Scheduling Meetings across Organizational Borders

Collaboration and Interoperability between Government Agencies and External Partners

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Abstract

Swedish agencies are obligated to collaborate in order to fulfil their respective missions. One of the largest agencies, The Social Insurance Agency, collaborates with several agencies, employers and care providers. Collaboration that needs synchronous dialogues and exchange of information, requires people to coordinate calendars, but since the organizations’ technical systems are separated, problems occur. The meeting organizers have to face the time-wasting problem of searching for suitable meeting occasions, without access to the calendars of their external meeting participants. Meetings across organizational borders are, therefore, difficult to arrange. This study has enlightened this problem, using methods for deeper understanding of the user’s point of view, searching for alternative solutions and with an experimental approach evaluated four different alternatives, all with their own unique pros and cons. One solution based on a WebDAV/CalDAV concept is recommended, due to its potentials. It is superior to the other alternatives, because of its strength in functionality. Moreover, it has great potential to develop into a broader collaboration service, offering a digital work space with functions for document sharing, discussion boards etc.
Sammanfattning

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1 Introduction

When citizens need to interact with government agencies, it can be difficult knowing what agency to turn to, especially in life situations and matters involving more than one agency. Therefore, the parliament expects its agencies to cooperate, and become more available and easier for citizens to interact with. The agencies are in fact obligated to help each other and support citizens inside the frames of its own missions and responsibilities [1], [2].

Moreover, Swedish agencies often have to cooperate with additional external parties, such as care provider and employers. For example, when a person with disabilities needs support entering the labour market, Försäkringskassan (Swedish Insurance Agency) has to cooperate with several parts such as other agencies, employers and care providers. Worth to mention is that agencies also cooperate, beyond individual matters, at local, regional and national levels. Both the growing amount of refugees and the combat against economic crimes and frauds are examples of national agency cooperation where Försäkringskassan cooperates with other agencies such as Migrationsverket (Swedish Migration Agency), Skatteverket (Swedish Tax Agency) and Kronofogdemyndigheten (Swedish Enforcement Authority) [3].

Swedish agencies are independently governed and act like silos or downpipes, despite the government’s wish and ambition for developed collaboration. This is obvious especially when it comes to information technology, where almost every agency has its own infrastructure, systems and solutions [4].

Consequently, the calendar systems are not transparent between agencies, and a meeting across organizations is therefore time-consuming to arrange. When administrators at one agency need to meet administrators at other agencies, they have to spend a lot of manual work trying to synchronize their own calendars with their cooperating partners. If their cooperation involves further external parts, such as the customer itself, care providers or employers, the meeting administration gets even harder.

1.1 Problem Description

Even if new collaboration technology offers new digital meeting opportunities, one fact remains, suitable times must be found, no matter if the meetings are digital or not. However, meeting arrangements across organizational borders are not easy to manage, as Swedish agencies have their own data platforms with no or limited connections. The meeting participants need to synchronize their calendars manually, trying to find available dates and times to meet. Scheduling meetings across different organizational borders are thereby the problem addressed in this study.

As the agencies’ administrators are quite busy and their availability limited, meeting arrangements demand foresight or luck. The organizer has to phone or email the participants, often more than once. With increased numbers of participants, the harder the puzzle is to solve. Moreover, if a key participant needs to rebook or cancel, the entire procedure starts all over again.
1.2 Vision
The vision is a solution, helping the agency administrators to schedule, and if needed reschedule, their meetings both faster and easier. Then, they and their cooperating partners will be able to arrange meetings without unnecessary delays, making the organizations more efficient, which will be beneficially to all Swedish citizens.

1.3 Purpose and Objectives
The purpose of this study is to enter deeper into the needs concerning calendars and meeting scheduling across organizational borders, and search for at least two alternative solutions of which one would be recommended.

The result is expected to support a future decision about possible solutions and suggests ways to solve the problem. Försäkringskassan requires a solution that is platform independent, and able to reach from computers and other devices such as tablets and mobile phones.

1.4 Scope and Restrictions
This study has been carried out, from May to October 2016, at Försäkringskassan and its IT department in Sundsvall.

At the IT department, the problems due to lack of transparency between agencies and their calendar systems were already well known, and existing knowledge has served as foundation and a starting point. However, a deeper understanding of the problem, together with alternative ways to minimize or solve the problem are needed. The study has had a service design approach, i.e. exploring, experimental and evaluation in iterative stages.

This study did not conduct an implementation of a recommended solution. Instead, it ended with a delivery to Försäkringskassan, describing gathered information from a user perspective, alternative solutions, and recommendations. Meeting scheduling is a problem that Försäkringskassan shares with its cooperating agencies, and the result of this study must therefore be further and carefully discussed at Försäkringskassan together with its partners.

1.5 Thesis Outline
This thesis is structured as follows:

Chapter 2 "Background" gives information about Försäkringskassan, its cooperating partners, and the government’s strategies and efforts for making the public sector more cooperative. The chapter also contains a short description of the Unified Collaboration concept, and discuss some challenges Swedish agencies have ahead.

Chapter 3 "Theoretical Framework" presents an outline for service design, compared to product and application design.

Chapter 4 "Methods" describes the method used in this study, from planning and data
1. Introduction

collection to evaluation and reflection through the iterative stages of Service Design.

Chapter 5 "Current Situation" reflects the analysed results of questionnaires, and complementary sources in order to enlighten the problem in depth. Furthermore, it describes how meetings are scheduled and by whom, together with an overview of existing functions of Microsoft Exchange.

Chapter 6 "Market Overview and Evaluation" is the result of the design and experimental stages, literature studies and evaluations. It draws the conclusion that the WebDAV/CalDAV alternative need to be further explored, design and proved as concept, solving the scheduling problem. WebDAV/CalDAV is further described in Chapter 7.

Chapter 7 "The WebDAV/CalDAV for Försäkringskassan" consists of a technical background description of WebDAV/CalDAV, followed by a summary of how the concept has been designed and evaluated in this study. WebDAV/CalDAV are standards for management of shared files and document, as well as accessing, managing and sharing calendar data on servers.

Chapter 8 "Discussion" contains reflections about the findings, the recommended solution and its potential. In fact, WebDAV opens up new opportunities to design a service that addresses several more aspects than scheduling across organizational borders. With a service design approach and customer involvements, Försäkringskassan can, not only solve their internal administrators’ problem, but also offer its cooperating partners new opportunities. The results are finally discussed together with recommendation for future work.

1.6 Terminology

In this document, the Swedish terms for agencies are used, however with an English translation when first mentioned. See table 1.

<table>
<thead>
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<th>Term</th>
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<td>Skatteverket</td>
<td>Swedish Tax Agency</td>
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<tr>
<td>Pensionsmyndigheten</td>
<td>Swedish Pensions Agency</td>
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<tr>
<td>Arbetsförmedlingen</td>
<td>Swedish Public Employment Agency</td>
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<td>Kronofogdemyndigheten</td>
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2 Background

This chapter will give a brief introduction to Försäkringskassan, its cooperating partners, and cooperation challenges.

2.1 About Försäkringskassan

Försäkringskassan is one of Sweden’s largest government authorities. It is a central and important hub in the Swedish social safety system, sometimes referred to as "the Swedish Model". Together with Pensionsmyndigheten (Swedish Pensions Agency), it provides both basic protection and income-related benefits. The social insurance system covers essentially everyone who lives or works in Sweden. It provides financial protection for families, children and the elderly, as well as people with disabilities, illnesses or occupational injuries [5].

There are currently about 13,400 employees working for Försäkringskassan at more than 60 offices throughout Sweden. They make about 20 million decisions annually concerning payments to individuals in various situations. During 2014, the payments reached 219 billion SEK. The main receivers are families, and people with illness or disabilities [6].

