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Robotic Process Automation in Swedish Healthcare

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Abstract

To relate expertise and spread information about Robotic Process Automation (RPA) in the Swedish public sector three regions were examined: Region Skåne, Region Stockholm and Västra Götalandsregionen. A framework for information gathering and structuring was established from an initial literature study. Data and documents from the regions were gathered through twenty interviews with eighteen stakeholders distributed between regions and their internal organizations. A more in-depth examination of three processes and their implementation was also performed. It was found that all regions use RPA to some extent. They are all expanding their effort put into RPA, they are all in the process of scaling up their initiative, and they are all heading towards more centralized organizations surrounding RPA. All three regions are in the process of implementing a central department intended to provide RPA solutions to the rest of the organization. Information about automated processes were examined, it was found that most efforts have been made in the Finance area and three possible process characteristics for RPA potential were identified.

Acknowledgements

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List of Abbreviations

AMHS	Average Manual Hours Saved
API	Application Layer Interface
FTE	Full Time Equivalent
MHS	Manual Hours Saved
PAD	Process Automation Document
PDD	Process Documentation document
RPA	Robotic Process Automation
UI	User Interface
VGR	Västra Götalandsregionen
VGR-IT	IT departement at Västra Götalandsregionen
VGR-FS	Financial services at Västra Götalandsregionen

1 Introduction

RPA is currently a much-discussed subject – this was especially noticeable in the preparation of this master's thesis. When establishing contact with hospitals and other regional organizations the study was met with great interest and cooperation. A more thorough examination of RPA is performed in chapter 2.

To support the initial literature study the Swedish healthcare sector was chosen to complement the theoretical work with a practical case study. With the way the Swedish healthcare sector is organized – subjected to rule by the regional councils (regions), which manage multiple functions beside healthcare in the Swedish public sector, the work was organically extended to cover regional work with RPA.

The healthcare sector was chosen for three reasons – First was the preconceived notion that the healthcare sector has a large number of legacy systems, an indication that RPA is a well-suited technology. Second that being an important societal function while highly strained by administration RPA and automation could reduce manual labor and free resources making it a worthwhile study. And third that being similar and sharing some systems and structures the comparison of regional councils could add value to their own and other regions work with RPA by distributing the knowledge they have gathered.

1.1 Purpose

The overarching objective of this master's thesis is to relate information and expertise from RPA-implementation in Swedish healthcare. This is achieved by summarizing and analyzing the work performed by three Swedish regions: Region Skåne, Region Stockholm and Västra Götalandsregionen. The purpose is to contribute to the knowledge of the RPA-practitioners and managers in the regions as well as to practitioners and stakeholders in similar organizations.

To be able to give a holistic and structured representation of the RPA adoption in the organizations a literature study is provided in the background portion of the thesis from which important aspects of the technology RPA, the organizational requirements of RPA and the associated tools are gathered into a framework, which is used to create a structure for both collecting and presenting the regional data.

The main questions the thesis will try to answer are the following:

- What is the current state of RPA adoption?
- How is the RPA implementation structured in terms of:
  - Strategy & governance
  - Organization structure and sourcing
  - Tools
- What processes have been automated?
- What challenges have been identified?
- What lessons have been learned?

Finally, the aim of this thesis is to be valuable to similar organizations when evaluating the possibility of implementing or extending the use of RPA in their effort to make the public sector more efficient.

1.2 Limitations

The number of regions to include where limited to three: Region Skåne, Region Stockholm and Västra Götalandsregionen. Together they account for more than half of all employees employed by regions in Sweden.

these organizations is challenging, not only because of the sheer size but also because of the structure where many of the internal organization have a high degree of autonomy. Because of this, the study was limited from a complete insight into the organizations and the work performed with RPA.

Further the study was limited to the RPA-technology, many of the tools and systems supporting RPA also have many other abilities, such as process mining and artificial intelligence. There are also other types of automation, such as business process management systems, integration platforms and low-code platforms. These have all been left out due to limitations in terms of time and resources.

1.3 Method

Information about the technology was gathered from journals found on Google Scholar and LUBSearch, the literature search system of Lund University. The search terms used was “Robotic Process Automation”, “RPA”, “digital process automation”, “Lightweight IT”, “Lightweight IT Governance”, “IT Governance”, “RPA Governance” and combinations of these terms. From the references of the identified papers further articles were found. Further knowledge and information were gathered from white papers and vendor material and through interviews with RPA suppliers.

Out of this information an assessment framework for the case study was developed.

The study was performed as a practice-oriented comparative case study to assess the state of RPA-implementation in Swedish healthcare using the developed framework. Data regarding regions was gathered through unstructured and structured digital interviews and collection of related documents and data. The framework areas were converted into high-level interview questions, and the questions where then mapped against stakeholders within the three organizations.

Eighteen stakeholders where interviewed, spread over the included regions. Some stakeholders were interviewed multiple times, others only once depending on how much follow-up questions and clarification were needed. A presentation of the stakeholders and the question mapping can be found at the beginning of each case in the case study.

The gathered data was collected and then analyzed in Excel. Enabler data was structured, standardized, and tabularized. Process data was categorized into four distinct categories: Finance, HR, IT and Administration. Finance and HR processes were further mapped against a process structure created by the British government. Further analysis was performed by different data visualization techniques. Framework documents were collected, analyzed and relevant information extracted and then standardized and tabularized.

Value Contribution

The main contribution of this work is to summarize and distribute expertise and knowledge from RPA-professionals in a specific field, the Swedish healthcare system. It is a contribution to RPA case studies with a holistic view in a healthcare setting. Hopefully, this can be of value to other researchers and similar organizations in developing their RPA capabilities.

Lastly for the involved regions the study aims to share insights and identify strengths and weaknesses in their RPA initiatives.

2 Background

This chapter aims to familiarize the reader with RPA and important concepts connected to the technology.

2.1 What is Robotic Process Automation (RPA)?

Robotic process automation, RPA, can be defined as "*… a software paradigm where robots are programs which mimic the behavior of human workers interacting with information systems and whose objective is to perform structured and repetitive tasks quickly and profitably.*" (Jimenez-Ramirez A, 2019). A software robot performs a task following a predefined set of rules for how to interact with different systems via an appropriate interface (Hofmann, et al., 2020). In many papers RPA is limited to the graphical interface, this is not necessary and limits the effectiveness of implemented robots (Hofmann, et al., 2020). The main difference between RPA and traditional automation is that in traditional automation the task is "removed", it is absorbed by the implemented system. In an RPA implementation the task still exists but is moved from a human employee to a robot (Santos, 2019). The point of this outside-in approach is to make the automation of processes easier, less costly, and faster. With no large changes to the IT-infrastructure required and less technical skills needed RPA can move automation tasks from IT to the business end of an organization (Osman, 2019; Santos, 2019).

However, RPA is not a replacement of traditional automation but rather a complement to it (van der Aalst, 2018; Osman, 2019). Traditional automation is generally suited for cases with high frequency (van der Aalst, 2018) because of the high costs associated with building and configuring software

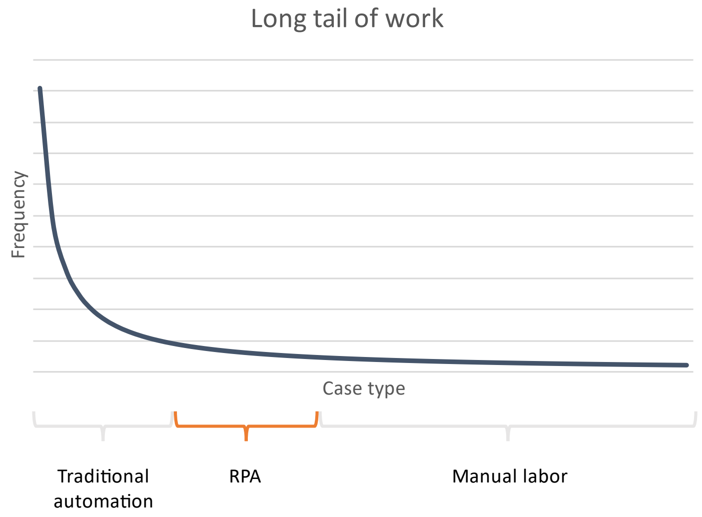

Figure 1 Long tail of work and the role of RPA.

systems. Less frequent cases are often left to be manually performed by employees. The main point of RPA is to extend the reach of economically feasible automation to more infrequent cases, freeing up time for human employees for more rewarding and value adding tasks as illustrated in Figure 1 (van der Aalst, 2018; Syed, et al., 2020).

For instance, integrating a legacy system without access layer interface (API) in a traditional way would require the system to be changed or reprogrammed. An often expensive and time-consuming effort. Using RPA, a software robot could extract the information in the same way as a human employee, by reading the graphical interface and using mouse and keyboard inputs requiring no changes to the existing system.

Two key concepts in RPA are robot and process, a robot is computing power on a server on the network or on the local computer dedicated to performing processes (Madakam, 2019). A process is a set of pre-defined rules to be executed by the robot.

There are two types of robots – unattended and attended (Hofmann, et al., 2020). Unattended robots can be run locally on the computer, or on the network and require no user input or collaboration. Attended robots are generally run on the local computer and require the user for certain parts of the task, such as starting the process, making judgements or to provide appropriate credentials.

2.2 Capabilities and drawbacks with RPA

In this section the main capabilities and drawbacks of RPA are highlighted.

2.2.1 Capabilities

Except the ability to pierce legacy systems and IT-silos by using the graphical interface the main advantages of RPA are the lack of need for systemic change, the fast return of investment and the short deployment time (Santos, 2019). The software robots can work all hours, do not get tired and the rate of errors is low to non-existent if the quality of the input data is high (Santos, 2019; Syed, et al., 2020).

The tasks possible to perform by software robots can be digested down to three areas with eight functional classes (Hofmann, et al., 2020):

- Data handling
  - Transferring data.
  - Changing file formats, encrypting, or encoding files.
  - Enabling analysis by speech, text, or character processing.
- Integration
  - Accessing or operating other applications.
  - Accessing or operating other services
  - Mimicking input devices.
- Process enhancement
  - Waiting for specified events, such as file changes, image appearances
  - Connecting elements to a choreography, such as looping and branching.

2.2.2 Drawbacks

The main disadvantage of RPA is the limitation to rule-based processes as well as the added task of monitoring the robot after implementation (Santos, 2019). Other disadvantages mentioned in the literature is the increase in complexity from synchronizing the interaction between robots and humans (Santos, 2019), the risk of extending the lifetime of outdated legacy systems (Santos, 2019) and the necessity of maintenance.

As user interfaces are more prone to changes than the application layer (Santos, 2019) robots will need to be reconfigured more often than traditional integrations, which might cause higher maintenance costs. There is also the issue of the name "robotic process automation", which while no doubt has increased the hype surrounding RPA it has also been a source of confusion to what RPA is (Santos, 2019). This is apparent when reading articles or vendor material, which commonly start by declaring RPA robots to be software programs and not actual walking and talking robots.

Another challenge is the impact on employees. Implementing RPA into an organization often results in employees having to perform new tasks or the company decreasing the workforce, which can create reluctance and opposition to RPA in the organization (Santos, 2019). When implementing RPA into an organization it is suggested to include affected personnel early in the process and to foster a positive attitude towards RPA to decrease resistance (Syed, et al., 2020). For workers to be able to work efficiently with their digital counterparts it is also important to provide training for employees (Syed, et al., 2020).

2.3 Process criteria & suitability

For a process to be automatable in anyway by any type of digital automation it must contain at least a single digital step, which is rule based and have digital input and digital output.

There are many suggestions for process characteristics of processes that are suitable for RPA implementation, some of the most cited characteristics are the following (Osman, 2019; Renard, 2018).

- Voluminous transactions.
- Frequent interaction with multiple systems.
- Use of systems with a stable environment.
- Ease of decomposition into unambiguous rules.
- Limited need to handle exceptions.

The criteria can be divided into three categories: necessary, complexity, and business case. Necessary conditions are such as being able to decompose the process into unambiguous rules, having digital steps and digital inputs/outputs. Frequent use of multiple systems is a complexity criterion and so is a limited need to handle exceptions. The voluminous transaction criteria is a business case criterion. A process needs to fulfill all necessary conditions, while complexity and business case criteria affect the profitability of the implementation. For instance, to limit the need of handling exceptions it is suggested to let less common exceptions be handled manually while the majority of cases are included in the implemented process, to increase cost-efficiency (Syed, et al., 2020).

By analyzing a selection of articles and vendor webpages for processes commonly mentioned in relation to robotic process automation a list of processes was created, which can give us an indication of which areas have high potential for RPA. Two main level-one process were identified: Finance and Human Resources (HR). The following vendor webpages and online trainings where used: UiPath, Automation anywhere and Blue Prism together with articles: (Hofmann, et al., 2020) (Jimenez-Ramirez A, 2019; Madakam, 2019; Osman, 2019; Renard, 2018; Beetz & Riedl, 2019).

Using global design principles developed by the English government, the finance and HR processes found where mapped to the level-two processes, resulting in the heatmaps in Figure 2 and Figure 3. Figure 2 conforms in part to claims by Deloitte, a multinational professional services network, that highlights record to report, purchase to pay and order to cash are processes with high automation probability (Tarsh, et al., 2018).

