solution enables the client to master all relevant steps from product design to portfolio management. The design process is essential when it comes to new product development. Here, we offer the five steps outlined in figure 5 to our clients. They can use our map service to identify locations, then follow the guided process to design the new parametric product, which can be reviewed and signed-off by a third stakeholder (4 eye principle). Once designed, the products can be monitored with our robust data pipelines which provide near-to-real-time data updates of solar radiation. Finally, the clients can steer their portfolio with the help of our portfolio analytics capabilities.

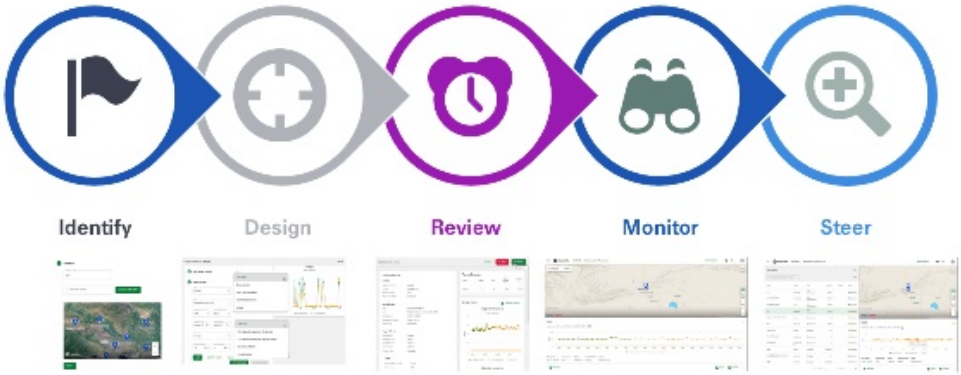


Figure 5 - 5 step procedure to design and operate a new parametric solar energy product

The above-described value proposition is delivered through 4 highly integrated business models.

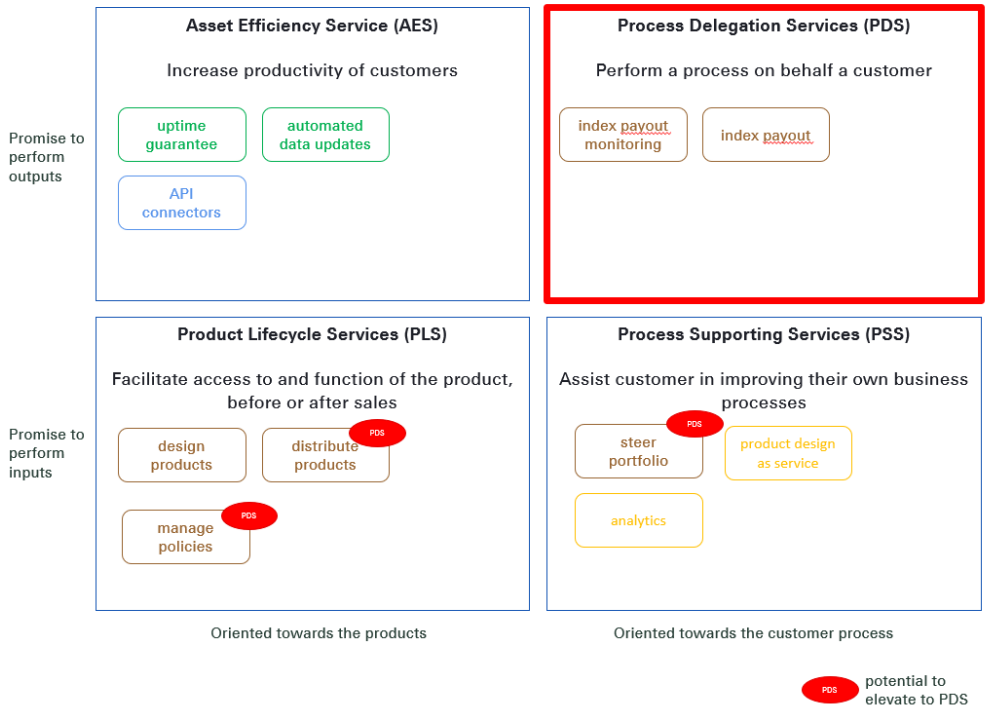


Figure 7 - Data service value proposition. We offer a well-diversified value proposition with potential to grow the process delegation services (PDS) further

Guaranteed Availability:

parametric products require 100% uptime of underlaying data delivery systems. We provide global coverage of state-of-the-art weather and climate data through well recognized weather service organizations, ECMWF and NASA.

Both organizations provide near-to-real-time data

- A new radiation scheme for the IFS | ECMWF
- MERRA-2 (nasa.gov)

which we integrate in our service offering either through the web platform or via API services. This service is renumerated via a base fee.

Solution Provider:
Our e2e solution provides the full insurance value chain of parametric products in a box. Client's design and distribute parametric products, manage policies and steer the portfolio through our systems. Once the policies are sold, the payouts are calculated in real time and monitored on daily basis. Renumeration of this service will happen in two ways: free of charge design features, which enable co-creation (hence allow us to get deep into the client's ecosystem) and fee-based services for distribution and portfolio management.

Consulting:
The free of charge elements of the service offering mentioned in the section above open the doors for consulting services on fee basis. These can be product design as service or any types of analytics (e.g., identify the best region for a specific product; streamline the sales/distribution process, etc.).

Add-on:
Last but not least, our services are available as API connectors which allow clients to integrate our solutions into their inhouse systems. This service comes at fee and is linked to consulting services for integration support.

Figure 7 summarizes our value proposition with respect to the service classifications. The goal must be to play in the PDS field, because:

- clients are bound
- clients value the service more
- almost natural growth opportunities with new services
- access to data

3. What does our target service system look like?

Service Blueprint

Our target service system can be visualized according to the following **service blueprint**, outlining the most important steps in the customer journey focusing on the primary insurance company. Additionally, it nicely visualizes the front as well as the back stage activities as well as the 3rd party providers needed to provide our end-to-end platform-based solution from the 'Product Design' to the 'Portfolio Management'.

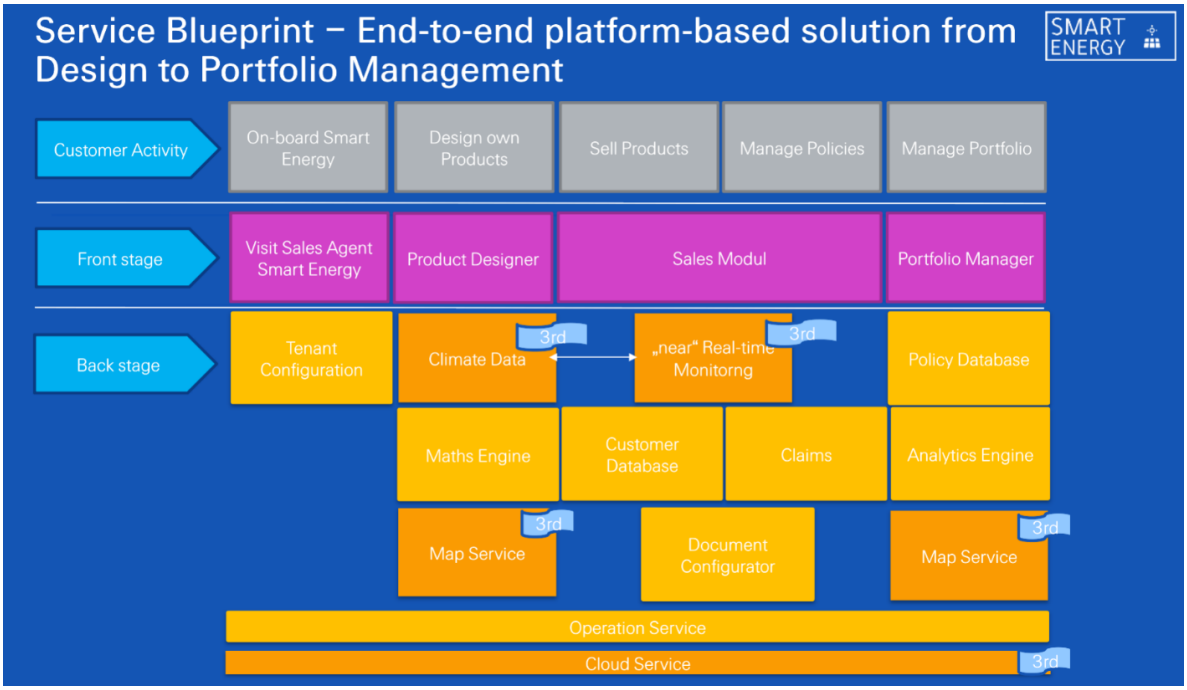


Figure 8 - Service Blueprint

Data integration

External providers are listed as 3rd parties and they are the providers of climate data, maps as well as Cloud services.
The climate data is used for the initial set-up of the parametric product and to monitor it on a regular basis. In addition to that, the map service can be used to identify locations. We use 'Infrastructure as a Service' (IaaS) offering essential compute, storage, and networking resources on demand, on a pay-as-you-go basis. With that, we have the flexibility to scale the IT resources up and down depending on the demand.

Value creation

Our model creates value for the customers in the following manner:

- There is no need for big RnD (Research and Development) investments as the customer can benefit from our technology, data and expertise.
- This enables our customers to enter new markets faster with more innovative products at lower costs and this generates a competitive advantage.
- The customization of the product ('Product Designer') and the end-to-end process handling (from the 'Sales Module' to the 'Portfolio Manager') enables our customer to become the partner of choice for sustainability topics.

4. Discussion and Outlook

Verifying our four hypotheses

We set up four hypotheses which we validated with the interviewer. The interviewer was an expert in the position of product underwriter from a private insurer as we identified this user group to play a crucial role for our market entry.

The **first hypothesis** we had to test was that end-customers have a strong need to protect their solar panel infrastructure and to have stable energy costs. The hypothesis got confirmed and we found even market data showing the growth opportunities for that topic (see section 1 - What challenge are we solving?).
The **second hypothesis** was that the private insurer has interest in sustainable energy or has pressure to grow through innovative products. This was clearly confirmed: Sustainability plays a major role in the insurance business. Many resources are invested in the development of sustainable products. In the case of major customers or tenders, sustainability is even directly demanded in some cases.
The **next hypothesis** that we put to test was weather index services are used by private insurers. This was confirmed: Index and data services play an increasingly important role, especially when usage-based data is incorporated into a product.
The **last hypothesis** was that innovation comes from partnerships. This was denied since private insurers often have their own experts assigned to such problems. It is unusual to bring in external partners for this.

Additional markets

Similar services can be rolled out in other markets. This is conceivable for energy markets where energy is generated from wind and hydropower.
The data situation in these cases however still needs to be evaluated.

What remains to be solved?

As we offer a service in a niche whereas the market itself is highly specialized, entering with new solutions might be challenging. Therefore, we need to ensure that we find partners interested in our service and able to push that service to the market, ideally by leveraging their already existing network.

Smart Plant Systems

Niklaus Dähler
Sandra Furter
Alvaro Garcia-Lopez
Robin Meli
Lena Neschenz

Abstract

Machines require maintenance regularly. But even the most sophisticated maintenance schedule can only partly limit the unplanned machine downtime. Nowadays machines are built with a powerful PLC (programmable logical controller) or IPC (industrial personal computer). Combining sensors and actors, a lot of data is generated. Our value proposition is to create a data model that predicts required maintenance and spare part replacements to avoid unplanned outages. As a machine manufacturer we can use our in-depth machine knowledge in combination with the collected data to make predictions about required maintenance to avoid unplanned outages/breakdowns.

Predictive Maintenance anticipates the equipment needs to avoid costs associated with unscheduled downtime. By connecting to devices and monitoring the data, we can identify patterns that lead to potential problems or failures. Those insights can be used to address issues before they happen. This ability to predict when equipment or assets need to be maintained allows us to optimize equipment lifetime and minimize downtimes.
In order to handle and use this technique we need various data from the machines in production. In our case study we are looking at a machine manufacturing company willing to accelerate its servitization process. The machine manufacturer proposes a structured framework that considers a dual perspective (asset and service), aims to address unplanned outages/breakdowns and improve maintenance decision-making.

Key words
Predictive maintenance, machines, manufacturing

1. Which Challenge Do We Solve?

Manufacturing companies are widening their offering by adopting the Product-Service-System (PSS) business model. This model consists of the joint offering of products and services to satisfy specific customer needs.

Usually, unplanned downtimes are a big pain for every manufacturing company. Most of these downtimes are caused by worn out parts and maintenances which are not based on facts (data) and scheduled within a fixed time interval. For this reason, it could happen that a part fails, producing an unscheduled downtime right after a scheduled maintenance.

With our service, we propose to mitigate the financial loss caused by an unplanned downtime, using predictions of failures and timely replacements of this deteriorated parts. These predictions allow to plan maintenances ahead when they really make sense. In addition, the spare part management and storage could be reduced on the customer side because we would be able to tell our customers **which** part is going to be needed and **when**.

Our main beneficiary is the production engineer who has the responsibility to run the production line. He spends most of his time guaranteeing the equipment efficiency and yield (quality). The quality of the produced goods is impacted by the equipment condition which can cause a yield-loss (unusable goods) growth during the production process.

Another big topic for the production engineer is the machine knowledge. Usually, only a small number of workers know the machine in detail. This poses a big risk to the company, especially if such an equipment specialist leaves the company. When the production engineer can rely on our manufacturer knowledge, this risk is no longer significant.

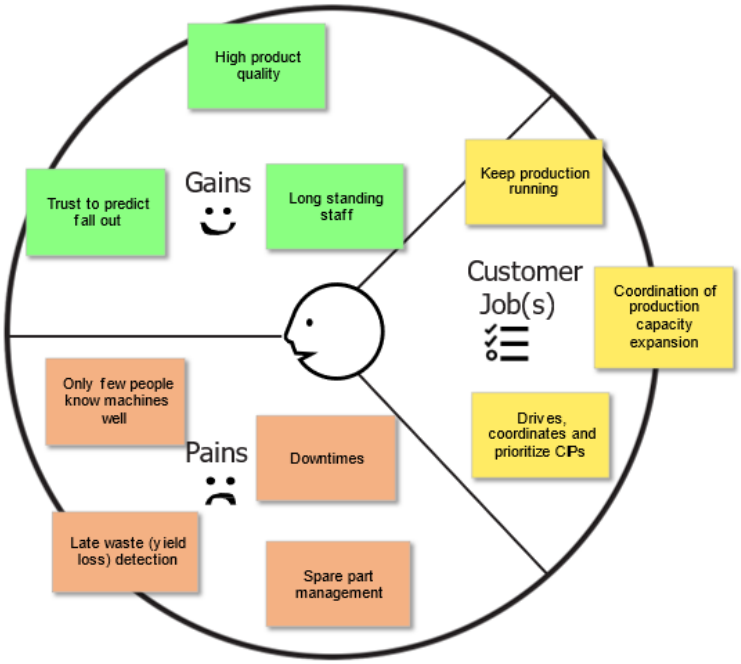


Figure 1 – Customer profile

2. By which Data-Driven Service Approach Do We Solve the Challenge?

We offer our customers security and knowledge about the maintenance of their machines. With our service, our customers can focus on their core activity, the manufacturing, and less on maintaining their machines. Furthermore, they would be able to save on personal and recruiting costs, spare part management and storage.

The production engineer could increase the machine efficiency easily without specialized staff if he is able to fully rely on our machine knowledge and the insights of similar machines around the world.

The data sources are our own machines which are in use at our customer's plants, collecting a huge amount of data. The new machines already have a lot of built-in sensors and actors which are collecting data but if required, we could equip older machines with additional sensors to be able to collect the same data. With an encrypted connection, this information will be sent to our secure online data storage hosted by a 3rd party provider.

Our approach is to create a smart data model, able to predict when a machine is not running smoothly. Using machine learning, our data model will get smarter and will be able to tell why a machine is not running properly and when a failure is going to happen. Is a specific part causing the problem? With this approach the customer would be able to replace the part before the machine is failing. Our data also tells the customer how frequently he needs to schedule maintenance to avoid unplanned downtimes and make production environments much more efficient.

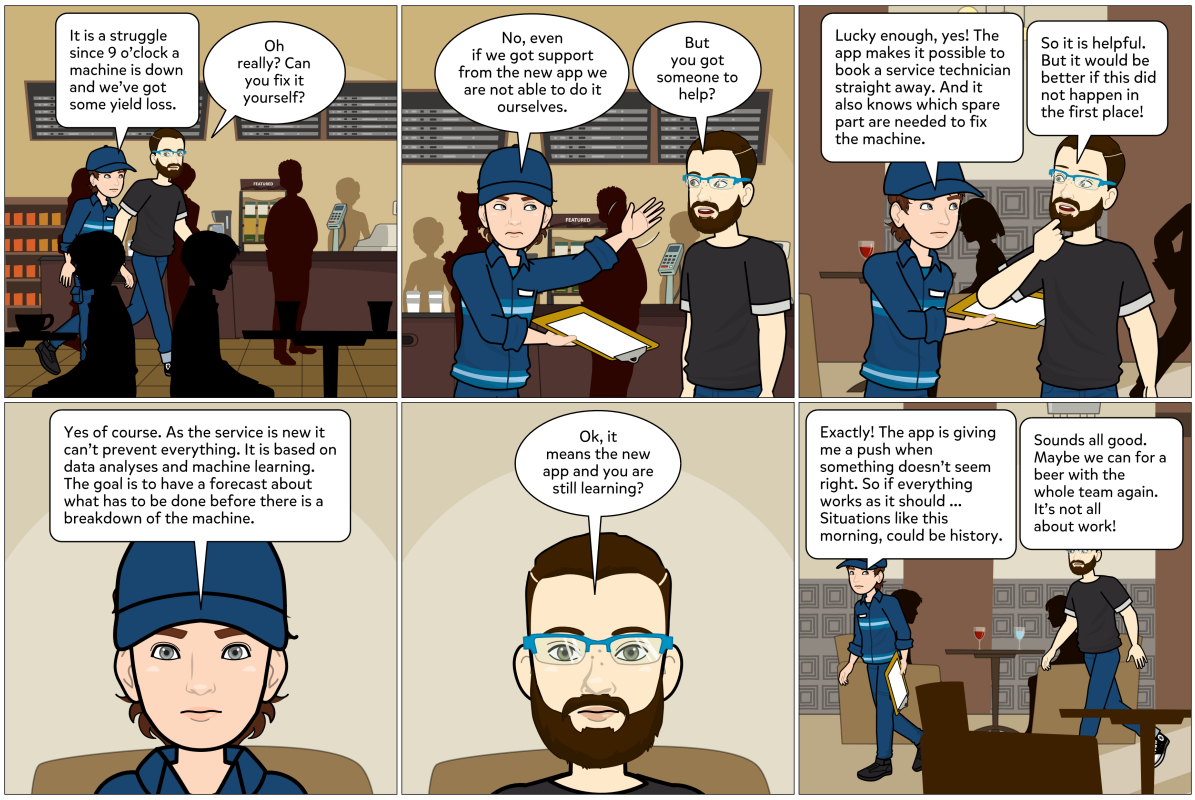


Figure 2 – Storyboard

Our service can be classified according to the scheme of *Ulaga and Kowalski*. The figure below (Figure 3) shows the different categories we can serve. During the product lifecycle we already provide remote support in case of failures, on demand service visits and delivery of spare parts.

In a first step of ramping up our service, we can provide our customers tools to increase their efficiency (AES). This happens mostly by visualizing the current machine state, which is based on current data. We can assist them with schedules to allow preventive maintenance. Finally, after our data model gets more advanced using the experience and data from our customers, we will be able to predict maintenances.

Thanks to our deep machine knowledge we can assist our customers during his process optimization (PSS). This is done by suggestions about how to optimize the machine. Additionally, we suggest which spare parts the customer might need next and generate a spare part offer automatically.

In the most sophisticated version of our service, it would be possible for our customers to outsource the whole machine maintenance (PDS). In this case, our technicians would take care of the customer's machine. We do not explicitly guarantee an uptime but an incident response time which could be low thanks to our failure predictions.