The IT Department has about a thousand employees, geographically placed at seven locations from Karlskrona in the south to Kalix in the north. Försäkringskassan IT has the overall responsibility for Försäkringskassans IT architecture, technical platforms, developed as well as purchased applications and services. The employees are occupied with tasks covering the whole chain from development to maintenance and support [7].

2.2 Cooperating Partners

In order to fulfil its mission, Försäkringskassan needs to cooperate with other government authorities, employers and care providers. They cooperate on different levels; local, regional and national, and exchange information about individual errands, structural improvements and at a more political level.

Cooperation between agencies and other external parts are about exchange of information, solutions to be discussed, facts to be verified, and decisions to be made. Some agencies are more tightly linked to each other, as they meet citizens in the same life situations. For example, a citizen that has been ill for a long time, enforces Försäkringskassan to cooperate with both employers and care providers, about how to support the citizen’s return to work. If the original work tasks are no longer suitable, due to the citizen’s health conditions, Arbetsförmedlingen will be involved searching for a more adequate work.

Försäkringskassan has its main connection points with Skatteverket, Arbetsförmedlingen, and Pensionsmyndigheterna.

2.3 Collaboration Technologies

Technology for increased openness, transparency and collaboration among Swedish agencies already exist. In this section, collaboration technologies are briefly defined and presented.
Collaboration is when two or more persons work together in order to achieve or do something. Google Hangout and Microsoft Skype are both examples of this collaboration technology, that offers the market new opportunities to communicate, share contents and cooperate efficiently.

The Unified Communications and Collaboration concept (UCC) contains a combination of communications and collaboration technologies, and aggregates the communication services, such as email, video, instant messaging, voice, presence, and video conferencing [8].

In technical contexts, collaboration is associated with asynchronous and synchronous services supporting persons to collaborate regardless of time or geographical place. Synchronous collaboration technology refers to tools that enable instantaneous collaborations across organizational and physical boundaries, for example web/video/audio conferences, telephone, and instant messaging. Asynchronous collaboration technology refers to tools that allow exchange of information that different individuals receive at different times, such as email, wikis, blogs, discussion boards [8].

Some of the main technologies used by UCC are Internet Protocol (IP)-PBX, presence, emails, Web conferencing, voice mails, instant messaging (IM) and many others. Referring to [9], the UCC concept can be seen as an integrated service that contains the following services, see figure 1.

![Collaboration Services](image)

Figure 1: Collaboration Services
2. Background

- Synchronous services connect people and make it possible to interact in real-time. The services are built upon technologies such as web/video/audio conferences, instant messaging, and VoIP telephone, and support the simultaneous connection of all participants.

- Asynchronous communication services model is people-to-people-centric communication, where information is stored and passed forward to the receiver, such as email, SMS messaging, blogging.

- The syndication/subscription communication services are associated with push communication technologies. It allows users to monitor a variety of information sources without visiting the original website and manually search for updates.

- The streaming services deliver rich media - audio and video/visual communication - to users, pre-recorded or on demand.

- Contextual services add the ability to associate situational knowledge with individuals, groups, and objects. It is central to the concept of enabling unified communications and can consist of role-based presence and location information. Presence and location context services can derive directly from communication endpoints such as computing device, and location information from GPS coordinates.

- The session management service includes support for protocols such as SIP and IM and presence including XMPP. It supports bridging or conferencing capabilities that enable multiparty communication and security functions such as signaling or media encryption.

- The session control service enables organizations to implement appropriate-use policies and controls.

2.3.1 Interoperability and Federation

Interoperability is the ability when two or more systems, organizations or processes communicate and operate with each other, without any effort from the customer. Interoperability can be considered as an aspect of quality, with increasing importance for information technology products and services [10].

Federation is when a user who has been authenticated by one organization automatically is authenticated by another organization of the same federation. A single-sign-on is used across the organizational borders [4].

2.3.2 Calendars as Collaborating Tools

The collaboration technologies develop rapidly, just as markets and organizations continue to pursue increased cooperation and openness across organizational borders. When it comes to synchronous interaction between people, the cooperators’ respectively time plans must be checked [11].

Calendars help people managing their time and commitments, both at work and in
private, and calendars and scheduling must therefore be considered as important collaboration tools. However, vendors have been slow in developing calendaring and scheduling solutions with focus on collaboration between companies and organizations. When technology shortfalls, users have to synchronizing their own calendars with coworkers and partners manually, relying on numerous emails and telephone calls to manage meetings, create schedules, and track events [11].

2.4 Cooperating Challenges for Swedish Agencies

The Swedish parliament has in several publications expressed the value of openness, transparency and effectiveness, and that Sweden has to ensure transparency among cooperating partners and other actors [12]. The strategy "Med medborgaren i centrum" contains goals for making Swedish agencies more cooperative, with the all-important citizens in focus, i.e. the importance of making it easier for the citizens to interact and easily get in touch with the agencies [13].

The public sector needs to develop the way they manage and exchange information, in order to make daily life easier to the citizens, but also because exchange of information across agencies organizational borders is crucial for the agencies internal administration. However, despite the government’s ambitions and long standing efforts, there are obstacles for increased coherency among agencies. Lack of interoperability can no longer be explained by technical limitations, instead more due to cultural and organization matters [14].

Trafikverket (Swedish Transport Administration) has with its project REMM, Resfria Mötens i Myndigheter (Virtual Meetings in public agencies), led and coordinated efforts to increase virtual meetings within and between public agencies. Their problem descriptions addresses for example need for cross-organizational solutions, technical problems, such as firewalls and lack of compatibility [15]. Their findings relate to when meetings are held, not the activities that precede a meeting arrangement.

New collaboration technology gives Försäkringskassan an advantage compared to many of their cooperative partners, as they can book and invite others to meetings using Skype. That is also why administrators at Försäkringskassan often act as meeting organizers. When meetings are needed, either physical or digital, the agency administrators have to exchange calendar data such as free/busy, before sending a meeting invitation. Problems, due to lack of transparent calendars between cooperating agencies and partners, generates a lot of time-wasting work when trying to solve the puzzle of available occasions possible for each participant to accept. Fully integrated system with full interoperability and transparency between calendars should solve the problem, but here and now, there are several obstacles ahead; technical, organizational and legal unsolved questions that need to be managed [14].
3 Theoretical Framework

A scheduling solutions across organizational borders can be seen as a future service. Therefore, in this chapter, the term service is explained, followed by descriptions of how to think and act when designing services, compared to products or applications. Customer involvement is also discussed as a contribute to the value experience.

3.1 Service Definition

Early definitions of services was grounded upon what products are not. Production, delivery and consumption of services were compared to production, delivery and consumption of products, emphasizing its differences [16].

A commonly used definition of the term service, states that a service is characterized by:

- intangibility: immaterial and abstract to its nature
- inseparability: Production and consumption of services can not be separated. The customer is co-producer of the service.
- perishability: not storable, service production and service consuming are performed simultaneous
- heterogeneity: the service is never exactly the same to all customer, because customers needs and requirements differ

[17]

Unlike products or applications, produced by the supplier and delivered to be used by the customer, both supplier and customers need to be much more involved in production and consumption of a service [18]. A service does not exist until it is experienced by the customer, and that is why production, delivery and consumption of a service are simultaneously performed.

Take a visit to the hairdresser as an example. The customer is actively involved during the haircut (inseparability), and two haircuts will therefore never be exactly alike (heterogeneity). The hairdresser has no standard, pre-produced hairstyles on the storage shelf, as production and consumption are simultaneous (perishability).

When developing a service, the supplier and customer need to establish a relation. The supplier has to respond to the customer’s need, and in turn, the customer needs to contribute to the service production and delivery in order to achieve the desired value. That is why services are more and more discussed from a value point of view, where the overall goal of service design and innovation is to create and establish processes that generates value to the customer [19].