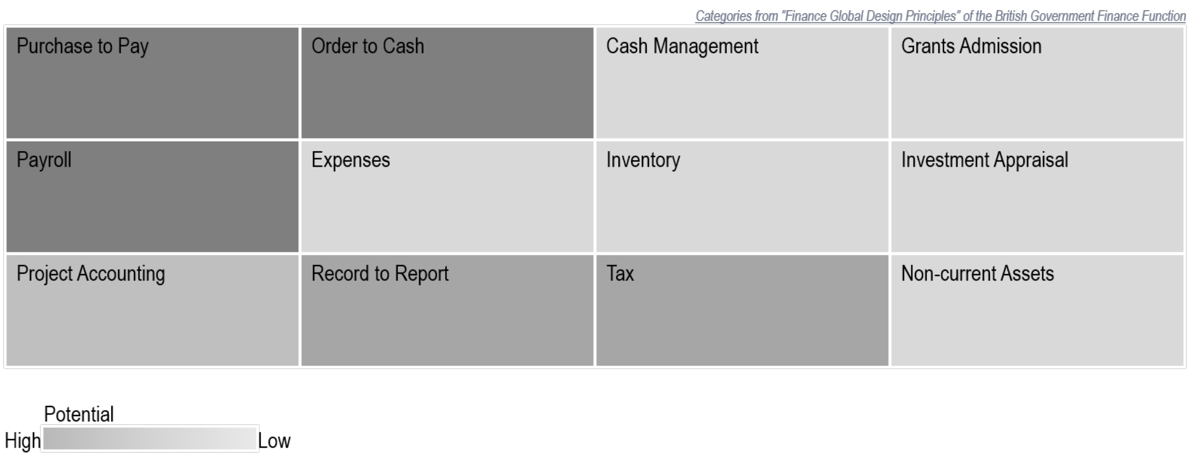

Figure 2 Finance level 2 process heatmap.

Figure 3 HR level 2 heatmap.

Common lower-level processes and tasks found where accounts payable, invoice processing, benefits administration, payroll, and recruitment.

2.4 Tools

At a minimum according to Gartner, a global research and advisory firm, a RPA software tool must include low-code capabilities to build automation scripts, integration with enterprise applications and orchestration and administration including configuration, monitoring and security (Ray, et al., 2020). All the tools that will follow also support both attended and unattended robots, have machine learning capabilities and extensions, and are limited to the windows operating system.

There are many RPA solution providers: Automation Anywhere, Blue Prism, UiPath, Nice and Microsoft are a few of them. Automation Anywhere, Blue Prism and UiPath are usually seen as the largest vendors while NICE is one of many contenders. Microsoft on the other hand has just recently developed RPA capabilities in their power platform. Some assessments and market share information can be found in Table 1. UiPath is generally seen as the overall leader in the field, with Blue Prism and Automation Anywhere as closest contenders.

*Table 1 A collection of vendor assessments. Gartner Magic Quadrant RPA is a yearly assessment of RPA vendors by Gartner. Everest, a global research firm, releases continuous RPA vendor assessments, this is from 2020. Forrester (a research and advisory firm) releases a yearly evaluation called wave and IT-central station (a crowdsourced knowledge platform) is continuously collecting evaluations of RPA solutions. *) On a scale from 1-5 where 5 is best.*

	Automation Anywhere	**Blue Prism**	**MS Power Platform**	**Nice**	**UiPath**
Gartner MQ RPA 2020	Leader	Leader	Visionary	Challenger	Leader
Gartner Critical capabilities 2020*	**4,22**	**4,13**	**4,17**	**4,06**	**4,21**
*Task automation via integration**	4,24	4,14	4,13	4,02	4,21
*Enabling citizen developers**	4,23	4,07	4,14	4,03	4,26
*Administration, process life-cycle management**	4,24	4,29	4,22	4,15	4,22
*Augmenting knowledge workers**	4,18	4,01	4,2	4,05	4,15
IT-Central station 2021 position	2	3	5	-	1
Everest					
Market share by revenue	>10%	>10%	-	5-10%	>10%
Year over Year growth	>100%	51-100%	-	11-50%	>100%
(Attended RPA) Market share by license revenue	2-20%	-	-	>20%	>20%
Nr of clients	>1000	>1000	-	200-1000	>1000
Forrester wave	Leader	Strong performer	Leader	Leader	Leader

*Current offering**	3,92	3,82	3,6	3,51	4,13
*Strategy**	3,8	2,8	4,2	4	4,6
*Market presence**	4	3,75	2,75	3,5	5
Development Platform					
Multipersona experience	X				X
Process recording	X		X	X	X

2.5 Enabling factors

In the following section information related to organizational setup and governance connected to RPA is provided.

2.5.1 Strategy

It is important that the objectives of the RPA implementation are in-line with the overall goals of the organization (Santos, 2019). Looking at general IT Governance research it has been established that IT Governance mechanisms and IS strategic alignment drive organizational performance (Ping-Ju Wu, et al., 2015), that this would also be true for lightweight IT and RPA is a reasonable assumption to make. Establishing clear RPA objectives will help guide the prioritization, assessment, and evaluation of processes (Santos, 2019). To make sure these goals are realistic they need to be aligned with the known benefits and disadvantages of RPA (Santos, 2019).

For an organization to be suited to implement RPA-solutions Syed et al. (2018) relays three characteristics identified in their literature study:

- Business drivers - A suitable organization should be driven by cost reduction, quality improvement, efficiency, and better compliance goals.
- Nature of existing technology - The organization should have many different systems, ideally legacy systems with no way of using more efficient automation methods, and the likelihood of moving to a new single system should be low.
- Degree of maturity - An organization needs to have well developed technical maturity with required skills, a technologically inclined staff, and a technological and innovative organizational culture (Syed, et al., 2020).

2.5.2 Governance

There are multiple frameworks for IT governance structures. Bygstad and Iden (2017) for instance suggests four distinct classes: laissez-faire, central model, bimodal model, and platform for general lightweight IT governance. The model is built upon a two-dimensional matrix of the variables securing and resourcing, see Figure 4. Securing is a measure of control of the technology while resourcing is a measure of the possibility for innovation.

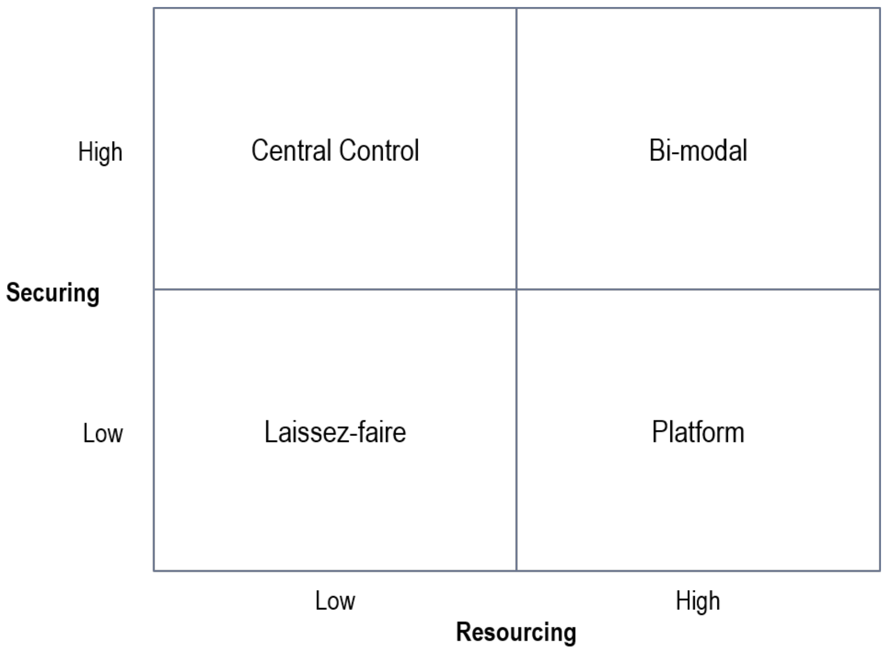

Figure 4 Lightweight governance matrix (Bygstad & Iden, 2017).

In the laissez-faire model heavyweight IT, or the common IT-department, is not allowed to make decisions about the lightweight technology. Lightweight solutions are developed as stand-alone solutions, often directly between line managers and vendors. In the central control model the central IT department is in full control of the lightweight technology. The platform model is inspired by the app stores of Google and Apple, the IT department supports a selection of lightweight technologies, which departments then can utilize. The bi-modal model was first suggested by Gartner and divides the IT-department into two. A new lightweight IT section, handling fully and only the lightweight IT technologies under traditional IT policies and standards, and a traditional IT department, handling heavyweight IT technologies.

There are a few suggested benefits and drawbacks with the different models listed in

Table 2 Benefits and drawbacks of lightweight governance models (Bygstad & Iden, 2017).

	Benefits	Drawbacks
Central control	• Full integration • Security	• Low innovation • High Costs
Bi-Modal	• Secure • Innovative	• Budget will limit innovation • Internal conflicts
Laissez-faire	• Innovative • User oriented solutions	• Hard to scale • Low security
Platform	• Low costs	• Hard to secure

Of the traditional IT governance models the most known is the tri-modal model of decentralized, federated, and centralized (Noppen, et al., 2020) represented in Figure 5. A centralized RPA organization means that a central unit handles all the RPA related tasks. This can be either the IT

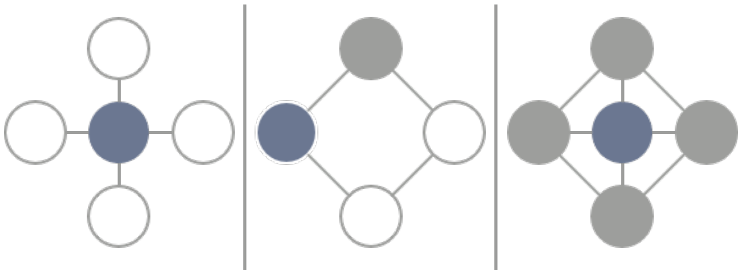

Figure 5 Graphical representations of a centralized, decentralized, and federated organizational structure. Each dot is a unit and blue represent full capabilities, gray some and white none.

department or a dedicated RPA Center of Excellence (Noppen, et al., 2020). A centralized structure has the potential benefits of cost-efficiency and standardization (Asatiani, et al., 2019) while also risking being less agile, and slower to rollout. Anagnoste (2018) suggests a Center of Excellence is the most efficient way of establishing RPA in a large organization after initial pilot projects.

A decentralized structure indicates several RPA initiatives inside the organization with no central guidance or connection (Noppen, et al., 2020). Decentralization could result in different RPA tools being used in different parts of the organization with no license consolidation but might be a more agile structure that fosters innovation. A summary of possible benefits and drawbacks of different organization structures is given in Table 3.

A federated organization is any type of combination of these extremes and is a common way to structure an IT organization. This organizational structure is used to try to keep the advantage of scale while retaining agility and innovation (Noppen, et al., 2020). Nordström (2019) expresses the risk of lacking end-to-end perspective when implementing a federated governance model. This risk is further expressed by Bygstad and Iden (2017), in that many prioritization decisions are taken in silos and only picking low hanging fruits without a holistic view.

Table 3 Possible benefits and drawbacks of organization structures (Asatiani, et al., 2019; Noppen, et al., 2020).

	Benefits	**Drawbacks**
Centralized	▪ License consolidation ▪ Easier to develop expertise	▪ Less of agile ▪ Less innovation
Federated	▪ License consolidation ▪ Business involvement ▪ Foster innovation ▪ Agile	▪ Ambiguity in ownership and responsibilities ▪ Lack of end-to-end perspective
Decentralized	▪ Enthusiasm due to involvement ▪ Fosters innovation	▪ Lack of control and prioritization ▪ Lack of end-to-end perspective

Governance processes are implemented to maintain alignment between the RPA initiative and the business strategy. There are many processes that can be used but a few examples are (De Haes & Van Grembergen, 2004):

- Steering committees
- Strategic committees
- Cross-functional initiatives
- Board inclusion

The American Army Financial Management suggests creating a governance board for request management and prioritization when implementing RPA. They recommend creating a board modeled after earlier successful boards inside the organization to increase familiarity for stakeholders to speed up engagement (Gex & Minor, 2019). They further suggest developing multiple avenues for interested employees to inquire and learn about RPA and the provided services. They also suggest developing measurements to follow-up on the initiative's development. They give the following as examples: FTEs saved and Uptime/incidents per month.

2.5.2.1 Delivery model

A suggested eight-step delivery model for RPA (Anagnoste, 2018):

1. Process identification
2. Process assessment
3. Process reengineering
4. User stories definition
5. Automation
6. User acceptance testing
7. Hypercare
8. Ongoing support

These steps can be either insourced or outsourced and for some steps different choices can be made. There are other delivery models suggested by vendors, which are similar.

2.5.2.1.1 Process Identification

Process identification is the process of finding and documenting processes that might be suitable for automation. It is critical for implemented processes to be well documented to prevent loss of knowledge in the organization after the process is no longer performed by any human staff (Syed, et al., 2020). Identifying possible processes to be automated can be performed either by operational personnel, middle management with process overview or at an initiative by top level management.

2.5.2.1.2 Process assessment

Process assessment is determining suitability and business case of suggested automation initiatives. Assessment can be made structured or ad-hoc, where structured is based on templates and pre-determined criteria while ad-hoc is performed by the assessor based on experience and discussion.

2.5.2.1.3 User stories definition

The purpose of user stories is to give the developers a context and reason for the automation. It helps the developer understand what the end user is looking for in the developed solution (Anagnoste, 2018).

2.5.2.1.4 Automation

Configuration of the automation software is needed. While RPA borrows a lot of its language from traditional software development the process is not the same (Willcocks, et al., 2015). Developing an RPA solution is more comparable to program configuration than software development and does not require programming knowledge (Willcocks, et al., 2015; Hofmann, et al., 2020). Configuration can be made in an agile or waterfall model. An agile way of working is focused on short sprints with a working product in the end of each, which is reworked multiple times if necessary. The waterfall model utilizes an approach where all requirements are defined beforehand, and a full solution is delivered at the end of the process.