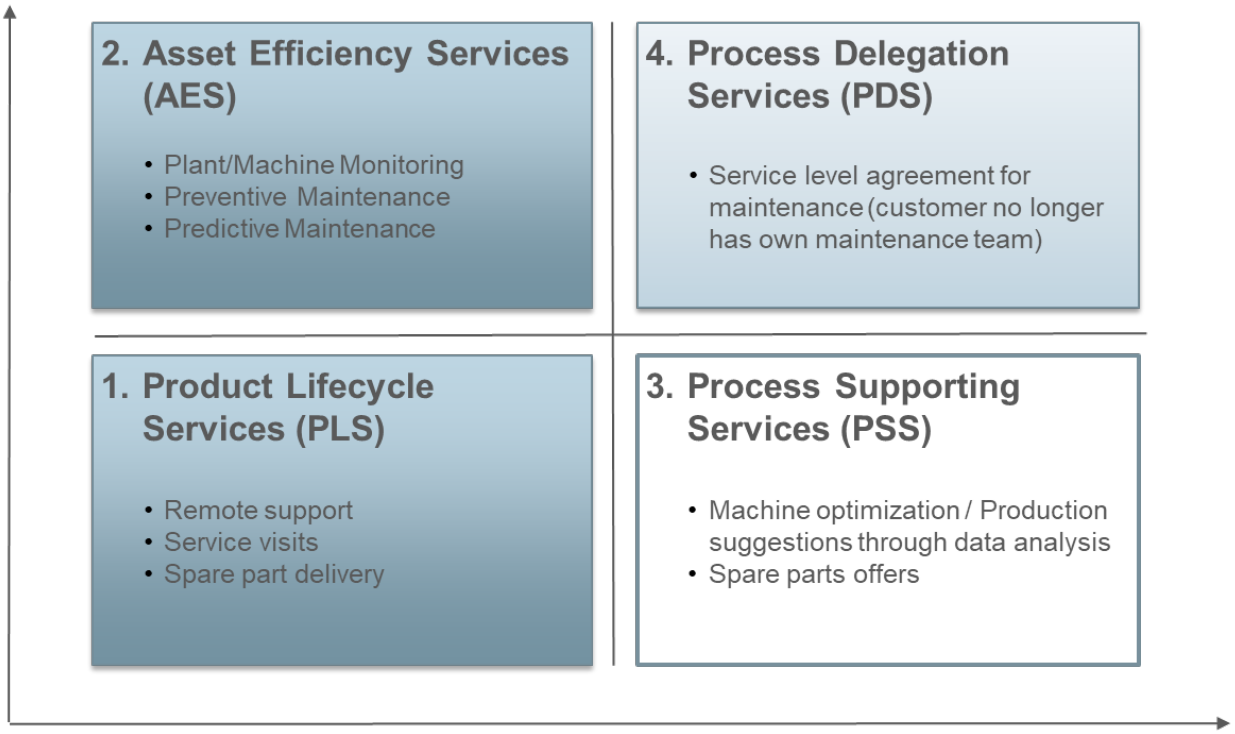


Figure 3 – Adaptation of the B2B Service classification (Kowalkowski "Service Strategy in Action")

3. What Does Our Target Service System Look Like?

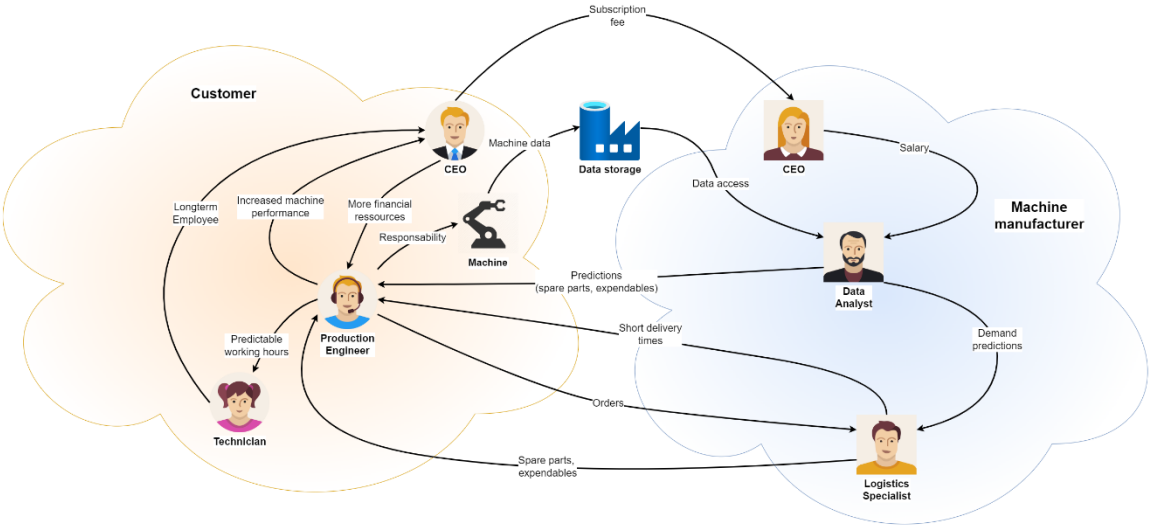


Figure 4 – Service ecosystem with the main actors

Value Creation

The customer benefits on various levels from our service:

Role/Persona	**Benefit**
Production Engineer	Does not have to worry about sudden machine failures as much.
	Is able to plan jobs more accurately (and stick to them).
	Has less yield-waste (unusable produced goods).
	Is able to increase production.
	Has to rely less on people (who get sick, leave, are late, etc.).
	Does not have to maintain a spare parts storage.
	Can use our data to find out how to better setup and tune the machines.
CEO	Can save costs (personal and spare parts management).
	Can produce more revenue due to increased production efficiency.
Technician	Has less overtime on account of less machine failures.
	Is more satisfied with the job.

The value for the customer is created using the data-based predictions. This results in a better machine performance with less internal resources and a higher output per machine, which at the end increases the company profit.

Value Capture

As a service provider we capture value by receiving a lot of data from our machines. This allows us to create insights that we can use for research and development of our next generation machines. In addition, the direct financial value is coming from the service payments performed by the customer.

4. Discussion and Outlook

According to our case study interviews, there is a strong need to use predictions to reduce downtimes and manufacturing costs. When we presented our value proposition to the same people we had interviewed at the beginning, we received valuable feedback:

- The suggested fees for our service were perceived as reasonable but the profitability depends on each customer's manufacturing cost and region.
- Our in-house domain expertise (development engineers or product engineers) is a big benefit to define detailed requirements for data analysis and reliable predictions.
- There is no one-size-fits-all solution for how this data is shared and managed and our smart service needs to be customized for individual companies.

Despite of the general positive feedback, we discovered several challenges related to the proposed "Smart Service". Our data-challenges could be grouped in three categories:

(1) **Trust** challenges. The customer is not convinced that it is possible to create a reliable data model able to predict unplanned outages.
(2) **Process** challenges related to data handling, e.g., capture, clean, integrate, transform, store, visualize, etc.,
(3) The biggest challenge is the **secure data management** infrastructure, e.g., security, privacy, information sharing, operational costs, data ownership, governance and ethical concerns. The manufacturing data, as well as quality and reliability information gathered during these processes is one of the customer's key secrets and has a direct impact on the company's business such as direct cost, warranties and liabilities.
Therefore, effective data management using appropriate expertise and secure infrastructure are necessary for Data analytics to support smart and sustainable manufacturing.

The Course of the Year 2021

We had six very interesting cases in 2021. Without wanting to prioritize the cases, they are put into a sequence here:

Given the background of the ongoing pandemic, three of the cases were centered around the organization and optimization of remote or hybrid office work or office infrastructure:

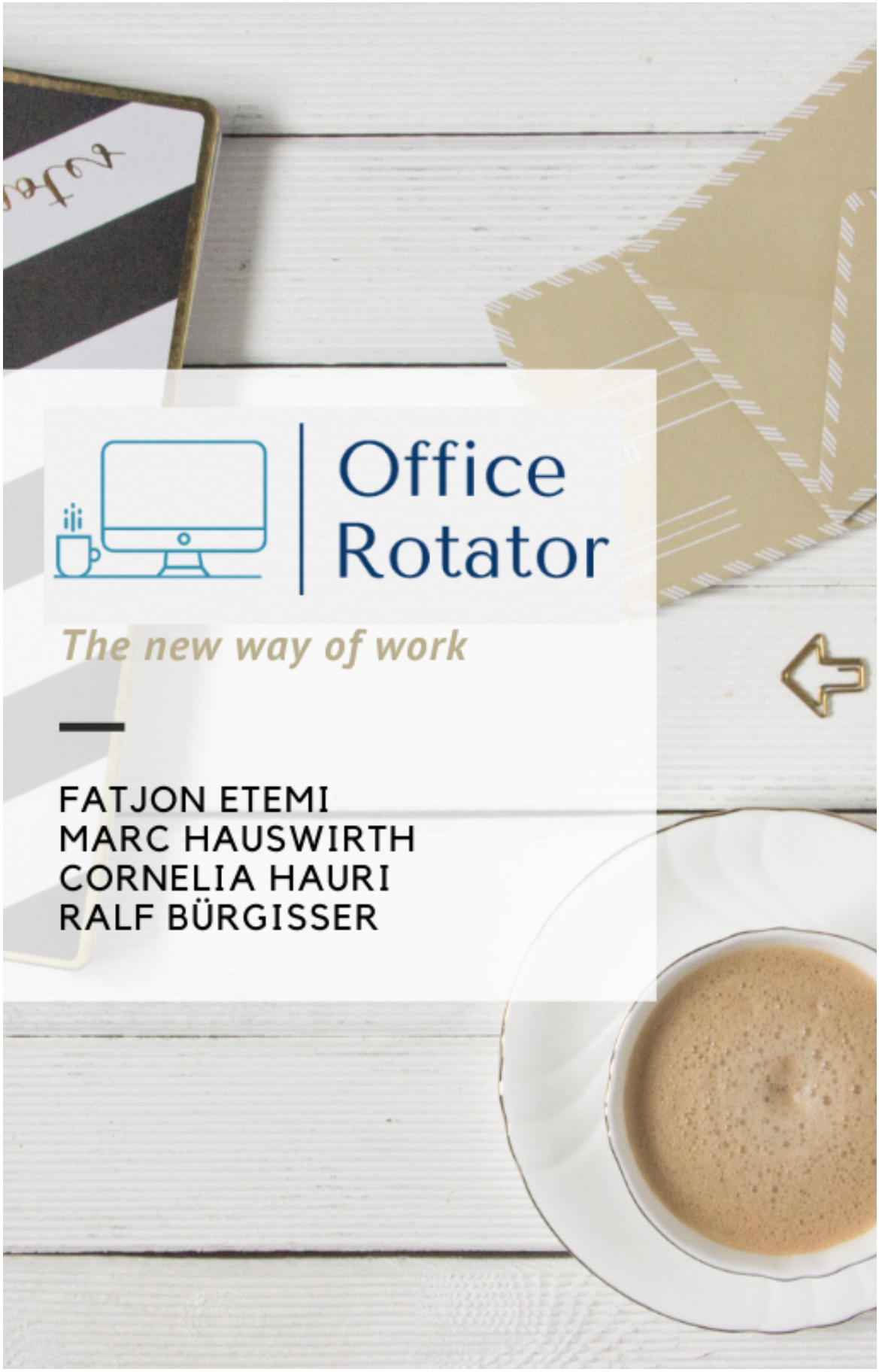
- Office Rotator
- Workplace User Experience
- Café Claro

Additionally, there were three cases in the area of optimization of work processes, such as the optimization of a workflow in a lab environment, the optimization of IT cloud utilization, or the optimization of shelf management processes in retail:

- eLogbook
- Cloud Infrastructure Optimization
- Smart Shelf: Digitale Erkennung von Obst & Gemüse mit ungenügender Qualität

There was again very high engagement by the participants this year. The cases were developed and sharpened over numerous design iterations and in the two-day *Mobiliar Forum Thun workshop*. Many thanks to Katrin Hasler and Ina Goller for their excellent moderation of this online workshop.

At two distinct moments in the development, i.e., after the development of the value proposition including digital prototypes and after the development of the service business system, the participants presented their cases to a high-profile ***expert jury*** consisting of industry representatives, entrepreneurs, and scholars. We would like to express our gratefulness to these experts here for dedicating their time and experience: David Hess, Fabio Rovelli, Ina Goller, Katrin Hasler, Kurt Stockinger, Lukas Schweiger, Marc Rennhard, Markus Marti, Nadine Charlon, Rolf Günter (alphabetically by first name). Their challenging feedbacks were essential for driving the cases to the next level.


Office
Rotator
The new way of work
FATJON ETEMI
MARC HAUSWIRTH
CORNELIA HAURI
RALF BÜRGISSER

Abstract

During the Covid 19 pandemic, many employees had to work from home. The working situation of office employees has changed abruptly, giving the topic of New Work an enormous boost. In the future, the workplace will probably no longer be fixed in one place. New challenges are opening up. To whom and in what form will office space be rented? How can employees find a suitable workplace? Office Rotator offers a platform on which office space can be rented flexibly for short or long periods without having to sign a long-term contract. As an attractive employer, companies can offer their employees a free choice of location independent offices and meeting rooms via Office Rotator. The smart use of data such as location, user behavior, weather data, ratings, etc. makes Office Rotator unique. The offers are adapted to the user. For multi user collaboration, requirements are combined to provide the appropriate space. Partnerships ensure that the processing (online and on site) is secure, smooth and fast.

Keywords
Home Office, New Work, Work Live Balance, Shared Workspace, Job

1. What challenge does Office Rotator solve?

The pandemic turned the working world upside down. Suddenly, many employees were ordered to work from home and had to reorganize themselves. This change brought new momentum to the way we work together and opened up opportunities for more modern working models. In addition, the Rundstedt[11] study shows that employees want more flexible working conditions.

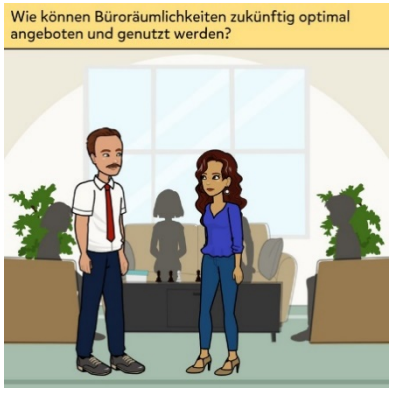


Figure 19 Problem definition

This event has shown that the time has come to establish new working models and that the world will not return to its former normality. On the one hand, there will be employers who own office space that incurs monthly costs but is not used entirely by their own staff. On the other hand, there

[11] https://www.rundstedt.ch/wp-content/uploads/2021/03/Whitepaper_Smart-Working_2021_DE-1.pdf

will be employees who want to avoid the long commute to the office. However, the personal living situation often does not allow for a home office in the long run. This is exactly where Office Rotator comes in. A platform that brings office space owners and office space users together for a new and uncomplicated experience.

Figure 20 Gains, Pains, Jobs

On the one hand, Steven benefits. He owns office space that is not being used. He can rent them out on the Office Rotator platform by the hour, day, week or longer. On the other hand, Robert Company wants to be an attractive employer and offer his employees not only on side office and home office, but also the countless possibilities of office space from Office Rotator. Robert is a business customer of Office Rotator. His employees can book an office of their choice via the platform. The costs are handled by the company. The office user Katy benefits from the Smart Service. As an employee, she can rent a suitable office at the desired location on Office Rotator.

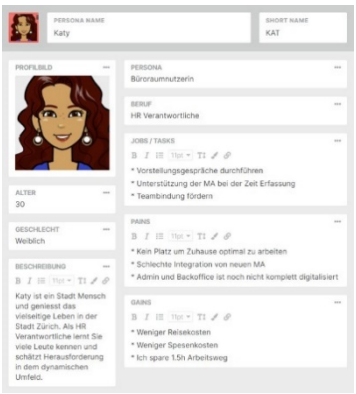


Figure 21 Persona Katy

The vision of Office Rotator:
Flexible office rental for any customer need at any time in any place.

2. What data-driven service approach do we use to solve the challenge?

Office Rotator "the Airbnb for office space" is based on the following value propositions:

Generate revenue by offering your office space

Customers who have a lot of vacant office space due to the new forms of work can offer it via the Office Rotator platform. You can publish an advertisement in just a few clicks. Tips from Office Rotator on how to better present office space will help to get more inquiries. Qualitative photos, equipment and availability are just some of the features that the office space providers can add to the post. The algorithm analyzes this data and suggests the space to suitable customers.

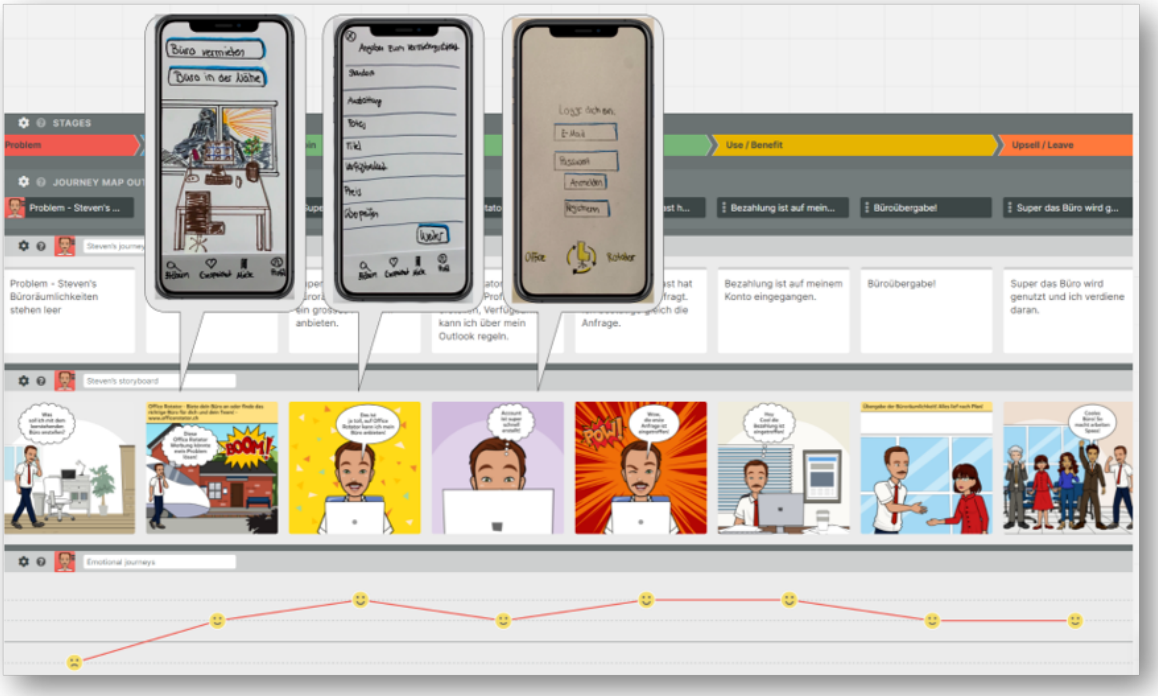


Figure 22 Customer Journey Office Space Landlord

Find office space quickly and easily in your area

Employees who do not find enough peace to work in their home office or who would like to meet their colleagues, but do not want to have a long commute, have come to the right place at Office Rotator. Office Rotator offers them the office space that suits them best. The data stored by the providers, as well as other data such as location, past bookings, ratings and weather data are analyzed. In addition, the platform offers the possibility of organizing meetings in order to find the appropriate space.

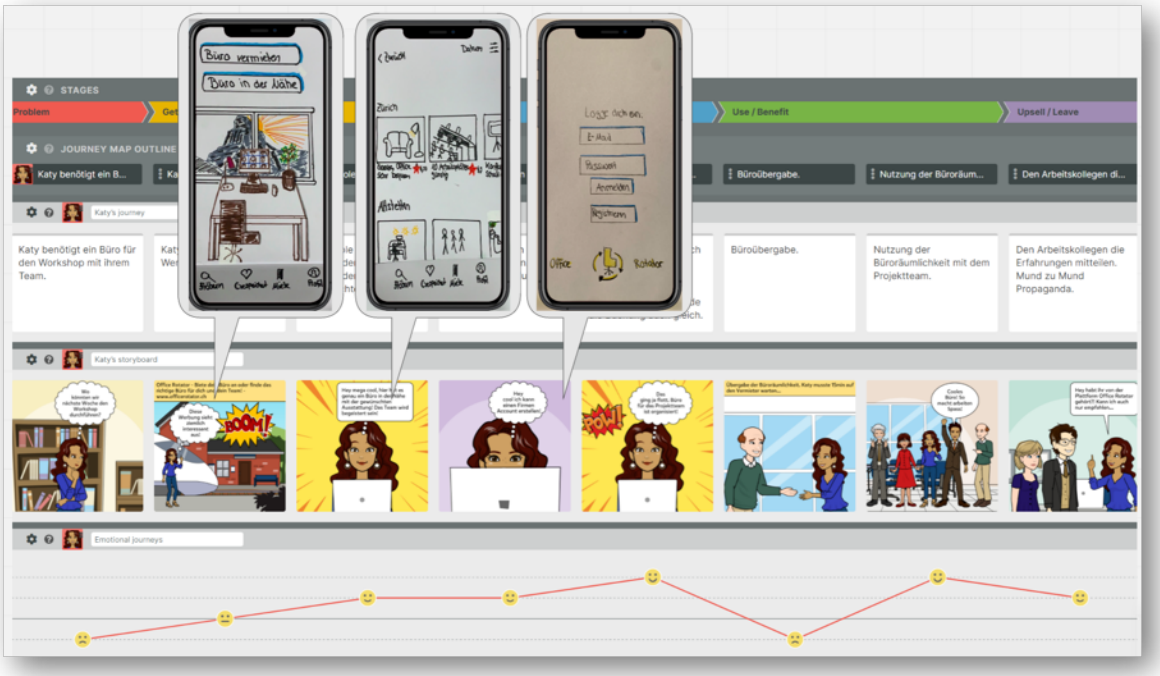


Figure 23 Customer journey office tenant

3. What does our target service system look like?

As described above, Katy and Steven interact with Office Rotator through various touch points. Initially, Office Rotator will engage with its customers through social media. The advertising can be personalized on the social media platforms and the reach is large. Figure 6 shows the Blue Print service from Steven.