3.2 Developing a Product or a Service

There has been a lot of research concerning user involvement in system development processes, but so far, little research about when and how to involve customers when designing services [18]. Almost every development process or model stipulates the need for
users to be actively involved in the process. Developing products or developing services have differences, but in both processes, user or customer involvement is unquestioned. User involvement is looked upon as a necessity for an application or product to fulfil wanted usability criteria. Usability is defined as "Extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use". Usability is evaluated related to the purpose of the product or application, to be compared to a service where the value experience is in focus [20], [21].

Gullikson [22] describes three main interactors, Human, Information and the Thing. Human refers to the user, Information to data with a value depending on context, while the Thing is something touchable, that can be design and also prototyped [22]. The development of a service can be compared, but is not equal, to the development processes of an application or product. For example, as a service is immaterial, it is hard to evaluate before it is released and actually possible to consume in reality [21]. Nevertheless, service design ideas and concepts, just as the Thing, need to be prototyped as close to reality as possible. But the methods differ.

In service design, a user becomes a customer, and the concerns for usability are shifted into focus on how the customer experiences the value of using the service [19]. But customer-orientation requires more than a rhetorical change of terms; user to customer, system to service, and usability to value. A user’s interaction with a system can be observed and measured, even evaluated by experts according to standards or guidelines. The value of a service, on the other hand, is created when it is consumed and valued only by the users themselves [19].

3.3 Service Design Stages

The methodology used is described in the book This is Service Design Thinking [23]. The process consists of four main stages.

- Exploration
- Creation
- Reflection
- Implementation

This service design process is iterative, and as all design processes nonlinear. At every step it is possible to take one or more steps back, or if necessary, start all over again from the very beginning [23].
3. Theoretical Framework

The process leaps between designing details and designing holistically, meaning that even when dealing with details the designer can never lose focus on the user’s whole journey. As a designer, one cannot control all aspects or viewpoints, because decisions always have to be made due to organizational structures, budget, resources and views of clients [23].

3.3.1 Exploration Stage

Service design puts customer in focus, but the customer is rarely the problem. In the Exploration stage, the designer acts like a detective or explorer, trying to understand both the culture and the goals of the company in need of the service. In this stage, it is too early to search for a solution. The designer is busy gaining understanding about the problem from the perspective of current and potential users. Moreover, the designer has to visualize the findings and its underlying structures [23].

3.3.2 Creation and Experimental Stage

This stage is experimental, and is about testing, retesting, and redesigning ideas and concepts. The stage is closely related to its following stage Reflection, and it is between these two stages most iterations are generated. Ideas, sketches, models, and prototypes are created, rejected or re-created. As Stickdorn and Schneider write in their book This is Service Design Thinking [23], this a stage of making mistakes in order to learn and develop:

"One of the main features of service design thinking is that this approach is not about avoiding mistakes, but rather to explore as many possible mistakes"

3.3.3 Reflection Stage

In the stage of Reflection, ideas and concepts are evaluated and redesigned. However, service design shares its iterative approach with product design, but it is harder to visualize a service compared to a physical, tangible product or application. Different methods are needed when evaluate its pros and cons. Matrix evaluation is one method, suggested by Österlin [24]. Role play or storytelling are other approaches that can make the service understandable to users and possible to verify [23].
3. Theoretical Framework

3.3.4 Implementation Stage
When implementation of a new service concept, a process of change has to be managed. It involves the employees at the company that offers the service, as they need to be motivated and engaged, open-minded to further adjustments and developments of the service. There will always be unsolved issues to be managed, and problems that might occur need to be solved quick and creatively [23].

3.4 Customer-Orientation
Many companies and organizations have a customer-oriented strategy, but if not supported by its working processes, a strategy is nothing but a well written document. Companies might know about the importance of their customers, but as long as it is not mirrored in the behaviour of the employees, knowledge of customer need and expectations will have no impact on its services or attitudes towards customers [19].

A company with ambitions to shift focus from products and technology into customers, service delivery and values has to face the challenge of changing habits, attitude and behavior patterns [19]. It is a huge transformation, involving structures, processes, and views to be changed [25].

For instance, talking to customers has become popular after years of collecting quantitative measurements and following up Customer Satisfaction Index for large customer segments. It can be seen as a sign that the relationship between companies and its customers is ongoing a change [23].

There are however different opinions about when customers should be involved. Depending on what to develop, design or innovate, the impact of customer involvement is more or less fruitful in different stages of the process. Completely new services, for instance, are helped by customer involvement in idea generation stages, but there are several proofs for the value of involving customers not just early, but throughout the entire development process [25].

3.5 Business Modelling
The launch of a new service needs more than just the design of the service itself. It needs to be seen in a business model context. How to generate a business model is described by Osterwalder and Pigneur in the book Business Model Generation [26]. The method taught in this book is named as the Canvas Model. A business model is, by authors of the book, defined as follows: A business model describes the rationale of how an organization creates, delivers, and capture value.

In short, this business model is built upon nine blocks; Customer Segments, Value Propositions, Channels, Customer Relationships, Revenue Streams, Key Resources, Key Activities, Key Partnerships, and Cost Structure. The nine blocks together cover the main areas of a business; customers, offer, infrastructure and financial viability [26].

In a competitive market, business models are about how to make money. In public sector, which is the scope of this study, thinking in terms of business models are worthwhile as it really spotlights the value the service provider wants its customer to
experience, and moreover, how it can be both developed and continuously maintained. Business modelling design is comparable to service design, and make use of almost the same tools and techniques, such as prototyping, scenarios and storytelling [26].
4 Methods

The following chapter describes the methods used in this study, from planning and data collection to evaluation and reflection, through the iterative stages of Service Design. Note that the fourth stage Implementation is excluded in this work.

4.1 Preparations and Planning

After initial meetings with supervisors at Försäkringskassan, a project plan was developed, containing background information about the problem and reasons for this study to be performed. A timetable was created as a Gantt chart. The plan did originally cover a period from April to October, but was rescheduled mainly due to vacations during the Summer.

4.2 Exploration Stage

The problems related to meetings across external borders needed a detailed analysis. The following areas were enlightened, by information scanning, questionnaires and by support of supervisors at Försäkringskassan:

- The extent of collaboration and external contacts across organizational borders
- Professions that collaborate with other agencies, how many and with whom they cooperate
- Systems or routines used for meeting scheduling
- If there are any legal restrictions, policies or guidelines regarding how to share calendars or view availability
- Meeting frequency, role as meeting organizers/-participants
- Main problem of today
- Time elapsed from meeting initiative to confirmed meetings
- Opinions about available functionality when acting as meeting organizer or participant
- Opinions and experiences when need to rescheduling due to cancellations
- Process descriptions divided in three stages:
  - Preparations/Before meeting is scheduled
  - During scheduling and invitation
  - After meeting invitation is sent and need to rescheduling occurs

4.2.1 Previous Knowledge

Information about Försäkringskassan as an organization was collected from their intranet. A previous performed questionnaire Beteendeenkät, that was conducted at Försäkringskassan in May 2016, with 2 368 respondents served as background and reference material for this study.
4.2.2 Questionnaire

A questionnaire was distributed to 159 employees within Försäkringskassan. The questionnaire was addressed to ‘inspirers’, which is an additional role outside regular tasks and functions. The inspirer role includes promoting new and efficient work processes and being the IT department’s eyes and ears on the inside, in order to capture areas for improvement. In the questionnaire the inspirers were asked questions about meetings with other agencies or cooperation partners. The questionnaire was made using Quest-Back and was open for answers from May 24th to June 3rd. The questionnaire had 33 respondents, where four of them do not have meetings with external partners.

4.2.3 Literature Studies

A literature study has been conducted, searching for research and reports about other organizations dealing with the meeting scheduling problem if collaborating cross-companies and -organizations. The purpose of the literature study was to find both descriptions of the problem in focus, and if possible, data about how to solve or minimize the problem.