Some articles suggest that anyone with process knowledge could implement an automation solution using RPA software (Syed, et al., 2020) but other articles argue that an expert in RPA-development is required for implementations to reach the potential expected (Kirchmer, 2017). What is agreed upon is the need for thorough process knowledge (Hofmann, et al., 2020).

2.5.2.1.5 User acceptance testing

After initial tests have been performed by developers the solution is tested by users to accept or verify that it fulfills the requirements. This is the last part of the development before deploying the solution into the production environment.

2.5.2.1.6 Hypercare

After the solution is deployed into the production environment there is usually a period of 1-2 weeks of close monitoring and bug fixing called hypercare (Anagnoste, 2018).

2.5.2.1.7 Ongoing support

Maintenance is a critical part of the RPA lifecycle, as any changes to in-service applications interface or functions will require the process to be reconfigured (Osman, 2019). Large changes might even force the whole process to be redeveloped. How to handle the downtime of critical processes in case of changes or system breakdowns is an important part of RPA support (Joseph, Leslie; Clair, Craig Le, 2020).

2.5.2.2 Platform hosting

When hosting the RPA platform there are mainly two choices: hosting the software on-premises or off-premises. An on-premises solution might be required by law in certain situations and give better control to the organization while the off-premises requires less in-house expertise and is often easier to scale.

2.5.2.3 IT-Coupling

The RPA initiative can either be a part of IT or a part of business, while RPA-implementation is often suggested to be handles as a business innovation project in collaboration with IT rather than an ordinary IT-project (Osman, 2019; Willcocks, et al., 2015). Both have benefits and drawbacks.

In a study of IT-coupling of RPA performed by Osmundsen et al. (2019) they found that a loose coupling between RPA and IT enhances enthusiasm for technology and digitalization, by bypassing need to go through IT. It also made it easier to engage and involve the people with the process knowledge, people who are vital to the success of the initiative. They also found that a loose coupling could result in a lack of control mechanisms to control and prioritize initiatives and a lack of end-to-end process view.

Loose or tight coupling aside RPA exposes organizations to a new attack surface and the IT department is fundamental in handling access, security and setting up the required infrastructure for robots. And while not necessarily required for development or maintenance, including IT to some extent is heavily suggested (Santos, 2019).

2.6 Trends & Patterns in RPA

RPA is a fast-moving area with multiple actors and a still growing market. There are a few trends surrounding the technology.

The capabilities of RPA are expected to increase as implementation of machine learning techniques, such as natural language processing and image recognition, will remove some of the limitations on what processes are able to be automated, as well as decrease downtime as implemented processes are able to update themselves in accordance to smaller interface changes. Already some vendors market what they call cognitive process automation, which is RPA extended by machine learning.

Large enterprise software providers have started developing RPA capabilities, often by acquisition of vendors. ServiceNow acquired Intellibot in March 2021, Microsoft acquired Softomotive in May 2020 and SAP acquired RPA vendor Contextor in 2018. RPA vendors on the other hand is moving towards a more holistic automation approach, extending platform capabilities into process mining and discovery, business intelligence, chatbots, machine learning/AI and the possibility to build simple applications.

2.7 Brief introduction of the included regions

Regional councils (regions) in Sweden are self-governing local authorities and one of the principal administrative subdivisions of Sweden. The main responsibilities of the regions are the public healthcare system and public transportation.

2.7.1 Region Skåne

Region Skåne is the third largest region in Sweden with 1 300 000 residents and 36 000 employees. An organizational overview is provided in Figure 6.

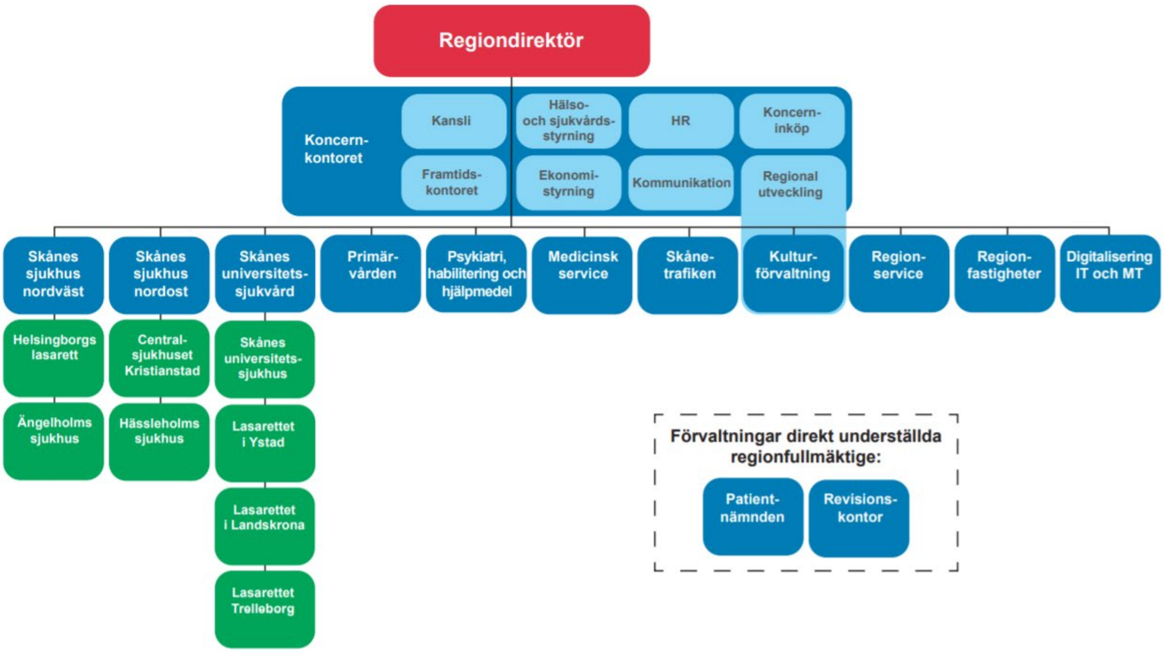

Figure 6 Organizational overview in Swedish- Region Skåne. https://www.skane.se/siteassets/organisation_politik/dokument/organisation_tjansteman.pdf

2.7.2 Region Stockholm

Region Stockholm is the largest region in Sweden with 2 352 549 residents and 45 000 employees. An organizational overview is provided in Figure 7.

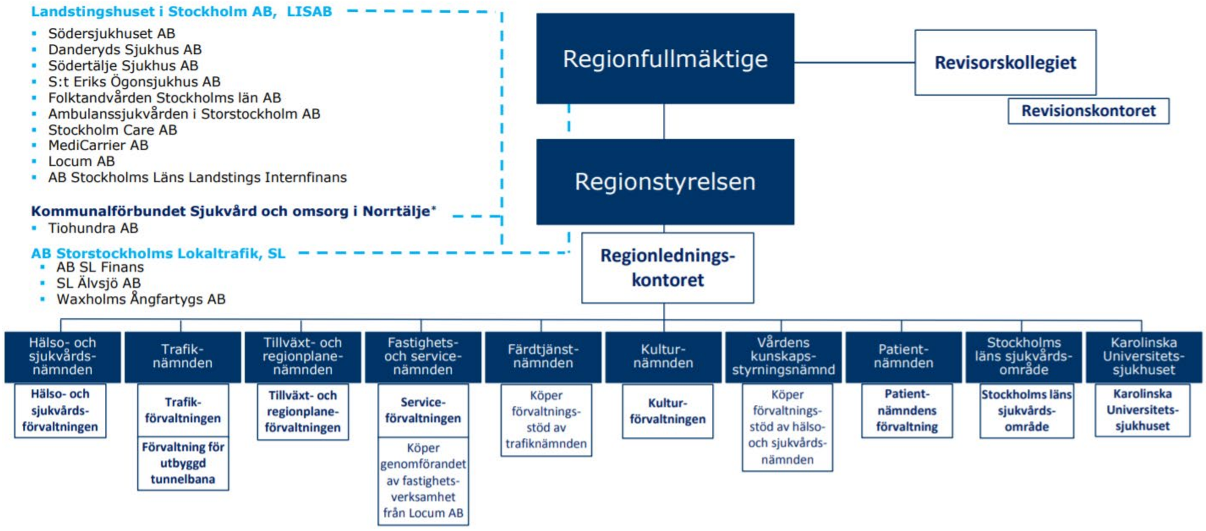

Figure 7 Organizational overview in Swedish - Region Stockholm. https://www.sll.se/globalassets/6.-om-landstinget/organisation/region-stockholm-organisationsschema-2021-juli.pdf

2.7.3 Västra Götalandsregionen (VGR)

Västra Götalandsregionen is the second largest region in Sweden and has 1 734 443 residents and 49 000 employees. The regional operations range from healthcare and public transport to running the opera and taking care of the botanical garden. An overview of the organization is provided in Figure 8.

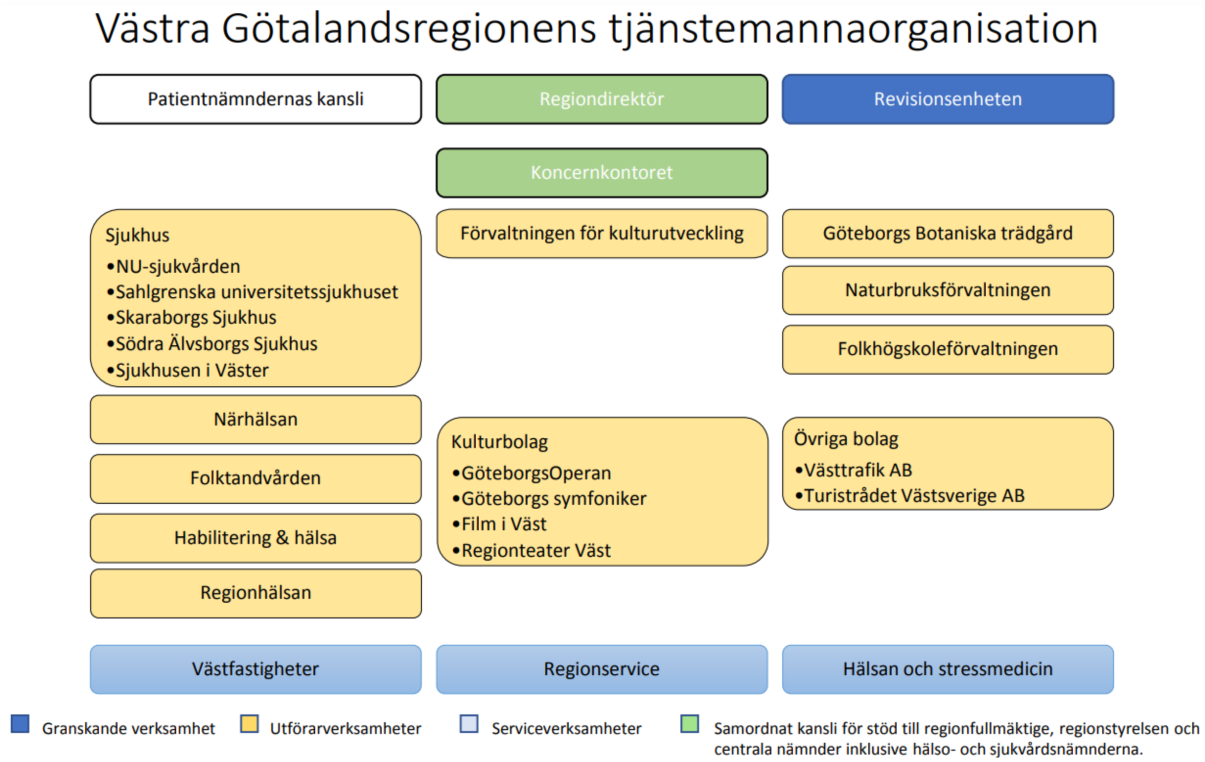

Figure 8 Organizational overview in Swedish - VGR. https://alfresco-offentlig.vgregion.se/alfresco/service/vgr/storage/node/content/workspace/SpacesStore/47a0c78d-c650-4174-99cb-40cbb383ee95/Tj%c3%a4nstemannaorganisation%20mindre.pdf?a=false&guest=true

2.8 Swedish public sector and health care specific issues with RPA

Working in the public sector in Sweden comes with a few special circumstances affecting the work with RPA either directly or indirectly stemming from the many laws and regulations applicable in this sector.

To start with there is the law of public procurement, directing how public organizations can buy products and services. In short, the public organization is required to publish a public inquiry document which any provider can submit an offer to (Konkurrensverket, 2020). Further the public organization is legally obliged to expose any service or product procured to competition (Konkurrensverket, 2020). Since any procurement of technical solutions has a risk of dependence on the supplier this can be problematic when public organizations procure IT solutions.

Another law effecting RPA more directly when applied to healthcare and in healthcare settings is the law of patient data. As there is no direct legal opposition to accessing patient data using robots it has been made complex by the requirement for two-factor authentication (Nilsson, 2020).

A third circumstance in the public sector is the SITHS certificate, SITHS certificates are electronic identity cars used for secure identification of employees and systems in many parts of the Swedish public sector, which does not have any certification type for robots. Until this has been developed there is no legal way to use unattended robots for any processes requiring SITHS-certification (Nilsson, 2020).

Delegating decisions to robots or other automation tools is allowed for national institutes, such as the Swedish Tax Agency and the Swedish Social Security Agency, but is not allowed during the time of writing for regional or municipal organizations. It is suggested in a report to the Swedish Government that all decisions that the board can delegate and that can be appealed should be allowed to be automated. The suggestion is that this change should be implemented in the spring of 2022 (SOU, 2021).

3 Framework

From the background literature review a holistic framework for assessing the state of RPA maturity in an organization has been created and will be used to answer the studies predefined key questions.

Figure 9 Assessment framework developed from pilot study findings.

Enablers

Organizational structures and resources enabling RPA implementation.