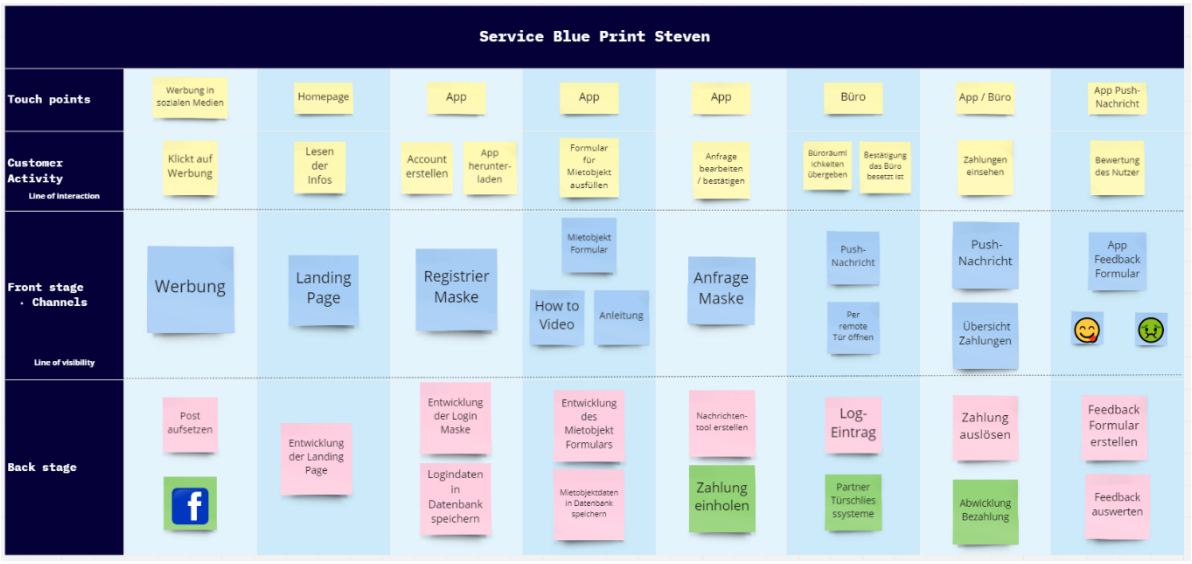


Figure 24 Service Blue Print Office Space Landlord

The interactions take place via an app. This allows the user to conveniently organize a work location for the next day while they are on the move. Customers must register before making their first booking. Identity data is recorded for personal security and fraud protection. Notifications are made either via "push notification" or e-mail. The backend runs the usual services such as payment processing, scheduling, database queries, approval processes, etc. Steven is offered additional services such as an automatic locking system.

The Blue Print service for Kathy shows many similarities to that of Steven. Figure 7 shows the Blue Print service for Kathy.

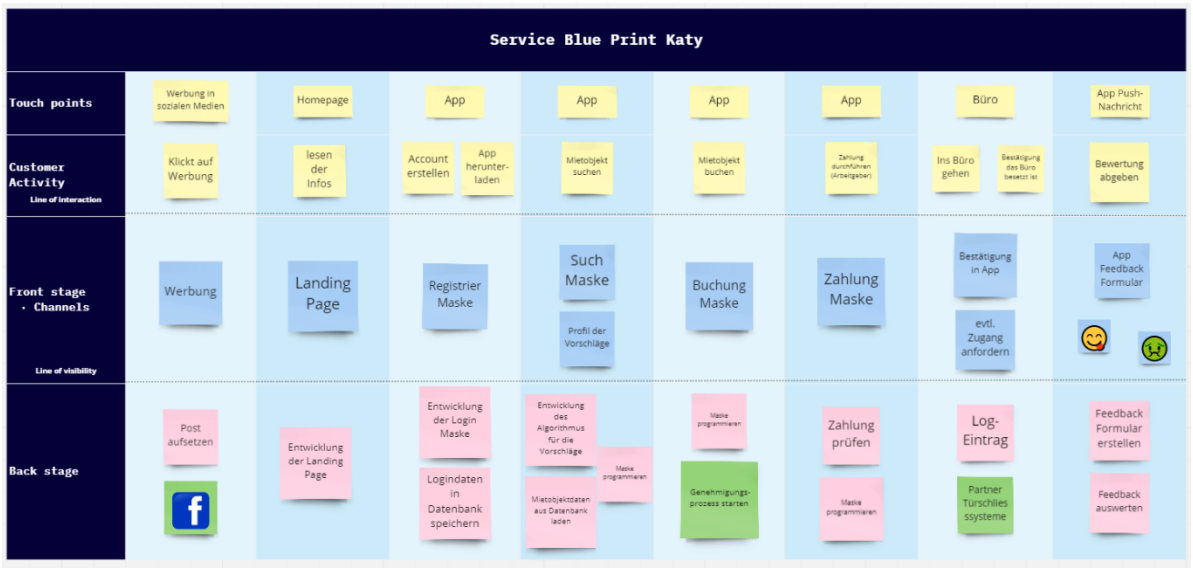


Figure 25 Service Blue Print Office Tenant

Data integration

Partnerships are expanded over time. Weather data can be used, for example, to suggest office space with optimal train connections in the event of snowfall. Initially, the focus will be on Katy's and Steven's personal data, such as calendar data, location, etc., in order to provide a user-centric service. In order to provide a user-centric service.

Values for the Office Rotator clientele

Office Rotator's service makes it easy for office space owners to adapt to the demands of new ways of working, offer office space, avoid vacant space and generate revenue as a result. On the side of the office space seekers a new horizon is opened by the service of Office Rotator. New forms of work are made possible. Katy finds an uncomplicated working environment in which she can concentrate better, feels comfortable and enjoys her work more.

Service hypothesis

Office Rotator assumes that enough office space owners are willing to offer their space through Office Rotator. However, owners may also fear that access to the space will be difficult, that vandalism will occur, or that the profit will be too low. Therefore, it is hypothesized that there are enough owners who will offer their office space. The hypothesis is confirmed when 20% of the owners interviewed sign a letter of intent (LoI) to cooperate with Office Rotator. Further hypotheses on business-relevant assumptions are presented in Table 1.

Table 3The most critical hypotheses

1. we believe that...	2. for verification, we will...	3rd measurement...	4. our hypothesis is correct, if...
Owners would like to share / rent their office space	LoI MVP	Share LoI	20% LoI --> Offer rooms
Office users do not want to work from home	Determine interest via social media (FB)	Download	In 8 weeks, 0.5% of viewers click on a download link.
sufficient office space combinations are available	Survey via social media (FB)	Match between survey and offer	Extrapolation of the LoI with regard to location, characteristics of the office space, etc.

4. Sources

- https://www.rundstedt.ch/wp-content/uploads/2021/03/Whitepaper_Smart-Working_2021_DE-1.pdf

Workplace User Experience

Jonas Bachmann
Rodolfo Andres Benedech
Rosalie Quach
Roy Morrison
Cyrill von Senger

Abstract

Across the world, many organizations are transforming their workplace models to activity-based and hybrid working. These workplace transformation projects offer immense opportunities to reduce office space costs, enhance workplace user experience (UX), performance and, as a result, improve business outcomes. At the same time, new ways of working also lead to new challenges which increase the risk of workplace managers failing to achieve the stated objectives of the workplace transformation.

One major challenge workplace managers face is to ensure that for every workplace user and at any time, there is a desk available that optimally supports the workplace user in executing the task at hand. Secondly, workplace managers are missing the information and insight required to ongoingly assess how well the workplace fits the needs of all workplace users, so that corrective action can be taken if necessary.

These challenges can be addressed by combining data streams from workplace conditions and UX. Workplace conditions are monitored using sensors that measure noise levels, air quality, and occupational density. Workplace UX monitoring is accomplished with wearables measuring stress parameters such as heart rate, heart rate variability, and skin conductance. Machine learning generates actionable insights from these data streams. To address the first challenge, the system learns which individual setting is best for each workplace user in a given work context. To address the second challenge, the system learns how the overall optimal workplace conditions need to be for optimizing the overall workplace UX of all workplace users.

Hence, the service platform comprises two tools. The first tool – ***desk matcher*** – makes sure that each workplace user at any time finds the workspace that best suits his/her preferences and activity. With the second tool – ***workplace optimizer*** – workplace conditions and UX are continuously monitored and, if necessary, corrective actions to re-establish a fit of workplace conditions with workplace user needs are suggested.

Key words
Workplace transformation, workplace user experience (UX), sensor as a service, biometrics, workspace data

1. Which Challenge Do We Solve?

What are the biggest challenges our prospective customers – workplace managers – face? To answer this question, we interviewed workplace management decision-makers in mid-sized and large Swiss knowledge worker organizations. Our customers' job is to cost-effectively plan, provide and operate user-friendly workspaces. The interviews we conducted revealed two major pain points: Firstly, workplace managers are missing the information required to ensure that, at any time, each workplace user can perform his/her work in a workspace that is suitable for his/her activity and, if necessary, collaborate with the colleagues. Secondly, workplace managers are missing the information required to ongoingly assess how well the workplace fits the needs of workplace users to optimize the overall workplace UX.

2. By which Data-Driven Service Approach Do We Solve the Challenge?

By processing new data through sensors such as noise level, air quality, occupancy, or workplace users' stress level, our tool offers a compelling value proposition to workplace managers as well as workplace users. Workplace managers benefit from receiving previously unavailable insights and recommendations in real-time to ensure the workplace UX is ideal. For example, this allows workplace managers to adjust the air quality in specific workspaces to boost productivity.

For workplace users ***desk matcher*** offers recommendations on the optimal workspace considering the users' desired preferences and activity. The optimal workspace can therefore be a silent room, a room that allows for easy collaboration with team members or group meetings as well as phone booths.

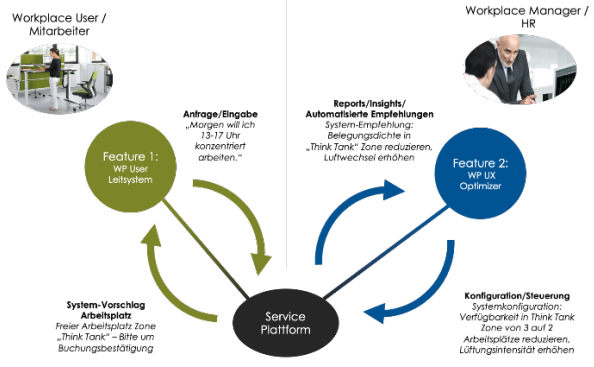


Figure 1: Ecosystem with the main actors workplace user, manager and platform

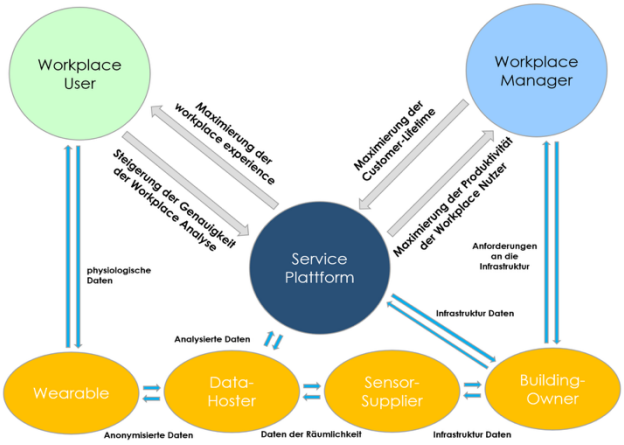


Figure 2: Ecosystem with additional actors to enable the value stream.

For the measurement of the stress level, we use biometric data such as heart rate or respiration rate. These are obtained on a voluntary basis via wearables. Based on location data via mobile and beacons, the system knows in which workspace the corresponding workplace user is located. With sensors in the respective rooms, we measure the physical room quality, such as noise level, air quality, and temperature.

We use two machine learning approaches delivering the data-based insights for ***desk matcher*** and ***workplace optimizer***:
With the first approach, the system learns which kind of setting (space, room climate, occupancy density, etc.) is optimal for each workplace user and his/her different activity. With the second approach, the system learns how the overall optimal room setting is (all workplace users) to feel most comfortable and achieve the highest productivity.
The solution provides real-time KPIs such as occupancy rates and allows the workplace manager to configure the office settings (e.g. occupancy densities per zone). The system permanently optimizes the recommendations on an individual basis (workplace users) and on an overall basis to the workplace manager (see Figure).

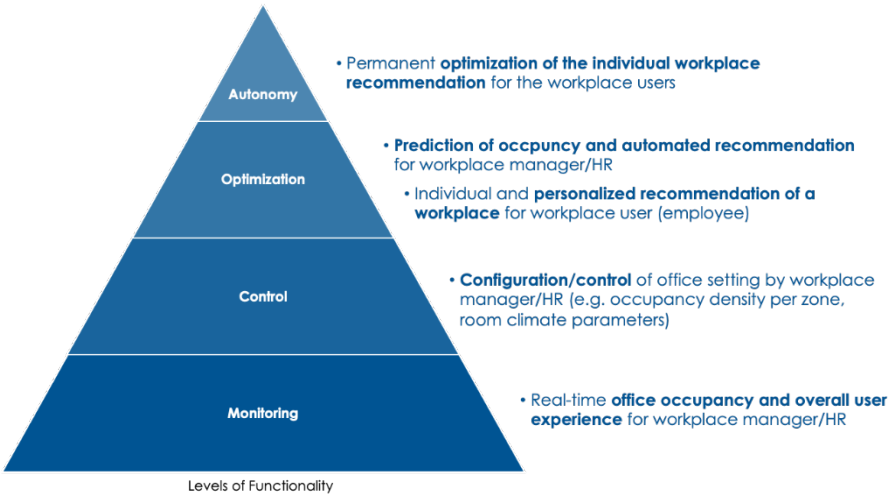


Figure 3: Levels of functionality of our service platform

3. What Does Our Target Service System Look Like?

The first tool – ***desk matcher*** – is designed to make sure that each workplace user at any time finds a workspace corresponding to his/her preferences and activity.
The second tool – ***workplace optimizer*** – is designed to continuously monitor workplace conditions and workplace UX, based on which corrective actions are suggested. If, for example, stress reactions are associated with a poor room climate or high noise level, the system sends out a message and suggests corrective measures.

Workplace managers benefit on various levels from these decision support systems. Functionally, workplace managers can better perform their job, which is to provide a workplace that optimally supports workplace users in executing their tasks. On a financial level, happier, healthier, and more productive workplace users positively impact the business outcomes and financial results of the organization. Another social benefit is that happier and more productive workplace users improve the workplace manager's standing in the workforce. In addition, a workplace manager being able to successfully measure, understand and improve the workplace based on data is going to earn additional respect and credibility from superiors. On an emotional level, success in executing his/her

job, coupled with a better standing among both, workplace users and superiors are expected to have a positive emotional impact on workplace managers.

Figure 5: Mockup of workplace user (workplace user) smartphone app

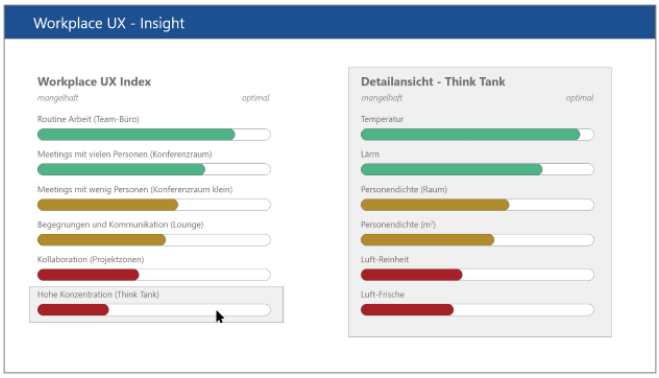


Figure 6: Mockup of workplace manager (HR) monitoring and control dashboard

In terms of business model patterns, we see three fits. First, the "Leverage Customer Data" model. We collect data on the workplace and workplace users to optimize the UX. Furthermore, the "lock-in" model suits our service platform as the various systems are closely interlinked and as the amount of data increases, we create a more precise algorithm with continuous optimizations for the workplace. Finally, we are using the "sensor as a service" model. By using sensors, we generate added value for the workplace user and manager.

When testing the most important hypothesis, we will proceed as follows:
To evaluate whether there is an actual demand for our ***desk matcher*** among our target customers we will conduct qualitative interviews. To test whether we can affect optimizations with the workplace UX data streams, we would like to set up a pilot project with ETH and EMPA NEST. They have a test environment in place to gain insights all around the workplace UX. To find out whether we will receive data in sufficient quantity and quality, we will survey our target customers on their willingness to participate.

Sources

- Figure 3: Levels of functionality: Framework based on Michael E. Porter and James E. Heppelmann: "How Smart, Connected Products Are Transforming Competition", November 2014, Harvard Business Review

Café Claro

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Abstract

The coffee machine's water has not been changed for days and nobody is taking care of the stacked cups in the sink. Who is not familiar with this situation? This is where the smart coffee company 'Café Claro' comes into play. We democratize coffee machines in small and medium sized enterprises and make coffee enthusiasts happy again.

Every coffee drinker is encouraged to participate in the 'Café Claro' ecosystem to keep the office environment clean and the coffee enjoyment high. A smart system periodically assigns maintenance tasks to coffee drinkers in the office and rewards the ones that execute those tasks. Free coffee and vouchers are incentives to participate. As home office has become very popular, the smart system ensures that only colleagues that are available in the office are assigned a task.

Coffee supplies such as coffee beans, milk, sugar or cleaning equipment are delivered automatically, based on the amount of consumed units. Furthermore, integrated sensors report if a coffee machine requires maintenance, which again increases its guaranteed availability. An integrated payment system makes the monthly accounting obsolete and a social media component to inform co-workers about their coffee break completes the service. With the goal, to make the coffee break enjoyable and to strengthen the team spirit.

Key words
pay-per-use, IoT, food logistics, smart ordering, gamification

1. Which Challenge Do We Solve?

About 80% of the employees are drinking one to two coffees each day. In every enterprise there is at least one coffee machine installed. For this daily coffee consumption at the office, the following tasks must be guaranteed:

- clean cups and dishes must be available
- the reordering of the coffee beans, milk and cream and the sugar must be duly initiated
- the regular decalcification of the coffee machine must be executed
- the exchange of the necessary coffee water is very important,
- the trash bin of the used coffee powder must be regularly emptied and cleaned and
- the collecting & counting of the money of each coffee user is necessary

Our interviews showed that for many small and medium-sized enterprises (SME) these are typical tasks of a person who feels responsible for them – but does not necessarily like to complete them. Unfortunately, their effort is rarely noticed and depending on the number of machines, the effort to complete all these tasks may reach up to 10% of an employee's weekly working time.

Beneficiaries of the Smart Service and Their Needs

This smart service is developed for SMEs between 20 up to 250 employees. We primarily approach the CEO of a company or – depending on its size – the person responsible for the office management. However, any (coffee drinking) employee in the company will be involved and benefit from the service, since it aims at distributing tasks amongst the employees.

The Value Proposition Canvas (see Figure) shows the major findings of the executed interviews and of our smart service 'Café Claro'. The key pains evolve around the payment concept (if SME charge for the coffee), the unfair distribution of tasks around the coffee machine (they are often completed by the same persons), the milk might be sour or not available at all or cups are dirty and no one takes care of washing the dishes (which might be especially annoying if guests are expected).