By gathering information about available applications that addressed to problem, a brief market overview was compiled. Available applications were categorized, based on functions and features they had in common [24].

At the same time, existing functionality in calendar application (Microsoft Outlook) already used at Försäkringskassan was explored, and therefore mentioned as part of the market overview. See Chapter 6; Market Overview and Evaluation. Time and effort were also spent on exploring Försäkringskassan’s mission, organization and structure. Main sources were Försäkringskassan’s intranet, and its employees.

4.3 Creation and Experimental Stages

This stage consists of prototyping, tests and retesting. The starting point is to describe Use cases as processes, trying to simplify the process and thereby eliminate user problems.

4.3.1 Use Cases and Process Analysis

Based on answers from both questionnaires and existing user scenarios and knowledge within Försäkringskassan, the scheduling process was illustrated as user cases, illustrating the processes from meeting scheduling initiative to completed invitation. Microsoft Visio Professional 2013 was used to visualize the processes. Visio is a digital diagramming tool for graphic representation of models and relations of object. In the study, process analyses were used to visualize and identify the problems in both present situation and proposed alternatives.

4.3.2 Prototyping a Concept

Process analysis is a commonly used method, by industrial designers and application developers. Based on process analyses, problems in the present situation can be visualized, communicated and analysed. From these identified problems, the required functions needed to achieve the desired result was stated [24]. The scheduling processes were visualized for each category of solutions, and analysed from a user point of view,
i.e. related to the vision about making scheduling faster and easier.

The study had to handle the setup of the technical concept, prior to creating a user interface and interaction design.

4.4 Reflection Stage
As this study is limited to a technical conceptual design without any user interface, reflection is theoretical, using a matrix for evaluating different alternatives. Aspects such as functionality, usability, and implementation was summarized in a matrix in order to make it easier to overview and evaluate. Furthermore, the technical concept was described and tested by IT personnel at Försäkringskassan and at the cooperating agencies.

During this entire study and all design stages described above, the emerging results have been discussed and verified continuously by the supervisors at Försäkringskassan. At two occasions, the study and its results have been presented and discussed together with Arbetsförmedlingen, Skatteverket och Pensionsmyndigheten.
5 Current Situation

This chapter presents the part of the results collected from questionnaires, process analyzes, and literature, describing the current situation when employees at different agencies need to arrange meetings across organizational borders.

5.1 Email and Calendars in Use

Most agencies use Microsoft Exchange server and MS Outlook 2013 at the clients. MS Exchange is a messaging platform with functionality and features such as email and calendars. MS Exchange uses Active Directory to authenticate and authorize users in its network. The goal is, according to Microsoft itself, to "support people and organizations as their work habits evolve from a communication focus to a collaboration focus" [27].

Even if almost every agency and many other external partners use Exchange as server and Outlook 2013 for the clients, they are not integrated, instead they run separately.

An Exchange Federation is implemented between Försäkringskassan and Pensionsmyndigheten, and discussions are ongoing between Skatteverket followed by other agencies. This federation is set up for Skype meetings, with ability to view presence and chat, but does not cover access to calendars.

5.2 Scheduling Technique

When scheduling a meeting within an organization, the meeting organizer creates a list of participants, selected from the organization’s ’address book’. The collaboration application, such as Exchange, coordinates the participants schedules to identify a time where they all are available. The organizer can handle location manually, or let the application suggests available locations. Schedule management, meeting location reservations, and resource management are all integrated.

If the participants are external, meeting arrangements have to rely on manual routines, still there are existing functions supporting the meeting organizer.

5.3 Existing Solutions in Exchange

Exchange offers functions and features that do addresses scheduling, although the respondents of the questionnaire did not mentioned them. The questionnaire showed that the respondents, instead of using existing and available functionality, created their own routines, either they phoned or emailed their meeting participants before sending a meeting invitation. Sometimes they attached an excel file asking for preferable dates and times, or simply practice a trial-and-error technique.

Within an organization, the users’ calendars are normally transparent, and it is easy to search and find available dates and times for a meeting. When meetings with external partners are required, Exchange/Outlook offers some functions related to the need for meeting scheduling. Not with full transparency, but still helpful.
5. Current Situation

Three functions are described below.

5.3.1 Share Calendars by Email

Calendars shared by email arrive in the recipient’s inbox as email message attachments (ics).

If the participants are using Outlook, the meeting organizer can ask them to send their calendar by email. The sender can select date range and how many details he/she wants to expose. The calendar can show only available times without any information about other bookings or engagements, or be sent with transparency. The meeting organizer can view the received calendars side-by-side, and easily find available times suitable for all participants. Note that these calendars only are snapshots, valid only when sent. Therefore, it can very soon be out of date, as the calendars are frequently updated by the administrators. See figure 5.
5. Current Situation

5.3.2 Share Calendars using a Microsoft Exchange Server Account

Microsoft Exchange Server enables calendar sharing with others who have Exchange accounts. That means that calendars can be viewed only by others to whom you or your organization have granted permission. At Försäkringskassan, calendar sharing is possible for users within the organization, but inactivated for external use.

5.3.3 Share a Calendar by Publishing

Publishing an Internet Calendar requires neither the publisher nor the user to use an Exchange account. Outlook calendar can be shared with others by publishing it on a WebDAV. It requires access to a web server. See figure 6.

Figure 5: Process description of the present situation using Outlook functionality

Figure 6: Toolbar Publish to WebDAV Server

5.4 Roles with External Contacts

There are several roles within Försäkringskassan that are involved in cooperation with other agencies or external partners. Scanning the internal address book, searching for roles as Samverkansansvarig, Personlig handläggare, and Servicehandläggare resulted in 5 252 results, i.e. administrators than potentially can or are cooperating with external partners.

- The role *Samverkansansvarig* (81) can be placed on local, regional or national level, cooperating with other agencies, communities, care providers etc. They cooperate with partners on associated level.

- The role *Personlig handläggare* (4 400) handles individual matters, and has personal contacts with customers and its care providers and employers.
• The role Servicehandläggare (771) works at Service Offices on more than a hundred locations all across Sweden, in which Försäkringskassan together with Pensionsmyndigheten and Skatteverket meet customers mainly in spontaneous meetings but sometimes also scheduled.

Beyond the three roles above, other roles, such as IT personnel and managers can cooperate in projects, networks or other contexts. A previous and large survey performed in May of 2016, showed that about 80 % of all employees have external contacts, including customers/clients. Excluding customers, just over a third have meetings with cooperating parties, either physical and/or digital meetings.

5.5 Meeting from a User Perspective

The questionnaire, distributed within Försäkringskassan, was answered by 33 respondents, mainly administrators. The questionnaire was distributed with help of Försäkringskassans inspirers, and therefore sent to respondents assumed to have external contacts. Their answers gives us valuable information about how often they meet partners outside their own organization, how often they organize meetings, and their view of problems connected to meetings across organizational borders.

In the questionnaire, the respondents were asked to describe what the main problem related to meetings with external parts was. They were able to express themselves freely with their own words.

• Technical problems when performing Skype meetings. External participants need to download a plugin. Difficulties to use.
• Participants’ calendars are full with no or little available spare time. Participants also prioritize their own organization before other organizations.
• Situations when the meeting organizer does not know the name of the most adequate participants at the cooperating agency or care provider
• Lack of transparent platform where all calendars can be shared by cooperating parties

The problems caused by the latter issue above motivate this study.

5.5.1 Partners and Meeting Frequency

Försäkringskassan’s most common cooperating part is Arbetsförmedlingen, with whom 80 % of the respondents scheduled meetings. Care providers and communities (62 % respectively 40 %) are the second most frequent part in cooperation. See figure 7.
75.8% of the respondents are frequent meeting organizers or participants, and meet with external parties every week or every month. See figure 8.