RPA Strategy

The study has established that strategy and objectives are important in an RPA initiative, by asking why RPA is implemented, what the objectives are and how these are to be met, it is possible to gain insights into the organization's strategy and goals.

- Why has RPA been implemented?
- What are the objectives of the RPA implementation?
- How are these objectives going to be achieved?

RPA Organization

To get an overview of the RPA organization the study investigated how the organizations are structured, positioned and what resources and tools are used.

- Organizational structure - how is the RPA organization structured?
- Resources
  - How many employees are included in the RPA projects?
  - What are their roles?
  - Who performs maintenance and how much is needed?
- What tool is used?
  - How is the tool hosted?
  - How many robots are used?
    - Unattended robots.
    - Attended robots.

Processes

To understand where RPA has been applied and what results have been realized data was gathered together with information about what processes and tasks have been automated by RPA.

- What processes have been automated?
  - Characteristics
  - Process mapping
- What results have been quantified?

Framework

To determine how the regions work with RPA, how the process criteria in literature compares to practice and what structure capital is available in the regions, the templates and evaluation methods used by the regions where gathered.

- What principles are used for assessing RPA initiatives?
- What principles are used for evaluating RPA initiatives?
- What principles are used for evaluating process suitability?

Execution

To determine how the RPA initiative have developed, which challenges they have found and what they are planning.

- Delivery method?
- How has the organization reacted to the RPA implementation?
- What lessons have been learned?
- What challenges have been identified?
- What are the next steps for the organization regarding RPA?

Governance

The background established that strategic alignment is important for IT-projects, to determine how the regions align their RPA initiative to the established strategy the study identified implemented governance mechanisms.

- How is the governance of the RPA initiative structured?
- What governance mechanisms are in-place?

4 Case Study

4.1 Region Skåne

Eight stakeholders were interviewed in Region Skåne. Four RPA developers and a solution owner in a first group interview, a second interview with two managers, a third interview with one of the developers, a fourth interview with a developer and an administrator using one of the robots and a fifth final interview with the four developers. A few clarifying questions were asked through email. The stakeholder-question area mapping is found in Table 4.

Table 4 Stakeholder-question area mapping Region Skåne.

	Enablers-Strategy	**Enablers-Organization**	**Processes**	**Framework**	**Execution**	**Governance**	**Example process**
Administrator			X		X		X
Manager 1	X	X	X		X	X	
Manager 2	X	X	X		X	X	
Solution owner		X		X	X		
Developer 1		X	X	X	X	X	X
Developer 2		X	X	X	X	X	
Developer 3		X	X	X	X	X	
Developer 4		X	X	X	X	X	

4.1.1

4.1.2 Enablers

4.1.2.1 Strategy

The goal of the RPA initiative in Region Skåne is to eliminate non-value adding manual tasks in the organizations while freeing resources and increasing quality. Employees have more tasks to complete than time available, removing monotonous tasks will increase productivity while not decreasing the workforce.

The means to reach this goal is to create a centralized unit providing RPA as a service to the rest of the organizations. The central unit has not yet been realized, but an RPA-unit has been developed at region service and there is an ongoing pilot project investigating what it takes to develop an organizational wide provider of RPA services. RPA is viewed as a last-resort and is only supposed to be applied in cases where other types of automation are not suitable. In some cases, RPA is used as a temporary solution for cases that are not prioritized by the IT-department.

4.1.2.2 Organization

Region Skåne started their work with RPA as a project in 2015. After a successful project-phase it was developed into a unit under Region Service. The RPA-team is a part of the service function, Region Service, which provides back-office services such as finance and HR to the rest of the organization. The RPA team it tasked with providing automation solutions internally to the service function.

The platform is hosted by the IT-department, but it is not involved in or responsible for the RPA process implementations. Changes to the server is made by the supplier on request of the RPA-team. The differentiation between host and maintainer has been expressed as an issue, were the RPA-team has to carry messages between the supplier and IT-department when a problem has occurred causing the maintenance to be delayed.

The IT-department at Region Skåne is outsourced in its entirety and systems are mainly managed externally, which can create a risk of unexpected changes or updates to systems for the RPA-team. The IT environment is not perceived to be especially unstable, but some RPA processes are scheduled at night or other times of less usage since the IT infrastructure is strained during parts of the day.

4.1.2.2.1 Current solution

The RPA-team consists of a coordinator, a system owner, and three developers as well as a strategist who commits half of the working-time to the RPA initiative resulting in 5.5 FTEs. Region Skåne uses NICE as their platform which is hosted on premise by the IT-department. They have nine licenses in total, eight for cobots, the NICE solution for attended robots, and one license for an unattended robot. The developers at estimate that they spend fifteen hours a week maintaining the implemented processes and robots.

4.1.3 Processes

Region Skåne has twenty-three processes implemented distributed between Finance, HR and Administration see **Error! Reference source not found.**. The total manual hours saved by automating these processes has been estimated to 5103 hours annually. Further information about the processes can be found in Appendix 1.

4.1.3.1 Process Example – Invoice creation

The process was developed by Region Skåne – Region Service for the healthcare invoicing department. The goal of the automation was to automate the remainder of manual invoice creation to decrease manual handling. The process was suggested after a call for the departments in Region Service to find suitable processes for the RPA initiative. The invoice creation process was suggested because it was repetitive and required a large degree of manual labor.

An Excel template with invoice information is received via a service portal, the information is verified, and an invoice is created in the finance system Raindance. The invoice number is reported back to the customer using the service portal.

The automated procedure is similar, the information in the excel file is verified to make sure it adheres to the template used by the robot. After verification, the robot is started on a specific computer by an employee. The robot extracts the information from the file using a SQL-query and creates invoices through the web-interface of Raindance. The invoices created are then approved by an employee.

The developer was forced to use an attended robot since Raindance requires SITHS card authorization. Since the input requires verification, they do not see this as a large issue. The process was developed in stages, starting with a single type of invoices covering 2% of the manual invoice. After further development, the robot now covers 30% of manual invoice creations and adding invoice information has been made simpler by adding an input form to the Excel file.

A few technical challenges, mainly surrounding Raindance were identified during development and testing. Another challenge raised by the developer was the iterative development method, scaling earlier solutions to include new types of invoices was perceived as hard to do without the code becoming inoperable. However, implementing all invoice types from the start was deemed to be to complex.

The automation has resulted in employees in GSF having more time to spend on other tasks, and the solution has been well received by the organization. Most issues connected to the robot have been caused by faulty input data or changes to the template.

The next extension of the process will be to add further invoice types to the robot capabilities.

4.1.4 Framework

Processes and initiatives are documented iteratively using the information in the PDD found in the appendix. The first part is used to establish the business case, which is used by management to approve the initiative. The document is then further filled out in steps during the project development. The PDD collects information about the As-Is and To-Be process, both in text and as a flow chart. The business case is based on estimates of the number of manual hours spent performing the process and other qualitative improvements from automating the process. Furthermore it gathers information about involved stakeholders, departments and applications involved.

4.1.5 Execution

4.1.5.1.1 Delivery model

A project structure chart can be found in Appendix 1. Processes are generally suggested by employees in the service department, finding tasks to automate is a continuous part of job development. After a task has been identified it is partly documented, using the first part of the PDD document. Thereafter the process must be approved in a meeting, held between department heads and management.

RPA-developers choose the most suited and prioritized approved processes after speaking to super-users, process owners and suggester. Judgement is made based on their expertise and experience. If the process is not deemed suitable for RPA other possible solutions are suggested while less prioritized initiatives are instead put in a backlog. There is no standard operating procedure for process assessment. After a process has been decided to be automated the operational unit which suggested it is tasked with further documenting the task using the PDD. After documentation, an automation solution is developed by the RPA team in collaboration with the affected unit.

The scope of the testing phase and tolerances for errors are established together with the suggesting department. Testing is performed by the developers in a test environment as much as possible, but often the testing must be performed in the production environment due to the out-of-date state of some of the test-environments.

After deployment, the process is maintained by the RPA-team. Problems at the operational level are to be reported to the organizational service desk, which then direct the problem to the RPA-team but in many cases, departments reach out to the RPA-team directly. Functional changes to applications are made known to system owners beforehand through a designated email account.

Project and process evaluation is performed on an operational level; the RPA team is generally not performing any process evaluations since it was deemed that the benefits were hard to quantify.

4.1.5.2 Reception

The RPA-implementations have resulted in less time for employees spent doing tedious tasks, a decrease in errors in certain processes and a higher degree of compliance. The solutions are reported to have been well received by the organization.

4.1.5.3 Lessons learned.

Loss of expertise

To minimize the risk that the knowledge of how to perform a process is lost after the process is automated Region Skåne requires all tasks to be properly and thoroughly documented before implemented.

System failure
To minimize the risk in case of system failures multiple worst-case scenarios are documented and planned for in the documentation phase.

IT-coupling
Region Skåne expresses the opinion that IT is vital in scaling RPA. In their view RPA is an IT project and should either be driven by IT or at least have a high degree of IT involvement.

4.1.5.4 Identified challenges.

Authority & responsibility
Region Skåne expresses uncertainty about what systems and which data the robots are allowed to handle. They request nationwide guidelines to what robots can and cannot do.

Maintenance
A large issue with RPA is the maintenance. After realizing time savings from RPA implementation there are not enough resources to perform the automated tasks manually in case of downtime. Since changes to interfaces are not always advertised in advance there is a need to reconfigure robots very quickly at unexpected times.

Process structure
Region Skåne expresses a challenge about the processes that are possible to implement. They feel limited by the need for very structured processes and hope AI will decrease the need for structure since it severely limits the number of processes possible to automate.

4.1.6 Governance

The governance structure could be categorized as federated in the traditional sense or platform in the terms of Bygstad and Iden (2017) where the IT-department owns the platform but does not make any decisions regarding its application. The IT-coupling could be categorized as loose, with very little IT involvement in the RPA initiative.

Processes are documented using an established template. RPA initiatives Region Service are approved internally by management using an established project structure where in an early-stage, initiatives are evaluated using gathered business case data. Approved cases are thereafter prioritized by the RPA development team.

4.2 Region Stockholm

Information was gathered through a questionnaire, and five interviews. One with a digitization strategist at Region Stockholm, three with heads of administration in different parts of the organization and one with an external consultant delivering automation solutions to the region.

Table 5 Stakeholder-question area mapping Region Stockholm.

	Enablers-Strategy	**Enablers-Organization**	**Processes**	**Framework**	**Execution**	**Governance**
Digitalization strategist	X	X				X
Head of administration 1	X	X	X	X	X	X
Head of administration 2	X	X	X	X	X	X
External consultant			X	X	X	

4.2.1 Enablers

4.2.1.1 Strategy

An organization-wide automation initiative has just been initialized at Region Stockholm, up until now RPA projects at Region Stockholm have been local initiatives. A mix of larger initiatives, proof of concepts and pilot projects have been performed. In some instances, RPA has been used as a part of another automation solution to solve a specific problem.

The new initiative means to consolidate licenses, reduce costs, and take advantage of the multifaceted digitalization team by establishing a digitalization Center of Excellence. RPA is one of the capabilitie. The goal is to increase efficiency and shift resources away from administration by having experts in multiple areas and systems in the same team and develop digital solutions to the region.

4.2.1.2 Organization

Region Stockholm is a highly decentralized organization and has just recently developed a central department providing finance and HR services to the organization. There are RPA solutions present in at least seven suborganizations but very little to no coordination between the initiatives.

4.2.1.2.1 Current solution

There are multiple RPA platforms present, among them UiPath, Microsoft power platform and Blue Prism. Through material supplied by the region and interviews 16 employees working with RPA to some extent could be identified. The roles employed are developers, business analysts, managers, and system owners. Both the development and maintenance of solutions, and maintenance and hosting of platforms are mainly outsourced.

4.2.2 Processes

Two implemented processes were identified in Region Stockholm. Only one of them with correlated information about time saved. Table 6 displays a summary of implemented processes while Figure 10 displays a breakdown of finance processes in Region Stockholm.

Table 6 Process data - Region Stockholm. To calculate average manual hours saved only processes with correlated time saved information were included.

	Nr of processes	Manual hour saved	AMHS	AMHS per thousand employees	Effort	Maintenance
Finance	2	320	320	7	-	-
HR	0	-	-	-	-	-
Administration	0	-	-	-	-	-
Healthcare	0	-	-	-	-	-
Total	2	320	320	7	-	-

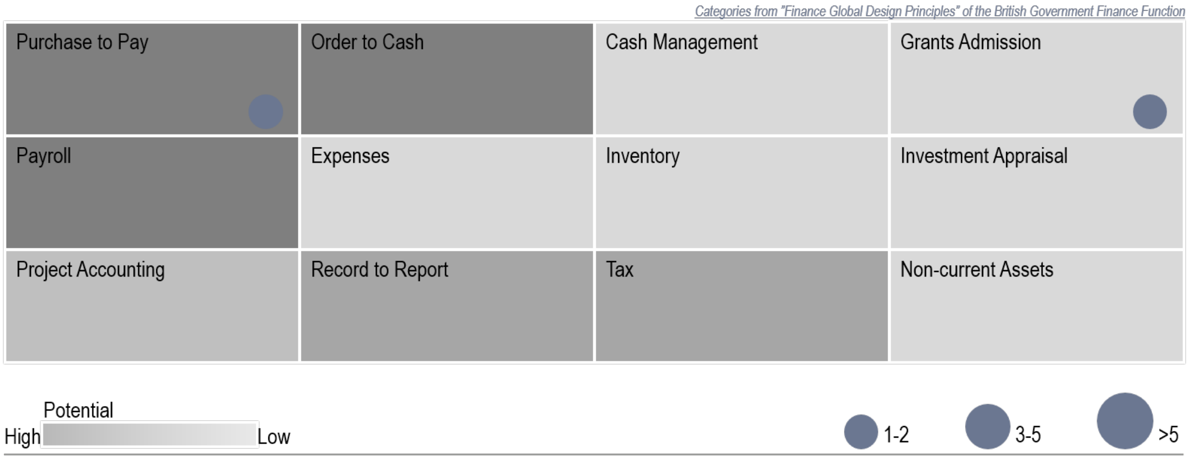

Figure 10 Finance process mapping - Region Stockholm

4.2.2.1 Process Example - Interpreter invoice reviews

The solution was developed for Hälso- och Sjukvårdsförvaltningen, HSF, by the digitalization and IT office with the help of external consultants. The goal was to reduce strain on employees, free time for more value-adding tasks and to increase efficiency of the invoice audit. The process was identified during a still ongoing assessment of automation needs in HSF processes. Being monotonous, repetitive, and demanding it was deemed as a good candidate for automation.