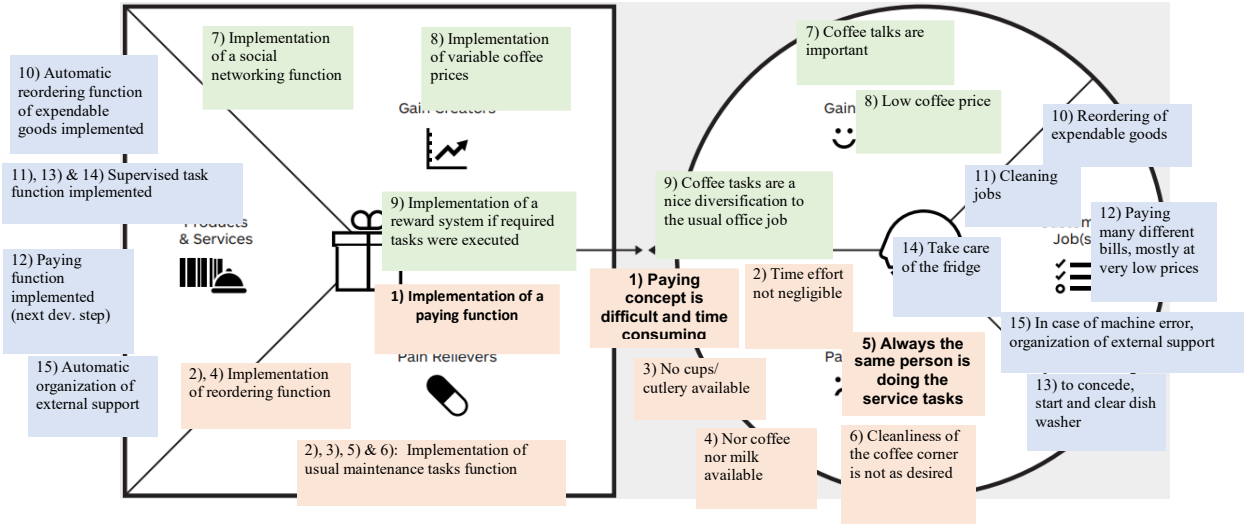

Figure 1: Value Proposition Canvas 'Café Claro'

2. By which Data-Driven Service Approach Do We Solve the Challenge?

Café Claro offers a relaxing coffee break: The 'Café Claro' smart service is a complete careless coffee package with a free coffee machine and everything employees of a SME need to enjoy their coffee. In this careless package an app is included, responsible to manage all pending tasks connected to the coffee machine. To be more precise, the following main functions are implemented:

- an overview of pending or already executed maintenance tasks,
- an overview of the next reordering of the expendables,
- a simple payment function that integrates with established payment providers
- a function to invite colleagues for a short coffee break.

The first three functions are based on collected coffee machine data and the last function covers the idea of convenient and interesting coffee breaks with colleagues.
The following table gives an overview of the supervised maintenance tasks and the required data to detect and activate them.

Maintenance task	Measured variable or parameter	Data owner	Analytics & Logic
Water exchange necessary	Time Water hardness	-	By the first commissioning the parameter "Water hardness" must be added by a power user. The water exchange itself will be necessary every morning. If the water has not been exchanged, no coffee can be selected.
Machine cleaning necessary	Operation time Coffee counter	Machine producer	After a certain amount of consumed coffees or after a defined operation time, this task appears.
Empty bean powder trash	Coffee counter	Machine producer	After a certain amount of consumed coffees or after a defined operation time, this task appears.
Refill coffee beans	Coffee counter	Machine producer	After a certain amount of consumed coffees this task appears.
Water collecting pan is full	Coffee counter	Machine producer	After a certain amount of consumed coffees or after a defined operation time, this task appears.
Reordering of milk	Coffee counter	Machine producer	After a certain amount of consumed coffees this task appears.
Concede and start dish washer	Time Coffee counter	- Machine producer	Task to collect the cups appears each evening. Dependent of the amount of consumed coffees and the manual input of the number of cups in the machine this task appears.
Clear dish washer	Time counter	-	Time counting starts as soon as the cleaning machine start is confirmed. This task appears after a cleaning machine dependent time factor. A standard time delay is already implemented but this factor can be adjusted by a power user.
Reordering of supply	Coffee counter	Machine producer	After a certain amount of consumed coffees this task appears.
Decalcification necessary	Coffee counter Running hours	Machine producer	After a certain amount of consumed coffees or after a defined operation time, this task appears
Regular inspection of the items in the fridge	Time	-	Once a week this task appears.
Coffee machine error available	Time Warning indication Water pressure Water temperature Grinder parameters	- Machine producer Machine producer Machine producer Machine producer	After a predefined amount of coffees or after a defined time interval a technician will be called to check the safety of the coffee machine. If a warning indication appears, the water pressure is more often outside the usual range or the grinder parameters show unusual values a technician will be called too. An additional function to schedule such visits is implemented too.

If someone has finished and confirmed such a maintenance task, a task related amount of credit points will be added to his/her app account. With these points either free coffees or another reward will be available, sponsored by the SME.

Beside this regular maintenance tasks other functions are available in the 'Café Claro' app:

Function	Measured variable or parameter	Data owner	Description
Invite colleagues for a coffee break	Knowledge of the colleagues in office	-	Implemented app function to arrange short coffee breaks with colleagues working in the office space.
Select coffee type[12] Pay selected coffee[1]	Actual machine status Warning indication	Machine producer	App function to select and pay available coffee types. This function will be limited to a certain physical distance between user and machine. If a warning is available or another coffee is in preparation the by the app selected coffee will be rejected. The Easy Pay function will always be available.
Adapt personal coffee taste[1]	Water pressure Water temperature Coffee, water ratio Grinder parameters Extraction time	Machine producer	With this app function the personal coffee taste of the user can be adjusted. Each time this user selects a coffee via the app the coffee will be prepared with his chosen parameters.

[12] These functions are concepts to implement later to increase the coffee experience with our Smart Service further

Most of the used parameters are in the property of the machine producer. Some retailers do already transfer some encrypted data via WLAN to retailer owned apps. To implement our Smart Service further negotiations to convince different retailers will be necessary. This point will be explained more detailed in chapter 3.

Storyboard & Prototype

Our data-driven coffee service is visualized in the following storyboard:

Figure 2: 'Café Claro' Storyboard

The app prototype is having the following appearance (for a clickable prototype, please visit: https://marvelapp.com/prototype/g5ga16b/screen/77820125)

Figure 3: 'Café Claro' Mockup

3. What Does Our Target Service System Look Like?

To fulfill the various functions of the smart service, different actors are involved, reaching from the machine manufacturer till the employees. The following blueprint helps to get an overview of the different steps involved.

Service Blueprint

Steps	Online Offer Smart Coffee	Order Machine	Install the Service	Buy a Coffee	Complete Tasks	Re-order Coffee & Equipment	Arrange Maintenance	Take a Break!
Physical Evidence	- SME reads about the offer online and evaluates the service	- Machine inkl. service is ordered online - Basic payment in advance (will be allcoated)	- Coffee machine and initial equipment arrives - Installation of machine and service	- Employees buy and enjoy their coffee	- Employees take over small tasks	- App shows that coffee and other equipment will be delivered	- SME is informed that maintenance is due - with possibility to book time online	- Employees meet for coffee breaks
Customer Actions	- Visiting website	- Make the order - Pay the basic payment	- Open package - Connect machine - Install app	- Chose coffe in app / on screen - Add milk or sugar	- Chose a task - Mark it when completed	- Read the info - Customize order if needed (amount)	- Read info regarding maintenance - Book time online	- Send and receive coffee break requests
Frontstage Interactions	- Show information on website	- Show order screen on website	-	- Display coffee options - Make milk & sugar available	- Show tasks and status of completion	- Show pending orders	- Show info at right time - Coordinate time slot online	- Send requests and answers
Backstage Interactions	- Design, program, host website - Deal with coffee machine manufacturer, install sensor	- Save order - Charge payment	- Coordinate delivery - Brief call center - Coordinate equipment	- Count amount of coffee - Analyse data	- Track task completion - Distribute credits	- Order is automatically coordinated with provideR - Data is registered	- Offer online booking tool - Coordinate data-based maintenance	- Set up accounts for employees - Data security - Show availability
3rd Parties	- Hosting - **Coffee machine manufacturer** - **Sensor manufacturer**	- Payment - Cloud service	- Delivery Service - **Food & Equipment Provider**			- **Food & Equipment Provider**	- **Service provider / machine manufacturer**	- Possible cooperation with Teams, Slack, etc.

Figure 4: Service Blueprint 'Café Claro'

The Value Created for the Customer and other Actors in the Ecosystem

As indicated earlier, the business model of our service is based on a pay-per-use principle. Financial value is exchanged between the different actors in the ecosystem (see the yellow arrows in Figure). When looking at the ecosystem it becomes clear that – besides the financial value – further values are exchanged: functional, emotional and social values. These values reach from information regarding service dates for technicians (functional) over the relieve not having to do all the machine tasks by yourself (emotional) to acknowledgement over the tasks completed (social). The social and emotional values are mainly found in the ecosystem actor "SME A", whilst the value reaching 'Café Claro' is mainly functional and financial.

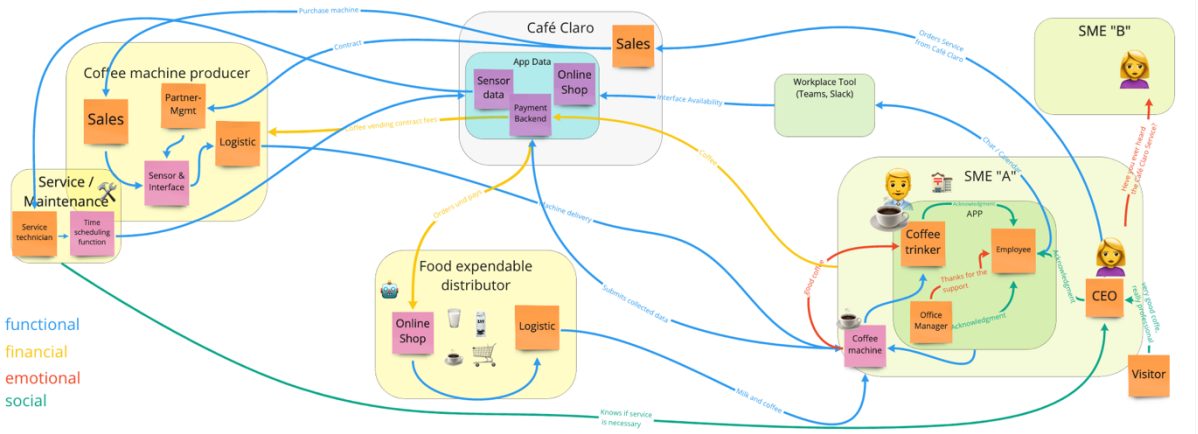

Figure 5: Ecosystem 'Café Claro'

The Riskiest Hypothesis and a Possible Test Framework

In the process of working on the Business Model Canvas we made some assumptions. They were turned into hypotheses we tried to evaluate.

Figure 6 Hypothesis #1

The most crucial hypothesis we defined is about the fact if our value proposition is recognized at all by potential customers. The main beneficiary actor, the coffee consumer, is not the same person as the decision maker that decides about such a solution. There is often not too much transparency about the actual costs of a coffee machine and its environment in a SME. Therefore, it is even more important to make sure the added value is well understood and positioned.

Besides testing the value proposition, it is also important to start negotiations with coffee machine producers early on, since our service is dependent on the data generated by their machines. This is the second hypothesis we introduced. Partnering up with a manufacturer is crucial to get our service up and running. We hope to convince a manufacturer as soon as possible – to be able to offer relaxing coffee breaks for as many SME in Switzerland as possible.

Figure 7 Hypothesis #2

4. Outlook

For a proof of concept, we kept the focus on coffee machines only. During the interviews with potential customers, it turned out that the ecosystem could easily be extended to other devices of the daily life in office kitchens. Dish washers or the fridge are perfect devices predestined for tasks that could be distributed across the entire team.

Another very interesting feature that has been discussed was dynamic pricing. A beverage from the coffee machine containing milk could become cheaper if the milk expires soon. This would go hand in hand with the above-mentioned ecosystem extension.

We believe that office kitchens have an undiscovered potential.

eLogbook

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Abstract

The eLogbook is an automated, digital logging and tracking system designed for capturing information pertaining to actors and work related to manufacturing lines. While our specific use case illustrates the service as applied to a pharmaceutical production line, it could be implemented in any scenario in which tightly controlled monitoring of production output and traceability of an end product is required or mandated by regulatory bodies (e.g. GMP environments such as cosmetic production).
At present, much of the logging data related to pharmaceutical production is still captured manually, especially in the small and medium enterprise (SME) environment. Health authorities require that the production chain of every marketed product is fully traceable. Therefore, it is key for a pharmaceutical business to be able to collect such information in a systematic, efficient, and reliable way. Primary data points could include the cleaning time of production apparatus, production batch numbers, and when a given machine was last serviced. The aim of the eLogbook service is to automate the collection, processing and storage of this data. The customer will benefit in work efficiency, quality, and transparency. In this paper, we describe the pain points the service aims to alleviate, go into the details of the data-driven approach to be employed and further describe the service in terms of its primary value proposition.

Key words
digital logbook, GMP, security, quality

1. Which Challenge Do We Solve?

The goal of this business case is to use logbooks more effectively in an industrial environment – particularly in the pharmaceutical industry.

In this regulated industry, logbooks are used for major or critical equipment. A logbook is one element of the documentation required, when manufacturing pharmaceutical products. According to the principles of Good Manufacturing Practice (GMP)[1], a logbook must contain the chronological history of production equipment, a testing device or even areas, where products are processed. The key activities to be logged by the people, who are carrying these operations out, are processed batches, cleaning, performed calibrations, maintenance or repair operations.

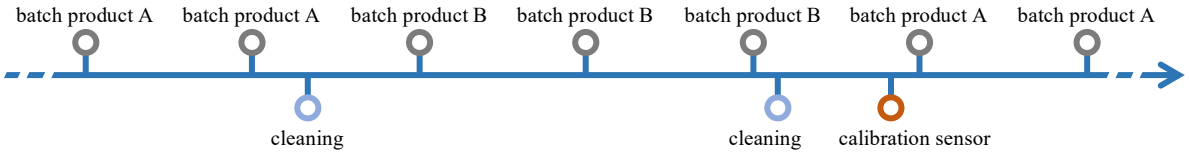

Figure 1 - Chronological logbook entries

Through the whole lifecycle of a piece of equipment, all these activities are tracked in paper logbooks (Figure) in most cases. This documentation may be consulted later as reference by the production/laboratory/maintenance staff or the quality insurance unit in order to gather some information for a specific task. For an auditor, the logbook records provide the evidence that the instructions were followed as required (e.g., correct calibration interval, clean hold time respected).

All these person groups have some benefits when using a logbook. The jobs to be done, the pains encountered and the gains they are expecting when using logbooks are summarized in the following table.

Table 1 - Customer profile

Customer jobs	o log activities accurately o check equipment/room status, check clean hold time o investigate historical records o demonstrate compliance during audits
Pains	o not logged promptly, entry could be missing o logging costs time o old entries are difficult to retrieve o log entry inaccurate, incomplete, difficult to read o not enough space for logging
Gains	o reference book o GMP compliance ensured (traceability) o logbook easily accessible for users, kept short and concise o complete documentation, coherent system o trend identifiable, frequent issues noticeable

2. By which Data-Driven Service Approach Do We Solve the Challenge?

Our service is a digital logbook (eLogbook) which can be used on mobile or desktop devices. The eLogbook will reduce the time for adding a new entry in the logbook, so that the line worker has more time for his main tasks. This can be achieved, because the user gets suggestions while adding a new logbook entry. These suggestions are based on machine learning models applied to the historical data. Additionally, the eLogbook will help the customer fulfil the GMP guidelines by leading the user during the logbook process. This ensures, that no entry is forgotten, wrong or inconsistent.

Figure 2 - Mobile prototype [2]

Table 2 - Pain relievers & gain creators

	What?	How?
Pain Relievers	o logging and checking can be done more efficiently o GMP compliance ensured (traceability)	o digital logbook has suggestions and dictation function o software leads the user based on rules. Software fulfil requirements (21 CFR part 11, FDA [3])
Gain Creators	o higher accessibility and transparency o trends detectable o safer and cheaper storage of data	o searching and filtering historical data o possible to visualize and analyze historical data o cloud is cheaper and has backup

A possible sequence of events in the day of a line operator depicted as a storyboard.

Check room and equipment status	Equipment identification	Check in product batch as log	Batch production	Equipment cleaning & logging	Check out / All logs in one place

Figure 3 - Storyboard

3. What Does Our Target Service System Look Like?

The Service Blueprint

The interactions in the service between customer, system and supporting processes is illustrated through two frequent manufacturing activities: batch production and cleaning. The diagram below provides a step-by-step breakdown of the process a line operator follows from the moment they receive a production order, through to the final check-out and cleaning of the manufacturing room and equipment. The objective of the operator is to lose as little time as possible in logging both activities. The customer interacts with the frontend, whereas the backend is the heart of the solution.

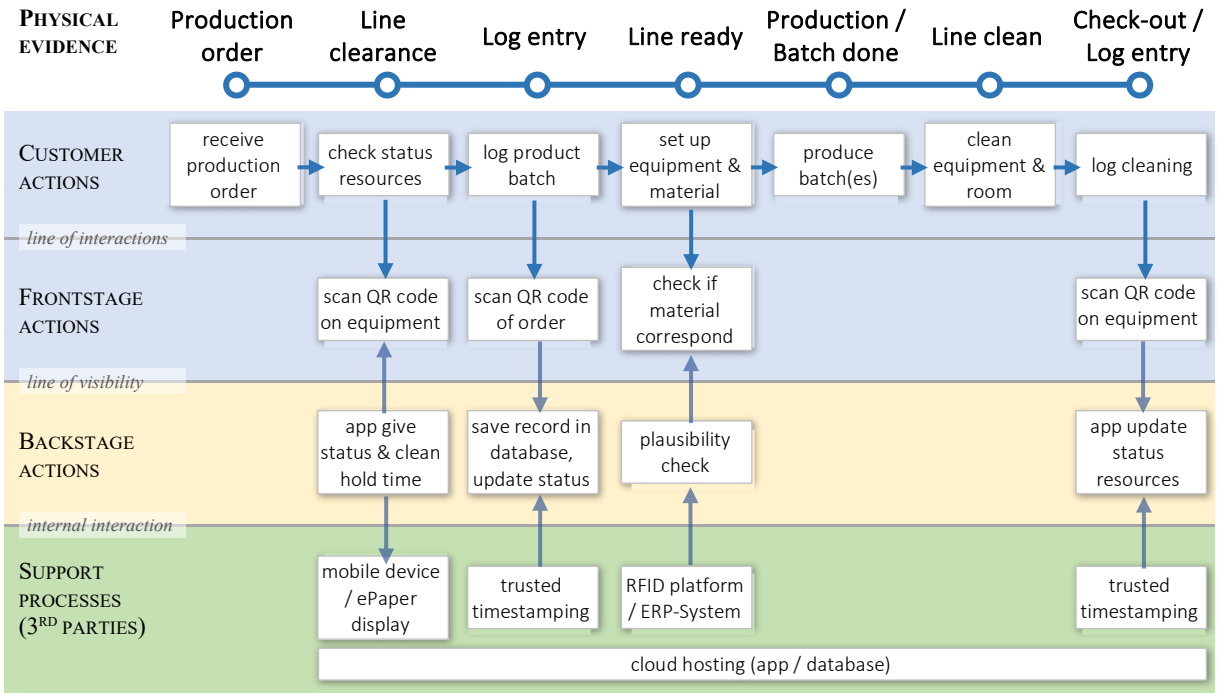

Figure 4 - Service Blueprint illustrating line operator work process for a production run

3rd Party Integrations

The eLogbook service encompasses several 3rd party actors. The basic product offering has been conceived as a SaaS solution with all data stored in the cloud. As such, one of the main 3rd party actors is the **cloud hosting provider**. Depending on the customer's needs, the application and data can be hosted on premise. However, this feature would be offered as an add-on and integration would incur additional cost to the end customer.

As an additional add-on, digital monitors (**ePaper displays**) could be offered as well. A business partner will supply the hardware. The displays are intended to be used to convey information on e.g. the cleaning "state" of a room, but could also serve as data-entry terminals in areas where mobile data capture is not feasible (e.g. Ex-areas).

A further service add-on is **Trusted Timestamping** [4]. This feature ensures the tamper-proof recording of logs by way of digital signatures. Implementation of this add-on would require partnering with a 3rd party provider such as SwissSign to ensure the integrity of the log entries.

Finally, IoT and **RFID systems** are opening a tremendous opportunity in the context of "Industry 4.0" for production industries. The eLogbook leverages RFID technology to tag every product that passes through a production line.