Figure 8: Meeting frequency
5. Current Situation

5.5.2 Physical vs Digital Meetings

In a previously performed questionnaire, Beteendeenkät, the frequently cooperative respondents were asked about how often they met external parts and whether the meeting were physical or digital. See table 2 and table 3.

Table 2: Physical meetings in percentage, weekly, with external parties

<table>
<thead>
<tr>
<th>How many physical meetings (%) do you have weekly?</th>
<th>Personliga handläggare</th>
<th>Samverkansansvariga</th>
<th>Servicehandläggare</th>
</tr>
</thead>
<tbody>
<tr>
<td>No meetings</td>
<td>36.7</td>
<td>5.9</td>
<td>67.4</td>
</tr>
<tr>
<td>1</td>
<td>19.8</td>
<td>17.6</td>
<td>11.6</td>
</tr>
<tr>
<td>2-4</td>
<td>34.1</td>
<td>58.8</td>
<td>11.6</td>
</tr>
<tr>
<td>5-9</td>
<td>8.2</td>
<td>11.8</td>
<td>4.7</td>
</tr>
<tr>
<td>10 or more</td>
<td>1.2</td>
<td>5.9</td>
<td>4.7</td>
</tr>
<tr>
<td>Participants</td>
<td>586</td>
<td>17</td>
<td>43</td>
</tr>
</tbody>
</table>

Table 3: Digital meetings in percentage, weekly, with external parties

<table>
<thead>
<tr>
<th>How many digital meetings (%) do you have weekly?</th>
<th>Personliga handläggare</th>
<th>Samverkansansvariga</th>
<th>Servicehandläggare</th>
</tr>
</thead>
<tbody>
<tr>
<td>No meetings</td>
<td>63.5</td>
<td>64.7</td>
<td>86</td>
</tr>
<tr>
<td>1</td>
<td>13.7</td>
<td>11.8</td>
<td>7</td>
</tr>
<tr>
<td>2-4</td>
<td>15.4</td>
<td>17.6</td>
<td>7</td>
</tr>
<tr>
<td>5-9</td>
<td>4.1</td>
<td>5.9</td>
<td>0</td>
</tr>
<tr>
<td>10 or more</td>
<td>3.4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Participants</td>
<td>586</td>
<td>17</td>
<td>43</td>
</tr>
</tbody>
</table>

The tables shows the meeting intensity, and that traditional physical meetings still are more common than digital meetings. Regardless of how meetings are performed, calendars must be checked and available times synchronised. More and more meetings are performed over telephone or Skype. Administrators at Försäkringskassan are the only part that invite to Skype meetings, by adding a Skype meeting link in the meeting invitation. The other meeting participants need to have Skype either on their client as part of Outlook or as a downloaded plugin. Some participants have difficulties to join a Skype meeting, due to technical problems or shortcomings.

5.5.3 Need for Long Term Planning

The result shows that meetings across organizational borders need to be planned with good foresight. For 62% of all meeting with external parties, it takes 11 days or more from an identified need until the meeting actually is completed. See figure 9.
5. Current Situation

The complexity increased in relation to the number of participants invited to the meeting. The more participants, the higher risk for cancellations and need for rescheduling. One respondent referred to rescheduling as "a nightmare." 

The time from an identified need to meet until a date and time is confirmed, takes about 1-5 days in 51.7% of the cases. In 17.2%, 11 to 20 days are elapsed. Additional 6.9% needed more than 20 days of foresight to schedule. Every 10th meeting is arranged in less than an hour. Numbers of participants affect the length of time from initiation to confirmed meeting invitation.

5.5.4 Cancellations and Rescheduling

37.9% finds current scheduling methods complex and problematic to use, when it comes to cancellations and need to reschedule. The risk for rescheduling increases the more
participants invited. If meeting with one or a few persons, a cancellation is easier to manage than if several participants from different organizations are invited. Some participants are also more crucial depending on the meeting agenda, and if so is the case, rescheduling can be really time consuming.

![Figure 11: Rescheduling](image)

When a meeting needs to be rescheduled, the meeting organizer has to repeat the entire process, searching for new dates suitable for all participants.

### 5.5.5 Meeting Organizer, Meeting Participant

The respondents find it a bit easier to organize meetings, than being invited by others. See figure 12 and figure 13. However, most meetings are arranged by administrators at Försäkringskassan, and experiences from being invited by external parties are limited.

![Figure 12: Being a meeting organizer](image)

![Figure 13: Being a meeting participant](image)
5.6 Processes when Scheduling a Meeting

The respondents were asked to described how they act as meeting organizers. Without access to the calendars of potential participants, the meeting organizer has three main choices when planning and creating a meeting invitation:

1. Trial and error
2. Email request
3. Telephone contact

5.6.1 Trial and Error

Without supporting applications, a meeting organizer invites to a meeting based on the own calendar, just relying on chance. It is complicated when the proposed time suits some, but is rejected by other. The organizer has to suggest new dates and times, and repeats the entire procedure until the participants have accepted.

5.6.2 Email Request

The meeting organizer can, before sending a meeting invitation, ask for suitable times, by initially sending emails to the participants and ask for their availability. See figure 14.

5.6.3 Telephone Contact

An alternative to email requests, is that the meeting organizer contacts the participants by phone, one by one. They can then compare their calendars in real-time. This works, if only one or a few administrators are supposed to participate. See figure 15.
5. Current Situation

Regardless of if the meeting has been preceded by trial-and-error, email or phone requests, a later rebooking or cancellation cause problems and forces the procedure to be repeated.
6 Market Overview and Evaluation

This chapter describes the part of the results received from a market overview and the evaluation of four main categories of solutions. The contents of this chapter is based on the literature study and the process analysis conducted.

6.1 Categories

Based on the literature study conducted, existing solutions were summarized and categorized into the following four:

1. Full Federation
   - full transparency between calendars on different Exchange servers.

2. External calendars
   - external scheduling service as a complement to the Exchange server. Usually with individual accounts.

3. Doodle solution
   - a standalone web application for polls regarding suitable times for meeting.

4. WebDAV/CalDAV
   - synchronising different Exchange servers using ICS feeds via a WebDAV server. WebDAV/CalDAV is further described in Chapter 7.

6.1.1 Category 1: Full Federation

The Full Federation option is by far the most effective one. Its upsides are many, but there are some major obstacles.

The Full Federation option is a solution where all the frequent cooperating agencies would share a common Exchange server. All the transparency problems concerning calendars would be solved, basically without the users even noticing the difference. For the users, the interface would stay the same, and they would be able to access calendars from their cooperating partners in Outlook. Just the as the present situation concerning their coworkers.

A restriction to only show free-busy time slots is possible, and probably the most likely to be used. It still fulfils all the requirements.

But as mentioned, there are obstacles needed to be addressed before this solution could be taken into practise. The three biggest problems to be handled with the Full Federation solution are:

1. All parts need to use the same software solution, in this case Outlook. Problems could arise related to internal updates to other versions.

2. The question of maintenance and management needs to be addressed.

3. Cooperating parts outside the government sphere would not be included in this solution. The problem concerning scheduling will remain towards care providers, employers etc.
It is recommended to strive towards this solution in the long term. It would bring the government agencies closer together and supports a better and more efficient cooperation.

**Use Case**
The process to handle meetings with the Full Federation solution will be the same as the present situation within the borders of the agencies. Since there is full transparency (free/busy time slots) and the interface is the same (Outlook), the meeting organizer is free to compare the participants calendars and send invitations.

![Figure 16: Process Visualization Category 1 Full Federation](image)

**6.1.2 Category 2: External Calendars**
The External Calendars solution is one that circumvent the transparency limitations in the present situation concerning separate Exchange servers. The way to do this is by having an additional, public calendar for external use.