Each month invoices from five interpreter suppliers regarding close to 20 000 interpreter services is received by HSF. From the larger supplier an invoice material containing between 1200-1300 pages are received each month, which must then be checked against internal systems. Prior to automation these checks were carried out by printing the invoice and carrying out the compliance checks by manual labor.

RPA is only a part of this solution. There was also a platform created for gathering invoice details supplied by a low-code vendor. A robot is used to access systems, which the low-code environment does not have access to because of a lack of an API.

The process is now fully automated and there is no manual review of interpreter invoices. The department has a higher degree of employee satisfaction, has more time for employees to perform other tasks and the automation is expected to save 2.2 MSEK per year as a result of the more rigorous invoice review the robot can perform. Furthermore, the solution can be applied to previous invoices, finding compliance errors retroactively, potentially further increasing financial gains.

4.2.3 Framework
No framework information was made available to the study.

4.2.4 Execution
4.2.4.1.1 Delivery model
Hälsa- och Sjukvårdsförvaltningen, HSF, follows a general solution model, which they apply also for RPA, called design thinking. The model focusses on identifying needs and from the established needs identifying an appropriate solution. After a process in need for automation is identified it is minutely documented in collaboration with the employees normally executing the process. During documentation special effort is taken to identify the steps which the employee has internalized and might forget to communicate. When identifying a solution, a holistic approach is taken to make sure the solution is designed with an end-to-end perspective. Solutions are then generally developed and maintained by external consultants and tested and approved by the affected employees.

4.2.4.2 Reception
HSF reports that its solutions has been very well received by affected personnel. Basing its solutions on employee needs and implementing solutions for monotonous, repetitive tasks not appreciated by employees have only yielded positive reviews so far.

4.2.4.3 Lessons learned
Process visualization
HSF has established that visualizing the whole process is crucial to make automation possible, while also increasing understanding among employees for colleagues' tasks.

Including employees
HSF has also noted that making the employees part of the implementation process is very important. It increases the engagement and understanding for automation and RPA.

4.2.4.4 Identified challenges
SITHS
Region Stockholm has expressed the lack of SITHS-authorization methods for robots to be an issue.

Reactive legislation
HSF expresses an opinion that RPA, and technical innovation in general in the public sector, is limited by the slow development of new regulations regarding technical solutions.

4.2.5 Governance
The RPA initiatives have not been coordinated between the internal organizations, as such the work with RPA has also been very decentralized. While there are RPA solutions present at at least seven suborganizations in Region Stockholm, there are no region-wide license agreements with RPA providers or any organizational guidelines for RPA implementation.

The governance structure of RPA at Region Stockholm most closely resembles a decentralized structure, moving towards federated with their new initiative. All decisions taken about RPA have been made at a local level with very little coordination. Thera are no region-wide license agreements with RPA providers, regional-wide platforms, or organizational guidelines for RPA implementation. In the model of Bygstad 2017 this would be a laissez-faire structure.

4.3 Västra Götalandsregionen

Six interviews were performed with Västra Götalandsregionen (VGR), two with a business developer digital workplace and a system administrator at the finance services department. Two with a solution architect at Sahlgrenska university hospital, one with an application specialist at VGR-IT and one with an RPA developer and a process owner. The question-area mapping can be found in Table 7.

Table 7 Question-area mapping - Västra Götalandsregionen.

	Enablers-Strategy	Enablers-Organization	Processes	Framework	Execution	Governance
Business developer	X	X			X	X
System administrator	X	X	X	X	X	X
Solution architect	X	X	X	X	X	X
Application specialist	X	X	X	X	X	X
Process owner	X		X		X	X
RPA developer	X	X	X	X	X	

Västra Götaland has multiple RPA initiatives. The largest are the initiatives in the IT department, which provides RPA in small scale to other parts of the organization and the department at finance services, which develops RPA solutions internally. The information presented is a summary of interviews with multiple persons in different departments.

4.3.1 Enablers

4.3.1.1 Strategy

The population in Västra Götaland, and Sweden in general, is ageing and to meet the expected increase in the need for healthcare the organization must become more efficient and redistribute resources to healthcare. The long-term goal of RPA implementation is to free up resources from administration. The short-term goal is to improve compliance and reduce human induced errors.

To reach these goals VGR is developing a RPA Center of Excellence providing a RPA platform for the rest of the organization while establishing guidelines and best practices as well as selling RPA solutions as a service.

4.3.1.2 Organization

VGR has worked with RPA since 2016, initially at small scale at Södra Älvsborgs sjukhus. The first processes were run there on a laptop in a locked cabin without internet connection to comply with the current information security guidelines. Since then, the RPA organization has developed, and there are now at least five RPA units distributed in VGR. One of these is the team at VGR-IT, responsible for hosting and maintaining the platform, developing RPA guidelines, and building RPA solutions as a service for the rest of the organization. Another team is the one located in financial services of the services department, Region Service, which sells finance services to the rest of the organization. There are also initiatives underway in a few of the hospitals, for instance Sahlgrenska is examining RPA as part of a project in digital development of the organization.

There are multiple departments performing RPA development, all with different scopes. The IT department sells RPA implementations of non-critical processes to the whole organization, while the finance services RPA team develop RPA solutions internally for the finance services department.

Sahlgrenska is mainly evaluating RPA and establishing use-cases and issues. There are no outspoken guidelines as to how RPA is supposed to be used in the organization.

IT is mostly insourced and owned by VGR-IT, which allows a high degree of control. System providers are allowed to update their systems the first Monday of each month and notice is given before larger changes. The system is perceived as stable, but some processes are run on the weekends to avoid peak-hours when some systems are strained.

4.3.1.2.1 Current solution

Counting the individual people known to the author who work with RPA to some extent in VGR results in nine individuals – but there are likely more. The extent of time spent working with RPA among these individuals is mixed, making an FTE estimation very uncertain.

The IT department has two consultants and a manager, finance services employ three developers working part time with RPA and part time in the organization together with two business analysts who volunteer in helping the department with documentation outside of their regular duties. Sahlgrenska has two employees working partly with RPA. The other initiatives also employ some RPA personnel, but the numbers and extents have not been made available to the study.

VGR uses UiPath as its platform, which is hosted on the premises by external personnel also tasked with the maintenance of the platform. There are currently twenty-two robots running at VGR, eight attended and fourteen unattended. The finance services RPA team report about 6 hours a week spent doing maintenance and the RPA team at VGR-IT report less than 10% of their average working time is spent doing maintenance. Sahlgrenska report that very little time is spent maintaining after the initial weeks post deployment.

4.3.2 Processes

*Table 8 Process summation – VGR. *) Hours reported by VGR-FS, other departments also perform maintenance.*

	Nr of processes	Nr of processes with related time information	Manual hours saved	AMHS*	AMHS per thousand employees *	Maintenance	Effort
Finance	13	11	9354	712	14	-	-
HR	4	4	687	172	3	-	-
Administration	8	4	11084	2771	39	-	-
Total	25	19	21125	1089	22	>290H*	-

Table 8 shows a summation of process information gathered from VGR. Further information and description of processes can be found in Appendix 2. Besides the processes in Table 8. VGR has implemented two processes which were only run once. The first was to send out a large number of emails to individuals holding a valid healthcare journey-card saving an estimated 700 hours of manual labor. The second was a smaller task estimated to have saved 70 hours of manual labor. Because of their single-use nature these processes have not been included in the tables and figures.

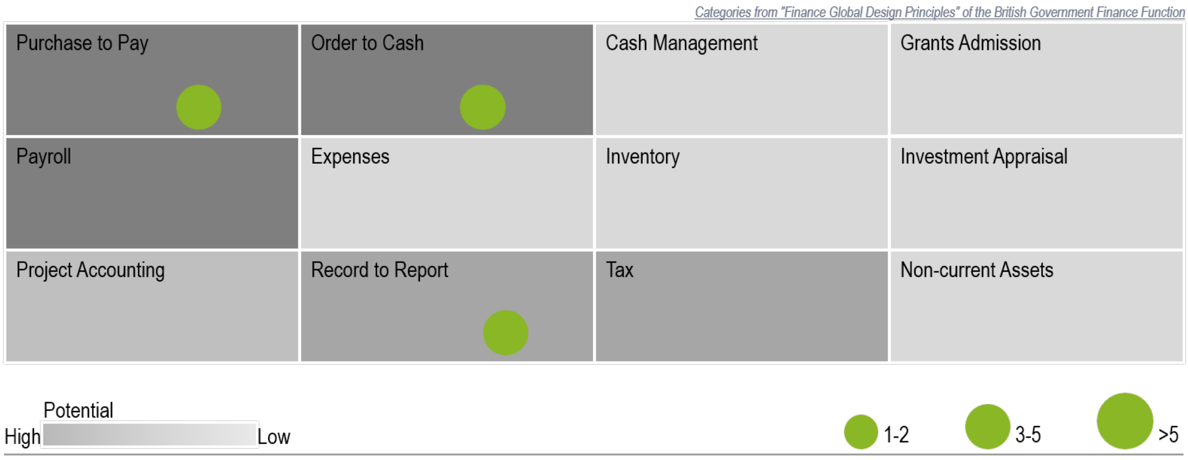

Figure 11 shows where in the finance area RPA solutions have been implemented in VGR.

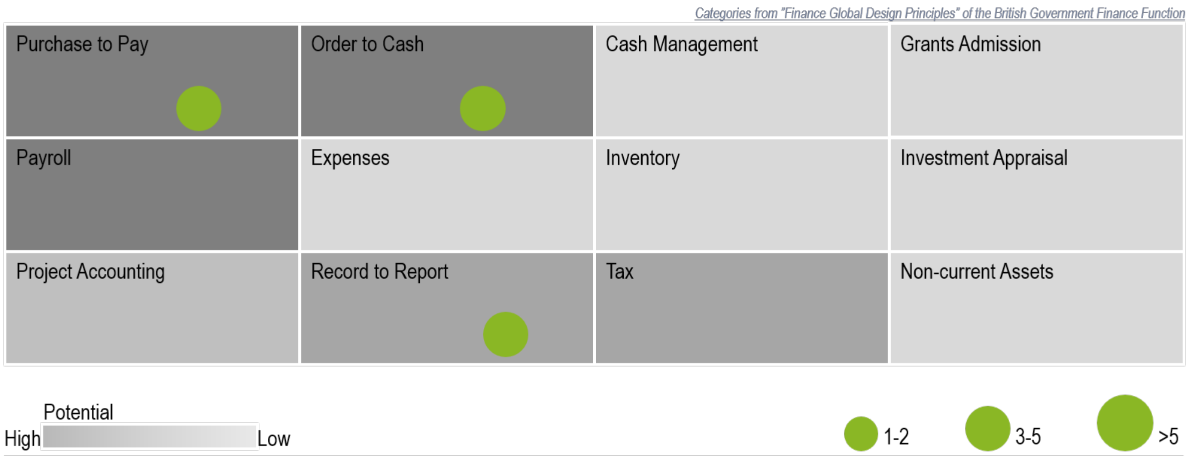

Figure 11 Mapping of VGR finance processes.

Figure 12 shows in which HR processes RPA solutions have been implemented in VGR.

Figure 12 Breakdown of VGR HR processes.

Table 9 shows a breakdown of the implemented finance processes in VGR.

Table 9 Process data - VGR. To calculate average manual hours saved only processes with correlated time saved information were included.

	VGR		
	Nr of processes	AMHS	AMHS per thousand employees
Purchase to Pay	3	90	2

Order to Cash	5	1210	25
Record to Report	3	505	10
Finance	11	712	14

Figure 13 displays a scatter plot of all implemented processes in VGR with corresponding manual hours saved information, five "outlier" processes have been highlighted: X-ray results, Reminder – debt collection, Healthcare journeys – invoice creation, Healthcare journeys – VGI letters and Statistics närhälsan – cash reconciliation.

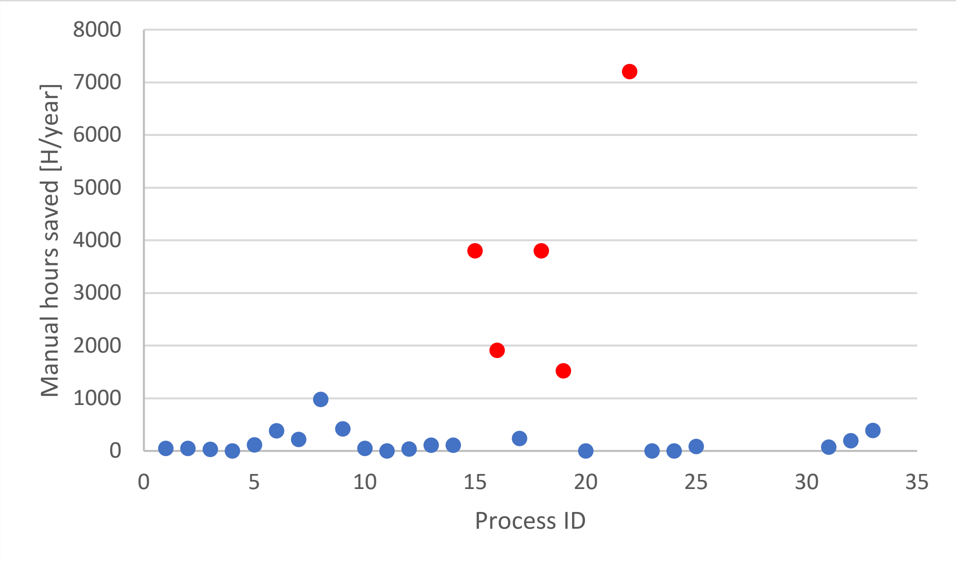

Figure 13 Scatter plot of manual hours saved - five outliers highlighted.