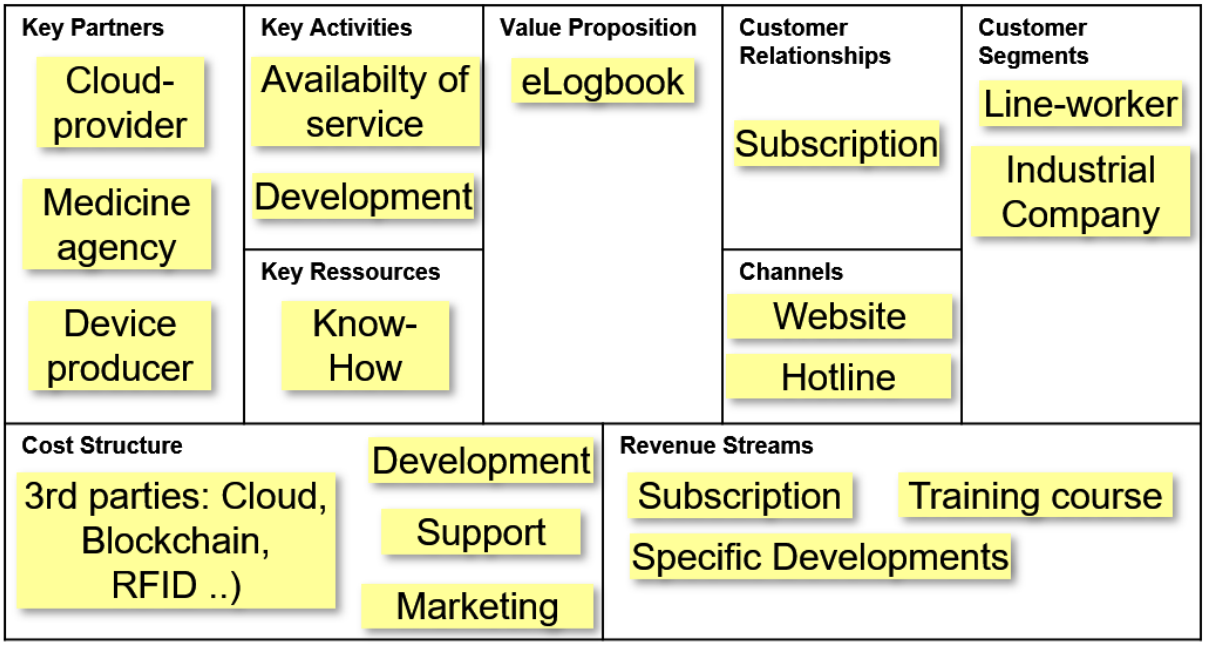

Figure 5 Business Model Canvas

Value Creation

We are convinced that the eLogbook creates value for customers, for society as a whole, and for us as vendors. Primarily, customer will benefit from gains in work efficiency, quality, and transparency. The solution offers a way for line operators and others on the shop floor to free up their time and work on more value-added tasks rather than spend time capturing logs. We expect these individual gains to produce compounding effects and allow the customer to optimise the scheduling of their production runs which in turn will lead to higher output.

Leveraging the digitisation of logs will also lead to higher quality products, as the precision and consistency of digital logs will certainly be higher than that of data points captured manually in paper-based fashion. Combined with the effect of increased transparency, the service will facilitate pre-emptive maintenance of production equipment, alerting to breaches of production procedures and potential product contamination. This benefits not only the customer, but has implications for end consumers, ensuring that they receive the highest quality and safest-possible product.

Finally, the expected increase in transparency of information throughout customers' organizations will lead to less downtime e.g. when audits are performed. Rather than tediously piecing together data from paper logbooks, digital logs can be compiled and reported upon at the touch of a key. We are certain many other new uses of the collected data will emerge over time.

Verification of Hypotheses

We are confident, that the majority of the points highlighted in the business model canvas fit with customer needs. To substantiate our assumptions, we have formulated a series of hypotheses, which we aim to test in due course. As an illustration, one hypothesis we believe to be critical is as follows:

Table 3 - Hypothesis check

	**We believe** it is critical to our customers that they can rely on customer support, which is available 24/7.
	**To verify that, we will** conduct interviews with potential customers
	**and measure** the percentage of customers, who agree with the hypothesis.
	**We are right if,** 80 % of the potential customers agree.

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CAS Smart Service Engineering 1/2021

Abstract

More and more medium-sized and large enterprises are taking the step into the cloud. Often this goes hand in hand with the IT transformation from the old hierarchical structures to agile software development – costs are no longer just a manager topic. This leads to a new situation where Product Owners (PO), Business Owners (BO) and many others also need an overview of the costs and consumption of their cloud assets to manage them properly. Many of these organizations are currently struggling with this task or must spend a lot of resources to manage these costs.

Our solution enables all responsible parties to have the same view of the cost and consumption data of their clouds, without having to deal with the provider-specific details of the different cloud providers.

Our service will provide customers with an easy-to-use self-service platform to optimize the cost and consumption of cloud services. Initially, we will offer these analytics to our customers as a service for the three currently most popular cloud providers (Microsoft Azure, Google Cloud, and Amazon Web Services). In addition, we also intend to use self-developed machine learning algorithms for all our customers to identify patterns and further optimize cloud infrastructure.
Overall, we want to give our customers the assurance and confidence that their cloud costs and cloud consumption will be managed in the best possible way if they only subscribe to our service.

Key words
Data Analytics, Automation, Optimization, Machine Learning, Cloud Infrastructure

1. Which Challenge Do We Solve?

Companies are more and more moving their local IT infrastructure into cloud environments. Most of them do not limit themselves to just one provider, because every of the large players has its own advantages. Those multi cloud environments bring complexity in generating reports with regards to cost and consumption. Although each provider offers its own reporting, it is laborious for a controller or IT PO to handle the different data structures and generate truthful reports.

Also, the optimal mix between costs and performance of the infrastructure puts the product owner in distress. If the infrastructure is oversized, costs will exceed budget. On the other hand, if its undersized, performance issues may occur. In daily business the IT PO also needs to handle with unplanned releases. In the end, he finds himself in a triangle of internal customers, his superior and controlling, in which he tries to please everyone, but with his current possibilities he may fail.

Figure 1 - Storyboard

2. By which Data-Driven Service Approach Do We Solve the Challenge?

With the entire value proposition, we clearly address the main pain points referring Figure 2: lack of knowledge in terms of the running IT-resources and balancing the IT costs and consumptions.

The core function of our digital service is a centralized user portal, which displays the current cost/consumption situation of the IT resources and offers a cost comparison service. The value proposition is therefore divided in three main services:

- Dynamic cost and consumption reporting
- Cost comparison, based on the current hardware demands between the three most popular cloud providers
- A consumption planner for the forecasted IT demands

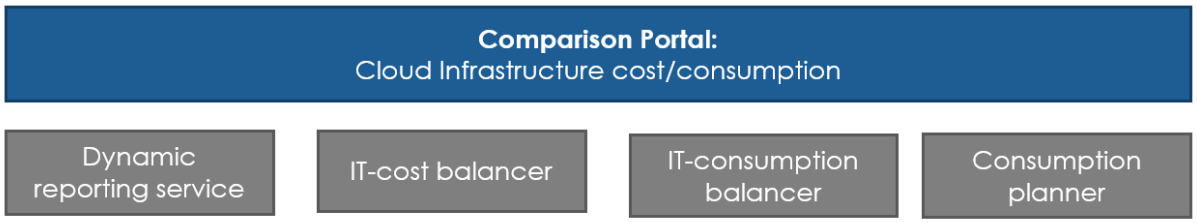


Figure 2 - Value Proposition

In fact, users have today the possibility to compare the costs of the IT-providers by themselves. But the main value of our service comes to play when the demand for IT-resources is changing with high frequency. On our comparison portal, the users have access to a meaningful report, which can be generated in seconds. That leads the user to take the right decision concerning IT-resources sizing and generates transparency overall.

To run the service, we are gathering cloud infrastructure data, in detail: cost/hardware consumption and idle state information. These data enable insights, which are required to compare the overall costs of the onboarded cloud providers. Especially the historical trend data of customers enables us, to evolve the algorithm continuously, which leads to more precise IT-resources recommendations.

3. What Does Our Target Service System Look Like?

As mentioned in the previous section, the service is designed as a platform for users. Figure shows the entire service blueprint.

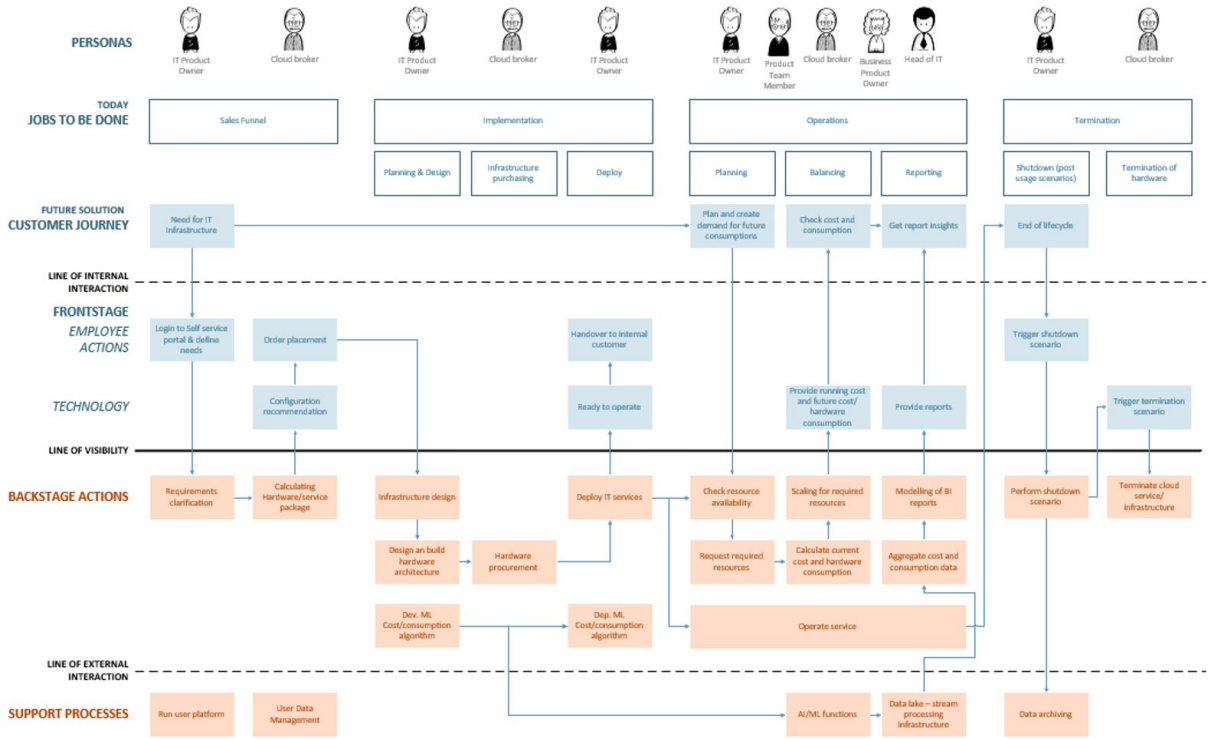


Figure 3 - Service Blueprint

Main interactor is the IT PO which starts the process in the portal. By entering the requested parameters, the portal gathers information, plans, designs and eventually proposes optimal design. After signing off the proposal, the service communicates through an API with the respective cloud provider and orders the requested infrastructure. There will be no human interaction after the signing

off step – all will happen in an automated way. Once the order is ready to be deployed, the portal informs all involved parties and deploys the order for operative state. During operations, the IT PO as well as other stakeholders have the possibility to get reports. Furthermore, the IT PO can further plan consumption through an interactive dashboard as well perform balancing measures for the current running infrastructure to avoid bottlenecks.

The service enables the IT PO to manage and operate the entire IT infrastructure of a company through one portal. It integrates multi cloud provider environments into one single point of engagement. Reporting is simplified and no manual interference is needed to get the correct information for development- /product teams or management.

We developed three critical hypotheses as potential showstoppers which need extended testing. These have been rated as paramount to reach a mature state of the product. The testing is designed to get best possible insights with regards to technical feasibility as well as customer perspective for such a service.

The identified hypotheses are:

1. Development of the platform algorithm to generate insights for infrastructure cost/ consumption/ planning (current as well as future demand)/ infrastructure design
    a. An MVP definition of the algorithm will be developed– what are the key elements for the first version of the product?
    b. Design and execute a feasibility study – is it possible to achieve our vision of the portal?
2. Acceptance for interaction with the three most popular cloud providers
    a. Create a formal request to interact with their platform via API
    b. Perform research about pitfalls when using provider data for further paid services (legal as well as technical)
3. Acceptance resp. willingness of customers to pay for such a service
    a. Field study – interviewing decision makers as potential customers about pains and desired solutions
    b. Perform online research (competition/reviews of existing products/user groups)

4. Sources

How to Manage and Optimize Costs of Public Cloud IaaS and PaaS (gartner.com)

Smart Shelf: Digitale Erkennung von Obst & Gemüse mit ungenügender Qualität

Christoph Rüeger, Daniel Konrad, Krister Koplimets, Markus Baumann

Abstrakt

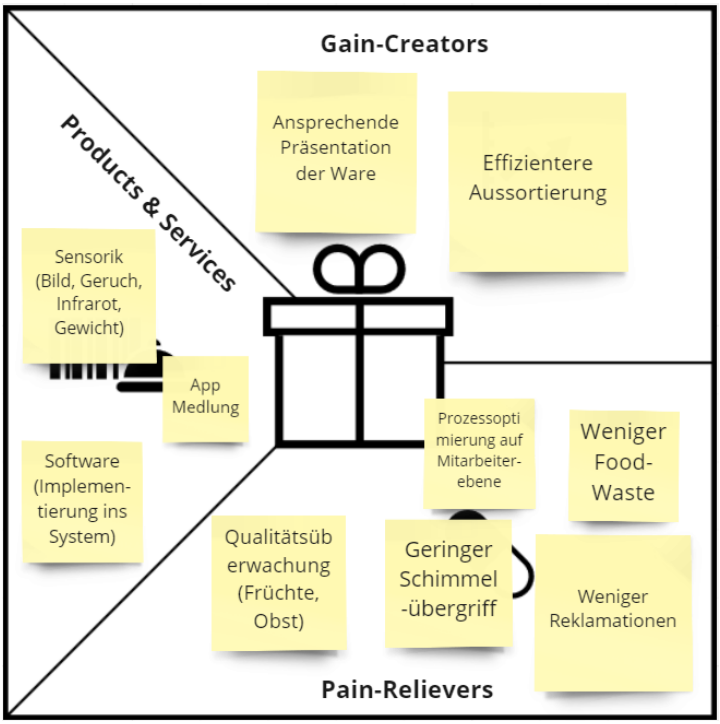
In diversen Detailhandelsläden wird das Obst & Gemüse nach der Anlieferung am frühen Morgen meist direkt in den Verkaufsregalen ausgelegt. Die Überwachung der Qualität sowie die Aussortierung der schlechten Ware erfolgt mehrmals täglich in manueller Tätigkeit durch die Mitarbeiter.
Mit unserer Lösung von Software und Sensortechnik bieten wir die automatische Erkennung von Obst und Gemüse mit ungenügender Qualität an. Aufwendige Arbeitsschritte können damit reduziert oder eingespart werden. Bei einer definierten Abweichung vom erwarteten Qualitätsstandard generiert das System eine Meldung, die direkt auf dem Handlesegerät des Mitarbeiters angezeigt wird. Nach Entgegennahme der Meldung wird er/sie zum entsprechenden Regal geführt, um die Ware auszusortieren. Durch den integrierten Prozess mit NFC Technologie wird sichergestellt, dass die erforderliche Tätigkeit nachweislich ausgeführt wurde. Als zusätzlichen Mehrwert können damit einfach Auffälligkeiten oder Häufungen dargestellt werden, was unseren Kunden weiter Zeit einspart bei der Analyse und Einleitung notwendiger Massnahmen oder Optimierung der Lieferkette.

Key words
Automatische Erkennung, Klassifizierung, Integrierter Workflow, Sensoren

1. Welche Herausforderung lösen wir?

Kleinhändler und auch grosse Retailstores müssen mit der gleichen Challenge kämpfen: das Koordinieren von täglichen Durchgängen um verfaultes Obst und Gemüse auszusortieren. Diese Tätigkeit nimmt viel Zeit in Anspruch und ist sehr Resourcen-intensiv, wie unsere Field-Research herausgestellt hat. Dieser Prozess konnte bis heute nicht automatisiert werden. Mit Smartshelf werden Mitarbeiter über Körbe direkt benachrichtigt, die Fäulnis ausweisen und aussortieren werden müssen.

Von dem Service werden in erster Linie die Filialleiter, aber auch die normalen Mitarbeiter profitieren. Die Leiter müssen nicht mehr die Durchläufe manuell koordinieren und die Mitarbeiter können die händische Arbeit minimieren. Nur noch die wirklich mangelhaften Körbe müssen aussortiert werden.



Bei den Gain-Creators kann man zwei Punkte erwähnen:
1.) die Filialleiter können mit dem Service die Ware im Regal ansprechender präsentieren
2.) die Aussortierung von mangelhafter Ware erfolgt durch genaue Lokalisierung effizienter
Als Pain-Relievers konnten wir fünf Punkte identifizieren:
1.) die Mitarbeiter-Ressourcen können effizienter eingesetzt werden
2.) die Reklamationen durch Kunden können minimiert und die Kundenzufriedenheit gesteigert werden
3.) der Schimmelübergriff auf frische Ware wird eingedämmt
4.) Qualitätsüberwachung/-prüfung wird erleichtert
5.) Food-Waste wird gesamtheitlich minimiert.

2. Mit welchem datengetriebenen Service-Ansatz lösen wir die Herausforderung?

Wir, «Smartshelf», rüsten konventionelle Obst- und Gemüse-Regale mit Sensoren aus. Die erzeugten Sensordaten werden benutz, um traditionelle menschliche Aufgaben automatisch zu delegieren. Damit entlasten wir unseren Kunden. Diese Aufgaben werden zusätzlich automatisch überwacht, was die Arbeit von unseren Kunden zusätzlich vereinfacht.

Abbildung 6: Storyboard

Unser Service erkennt aus den erzeugten Daten die Präsenz von verfaulten oder qualitativ minderwertigen Produkten im Regal und löst automatisch via Push-Nachricht auf dem Handheld einen Kontrollgang aus. Der Mitarbeiter lokalisiert die Position mittels NFC und bestätigt die Aussortierung nach Abschluss der Arbeit auf dem Handheld
(siehe Abbildung 7).

Abbildung 7: Ausschnitt Prototyp

3. Wie sieht unser Service-System aus?

Anhand des in Abschnitt 2 gezeigten Storyboards und Präsentation unseres ersten Entwurfs der Applikation mittels Marvelapp (Abbildung 2), konnten die direkten Interaktionen unseres Kunden gezeigt werden. Der Grossteil unseres Service läuft aber im Hintergrund ab, hinter der sogenannten «Back of Stage Interactions»-Linie. Mittels Service Blueprint kann ein Überblick über den Prozess gegeben werden, siehe Abbildung 3.

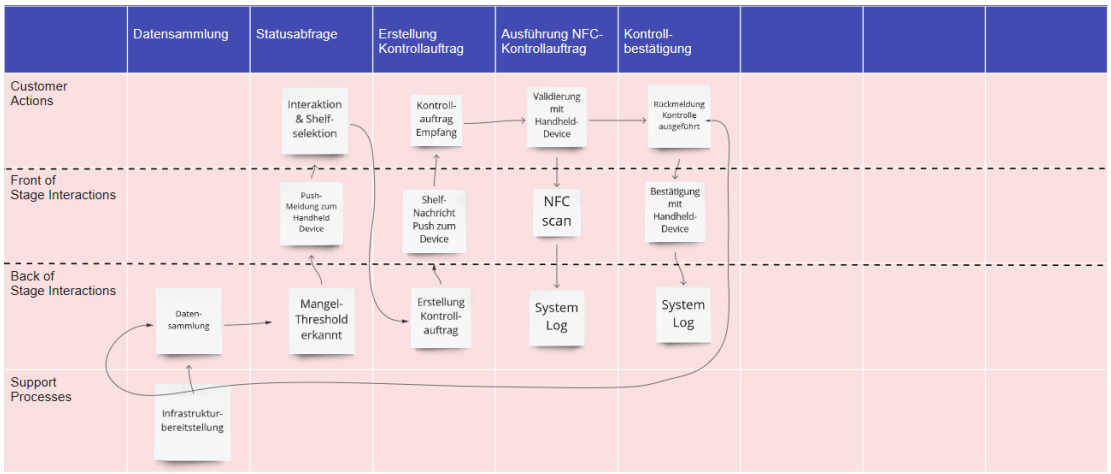


Abbildung 8: Service Blueprint

Gesammelt werden lediglich Daten über das Produkt, sprich das Obst und Gemüse. Auch wenn der Mitarbeiter mit seinem Gerät den Start und das Abschliessen der Arbeit (Aussortierung des Gemüses/Früchte) mittels NFC-Scan bestätigen muss, sollen auf Seiten SmartShelf AG keine Kunden/Mitarbeiterdaten erfasst und ausgewertet werden. Da die Integration der SmarShelf-Software auch in bestehende Systeme möglich ist, kann jedoch nicht ausgeschlossen werden, dass diese Auswertung nicht doch über das Hauptsystem erfolgen kann. Zum Schutz der Mitarbeiter und des Arbeitsklimas wird dies daher nicht empfohlen. Somit liegt der Wert für den Filialleiter nicht in der Überwachung seiner Mitarbeiter, sondern in der Effizienzsteigerung der internen Abläufe. Durch die genaue Erkennung von auftretender Fäulnis und die Benachrichtigung an die Mitarbeiter, können Kontrollgänge genauer und effizienter geplant werden, was Zeit- und Aufwandsersparnisse mit sich bringen. Dies Entlasten wiederum den Mitarbeiter selbst.