Since synchronizing from the Outlook calendar to an external one is restricted due to safety regulation, this solution would be very demanding for the users. Since the synchronization only works one way, from the external calendar to the Outlook calendar, it would be the users’ job to manually handle the external calendar and keep it up to date. It would also require the users to handle one more account and password.

Therefore, this solution is not to be recommended.

**Use Case**
First of all, the users need to keep their external calendar up to date with their Outlook calendar, since synchronizing from the Outlook calendar to the external calendar is not allowed. The external calendars are transparent between the cooperating parties, so the meeting organizer is free to study all the participants calendars to find the most suitable time for a meeting. When the most suitable time is identified, the meeting organizer can either send the invitations in the present Outlook calendar or in the external calendar system. If the invitation is sent in Outlook, the participants will manually have to reserve that time slot in their external calendar system. When a meeting in the external system is accepted, it will be confirmed and trackable in the external calendar. The
Outlook calendar can either get the meeting by automatic synchronization with the external calendar, or by the participants manually adding the meeting to their Outlook calendars.

6.1.3 Category 3: Doodle Solution

The Doodle solution is an easy-to-use web based application, where one can create a poll concerning available times.

Although, this solution does not cover the whole problem. It has its drawbacks and it is not a complete solution. The major concerns are:

1. How to deal with the answers. Since there is no transparency, there is a possibility that not all participants is available at the most suitable time for the other participants. This leaves the meeting organizer in a dilemma. The question is if the most suitable time really is suitable. If not, the whole process would need to start over and valuable time is wasted.

2. The problem concerning transparency still stands. The meeting organizer still needs to blindly propose times, without any information from the participants.

3. The times proposed by the meeting organizer, accepted or rejected by the participants are just snapshots of information from their calendars. Meeting proposals accepted in the poll may very well be out-of-date by the time the meeting organizer sends the meeting invitation. To counter this, the participants and the meeting organizer would need to reserve every time slot they accepted in their calendars to make sure they do not overbook. This would lead to a lot of time slots appearing to be booked when they in reality are not.

There are two ways to implement this solution. Either purchase it as an existing service, eg. doodle.com, or develop the service in-house. The advantage of buying an existing service is that it is a fast way to get the service up and running, to a fairly low cost. The downside is that Doodle, from a user’s point of view, does not reflect the professionalism and credibility that is expected from a government agency. By developing an own Doodle solution, it will be obvious to the user that the agencies are in charge of the solution, and it will be perceived as more trustworthy and secure. The downside by developing a own Doodle solution is the higher initial threshold.

The Doodle solution can be a great tool as a complement to other solutions. It can
easily be taken into use, and it would be an improvement compared to the present situation. The Doodle solution can also be used with parties outside the government agency sphere.

**Use Case**
The meeting organizer proposes suitable times and sends a poll to all of the participants. The participants check the proposed times against their Outlook calendars and answer by choosing if the times is suitable for them. The participants can also propose other times. When all the participants have responded, the meeting organizer summarizes the answers to find the most suitable time for as many participants as possible. The meeting organizer can then send out a meeting invitation in Outlook. See figure 18.

**Figure 18: Process Visualization Category 3 Doodle solution**

6.1.4 Category 4: WebDAV/CalDAV

A WebDAV solution is basically built by synchronizing calendars to a separate server, from which calendars can be subscribed. Depending on design of the user interface, it can appear as more or less transparent and as a part of the user’s ordinary calendar.

WebDAV (Web Distributed Authoring and Versioning) is an extension to HTTP-protocol (Hypertext Transfer protocol). As a network protocol, it can transfer and modify files on a server, and also keep track of authentication and versioning. CalDAV is yet another extension to the WebDAV protocol, especially designed to handle calendars. This protocol allows calendars to be shared by several users.

With this solution, users from different agencies will be able to subscribe to each other’s calendars. This will allow real time updated calendars to be shared between government borders. It also allows other parties outside the government agency sphere to be a part of the solution.

More about WebDAV/CalDAV is explained in Chapter 7.

**Use Case**
The Use Case below depicts the WebDAV solution without a shared interface, when the participants upload their calendars for the first time. Here, the meeting organizer needs to send out a request to every participant to submit their calendars to the server. The participants need to submit their calendars and respond with the link. This is only
performed once. When this is done, the meeting organizer can easily find a suitable time for a meeting.

Figure 19: Process Visualization Category 4 WebDAV/CalDAV
6.2 Evaluating the Alternatives

The optimal solution is fully transparent between all participants’ calendars, regardless of organizational belonging. Full transparency requires an integration between platforms and systems used by the collaborators. It is evaluated in comparison to the use of external calendars, web applications for meeting inquiries (Doodle), and the WebDAV/CalDAV alternative. See table 4.
### Table 4: Evaluation Matrix

<table>
<thead>
<tr>
<th>Description</th>
<th>Category 1: Full Federation</th>
<th>Category 2: External calendar system</th>
<th>Category 3: Doodle-solution</th>
<th>Category 4: WebDAV / CalDAV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transparency between calendars</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Possible to control by policy in Outlook.</td>
</tr>
<tr>
<td>Calendars in real-time</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Send meeting requests</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Rebook/Cancel</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Integration with Outlook</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

#### Functionality

<table>
<thead>
<tr>
<th></th>
<th>Category 1: Full Federation</th>
<th>Category 2: External calendar system</th>
<th>Category 3: Doodle-solution</th>
<th>Category 4: WebDAV / CalDAV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effort to send meeting invitation</td>
<td>Low</td>
<td>Medium</td>
<td>Low</td>
<td>Low, as full federation except for the schedule assistance function</td>
</tr>
<tr>
<td>Effort to respond to meeting invitation</td>
<td>Low</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Effort to take into use</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>High</td>
</tr>
</tbody>
</table>

#### Implementation

<table>
<thead>
<tr>
<th></th>
<th>Category 1: Full Federation</th>
<th>Category 2: External calendar system</th>
<th>Category 3: Doodle-solution</th>
<th>Category 4: WebDAV / CalDAV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Realizability</td>
<td>N/A</td>
<td>Hard</td>
<td>Easy</td>
<td>Hard</td>
</tr>
<tr>
<td>Maintenance and support</td>
<td>N/A</td>
<td>High</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Estimated initial cost</td>
<td>N/A</td>
<td>Medium</td>
<td>Low</td>
<td>Medium</td>
</tr>
<tr>
<td>Estimated running cost</td>
<td>N/A</td>
<td>Depending on design</td>
<td>Low</td>
<td>Medium</td>
</tr>
</tbody>
</table>

#### Summary

<table>
<thead>
<tr>
<th></th>
<th>Category 1: Full Federation</th>
<th>Category 2: External calendar system</th>
<th>Category 3: Doodle-solution</th>
<th>Category 4: WebDAV / CalDAV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strengths</td>
<td>Full transparency gives optimal support to find suitable times.</td>
<td>Easy to find suitable times thanks to open calendars. Synchronization with Outlook calendars is possible.</td>
<td>Does not demand external accounts. Easiest alternative to implement and launch. Low initial threshold for users.</td>
<td>Makes is possible to view updated calendars at all times. Biggest advantage at recurring meetings with the same people. After initial setup, the calendars is easily accessible and integrated into Outlook.</td>
</tr>
<tr>
<td>Weaknesses</td>
<td>Difficult to realize when partners have different systems and regulations. Collaboration with care providers and employers means lots of parties need to be integrated. Question about maintenance and support responsibility.</td>
<td>External user accounts is necessary. External calendar probably needs to be handled manually. High initial threshold. Difficult for non-frequent users.</td>
<td>The meeting organizer still needs to suggest times without support from calendars. Requires manual handling in Outlook to send meeting invitation.</td>
<td>Without a user-interface, every calendar subscription needs to be added individually. Non-frequent collaboration with different parties will therefore become demanding for the user.</td>
</tr>
</tbody>
</table>
6. Market Overview and Evaluation

6.3 Conclusions

Full Federation can be considered as the optimal solution concerning functionality and usability, and be used as a comparison towards the other solutions. Still, full Federation has its drawbacks in implementation and realizability. Federation is in reality also limited to other agencies or large cooperating partners. Small companies and private care providers can not to be expected to join the federation, and are therefore in reality excluded.