Table 10 displays average hours saved in VGR if outlier processes are excluded in the calculations.

Table 10 VGR average manual hours saved excluding outliers.

	VGR	
	Nr of processes	AMHS
Finance	9	236
HR	4	172
Administration	1	84
Total	14	207

4.3.2.1 Process example - Healthcare journeys invoice creation

The solution was developed by VGR-FS for the VGR-FS healthcare journeys department. The goal of the automation was to reduce manual hours spent for employees and to increase compliance with regulations since only 30% of journeys were examined prior to automation.

The process is connected to the process healthcare journeys – VGI Letters, which is a prerequisite for this process and was the first process of the healthcare journey related processes to be automated. The department has long been looking for a way to automate the process of creating invoices since it is very manually demanding and completely rule based. The process was low in priority by the department, even though they were by regulation forced to check all journeys, which they were unable to do manually because a lack of time. There was an almost finished automation concept using another technique developed by external consultants but after an employee at the department heard about the internal RPA initiative, the external project was put on hold. An RPA solution was developed in its stead since the department preferred to have an internal solution.

In the letter creation process all healthcare journeys supplied by Västgötatrafik in the last time-period are checked against current exceptions and a list of people holding exemption cards. All patients not covered by any exception or present in the exemption list are sent a letter informing them that they have thirty days to validate that they are exempt from payment or an invoice for the journey will be sent.

The invoice creation process picks up where the letter creation left off thirty days later. All journeys sent a letter in the previous iteration are cross-referenced against the now updated exemption list. If a person is not exempt an invoice is created in the finance system Raindance.

Implementing a robot solution changed the actual process very little but has greatly increased the scope of journeys validated. The solution was developed in stages, at first only parts of the process was automated but the automation grade grew over time and so did the percentage of journeys verified. From 30% of all journeys at first to all, around 60.000-65.000 journeys each month.

As a result of the automation 1.5 FTEs have been saved at the healthcare journeys department, no employees were let go but vacancies were left unfilled. It estimates another 0.5 FTE has been saved at the patient invoices department since the invoice information previously generated by the department was sent to them for creation. There were some initial fears of losing work-tasks, but the department is very happy with the solution and the verification task is not missed.

No issues were found during development, but testing was performed minutely since the process is patient-facing. When implementing the letter creation, the process was run in tandem with the departments manual work for multiple weeks and all output was compared to make sure it matched the manual output exactly.

There have been minor crashes, such as when the input file from Västtrafik had a column name changed causing the robot to not be able to run. But the solution is perceived as stable. The robot is run on weekends when the technical systems and applications are the least strained.

The next extension of the process will be to fetch the data file from the external system automatically.

The process has high quality input data extracted from an external information system. It is entirely rule-based and digital fulfilling the necessary conditions for RPA. It is also customer-facing increasing the automation risk since if there is an issue it will affect customers firsthand.

4.3.3 Framework

VGR-IT has developed templates for best coding practice as well as a template for process documentation, the PDD. The PDD has been further condensed by VGR-FS into the PAD, a more concise document focusing mainly on establishing the business case to help prioritize projects and to not overwhelm employees with an automation idea. In the VGR-FS delivery model the information from the PAD is used to evaluate the business case of the automation and to make a high-level estimate of programmability using the evaluation matrix. The PDD is then used to perform more in-depth documentation of prioritized processes and the information is used for a final automation decision. All mentioned documents can be found in the appendix.

4.3.4 Execution

4.3.4.1.1 Delivery model

As there are multiple RPA initiatives there are multiple delivery models. As an example the model found at finance services developed in collaboration with VGR-IT is presented. A flowchart of the delivery model used by the finance services RPA-unit can be found in appendix 3.

Processes are suggested by an operational employee. The employee is sent a process assessment document, PAD, which is filled out and sent to the RPA developers. The PAD information is used to estimate the business case of automating the process using an evaluation matrix. A process given high values is deemed a good fit for implementation and a PDD template is sent to the operational unit for processing.

From the PDD information a further evaluation of programmability is done, mainly on the grounds of complexity, system access and prior experience of the developer. If the process is deemed appropriate for RPA it is implemented from the specification in the PDD. The process is documented in a robot documentation document, RDD, which is kept for posterity and ease of maintenance.

After implementation, the department is informed, and the process is scheduled in the robot workflow. The process is maintained by the development team.

4.3.4.2 Reception

When the finance department started their RPA initiative, they noticed a quite intense opposition to their work from parts of the organization, both from employees and department heads. In the beginning of 2020, after some successful implementations, a shift in attitude could be noticed and more requests and larger interest was expressed.

Sahlgrenska and VGR-IT have had more positive feedback from the affected units, with one employee calling the implemented robot “the first actually helpful digitalization initiative”. VGR-IT has instead had some resistance from the IT personnel, feeling that RPA is “spaghetti code” and a short-term solution. VGR-IT has also noticed a problem getting suggestions on processes to implement, but they feel that this is due to lack of knowledge of RPA rather than organizational resistance.

The general results of the RPA-implementations have been FTE savings, higher compliance, and less errors in process execution.

4.3.4.3 Lessons learned

Process knowledge
Training internal staff in developing RPA-solutions is reported to be very beneficial, especially in early stages having employees with previous knowledge helped the RPA-project get off the ground when employees could identify easy-wins RPA-implementation from their previous departments.

What will happen to me?
For RPA-implementation to be successful it is important to have employees working with you, not against you. VGR reports that having an answer to the question “what will happen to me?” when automating a task performed by an employee is vital. It is suggested to develop employee training programs and for department heads to highlight the more fulfilling tasks the employee will be able to perform.

Successful examples
After an initial organizational resistance toward adopting RPA in the departments the attitude has now shifted after a few successful RPA-implementations. Starting RPA-implementation early and letting the organization mature into an adoption with the aid of successful examples and strategic information campaigns is vital.

Realistic time-estimates

For an accurate estimate of impact it is necessary to have accurate estimates of FTE-savings. A problem VGR noticed was that the time estimates of processes was unrealistically low, further investigation showed that managers purposefully gave low estimates as not to lose all the time in budget after the task was automated. Instructing managers in giving proper estimates and giving the option of using some of reallocated time for quality improvements enhances the situation.

4.3.4.4 Identified challenges

Cloud Access

Email or files in the cloud are not accessible by robots right now.

SITHS-authorization

No robots are issued SITHS-card credentials and cannot access systems requiring those. There is a possible workaround using an application layer interface but as of now no processes are implemented requiring SITHS-card authorization.

4.3.5 Governance

The VGR RPA initiative started decentralized but has developed into a federated structure and is further developing towards a more centralized but still federated organization with more standardization. The platform decisions, licensing, coding best practice are set by VGR-IT while the surrounding departments choose and often develop their own implementations. In the Bygstad 2017 framework VGR would most likely be classified as a mix between the platform model and the bi-modal model. VGR-IT has a central responsibility providing the platform and support while organizations are free to develop their own RPA capabilities. The IT-coupling could be classified as moderate.

There are a few mechanisms for governance implemented. VGR-IT has developed the templates for documentation and coding best practices. They also connect different RPA initiatives throughout the organization. All prioritization of processes is made by the developers themselves and there is little alignment between business and RPA while RPA is quite aligned with IT. A quite obvious example of the lack of governance is the fact that there are two simultaneous initiatives in establishing a Center of Excellence selling RPA to the organization.

5 Discussion

5.1 RPA

Many of the criteria for RPA suitability are the same as the suitability for automation in general, which highlights one of the main issues concerning RPA. Where does the process domain for traditional automation stop and where does the domain of RPA start? The reality seems to be that these are overlapping, and that there is no technical distinction of one from the other. Choosing automation method seems to be mostly a choice based on business case, strategic alignment, and technical landscape. A result of this is the problem of distributing responsibility between RPA-department and IT, which is mentioned as a source of resistance and problems in literature and shows itself as resistance from the IT department in the case study of VGR.

With enterprise software providers developing their own RPA capabilities the future in RPA is uncertain. Will RPA as a stand-alone system disappear when legacy systems are updated, and the remaining IT-silos can be implemented using capabilities of the existing IT systems? Will RPA technology move back into the IT function or even further into the business side of the organization when software providers as Microsoft enable RPA development and other low-code automation as a standard feature in their software licenses? Is the RPA Center of Excellence a too narrow department to meet future requirements? A general business process automation center might be more appropriate as the technique develops and is proposed as best practice by Gartner, a global research and advisory firm. Looking at the movement among the largest vendors there is a noticeable trend in moving from pure RPA into more general automation tools with prebuilt API-connectors and possibilities to build simple applications.

Using the data collected from Region Skåne, the average time from start of the process documentation to robot hand-over for a process implementation is calculated to 26 days, although heavily dependent on application, supporting the RPA claim of short implementation times.

5.2 Case Study

Making comparisons between organizations is not without problems. They might measure things differently or as in this thesis the distribution of available data between the regions has been unequal. Regardless there are conclusions that can be made, and in some cases when data is lacking there is often a possibility to discern trends or indications that might be useful. As a result of the lack of data from Region Stockholm, the discussion is mainly focused on results from Region Skåne and Västra Götalandsregionen.

5.2.1 Enablers

An obvious trend among the regions is the centralization of the RPA organization as they are moving towards scaling RPA. They are all in the process of establishing a Center of Excellence selling RPA as a service to the rest of the organization. While Region Stockholm and Västra Götalandsregionen might allow a hub-and-spokes model where internal organizations can retain RPA development capabilities, Region Skåne is moving towards a fully centralized model.

An interesting note looking at the establishing of RPA capabilities in all the regions is that it has not been implemented top-down but from inside the organization. Both the finance service at VGR and region service at Region Skåne are fully comprised of citizen-developers which through technical skills training have learned RPA development.

Lacking the appropriate data, it is unfortunately not possible to do a proper analysis about the resources used by the RPA initiatives in the regions. From the data gathered three conclusion can be drawn;

1. The RPA initiative in Region Skåne is most likely not yet profitable looking at time saved, and time spent, with an expected 5.5 FTEs spent and 5103 hours saved annually. Using the average yearly worktime in Sweden, 1474 hours, the time saved can be calculated to 3.5 FTEs. It is not likely to be saving the region any time yet.
2. The VGR FS team is profitable based on time saved and spent, with three part-time developers and the approximately 12 000 hours (corresponding to 8.5 FTEs) indicates a quite large amount of time saved.
3. The RPA initiative at VGR-IT is increasing the efficiency in the organization even counting only a single process. The lab-results surveillance process is estimated to save 7200 manual hours each year, almost 5 FTEs, outweighing the three FTEs of the VGR-IT RPA department.

The most similar RPA departments included in the study is the one at Region Skåne and the department at finance services at Västra Götalandsregionen. Both are located inside the support function for the organization and are comprised of three citizen-developers recruited from inside the organization who have learned RPA development on the job. The VGR developers are working part-time with RPA development. They also have about the same number of processes implemented – 24 and 23, respectively. The main differences between the teams are the tool used – NICE and UiPath, respectively, and the level of IT-coupling, the finance service RPA team has a large degree of support from the external RPA experts at VGR-IT who have developed coding best practices and structure capital as well as helped them with their delivery model. Further there is the obvious difference in size, Region Skåne has 36 000 employees while VGR has 49 000 employees. When comparing the time saved by the solutions implemented by the teams there is a quite large difference; VGRs solutions save around 12 000 hours each year while Region Skånes solutions save around 5 100 hours. Even when accounting for organization size the difference is significant. While this can be the result of any number of things, one interpretation is that a tighter IT-coupling for a team of citizen-developers is beneficial in terms of return on investment for the RPA initiative. Given the estimates of 690 and 288 hours annually spent maintaining processes for Region Skåne and VGR-FS respectively, concluding that only a fraction of the available FTEs are spent maintaining processes indicating that there is large room for further development of new processes in both regions.

5.2.2 Processes

From the process mapping it can be concluded that the main part of the processes gathered from the regions have been implemented in the Finance area, and specifically in three level two processes; Purchase to pay, Order to cash and Record to report. Also, the HR processes implemented conforms well to the areas indicated to have high automation potential from the literature study. Following Finance, the most common category of processes is general administration and then HR. The distribution of processes identified further confirms that there is potential for RPA in Finance and administrative processes while HR has yielded lower results.

We can discern a pattern where VGR has a generally higher number of manual hours saved per process, which is still significant when accounting for difference in organizational size. Further mapping the Finance processes to lower-level processes does not discern any obvious difference in process implementation area – indicating that the difference in manual hours saved per process is not connected to process area but rather to something different. Looking at Figure 13, five outliers can be identified which each save close to or more than twice as many hours than any of the other processes. Excluding these processes, the average hours saved per process is found to be very similar between the two regions: 207 to 222 hours, respectively.

Comparing the outlier and process area analysis it seems like the process characteristics explain the difference in time saved better than the area of implementation. This suggests that when identifying RPA initiatives, the focus should lay on process characteristics rather than field of inquiry.