Was bei jeder Installation beachtet werden muss ist zum einen die Aufgabenzuweisung und wie das Team intern aufgestellt ist. Je nach Filiale und Anzahl Mitarbeiter muss gegeben falls beim Eintreffen der Mitteilung auf dem Handheld eine Zuweisung oder Annahme des Mitarbeiters erfolgen, um Leerläufe und Missverständnisse zu vermeiden.
Auf der technischen Seite bedarf es einer «Learning-Curve» des Detection-Algorithms. Da jede Filiale anders aufgebaut ist und somit über andere Einflussfaktoren verfügt, muss sich das System erst einpendeln, was kurz nach Installation zu möglichen Falschmeldungen führen kann. Diese Falschmeldungen werden Systemintern bearbeitet, da es sich im Kern um ein Lernendes System handelt. Detektionen werden immer mit einer Wahrscheinlichkeit angegeben, die der Kunde jedoch nicht sieht und nur für das System sichtbar ist. Bei Häufung solcher Fehlinterpretationen kann Smartshelf mittels Feature-Engineering nachhelfen.

The Course of the Year 2020

We had four very interesting cases lined up here. Without wanting to prioritize the cases, they are put into a sequence here:

There were two cases with a focus on optimizing the life of professional or private users while a material stream of logistics was involved:

- Automatic medical implant ordering for hospitals
- Smart Emergency Supplies

And there were two cases with a focus on immaterial handling of processes and facilitating the job of professionals with their customers:

- GiZ - Gebäude im Zentrum
- Smart Selling

Automatic medical implant ordering for hospitals

Andreas Dünki
Dominik Jenni
Reto Järmann
Stéphanie Bartels
Stephan Geuter

Abstract

Most hospitals in Switzerland issue purchase orders for implants only after an implant has been used in surgery, delaying cash flow for manufacturers. Furthermore, orders are still made by fax or other manual procedures. Our company offers implant manufacturers a solution that enables their implants with IoT-capabilities together with a service that automates the ordering process and automatically manages stock at hospitals. This will completely eliminate manual ordering tasks for hospitals and implant manufacturers can deliver their products quickly, accurately and in standardized manner. In addition, we will use the consumption data from the hospitals to create predictive models to power our new service. Our offer allows implant delivery before the need is recognized by hospitals. Our service frees-up capital by optimizing hospital stock and thus increasing cost efficiency. Lastly, implant manufacturers can automate order processes, and gain better insights about their current implant stock with our new service.

Key words
Order processes; IoT; hospital logistics; medical implants; healthcare

1. Which Challenge Do We Solve?

Hospital logistics consider in particular the material flow from the supplier to the patient. A reactive ordering process has established itself in many relationships between implant suppliers and hospitals. After an implant has been consumed in the surgery room the medical staff sticks the product labels on a paper consumption report and sends it to the implant manufacturer. After receiving the consumption report, the implant manufacturer's back-office prepares the replacement products, replenishes hospital stock on site, and invoices for consumed implants.

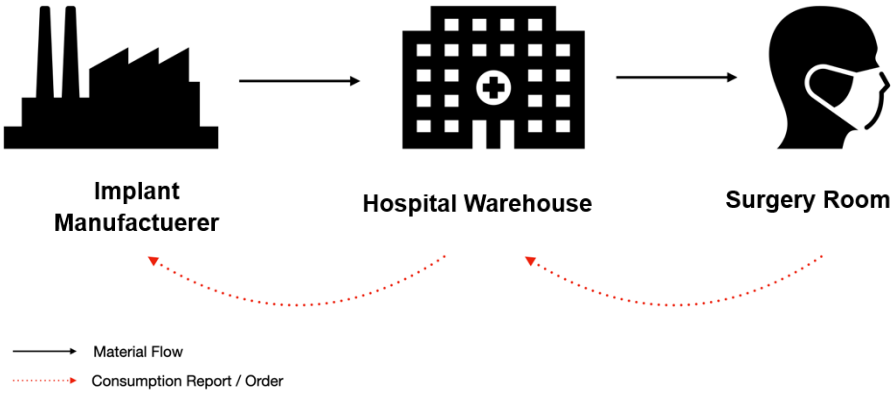


Figure 1. Current flow of implants, information, and purchase orders

The main challenges for the hospital employees are mistakes in the heat of moment in the surgery room. Sometimes product labels go missing or are listed twice on the consumption report. This is leading to incorrect bookings, inconsistent inventory counts, and disputes over invoices.

"Unreadable reports, increased error rates and manual entry of the orders into the system"

The implant manufacturer receives the consumption reports from hospitals in many different formats. The negative consequences for the back-office employees on the supplier's side are unreadable reports, subsequently increased error rates and the manual entry of the orders into the system. Fast delivery times are crucial for customer satisfaction, cost efficiency and patient safety. Furthermore, most suppliers maintain device stocks in the hospital that is still owned by themselves thereby blocking capital.

Lastly, the manufacturer's overview about stock in hospitals is unreliable so that regular inventory counts on-site needs to be performed. These cost time and resources and generate large organizational efforts. Stock inventory checks need to be done by the implant manufacturer under supervision of a hospital employee.

"Inaccurate forecasts, lots of tied-up capital and expiry of sterile products"

In other departments of the implant manufacturer employees struggle with high storage costs of implants, due to inaccurate forecasts. Expensive sterile implants tie-up a lot of capital, furthermore, after the expiry date the remaining stock has to be disposed.

In conclusion, both sides will strongly benefit from a simplified, standardized and faster communication. The supplier would like to receive a purchase order quickly so they can replenish stock in hospitals. On-site stock at hospitals can be optimized using modern machine learning algorithms to free-up manufacturer's capital as much as possible. Hospitals want immediate and complete transparency on delivery dates, so they can better plan surgeries.

There are existing approaches on both sides of this business relationship. Our solution addresses the implant manufacturer where we focused on the biggest pains and gains mentioned above. For the hospital staff the new ordering process much faster and easier. Although, both sides benefit from the new service, we believe that business innovation should be driven together with dynamic medical manufacturers.

2. By which Data-Driven Service Approach Do We Solve the Challenge?

We call ourselves ImpStock and offer a service to benefit implant manufacturers and hospitals. Our customers (implant manufacturers) store their products in the hospital in our intelligent IoT-storage system. The Smart Medical Cabinet SMC2000 (SMC) automatically and independently registers implant consumption on the hospital side and sends these data via our service to the manufacturers for invoicing and re-stoking.

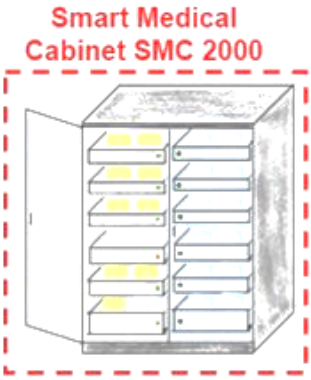


Figure 2. Drawing of our Smart Medical Cabinet Prototype

"Increased production planning reliability as well as reduced storage costs and waste"

We leverage consumption data, accident statistics and weather data and build a prediction model to forecast the future consumption of implants in hospitals. Thereby, we enable manufacturers to increase production planning reliability, reduce storage costs and the waste of expired sterile implants.

"Increased customer satisfaction and competitiveness"

Thanks to our AI powered service, implant manufacturers achieve better availability of implants in hospitals as before, while needing less implants. For the medical staff, the workflow improves as well. They can remove the implants from the storage as usual without thinking about subsequent

Figure 3. Storybook visualizing the process steps with the new service for an exemplary hospital in the Swiss mountains.

paperwork. Both measures increase the satisfaction of the end customer (the hospital) and thus the competitiveness of the implant manufacturer.

3. What Does Our Target Service System Look Like?

Our ecosystem consists of data suppliers, delivery companies and hospitals. Thanks to our ecosystem and our fully integrated service platform, we can transfer implants from one hospital to another if this is faster than the delivery from the supplier.

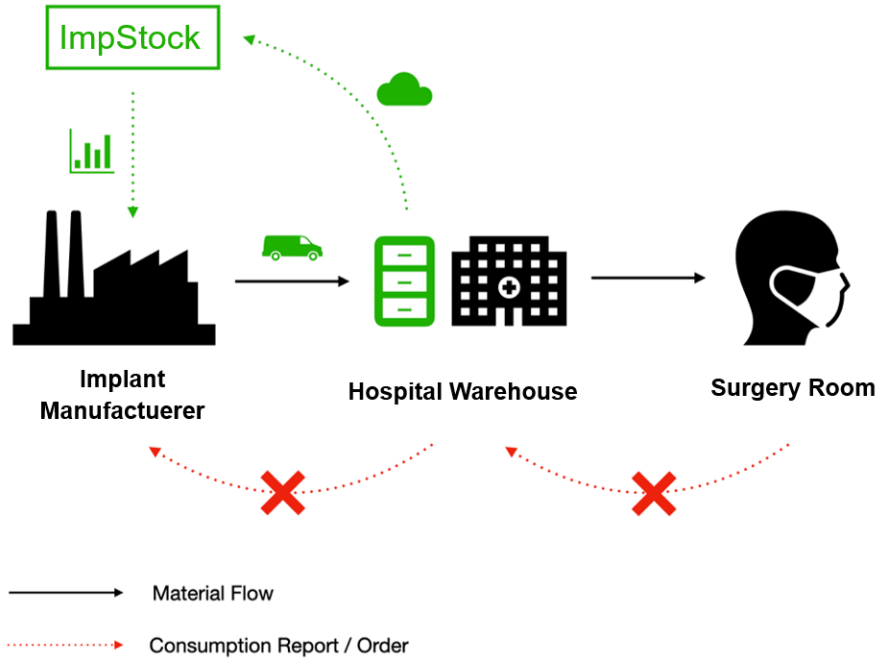


Figure 4. Flow of implants, information, and purchase orders with our new service.

The backstage within our service blueprint consists of an implant management system and the prediction model (Figure 5). These two systems trigger orders to the implant manufacturer (front stage) which is either an interface to their Enterprise-Resource-Planning system or a web portal. Furthermore, the web portal also gives status information about stock in the different hospitals, supplies in delivery, and projected consumption. After preparing the order, an independent logistics service delivers implants to our Smart Medical Cabinets in the hospitals.

The key component of our new service offering is the Smart Medical Cabinet – it maps implant usage in hospitals to a comprehensive implant management system. Implant manufacturers gain an accurate

view into their stock located at hospitals. The biggest pain reduction and gains are on the manufacturer side whom we will charge a commission for our services.

In addition, the data collected during implant transactions allows us to continuously improve our predictive capabilities. As with other smart, data-based services, our predictions and services get better and better the more SMC are installed at hospitals. The improved service in turn benefits of course our offering, but also our customers on both sides.

In order to build a successful service, critical assumptions need to be verified. The most critical assumption underlying the service concerns the value proposition.

WE BELIEVE THAT:

We can reduce storage cost with our service.

WE'LL TEST IT WITH:

Building a scenario using historical data from Implant manufacturers. To be able to use the data we will convince three manufacturers to sign an LOI.

AND MEASURE IT WITH:

Inventory turnover rate for specific implants in hospitals.

WE ARE RIGHT IF:

Our scenario shows that the inventory turnover rate can be improved by 30%.

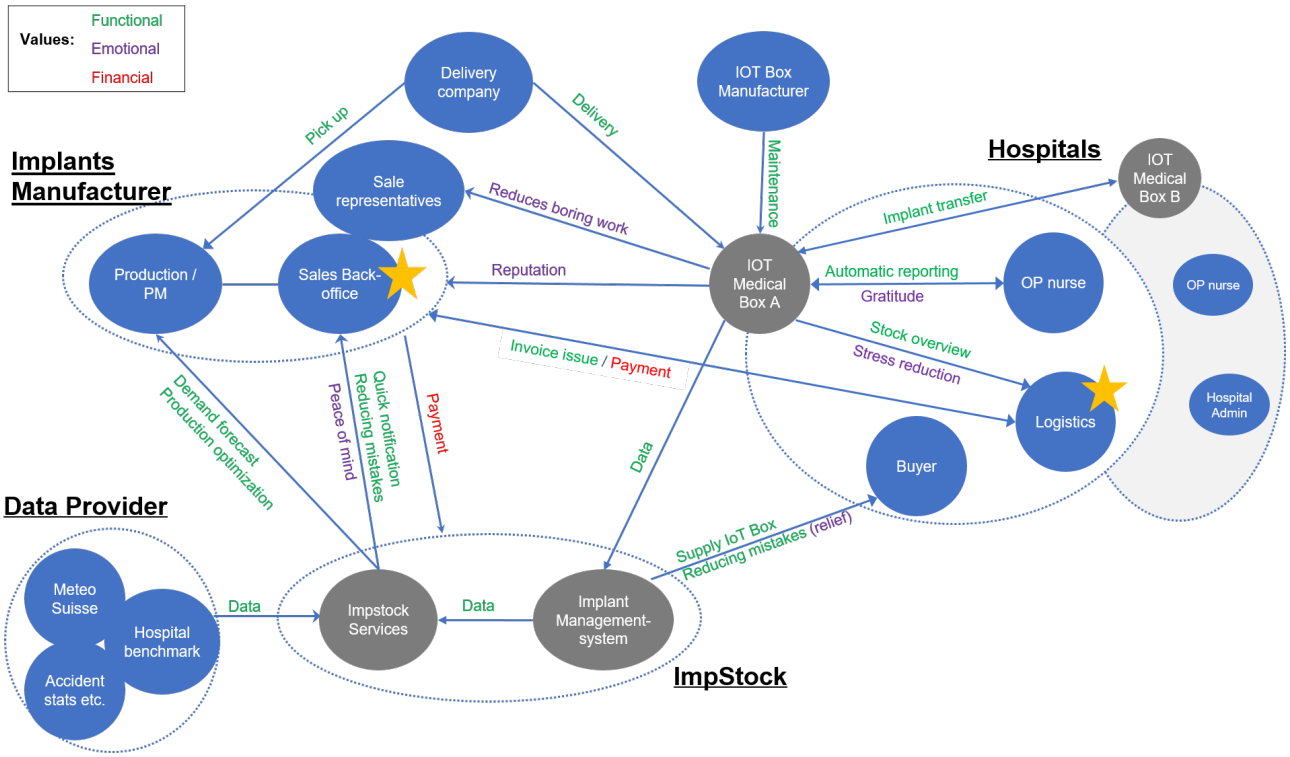


Figure 5. Service Ecosystem for ImpStock automated implant ordering process.

4. Acknowledgement

During the development phase of our project, many people helped us to get insights into the ordering process of implants. Many of them also challenged our ideas and gave us advice, which helped us and improved our service. We sincerely thank all interviewees, gest-speakers, fellow students and our Professor Dr. Jürg Meierhofer for their invaluable support.

Smart Emergency Supplies

Mario Bless
Davide D'Elia
Oxana Grunert
Marc Kistler
Heidi Steiger

Abstract

Emergency supply can become an important survival factor. It does not only consist of food, but also of various other products such as gas cookers, flashlights, batteries, toilet paper etc. Households should stock sufficient supplies at home to be prepared for a period of emergency. According to surveys, up to one third of households in Switzerland do not have sufficient emergency supplies for one week.
However, when food is thrown away every day and millions of liters of water are used to produce it, households need help to slow down and control this waste. A smart service is proposed to support households and make it much simpler to order, stock and manage emergency supplies at home. Initially, the service proposes products according to a households' individual tastes and preferences in the right amounts.
A virtual shopping cart is generated, and selected supplies are ordered and delivered through third-party retailers with home delivery service. Consequently, the service keeps track of the amount and composition of the emergency supplies, including expiry dates. It proposes recipes for regular consumption and turnover of goods, and reminds the household to re-stock on a regular basis.

Key words
Emergency supplies, food management, food logistics, food waste, smart ordering

1. Which Challenge Do We Solve?

Use Case

During the Corona crisis in 2020 many households started panic-buying supplies such as food, toilet paper and soap in order to be prepared for a potentially longer period without access to retail shops. Within a few days, retailers were sold out of certain goods.
Switzerland authorities recommend storing a sufficient amount of supplies at home to be able to survive at least one week without having access to a shop.[13] A study by Agroscope in 2018 found that between one fourth and one third of households do not meet this requirement.[14]
Storage of supplies at home requires regular use and turnover of goods in order to avoid waste. This can be a quite significant logistical challenge for households. The authors of this paper see an opportunity to support them. They propose a smart service to support households in the different stages of this task, from selecting the right products and amounts for their emergency supplies to providing recipes for meal planning such that the supplies can be regularly used and re-stocked. The purchase of the supplies will leverage existing retailers offering home delivery service.

Beneficiaries

The main beneficiary of this service are private households. They are supported to have the right range and amounts of supplies for an emergency situation. The service leverages information about individual preferences and therefore is customized for each household's needs.
Beneficiaries of the service are furthermore retailers with home delivery service, who will benefit from higher revenues and improved capacity utilization. Furthermore, they might be better protected from "shop runs" similar to those observed during the Corona crisis in early 2020.

Jobs, pains, and gains of the beneficiary

Jobs	○ select the right range and amounts of emergency supplies to be able to satisfy the basic needs of the household in case of an emergency ○ regularly replace and re-stock supplies to ensure that they are unexpired and edible
Gains	○ being prepared for an emergency ○ having the right amounts and choice of supplies ○ healthy food in line with the household members' individual taste and preferences (right amount of calories per person per day)
Pains	○ needs to get informed what is required for emergency supplies ○ keeping track of expiry dates ○ risk of food waste if not regularly consumed ○ lack of ideas what to cook

[13] https://www.bwl.admin.ch/bwl/en/home/themen/notvorrat.html
[14] A. Zimmermann, G. Prescia (2018), Notvorrat: aktuelle Situation und Einflusskriterien, Agroscope, https://www.bwl.admin.ch/dam/bwl/de/dokumente/Dokumentation/publikationen/studie_notvorrat_agroscope.pdf.download.pdf/71_AS_Lebensmittel_Zimmermann_Notvorrat_D.pdf

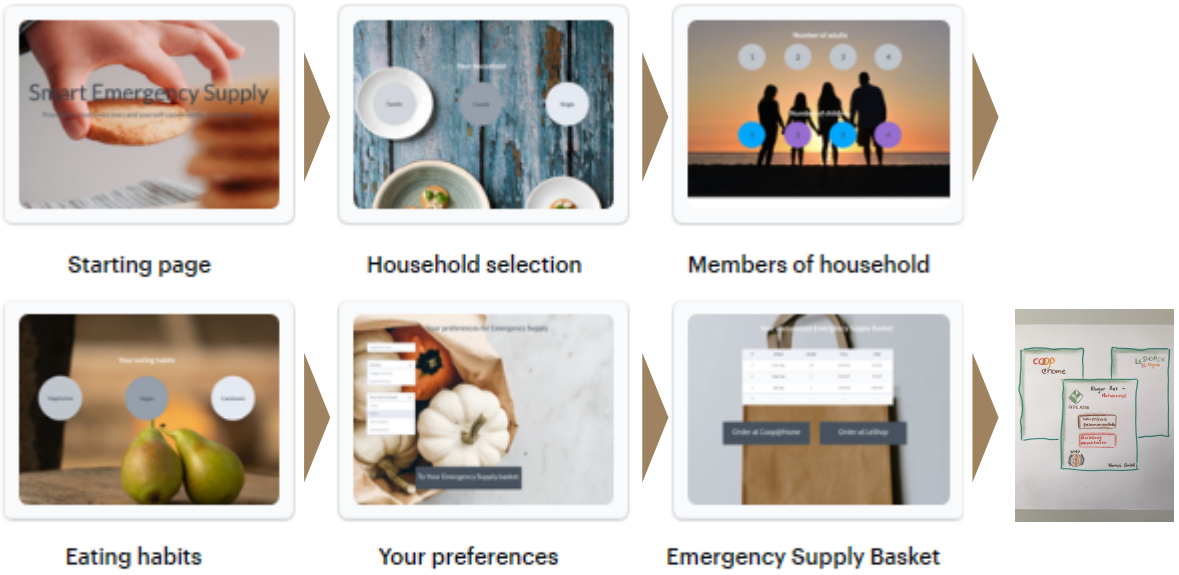
2. By which Data-Driven Service Approach Do We Solve the Challenge?