The External Calendar solution offers all the wanted functionality, but has its drawbacks on usability and implementation.

The Doodle solution has its advantages concerning usability and implementation, but it does not offer all wanted functionality. It can however be considered as a Quick Fix.

The WebDAV/CalDAV concept has its strengths in functionality, and if designed with a good user interface, also in usability. On the downside is the implementation, where the server would need to be set up and a user interface has to to be designed.

Introducing Doodle or encouraging users to learn about already existing Outlook features are solutions that can be implemented fast, easy and to low costs. It is just a matter of information. Both alternatives have drawbacks, but still, they would be an improvement compared to the present situation.

The WebDAV solution will act with full transparency between agencies and moreover, it has the advantage to easily include other external collaborators, such as employers or care providers. When technically configured and an graphical user interface is added, users will perceive the WebDAV solution as integrated part of their present calendar system of today.
7 The WebDAV/CalDAV Concept for Försäkringskassan

This chapter describes WebDAV/CalDAV, and shows how the WebDAV/CalDAV concept has been designed, evaluated and finally recommended as a solution for scheduling across organizational borders.

7.1 Standards for Calendars and Scheduling

Standard-setting organizations have been slow in developing calendaring and scheduling standards with focus on cross-organizational collaboration. Today, development of interoperable calendar functions and features are done by CalConnect, which is a Calendaring and Scheduling Consortium, but not a standard development organization. CalConnect contributes to standards-setting, as they give feedback on existing standards and report needs of user communities. Thereby, CalConnect is a source for knowledge and information for engineers and designers when developing calendar and scheduling applications and tools [28], [29].

The Internet Engineering Task Force (IETF) is an open community of designers, operators, vendors, and researchers concerned with the evolution of the Internet architecture and the smooth operation of the Internet. IETF is governed by a steering group, the Internet Engineering Steering Group (IESG), which is responsible for all IETF activities and are those how can approve new Internet standards [30].

Request for comments (RFC) is type of publication from IETF. A RFC is authored, peer-reviewed and processed, until the IESG approves it, and the RFC became a standard. The first Internet Calendar specification came in 1998, and became later a standard for calendar data interchange on the Internet, desktop computers, mobile phones etc. RFC 2245 defined how an iCalendar handles scheduling tasks, such as making invitations and receiving answers. iCalendar is a text format for calendar and schedule information, such as for example Event, Start and Stop, Organizer and Participants. The RFC 2245 has been replaced by RFC 5545 [29].

An iCalendar data file has an ics file extension, that can be imported or exported by many calendar clients over Internet. For example, when making a hotel reservation or buying a flight ticket, the confirmation is sent as an ics data file, able to view and publish in the receiver’s calendar. A meeting request from Doodle also generates an ics file sent by email and automatically viewed in the receiver’s calendar [31].

7.1.1 WebDAV/CalDAV

WebDAV is a standard developed by IETF. It is a set of extensions to the HTTP-protocol that allows file management and editing for remote users over the Internet.

CalDAV is an extensions to the WebDAV protocol, widely used for accessing calendar data on servers. It is a standard way of accessing, managing and sharing calendar data based on the iCalendar format. It consists of two specifications. The first, RFC 4791 [32] specifies a calendar access protocol that allows users to access and manage calendar data, while the second RFC 6638 [33] specifies a standard for how to schedule
transactions with iCalendar-based calendar components [29], [33].

7.1.2 iCalExchange

iCal Exchange is an already existing public server, where it is free to create an account and upload calendars. See http://www.icalx.com.

From an Outlook client, a user can easily publish his or hers calendar on a WebDAV server, provided that a WebDAV server is established and the user is given access to its URL.

7.2 Exploring the WebDAV Concept

In the experimental stage of this study, one Outlook calendar was published on the iCal Exchange server. When up and running, changes made in an Outlook calendar synchronizes with its published copy at the iCal Exchange server.

However, further research was conducted, trying to deepen the insights and knowledge for the prerequisite for future in-house solutions. Information was scanned on Internet, discussion boards, communities, and websites used and created by developers.

One finding was the Internet Information Services (IIS), a web server created by Microsoft. The WebDAV functionality is pre-installed on IIS, with capability to host content. IIS offers an open architecture, that enables a computer to be used as a server in a Windows environment. At this point, a WebDAV folder was created and files uploaded.

Another finding was the Milton.io framework, that is an open Java WebDAV server library. The library was originally created in 2007 for private needs, but has developed incrementally due to contributions from developers around the world. Now, it contains code and frameworks free to use and download.

Milton.io was used to set up a WebDAV server supporting CalDAV. Uploads and subscriptions of calendars were successfully performed. However, a private computer was used for the tests, and the firewalls had to be disabled. Due to uncertainty, and lack of access to secure test conditions, Försäkringskassan decided that the Proof of Concept (PoC) should be based on the original iCalExchange configuration.
7.3 Proof of Concept

In this PoC a WebDAV account was created. It is a one-time task. It can in practice be done by anyone, but preferable by someone with an overall responsibility for WebDAV and a shared calendar service, i.e. a authorized calendar administrator. The creation of a WebDAV account is easy just entering http://www.icalx.com/create.php.

In the PoC, a calendar administrator provides the calendar owners with the link, to use when they choose to publish their calendars and share it with others at the WebDAV server. From this moment, the calendar administrator has prepared for calendar sharing, and it is up to calendar owners to precede and make transparency between their calendars possible.

With access to the URL link, the calendar owners can select Publish Online and Publish to WebDAV server. The calendar owner can also decide to what extent its calendar data should be exposed to external parts, and moreover settings for uploading and synchronisation between Outlook calendar at client and the published one at WebDAV.

When first publishing a calendar, the calendar owner gets the opportunity to give others access to the calendar. That can also be done later at any time, sending the URL by email. Shared calendars can be viewed side by side in Outlook, which enables a good overview of calendars belonging to both internal and external meeting participants. If the WebDAV service is to be developed in the future, a user interface should be designed where users can search for colleague from other agencies or external partners, and easily share calendars with each others.

In this PoC, the server was placed outside the agencies, and could, despite its functionality, not be assumed as an acceptable and final solution, due to security restrictions and users’ need for trustworthiness.

Figure 21: WebDAV configuration alternative 1. External WebDAV server.

Figure 21 shows the circumstances in which the tests have been conducted. The external WebDAV server holds the calendars from Agency A and B. User A1 and B1 publish their calendars, and are both able to access information from its cooperating partners’ calendars. Users (A2 and B2) have no external contacts or need to cooperate, they are therefore not affected by the setup.
7. The WebDAV/CalDAV Concept for Försäkringskassan

However, an alternative conceptual design is recommended. With the WebDAV server placed inside one agency, as shown in figure 22, the agency can take responsibility for the entire service. The service may include authentication, maintenance, and security policies.

![Diagram](image)

Figure 22: WebDAV configuration alternative 2. WebDAV hosted inside an agency

7.4 Evaluating WebDAV as an Alternative for Försäkringskassan

The WebDAV solution, shown in figure 21, was documented in a short manual with two parts, one for Calendar administrators, and one for ordinary users. With the instructions, Försäkringskassan and its partners were able to set up a WebDAV server, publish Outlook calendars on it, and verify its functionality in their own technical environments.