Two main similarities were found between these outlier processes: first they all contain list or file comparisons and second, they all contain message or document creation from templates. To find possible sources of potential a comparison of the two invoice creation processes can be performed. The invoice creation in Region Skåne is very straight forward, extract the data from the template and input it into the invoice system. That is not the case for the healthcare journeys invoice creation – there are many exclusion criteria to check before an invoice can be created indicating the rather obvious; there is more time to save in a manually inefficient process. Furthermore, looking at the x-ray results process a unique characteristic were discerned; the manual process requires timing. There is no messaging system indicating a new result for a patient had been added to the system, forcing nurses to check the database for new results at chance. While a definitive conclusion cannot be made, requiring timing might be an indicator of potential for automation in a process.

A difference between the two invoice creation processes from the example in the Region Skåne section and VGR section is the quality of the input data, the data collected in the Excel-file in Region Skåne seem to be more unreliable than the data extracted by VGR from the Västtrafik system. This might account for the difference in faith put in the robots between the regions; VGR seem to put more faith into their robot than Region Skåne. VGR lets their solution send mail directly to patients, and there is no employee verification of invoices - they are automatically approved by the robot.

Another difference is the perception of the iterative approach to development, VGR perceives it as effortless while Region Skåne expresses scaling issues. The developer in VGR expresses that the UiPath platform has a much more efficient variable handling and lacks the memory dumping issues that they have experienced with NICE and that this might account for the ease of scaling when using UiPath.

5.2.3 Framework

VGR-FS has divided its data collection into two parts – the PAD and the PDD. The PAD is mainly distributed to establish a business case of the proposed process while the PDD is a complete process documentation. The reason for using the PAD is to lower the bar for process suggestions. In its experience making the organizations perform full documentation procedures for processes, which were later not automated, decreased the probability for sub-organizations to give new suggestions. Region Skåne minimizes documentation in early stages by filling the PDD document in stages – approval for the process is given when only the first part of the document is filled, and further documentation is then performed when the process is accepted for automation. To collect data Region Skåne use a more direct approach while VGR-FS mainly uses open questions with examples. This could be a potential reason for lower savings – Region Skåne collect less information for initial decision and prioritization of processes.

The study has not been able to find any structured or standardized way the regions handle initiative or project evaluation. Most estimates of manual hours saved seem to be directly taken from the estimated business case in the PDD and no follow-ups seem to be performed.

5.2.4 Execution

The reaction to RPA implementation has been mixed in the regions. While some, such as Sahlgrenska, report great employee engagement and adoption others report it to be hard to find processes and even employees refusing to help with documentation of tasks that are to be automated. These issues are further expressed in the challenges identified by the regions highlighting the importance of a change in management procedures when implementing RPA solutions.

The challenges expressed by the regions can be divided into three categories: organizational, technical, and judicial. The main organizational challenge is how to handle the organization when implementing a change such as RPA. The literature and Stockholm suggest including the organization early in the development will decrease resistance and VGR expands this with the suggestion to make sure that the employees affected knows what this change will mean for them. What new tasks will they have to perform, how will their work change? Further, VGR suggests that developing successful examples decrease resistance in its organization, when word spread of the possible decrease in menial labor an increase in interest could be detected. However, handling change is not a problem solely for RPA implementation and there are change management strategies that can be applied.

Continuing to the technical challenges they are mainly connected to access; foremost connected to the SITHS authorization methods while VGR also have some issues connected to accessing cloud services. While which applications use SITHS authentication is not standardized between regions the issue it the same. It is not possible to use unattended robots when SITHS-cards are required. This has also been acknowledged by Inerva – the company responsible for the SITHS-card authentication, while there is no solution in sight in the short term it seems like it will be developed in the future.

The judicial challenges are connected to what actions the robots are allowed to perform. While national organizations, such as the Swedish Tax Agency and the Swedish Social Insurance Agency, can delegate rule-based decisions to the robots this is not yet allowed for the regions. There is development in the area and a suggestion has been made to make the same rules applicable for regions and municipalities as for national organizations – that all decisions that can be delegated by the board and can be overruled should be legally allowed to automate. This change has been suggested to go into practice in the spring of 2022. A further judicial challenge mentioned is the access right of robots to systems containing medical records. This seems to be a non-issue legally, where Inerva (the organization providing the SITHS solution) in their research conclude that there are no legal challenges to accessing journal systems using robots. However, there is a requirement in place forcing multi factor authentication, which increase the complexity of implementing robot solutions.

5.2.5 Governance

In the governance paradigm of Bygstad 2017 all three regions most resemble models scoring low on securing. While all of them are going towards more centralized structures only Region Skåne is building a more securing structure by implementing a bi-modal model. Region Stockholm, most closely resembling a laissez-faire, structure is going towards a platform model, increasing resourcing while still low in securing. This indicates that the regions, contrary to the studies preconceived notions, have prioritized agility and innovation before security and stability.

Only Region Skåne were found to have any mechanisms in place for strategic alignment. The other regions are lacking in mechanisms for strategic alignment, a more structured approach could give direction and help drive the initiatives forward.

6 Conclusions

While it is challenging to compare data and organizations in this fashion, a few conclusions can still be drawn. To circle back to its purpose, this study will be concluded by answering the initial questions from the introduction.

What is the current state of RPA adoption?

RPA has been adopted by all three regions, while VGR seem to be furthest along with a well-defined support structure from the RPA team at VGR-IT they are all in a similar position where the next step is to create a more centralized organization and further develop the RPA initiative.

How is the RPA implementation structured in terms of:

- **Strategy & governance**
- **Organization structure and sourcing**
- **Tools**

In general RPA is used to make administrative units more efficient, in the short term to increase employee satisfaction and reduce errors but in the long-term RPA is seen as a tool in the effort to shift regional resources from administration to healthcare. The regions included are increasing their use of RPA and see it as a way to increase efficiency both now and in the future.

The governance structures are currently quite different, but the trend among the included regions is towards developing more centralized structures. The governance structures implemented by the regions are more prone to accentuate innovation and maximize resource use rather than security and reliability.

There is no trend among tools among the included regions: VGR use UiPath, Region Skåne NICE and Stockholm has not settled on a single tool yet.

What processes have been automated?

Most processes have been implemented in the field of Finance, representing more than 50% of the identified processes. Following Finance is administration and lastly HR. Of the administration processes only a few processes are implemented closely related to healthcare, and those that are, are administrative tasks with a single trial process in VGR where an RPA process is used to calculate suggestions for the amount of medicine to prescribe in a very specific case.

From the processes identified it seems that choosing the process to implement is important. The four most efficient processes save more time than the rest combined.

Process tasks and characteristics that might indicate a large potential for RPA implementation are list comparisons, document building from templates and the process being manually inefficient.

What challenges have been identified?

The largest challenge for regions connected to RPA is the problem with SITHS-cards forcing regions to build attended solutions or let the solution remain manual. A suggestion to develop a new user-type for RPA has been proposed but the timeframe for such a project is long and as of now it is not known if the project will be undertaken.

Another challenge for the regions has been to conclude what can be automated and what cannot – with the recent report (Nilsson, 2020) it has been made clearer what types of decisions are possible to automate.

What lessons have been learned?

Many lessons have been learned but in the authors opinion there seem to be a consensus that RPA projects require the inclusion of the employee who performs the task currently and will be affected by the implementation. Additionally, the implementation of RPA incentives employees to understand the process they are working in giving RPA the additional benefit of helping employees understand their and their colleagues work better.

With an ageing population comes a larger need for healthcare and a lower ratio between taxpayers and retirees, creating a large challenge for healthcare providers in Sweden. Automation and technical solutions are an important part in shifting limited funds from administration to care. RPA is growing into an important tool for the Swedish regions in the effort to do more for less.

7 Future work

Because of the time constraint and the difficulty in gathering information there is a lack in data especially from Region Stockholm, but also into the full extent of the RPA implementation in VGR. Further study of these Regions could be performed to complement the information gathered in this report. The regions chosen for this thesis are the largest in Sweden, comparing them to smaller regions could gain insights into what differentiates RPA implementation in small and large organizations. Further a more thorough examination of resources spent and saved by RPA implementation could benefit the included regions. With more time and larger regional involvement, the larger organizational impacts of the technology could be examined. Is employee satisfaction increased after implementation? Are errors reduced and patient care improved? Are resources being shifted from administration to healthcare or simply from administration to RPA implementation and maintenance?

There are still a lot of questions related to RPA that are not answered by this master thesis. The study has, however, provided a structured examination and insight to the RPA work performed within the three Swedish regions, Skåne, VGR and Stockholm.

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Appendix

Appendix 1 - Region Skåne

A1.1 Project structure

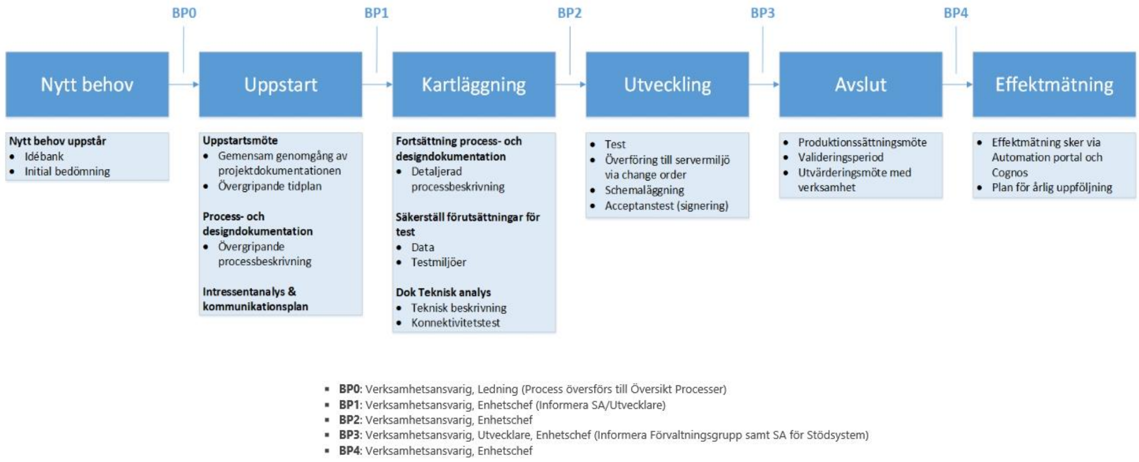


Figure A.1 Project structure diagram - Region Skåne. Official version from Region Skåne, in Swedish.

A1.2 PDD

Follows on next page, the document is in Swedish.

Regionservice
Digital förvaltning

RPA Process- och designdokumentation

Version

Datum	Version	Roll	Namn	Enhet	Funktion	Kommentar
191012	1.0					
191013	2.0					
	3.0					
	4.0					

Dokumentgodkännande Beslutspunkter (BP)

BP/ version	Godkänt av:	Roll	Namn	Organisation	Signatur och datum:
1.0	X				
	X				
	X				
2.0	X				
3.0					

**Elektronisk signeringsruta ska skapas*

Innehåll

1. Introduktion

1.1 Dokumentets syfte

Detta dokument beskriver processen som valts för automatisering med hjälp av Robotic Process Automation (RPA).

Dokumentet beskriver utförandet, villkoren och reglerna för processen **före** automatisering samt hur de förutses fungera **efter** automatisering. Huvudprincipen är att alla delar i dokumentet ska vara till nytta för olika intressenter och slutligen ligga till grund för de detaljer som krävs för att tillämpa robotautomation på den valda processen.

1.2 Kontaktpersoner

Roll	*Namn*	*RSID*	*Notering*
Verksamhetsspecialist			Kontaktperson stödsystem
Business Analyst			Kontaktperson processdetaljer och undantag
Processägare/Processansvarig			
Systemansvarig RPA			IT-representant
Systemansvarig (stödsystem)			
Ämnesexpert			Kontaktperson processdetaljer och undantag
Utvecklare			Ansvarig utvecklare

1.3 Minsta förutsättningar för automatisering

1. Digital, regelstyrd och standardiserad indata
2. Fullständig process- och designdokumentation
3. Testdata/miljö till utvecklarna
4. Tidplan för projektet
5. Beslutsvägar fastställda för BP1-BP4, intresseanalys & kommunikationsplan
6. Godkännande av informationsägare/processägare gällande data/information och riskanalyser
    a. Processen innehåller inte journalanteckningar eller annan känslig information.
    b. Processen innefattar inte beslut/attest
7. Stödjer lagar och regelverk gällande informationssäkerhet och dataskydd
8. Verksamheten ansvarar för all in- och utdata som produceras och ser till att mappar och filer inte byter namn/plats, samt att inga känsliga uppgifter sparas längre än nödvändigt
9. Användaråtkomst och användarkonton (licenser, behörigheter, behörighetsgrupp)
10. Autentiseringsuppgifter (användar-ID och lösenord) för inloggning på datorer och program
11. Ingen annan utveckling sker för denna process i nuläget.

Regionservice
Digital förvaltning

1.4 Parallella initiativ och annan utveckling

Nedan anges eventuella process- och systemförändringar och vad kan de ha för effekt på processen.

Initiativets Namn	*Inverkan på aktuell process?*	*Förväntat slutdatum*	*Kontaktperson för mer information*

2. Övergripande processbeskrivning

Här beskrivs den befintliga processen på en övergripande nivå för att ge utvecklare en generell förståelse för den aktuella processen.

2.1 Processöversikt

Allmän information om den process som valts för RPA Automation.

Objekt	*Beskrivning*
Processens namn	
Verksamhet och enhet	
Förvaltning	
Kort beskrivning av processen	
Behörigheter för att utföra processen	
Arbetsfrekvens	
Transaktionsvolym	
Genomsnittlig hanteringstid per utförande	
Uppskattad besparing (h/år)	
Effektmål	
Peak-period(er)	
Antal anställda som utför denna aktivitet	
Förväntade volymförändringar	
Förväntade undantag	
Input data	
Output data	

** Lägg till fler rader i tabellen för att inkludera relevanta data för automationsprocessen. Inga fält ska lämnas tomma. Använd "n/a" för de artiklar som inte gäller för den valda processen.*

2.2 Program som används i processen

Lista de program som används i processen. Lägg till fler rader för att komplettera listan över program.