The following table outlines the key elements of the value proposition of Smart Emergency Supplies and how these elements leverage data and analytics:

Value Proposition	**Leverage of data and analytics**
Composition of a customized shopping cart for emergency supplies *Values:* ○ Security (emotional value) ○ Being Prepared for an emergency (conditional value)	○ The customer answers several questions about her preferences and household characteristics (e.g. household size, budget, preference for certain brands, allergies, food habits…), which are stored as individual customer data ○ The service consequently proposes a virtual shopping basket with products from publicly available food databases, taking into account the household's preferences, the Federal Office for National Economic Supply (FONES) as well as WHO guidance for a balanced diet ○ The customer can change this list according to individual tastes and confirms the final choice
Online order with home delivery in collaboration with third-party retailers *Values:* ○ Convenience (functional value)	○ The electronic shopping basket is transferred to third-party retailers for ordering supplies ○ When executing the order, the online retailer sends back the expiry dates of the delivered goods, which then are stored by the service
Warehouse management: keep track of expiry dates, send reminders, re-stock supplies *Values:* ○ Avoid food waste (emotional, financial value)	○ The service constantly scans through every customer's products and expiry dates and suggests products with upcoming expiry for composition of meals
Customized recipe proposals *Values:* ○ Tasty and diversified meals (emotional value) ○ Good feedback from household members (social value)	○ Suggested goods are matched with recipe databases from external partners ○ Recipes are proposed to the customer based on the content of the client's emergency supplies

The service is targeted to learn over time what the client's preferences are in terms of products, frequency of consumption as well as recipes used.

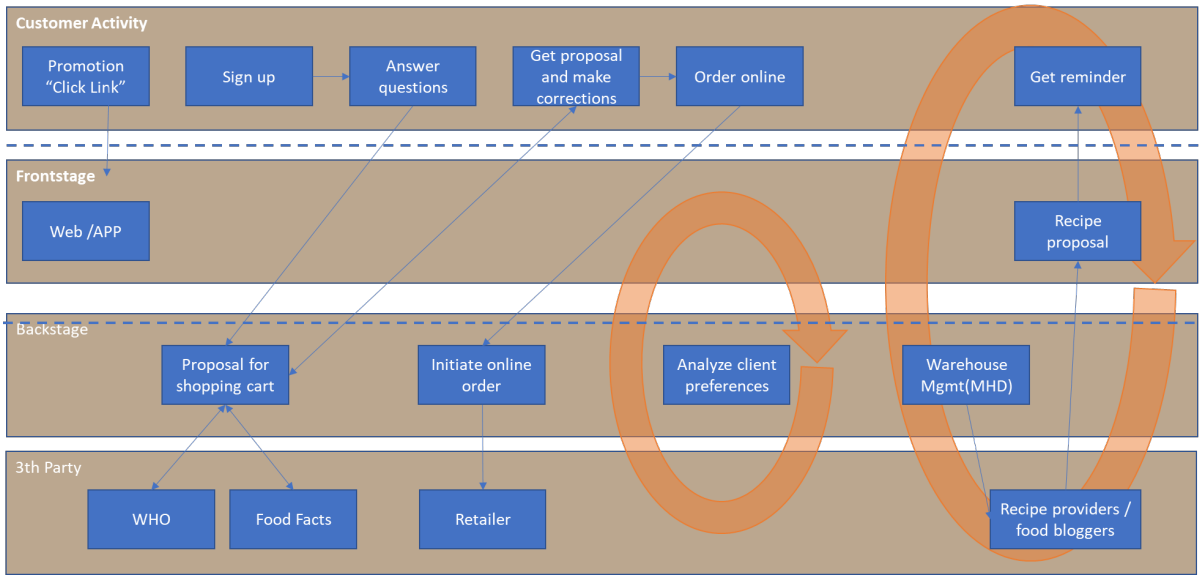
The initial interaction with the service is illustrated below in terms of a mock-up of a web page and flow for the initial Smart Emergency Supply Order:



3. What Does Our Target Service System Look Like?

Service Blueprint

The service blueprint visualizes the process steps of the service taking into account areas that are visible to the client as well as those that are running "backstage":



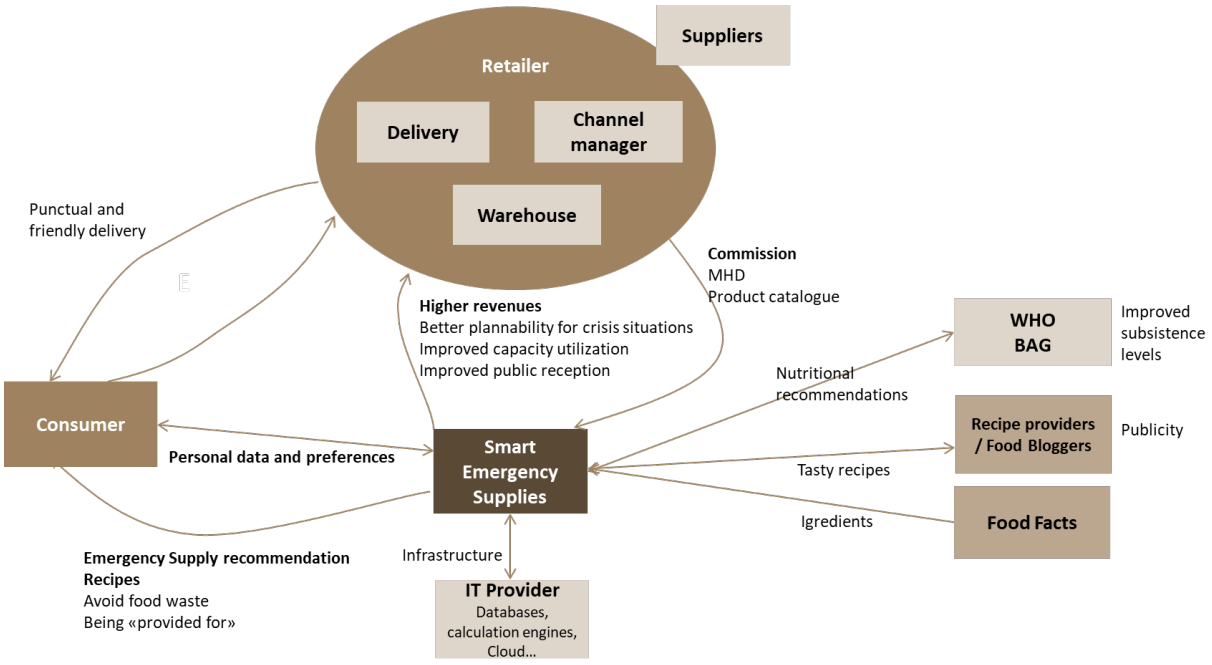
Data integration

Third-party providers are integrated into our service system as follows:

Food database ch.openfoodfacts.org	The database is openly accessible and can be fully downloaded or can be accessed via REST-API
Retailer	Interested Retailer has to provide API for accessing available products, basket, etc.
Expiration date	The expiration date is sent back from retailers once the order has been executed and is stored
Recipe databases	A household's list of products is used to query recipe databases for specific ingredients
Retailer Customer bonus system (Coop Supercard, Migros Cumuls)	Do improve our recommendation and services, private customer can voluntary give access to their *food shopping data (digital recipes/data)*

Value creation

The ecosystem and values created in the ecosystem are illustrated as follows:



Riskiest Hypotheses

Our two riskiest hypotheses are in relation to customer acquisition and revenue generation.

Hypothesis 1: Customer acquisition

We believe that we find enough people who are interested in having an emergency supply and a service supporting an personalized, intelligent compilation and a simple ordering process.
To verify that, we will start a survey in front of a retailer asking different questions in connection with our service to customers coming out of the store. We ask them to fill out a questionnaire with seven (7) specific questions (number of people who using the service, number of pets, special needs, special diets, possible diseases, personal preferences for branded articles and number of days they intend to stay self-sufficient) to classify the client and to put together a standard emergency supply. We measure the number of filled out questionnaires returned to us.

We are right if at least 100 cards out of 500 are returned and confirm they want our service

Hypothesis 2: Revenue generation
We believe that an online retailer is willing to pay a commission for additional orders being placed through our service.
To verify that, we contact the responsible managers of online ordering at one of the retailers in Switzerland
We are right if the responsible manager promises verbally to be interested in our service

GiZ - Gebäude im Zentrum

With smart building data, GiZ create a consistent customer experience

Catherine Ammann
Fabian Uetz
Gennaro Montanino
Michael Hilti

Abstract

Digitization has touched almost all aspects of our life. This digital revolution requires to rethinking building engineering and automation. Currently, there is no unified and systematic option to store the available building data and often the data are stored on different platforms. The multitude of unstructured data is a challenge for the various stakeholders: data cannot be found, information on the building is not up-to-date or documents are located in a variety of different storage systems - the need for simplification is tremendously growing.

The aim of GiZ is to network and operationalise building data for building owners, and project managers.

GiZ places the building at the centre and creates connectivity between the different types of data. GiZ ensures smooth data processing and facilitate communication between project managers and their customers. GiZ creates a platform able to map data and information in a flexible and future-oriented manner. This increases the efficiency and effectiveness of project management, reduces costs and makes up-selling and cross-selling easier to achieve through automatic sales lead generation.

Key words

Internet of things (IoT), networking of building data, smart data, data storage, building life cycle, sales-lead generation, machine learning.

1. The building to the centre

Connected buildings, via Internet of Things help the owner to reduce operating costs, save energy, and increase the monitoring quality of the building.

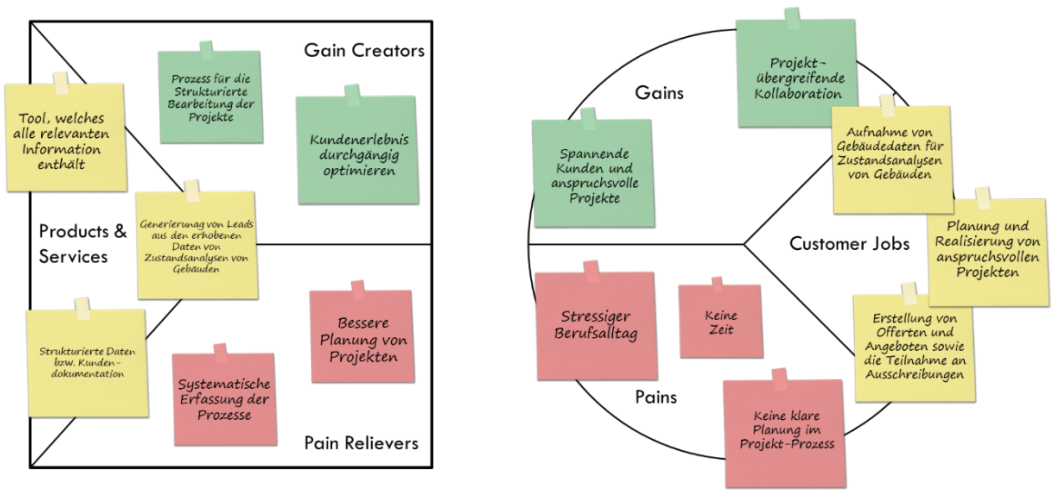
With a centralised platform, the collection and evaluation of building data becomes easy. Currently, such consistent processes are missing. The multitude of unstructured data available for a building is an immense challenge for the various stakeholders. The smart building data and operationalisation of this information for users - e.g. project managers – is the core of GiZ.

Currently, there is a lack of business incentives to manage the existing CRM system consistently and uniformly. As a result, relevant information about the customers or the building owner is missing: from wrong or missing addresses, to outdated or duplicated data, to inconsistent price calculations, discounts or hourly rates.

After the successful completion of the project, the customers are not consistently processed further, the motto "out of sight, out of mind" applies. The end-to-end customer experience and efficient and effective project management are often neglected and opportunities for up- and cross-selling are missed.

In order to align GiZ with the wishes and requirements of the target groups – here project managers - a value proposition canvas was created.

Figure 9: Value Proposition Canvas



Source: Own illustration

The relevant pains for the project manager before and during the completion of his tasks are:

- lack of planning security in the project process,
- stressful everyday work, and
- no time for anything.

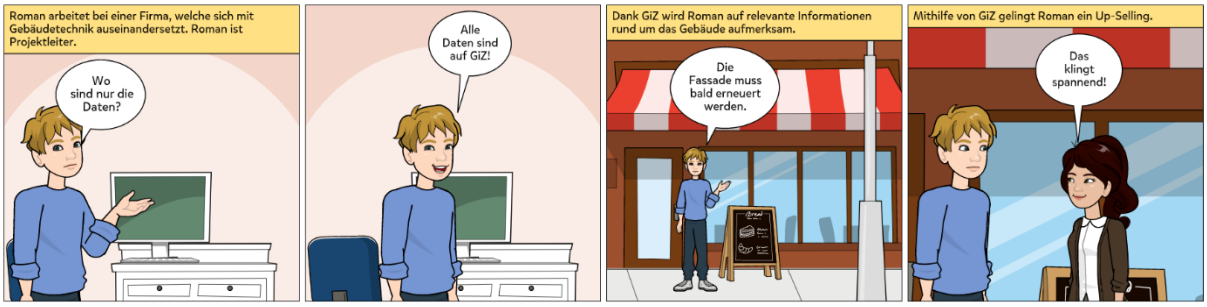
But there are not only pain but also pleasure points. The project manager achieves the following positive experiences and results when completing his tasks:

- cross-project collaboration, and
- exciting customers and challenging projects.

2. Data-driven decision-making in the building management industry

The aim of GiZ is primarily to create a long-term customer relationship over the entire life cycle of a property rather than a short-term project execution. However, this can only be achieved if the projects are carried out efficiently and effectively for the end customer, and the project manager can successfully support up- and cross-selling. GiZ connects and empowers the users to act competently and confidently towards the client. The story board visualises this value proposition.

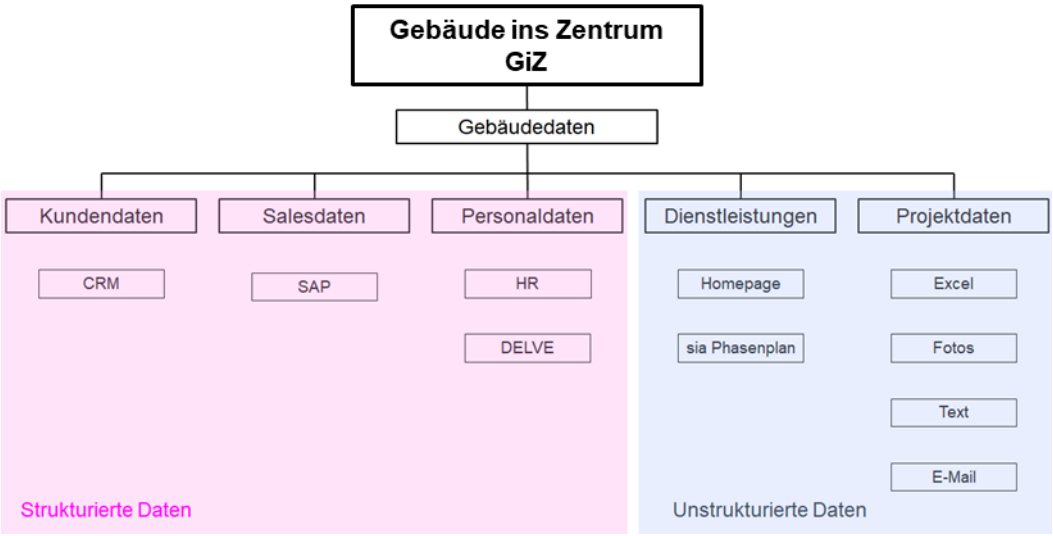
Figure 10: Story board



Source: Own illustration

GiZ aims at different data sources around building data, e.g. linking data from customers, sales, personnel, services, and projects:

Figure 11: Data sources



Source: Own illustration

3. Efficient and effective project management in building management industry

The more connected the world is, the more important thinking in networks becomes. GiZ builds networks for building data and thereby connects buildings, humans, and machines.

- Project manager:
- GiZ provides the project manager with all relevant information and data about the building – as well as emotional and social components (e.g. success and competence). In return, the project manager pays a license fee.
- Building owner:
- GiZ provides the owner with all relevant data and information about the building. In return, the owner pays a license fee.
- Non-human actors:
- The “Nun-human actors”, such as IoT network providers and cloud computing platforms, enable GiZ to create and connect the various databases, data sources and data systems. In return, GiZ pays licensing fees for the use of these platforms.

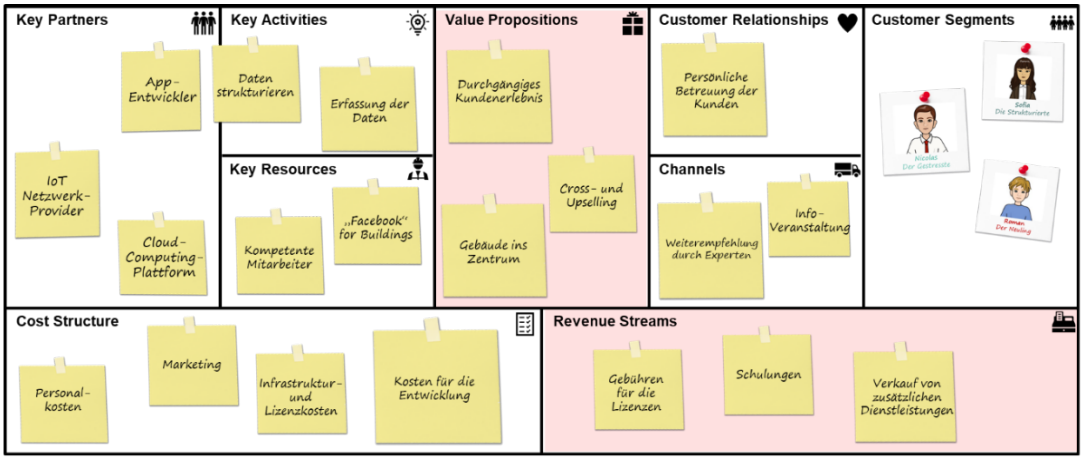
Figure 12: Ecosystem GiZ

Source: Own illustration

In addition to the key elements, the Business Model Canvas also shows the critical hypotheses:

- Hypothesis 1: the customer is willing to spend CHF 40,000 to 50,000 annually for the service.
- Hypothesis 2: the project manager succeeds in selling the customer an additional service (up- or cross-selling) in one out of five cases.

Figure 13: Business Model Canvas



Source: Own illustration

Smart Selling

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Abstract

Contacting customers with product and service offers is daily business in many companies. Often the contact is not successful or may even annoy the person contacted, which is not beneficial for the motivation of the advisors and for the overall sales performance. Our service "Smart Selling" aims at improving the sales performance by providing better insights into the potential of end-customers based on the use of additional knowledge. On the top of existing systems, like for example AI systems which provide a scoring of customers' potential for a specific product, we collect inherent knowledge from the client advisors in a playful approach and use this together with additional information to improve the scoring. Doing this in a transparent way, we increase the acceptance by the advisors and keep them motivated.

Key words
Customer acquisition & retention, Explainable AI, Gamification, Knowledge management, Scoring

1. Which challenge do we solve?

This business case aims at improving the sales performance by means of optimal data usage and increased motivation. It can be applied to any industry; however, we initially concentrate on the banking industry.

Many banks already use artificial intelligence (AI) to support their sales process. Usually, client advisors get lists of clients generated by AI which suggest customers who are identified to having a high potential of buying specific products ("scorings"). However, client advisors often poorly accept these scorings because they do not understand how the scorings are generated. They also feel left out because their own knowledge of the customers was not taken into account. As a result, they are often unmotivated to contact the proposed customers, which affects the sales performance.

This is exactly where the service "Smart Selling" comes in: The service includes the knowledge customer advisors have about their clients. This knowledge is currently locked in their heads, in e-mails or notes. The inclusion of the knowledge can improve the quality of the customer potential estimation.
Furthermore, the involvement of client advisors' knowledge also increases their motivation. They better understand how the scorings have been generated, which makes them coherent in their eyes. Through a playful approach, "Smart Selling" additionally increases the motivation of customer advisors.
The main beneficiaries of the service are sales managers leading a team of client advisors. Their sales performance will increase as a result of better scorings and thanks to a higher motivation of their team.