7.5 The Potentials Using WebDAV

WebDAV has several advantages compared to the alternatives, but moreover it has potentials beyond calendar functionality and scheduling. Examples of its development opportunities:

- As mentioned, the WebDAV solution has a main advantage as it allows other cooperating partners outside the government sphere to collaborate. A user-interface is required making it easy to join and attractive to use.

- WebDAV can expand sharing and cross-organizational collaboration outside the scope of calendars. WebDAV was originally created to meet demands for storage of documents across organizations. It would therefore be possible to expand the scheduling scope and create a digital workplace for collaboration and document storage between agencies and other cooperating partners, comparable to the commercial www.projectplace.se.

- Another possibility with the WebDAV solution is that it can combined between Category 2 and Category 4, i.e. external calendars and WebDAV. By the use of a WebDAV server, it would be possible to integrate the Outlook calendar with the external calendar, and vice versa. This would open up a lot of possibilities of how to design the system. Still, the drawbacks with external calendars remain.
A fourth option using WebDAV would be to create and add an automatic scheduling software. All participants can have their calendars synchronized to the WebDAV server, where calendars automatically can be compared to find the most suitable time. Then, the meeting organizer can make a meeting request that includes title of meeting, names of participants, desired time interval for the meeting to take place, and the duration of the meeting. The software on the WebDAV server could with this information search and send a meeting invitation, based on this information, for the most suitable time for all participants. If someone declines the meeting invitation, the software could try again to find a new time. With this solution the different parties do not have to share calendars with each other in the traditional sense. The calendar data would only be available on the WebDAV server.

7.6 Conclusions

The WebDAV concept has been verified as a releasable solution, that can be developed and implemented without any costly purchases or developing investments. The solution can, with an aesthetic and easy-to-use interface, become a service possible to offer to Försäkringskassans administrators, their colleagues working at other agencies, and other external parts. It will fulfil the requirements and make scheduling across organizational borders much easier and less time-consuming.

A Calendar Scheduling solution can be built with one or more WebDAV servers. The easiest way would be to use only one WebDAV server, located within one of the government agencies.
8. Discussion

Calendaring and scheduling technologies are collaboration tools helping users to plan their daily work and fulfill their responsibilities, both at work and in private. When technology shortfalls, users have to synchronize their calendars manually, which is time consuming and inefficient.

That is in fact, reality for administrators at many Swedish agencies since they have to arrange meetings without access to each others calendars. Many hours are spent searching for suitable occasions when meetings can be held, in worst case more hours to plan a meeting than to hold it. This study confirmed the time-wasting problem due to lack of transparency between agencies, and enlightened its impact on the their internal efficiency.

8.1 Consequences

Without deeper insights, the present difficulties concerning scheduling may seem trivial. The administrators have their own routines. In competition to other internal needs and requirements for new IT investments and development, the meeting scheduling problem across organizations may apprehend as negligible. Support for scheduling and collaboration across organizational borders may drown in a huge wish list of new IT features. As administrators already have their workarounds, and do not know that solutions do exist, the risk is obvious; no actions are taken.

Lack of IT functionality supporting collaboration across organizations has consequences on the agencies’ internal efficiency. But more alarming is the consequences for the citizens, waiting for decisions that sometimes have a direct impact on their daily life, health and economy. One can understand the impact of the scheduling problem, when considering the following findings; Försäkringskassan has around 5,000 administrators of which 75% frequently organize meetings or participate in meetings with external part. For 62% of all meetings with external parts, it takes 11 days or more from an identified need to meet until the meeting actually is held and completed. The number of participants affect the length of time from initiation to confirmed meeting invitation, and rescheduling is perceived as ‘a nightmare’.

8.2 Short Term Solutions

Microsoft Exchange, used by most agencies, already offers some supporting features for meeting scheduling, but nevertheless, unknown to the respondents that rely on manual routines when planning a meeting.

A standard application such as Microsoft Exchange has been developed and upgraded numerous of times, and covers much more functions than an ordinary user is aware of. As time to learn and develop as a user often is limited, important functions will never be used. Purchase and implementation of new or upgraded applications must be seen as investments, motivated by needs to increase efficiency or quality. If the technology is not fully implemented and features remain unknown, the investment will not achieve its expected value. An interesting question to raise is whose responsibility it is to develop, inform and support learning processes in an organization. Not just when a new application first reaches its market and user groups, but continuously.
Försäkringskassan has a network of 'inspirers', as a link to the IT department. They are the first to be inform and use as ambassadors when new technology is introduced. Assumedly, this works out well when IT wants to inform and educate about functions and application, but perhaps, it is not enough as a channel for input and increased knowledge and understanding about user’s ongoing and changing work situations and needs. Stickdorn and Schneider discussed the need to manage the process of change when a service is provided. The employees at the department offering the service, need to stay motivated and engaged, not just when the service is developed and released, but ever after, as new problems and shortcomings will occur. A service-minded attitude towards its customer is needed. A customer-oriented organization requires highly responsive personnel, preferable more proactive than reactive in its daily actings [23].

Back to our basic issue, scheduling across organizational borders. With a short term approach, a quick fix can be to inform and market already existing functionality of Exchange, or to inform about other alternatives, like Doodle, which with its pooling feature can contribute to an easier scheduling administration. Short User Guides can be written and published to help meeting organizers without any delay. It can solve some, but not all, problems concerning scheduling. With no delay and to a low cost, technicians, communicators or Help desk personnel can make life easier for meeting organizers. However, this requires knowledge of user problems in reality and channels for pro-active communication and support.

8.3 Long Term Solutions

With a long term approach, purposed to achieve a more sustainable solution, WebDAV/CalDAV offers a starting point for solving the existing scheduling problems. Moreover, it is also a platform with potential for developing collaboration services across organizational borders, such as other agencies, care providers, employees and future non-predictable partners.

WebDAV is platform independent, no costs are related to purchase or licences, and it will be possible to use from any devices. As long as users only publish and share information about free/busy, there will be no major problem related to security policies or restrictions. If developed into a platform for content sharing, comparable to projectplace.se or similar shared workplaces, questions about authorization and access control need to be enlightened and solved.

The strongest argument for a WebDAV-based solution is its potentials for further development. Without need to purchase, Försäkringskassan can develope its own partner collaboration service possible to offer its partners for a low cost and a minimum of administration. The partner collaboration service can be designed to contain considerably more functions and features supporting more than just scheduling. For example, documents can be published, shared and worked with, discussion boards and digital work places established, task list published and shared by collaborators across organizations. Technically, there is no limit. However, organizational policies and regulations must be considered, as well as users attitudes towards more transparency and networking outside the frames of its own organization.
If Försäkringskassan and its cooperating partners choose to develop an automatic scheduling software, an easily understood and supporting user interface is needed for the WebDAV solution presented in this study. A user interface will allow users to easily share their calendars and choose which calendars they want to subscribe to. The user interface in its simplest form would act like a address book, in which users can find links to the calendars of their cooperating partners.

8.4 Future Work

If decided to develop and design the WebDAV concept as a shared scheduling service, three main activities must be considered and set up:

- A business model must be generated, covering aspects such as customer segments and relations, value propositions, channels, key resources, activities and partnerships, cost structures and revenue streams.

- The technical platform and configuration based on WebDAV must be further configured and verified due to security policies at both the cooperating agencies and in general. The ambition as well as the challenge is to balance efficiency and restricted security requirements. In other words, to balance the development of a service that is both easy to use and secure.

- In order to offer an attractive, valuable service, a user interface needs to be developed. The concept needs to be given a truth-worthy impression, become easy to reach and easy to use by all collaborators. Customers have to be involved with a design-build-test approach, where the service is developed and continuously verified in its target context. The value of this scheduling service can be evaluated when scheduled meeting actually has taken place, i.e. when the meeting organizer and the participants have experienced the whole chain from Need for a meeting to Meeting completed.
Bibliography