The value proposition canvas (see fig. 1) provides an overview of the jobs, pains and gains of the sales manager. With our service, we mainly address the pain that data input is often seen as not useful and induces unwanted customer contacts, which leads to frustration of the client advisor. By including customer knowledge to the algorithm, we want to solve this problem. Another pain is the way the results from the algorithm are presented to the sales personnel: it is perceived as insufficient. This pain can be relieved by providing transparency through good representation and explanation of the results.

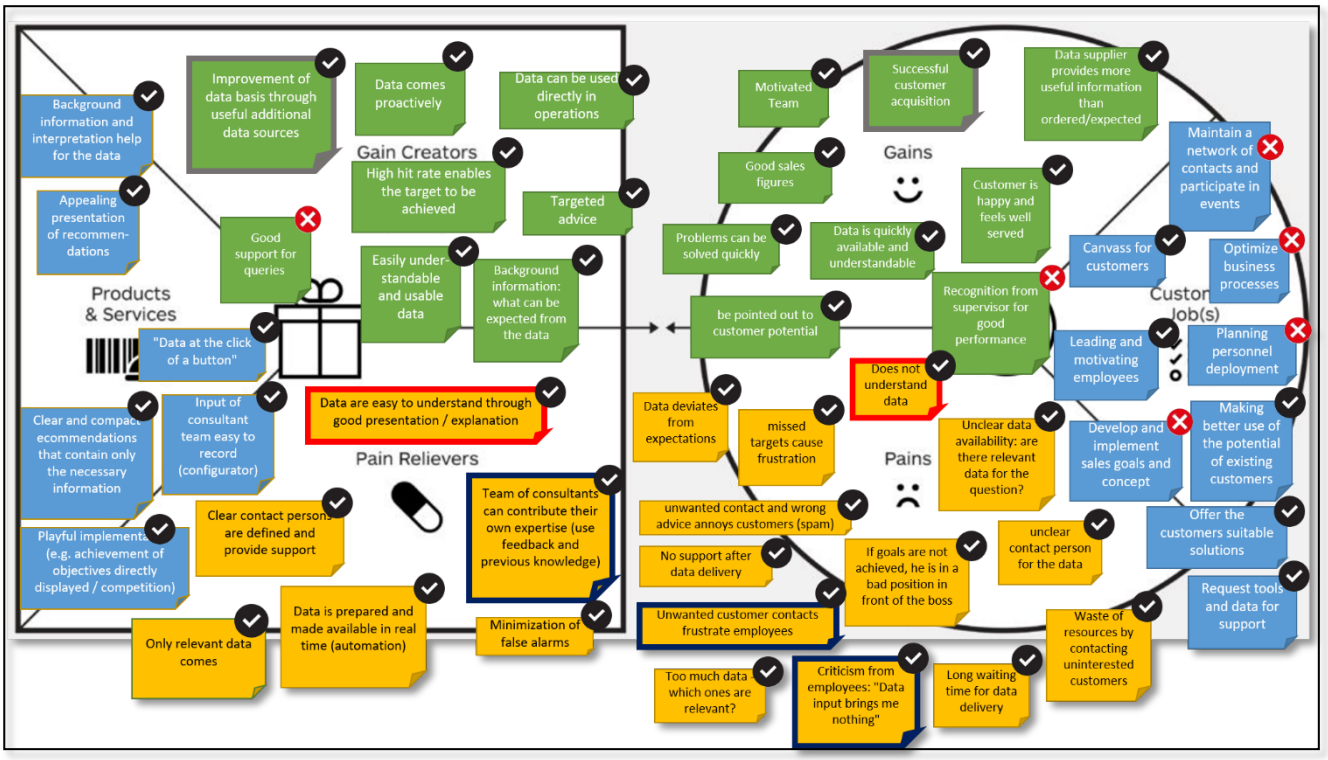


Fig. 1: Value proposition canvas

2. By which data-driven service approach do we solve the challenge?

To meet the recognized challenges, our service will deliver the following value propositions:

- Better customer target proposals through consideration of the existing knowledge of the client advisor about his customers;
- Increased motivation of the client advisors thanks to more involvement, gamification elements and a higher accuracy in terms of customer target proposals.

These two elements finally lead to an increase of sales performance which is generating value for client advisors and their superiors which are highly focused on this key figure.

To offer the stated values we have to leverage data. The main data elements and how they help to provide our service can be found in the table below:

Data element	***How we use it***	***Which value does it support***
Structured and unstructured data (e.g. e-mail communication) in terms of knowledge about the customer, generated by the client advisor while interacting with the customer or explicitly asked about by our service	Our algorithm tries to extract features out of this data (e.g. with "text mining" methods) which then can be used to optimize customer target proposals.	Better proposals and increased motivation (both thanks to utilization of the client advisor's knowledge)
Data generated by the "target algorithm"	We want to present only transparent proposals, and therefore we calculate for each proposal the main features which	Increased motivation (thanks to transparency and

	have influenced the algorithmic decision (by using "explainable AI" methods) and present it to the client advisor	starting points for the client advisor)
External data (matched to customers & non-matched training data)	Publicly available data (e.g. published by the customer himself, e.g. LinkedIn Profile) could be used to extract knowledge about the customer (e.g. current job position or sector) to be more accurate in determining customer needs. Furthermore, anonymized customer behavior data could be used to train and optimize the scoring algorithm.	Better proposals
Sales performance data	Sales performance data can be used to monitor the client advisor's own performance and bring it into a team view. By using gamification elements (rewards, tips) this data can support the team to reach goals with more fun.	Increased motivation (thanks to team involvement and gamification)

To give a better feeling about our service working in practice we worked with a Storyboard and some mockups:

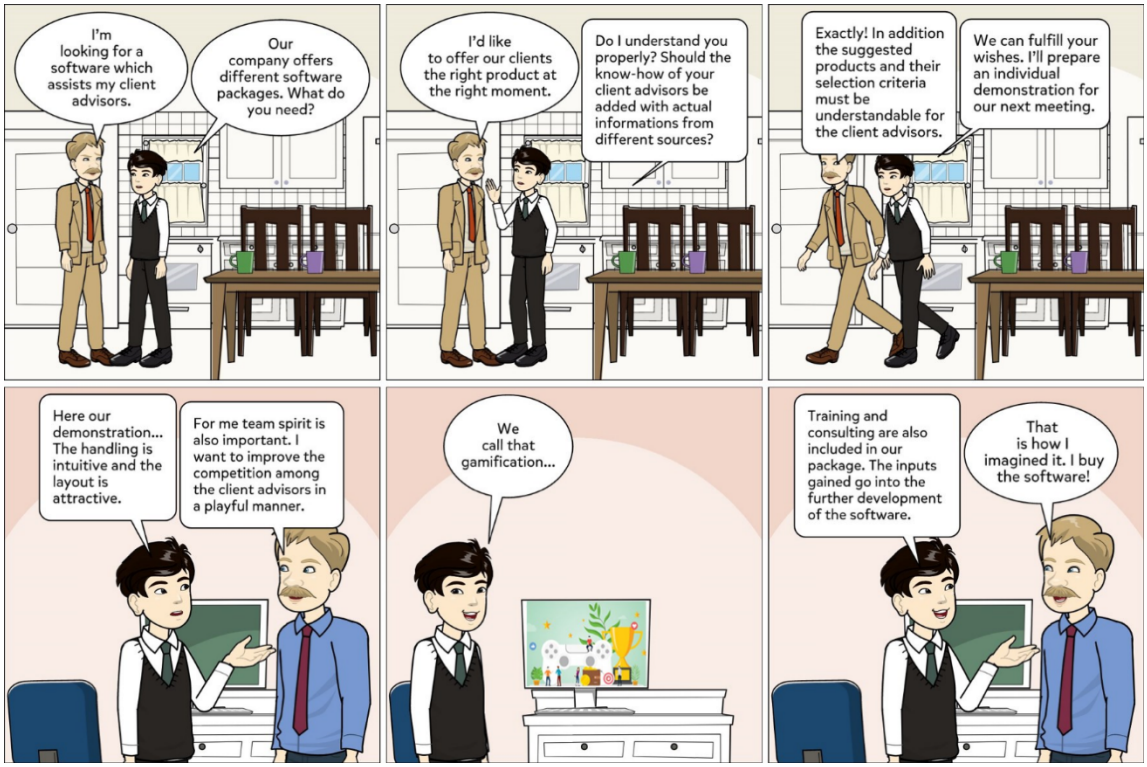


Fig. 2: Storyboard

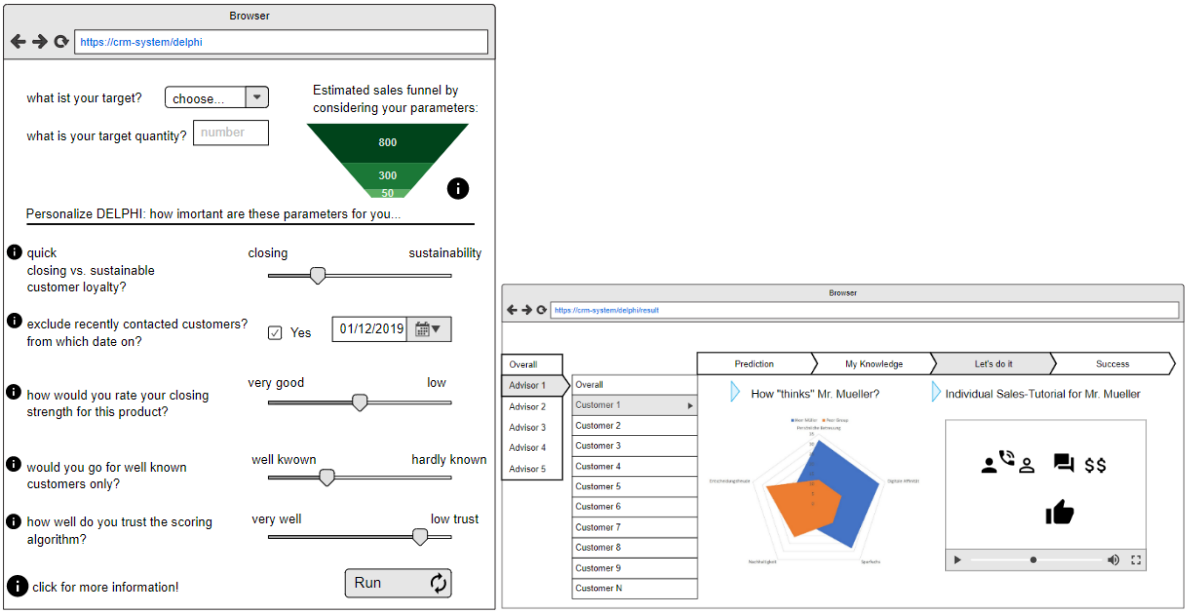


Fig. 3: Low-fidelity mockup

3. What does our target service system look like?

Our target service system can be visualized according to the following **service blueprint**, outlining key steps of the customer journey, our visible and backstage activities, as well as 3rd party service providers that will be needed. Since the value we propose to our customers becomes more tangible when having a closer look to the utilization phase, this phase is additionally shown separately.

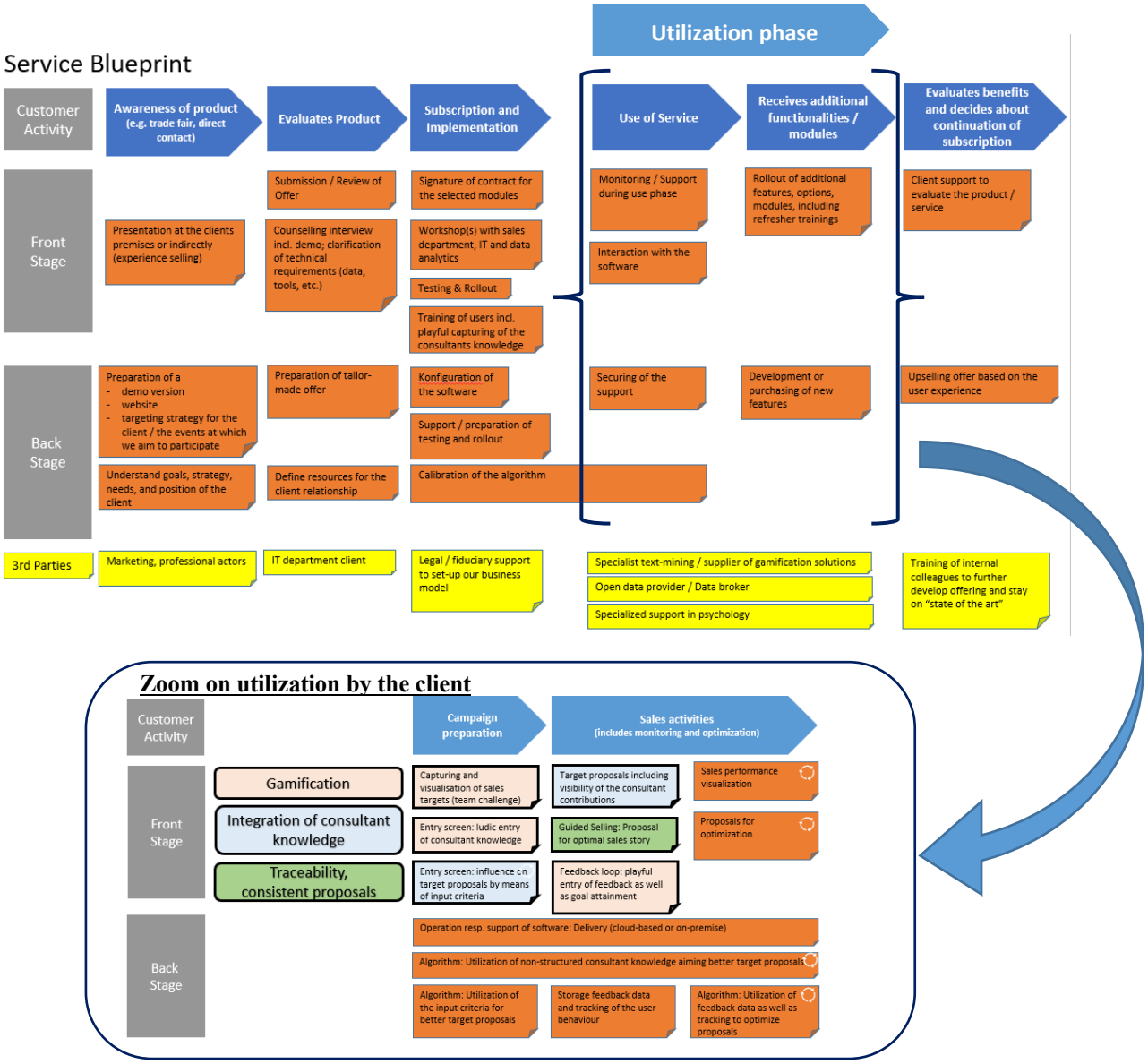


Fig. 4: Service Blueprint (incl. zoom)

In the service blueprint, external data providers are listed as 3rd parties. These could be open data sources, but also shared personal data sold by data brokers. The external data must be loaded into a consolidated analytics platform (e.g. data lake) and can then be used, together with the internal data, to train and/or to run the scoring algorithm. This loading and integration task can be managed through specialized interfaces (e.g. REST API) and data integration software.

This model creates value for the customer in the following manner:

- Enhancement of AI-based algorithm by human knowledge and experience. The job of sales consulting becomes more valuable and interesting since it leads to more positive client interactions and less frustration.
- Through guided selling: client advisors get good background information which allows them to propose the most appropriate product to their clients.
- Interactions with end-customers will be optimized, i.e. reduced to meaningful ones. There will be less end-customers who feel annoyed or disturbed.

- Gamification: higher "fun@work"-factor thanks to a graphically attractive interface to enter, retrieve, view data in relation to the sales campaign.
- Sales performance of any client advisor is visible to the team. This stimulates the competition among team members and supports them to reach goals in a playful manner.

As shown by our ecosystem (see fig. 5), the financial value for the service provider consists in the generation of subscription fees. But there is much more than that. For example, the development of our service gives us satisfaction as we support sales organizations in providing their consultants or sales personnel a much better work experience.

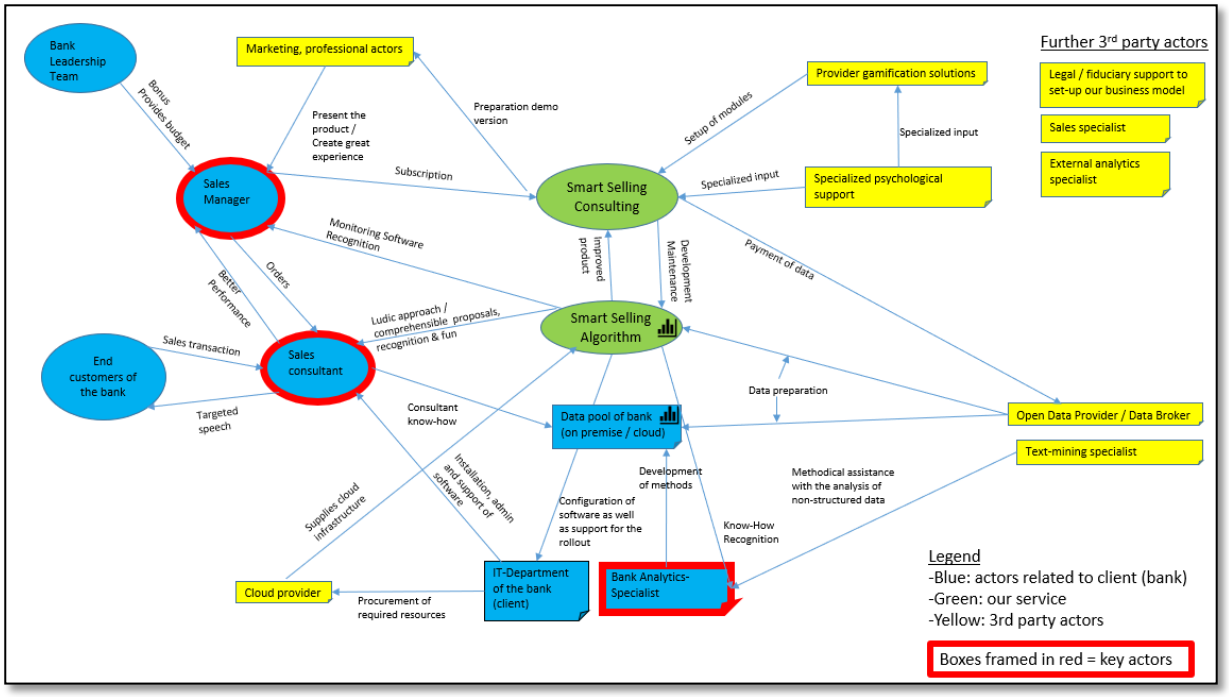
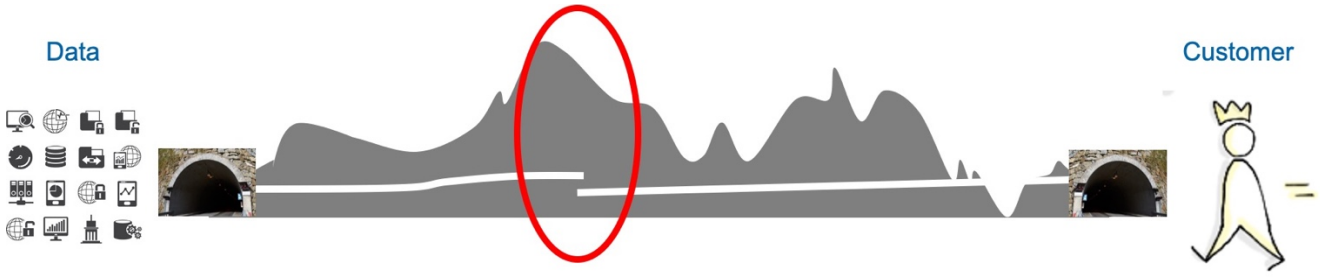


Fig. 5: Ecosystem

Our business case is based on several assumptions which need to be tested. The most important hypothesis assumes that sales consultants are most motivated when they can bring their own knowledge and experiences into the sales process. We test our assumption by giving to test consultants the opportunity to comment algorithm-generated scorings by describing how, where and when they bring in own knowledge. Simultaneously, their emotion curve and personal level of satisfaction is reported. We consider our hypothesis as correct if half of the consultants select a different order than the algorithm and if at least 50% of the test population attest this was a great experience for them.



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