Program	*Miljö/åtkomstmetod*	*Inloggningsmetod*
Raindance	Webbportal	
Excel	Applikation	
Pasis	Webbportal	

**Vid förändringar i stödsystem/regelverk/policys/övergripande instruktioner som påverkar RPA processen behöver information ges till RPA utvecklarna.*

2.3 Flödesschema före automatisering

[Bifoga ett Visio-flöde av processen före automatisering]

2.4 Flödesschema efter automatisering

[Bifoga ett Visio-flöde av processen efter automatisering] - Beskriv processen så detaljerat att BP1 kan beslutas]

3. Detaljerad processbeskrivning

I det här kapitlet beskrivs processen i detalj. Detta används av utvecklarna som underlag för att kunna bygga den automatiserade processen.

[Bifoga en detaljerad processbeskrivning för relevanta processteg, steg-för-steg]

3.1 Beskrivning av indata

*Bifoga Excel-mall för indata**	*Regler och Cellformat*	*Plats*
Indata.xlsx	Ange vilka regler som gäller för de olika fälten, t.ex. ”Datum måste anges med bindestreck: ÅÅÅÅ-MM-DD” Cellerna skall alltid formateras till text	R:\RPA Regionservice\GSF…

** Får ej innehålla känslig data. Fyll i dokument ”indata utdata RPA datasäkerhet” för att verifiera dataskydd och informationssäkerhet.*

3.2 Hantering av undantag

3.2.1 Kända fel eller undantag

Ange de steg som inte följer den tidigare beskrivna processen. Det kan t.ex. vara en popup som dyker upp i stödsystemet, eller att en viss sida tar ovanligt lång tid att ladda. Definiera också en åtgärd som roboten ska vidta om felet eller undantaget påträffas.

OBS! Tänk på att de fel som inte specificeras nedan kommer att hanteras som ”Okänt fel/undantag”.

*Steg**	*Undantag/Fel*	*Förväntad åtgärd*
3	Felmeddelande dyker upp	Klicka på ”Avbryt”

** Ange vilket steg i steg-för-steg-beskrivningen som undantaget gäller*

3.2.2 Timeout-hantering

Ange nedan vilken åtgärd Roboten skall vidta om ett oförutsett problem dyker upp (kan bero på externa faktorer, t.ex. att stödsystemet kraschar). Ange också vad roboten skall rapportera.

Steg	*Förväntad åtgärd*	*Rapportering*
Alla steg		

3.2.3 Rapportering

Ange vad roboten ska skriva i resultatfilen.

*Steg**	*Beskrivning*	*Rapportering*

** Ange vilket steg i steg-för-steg-beskrivningen som rapporteringen gäller*

3.3 Hantering av RPA-lösning (Fylls i av RPA-koordinator/Business Analyst)

Önskemål Cobot eller Robot*	
Önskemål schemaläggning**	
Cobot-dator	
Cobot-licenser	
Extra SITHS-kort	
Tillgång till R:\	
Access 2013	
Internet Explorer som standardwebbläsare	
Specialbeställning skärmlås	
Skala och layout: 100 % (Visningsalternativ)	
Lägga Change order	
Incidentprioritering på SharePoint RPA	
Uppföljning: • Effekter: mål och utvärdering Genomförande tid RPA process	

**Om RPA-lösningen kräver t.ex. ett fysiskt SITHS-kort måste det vara en Cobot. Tänk på att beställa Cobot-licenser och reserv-SITHS-kort!*

*** Tänk på att schemalagd tid kan påverka stödsystemets kapacitet eller annan prestanda. Schema bör läggas så att andra kritiska körningar, som körs samtidigt i aktuellt system, inte påverkas. Supporttider: vardagar 8-17.*

3.4 Backup-rutiner och kontrollmoment

Ange de rutiner och moment som ska säkerställa drift och kvalitet i processen.

4. Övriga Observationer

Exempel: specifika krav på revision och rapportering, etc.

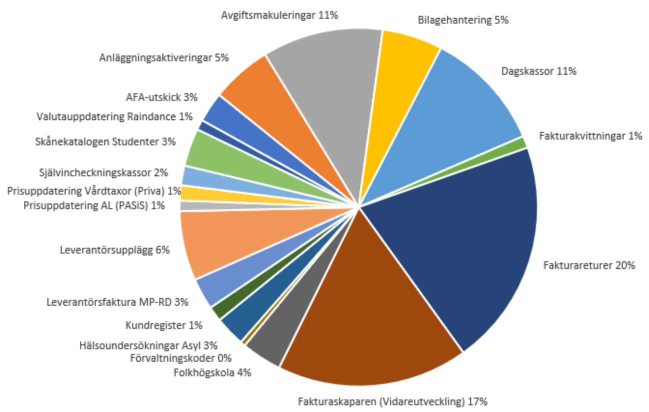
5. Ytterligare källor till processdokumentationen

Specificera nedan ifall det finns ytterligare material som skapats för att stödja processen kring automatisering. Bifoga gärna materialet.

Ytterligare källor		
Videoinspelning (valfri)		*Kommentar*
Regelverk (valfri)	*Länk till regelverk, riskanalyser, driftsgodkännande*	*Kommentar*
Annan dokumentation (valfri)	*Infoga länk till övrig processdokumentation, processbeskrivning, flödesbeskrivning, filer, SAD, UAT, acceptanstest, driftöverlämningsinformation, rutiner under valideringsperiod, nedlagd tid utvecklade processer etc.)*	*Kommentar*

** Lägg till fler rader i tabellen för att komplettera*

A1.3 Process descriptions & Data

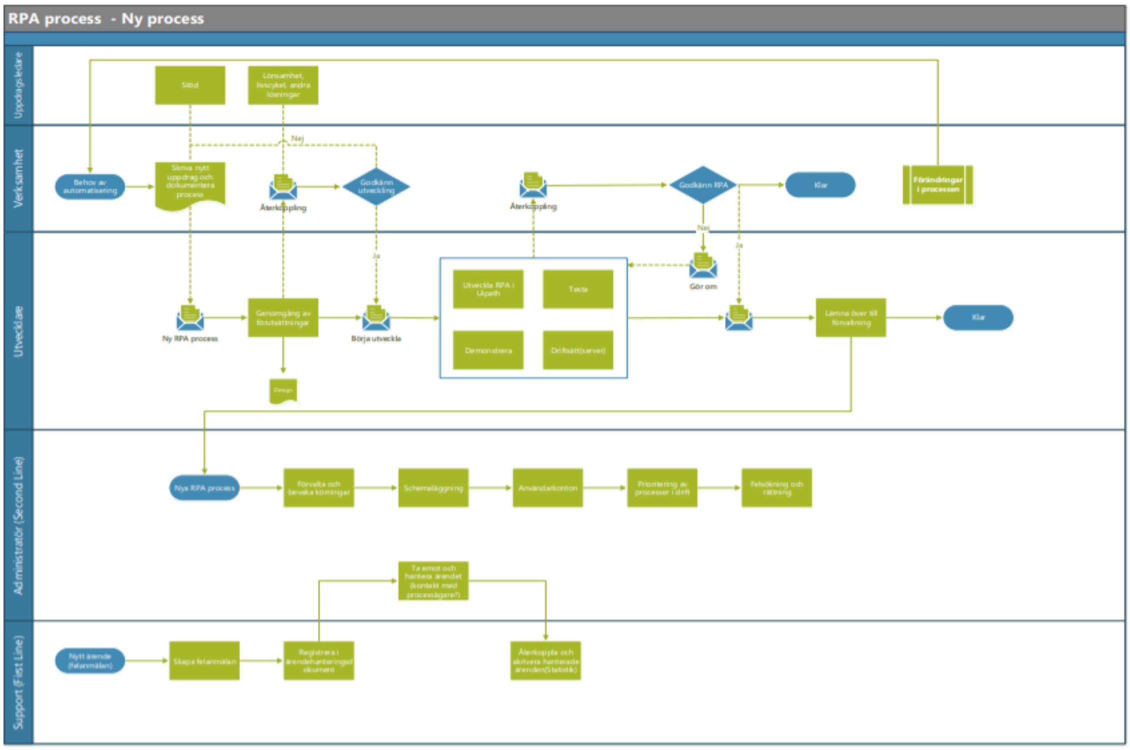


Processnamn		Besparing h/år
Fakturareturer	...	900
Fakturaskaparen (Vidareutveckling)	...	760
Avgiftsmakuleringar	...	480
Dagskassor	...	480
Leverantörsupplägg	...	276
Anläggningsaktiveringar	...	240
Bilagehantering	...	240
Folkhögskola	...	160
Skånekatalogen Studenter	...	150
Leverantörsfaktura MP-RD	...	125
Hälsoundersökningar Asyl	...	120
AFA-utskick	...	120
Självincheckningskassor	...	78
Prisuppdatering Vårdtaxor (Priva)	...	60
Kundregister	...	60
Fakturakvittningar	...	48
Prisuppdatering AL (PASiS)	...	42
Valutauppdatering Raindance	...	40
Förvaltningskoder	...	20

Process name	**Manual Hours saved Annually**	**Process Category**	**Development time [H]**
Invoice returns	900	Finance	30
Invoice creation – further development	760	Finance	60
Fee shredding	480	Finance	30
Cash registers	480	Finance	30
Adding supplier	276	Finance	60
Facility register	249	Administration	30
Attachment handling	240	Finance	14
Community college	160	Administration	14
Skånekatalogen student	150	Administration	30
Supplier invoice MP-RD	125	Finance	14
Health checks Asylum seekers	120	Administration	30
AFA-mailing	120	Administration	30
Self-check-in registers	78	Finance	14
Price update Health care prices (Priva)	60	Finance	14
Customer register	60	Finance	30
Invoice receipts	48	Finance	14
Price update AL (PASiS)	42	Finance	14
Currency update Raindance	40	Finance	14
Management codes	20	Administration	14
Principals' correction	240	Finance	-
Special compensation	25	Administration	-
Authorization termination	100	Administration	-
Locker access termination	330	Administration	-

Appendix 2 - Västra Götalandsregionen

A2.1 Project structure



A2.2 PAD

Follows on next page, the document is in Swedish.

PAD – Process Analys Dokument	(Processnamn (Använd namnstandard))
Författare:	**Datum: 2020-12-01**
Versionsnummer: 0.1	**Antal sidor Klicka eller tryck här för att ange text.**

Dokumentinformation

Kontaktpersoner

Namn	Roll	Kontaktuppgifter

Bilagor

Dokumentnamn	Länk

1 Processanalys

1.1 Övergripande beskrivning av processen – vad är syftet?

Ex. Beskriva varför verksamheten gör processen, vad är syftet/målet med att utförandet.

1.2 Automatiseringens mål

Ex. Vad är det man vill uppnå med att automatisera processen? Bottnar ofta i ett problem man upplever eller ett önskemål till förändring. Ex att man inte hinner hantera alla fakturor på utsatt tid eller att man önskar hantera en större mängd fakturor på samma tid/antal anställda.

1.3 Genomförbarhet/Hinder/Komplexitet

Ex. Finns det några utmaningar? Finns det specifika orosmoment t.ex. ostabila system, PDF-läsning, instabil IT-miljö, svårt att hitta selektorer, många komplicerade loopar, många beslutsvägar, verksamhetskritisk process, ej tillgängliga processexperter etc.

1.4 Business Case

Denna information om den manuella processen kommer att användas för att räkna ut business Case för information, beslutsfattande och uppföljning. Ofta behöver siffrorna uppskattas och återbesökas i ett senare skede.

Befintlig eller skapad process

Existerar processen sedan tidigare eller tas den fram i samband med automatiseringen?

Transaktionsvolym

Hur många transaktioner sker i processen per månad? Detta kan vara ett genomsnitt uträknat över ett år. T.ex. en budgetprocess som körs en gång i kvartalet beräknas köra 0,33 gånger per månad. En omorganisationsprocess där det sker tre omorganisationer per år utförs 0,25 gånger per månad.

Tid per transaktion

Detta är den tid det tar att hantera en transaktion när processen görs manuellt. Tiden inkluderar inte felhantering.

Procent av processen som INTE automatiseras

Hur många % av den manuella processen automatiseras inte? T.ex. anta att det finns ett manuellt steg I mitten av AS-IS processen som inte går att automatisera. Om detta steg tar 6 minuter och den totala processen tar 60 minuter innebär det att 10% av processen inte automatiseras.

Process-specifika kostnader per månad

Kostnader som endast inträffar om processen körs manuellt. T.ex. finns licenskostnader för personer som arbetar i den processen som ersätts av en licens för roboten. Orsakar den manuella processen merkostnad om den inte utförs i tid eller att verksamheten köper externa konsulter för den manuella processen.

Eliminerade fel per månad

Genomsnittligt antal fel som inträffar I den manuella processen som behöver hanteras av en person i processen/processexpert för att processen ska fungera som den ska.

Tid sparad/fel

Genomsnittlig tid som läggs på att hantera ett fel.

Processens livslängd

Hur ser behovet av processen ut i framtiden? Hur länge kommer processen att behöva utföras? Kan behovet t.ex. försvinna när nytt system som ingår i processen upphandlas.

1.5 Behov och önskemål inför ny-läge

Nytillkomna möjligheter/behov som kan uppfyllas med den automatiserade processen.
Ex. Man önskar sammanställa en rapport och skicka till ledningsgruppen, vilket ingen gjort hittills pga tidsbrist men har varit önskat från ledningen, man önskar en Excel-fil istället för pdf så att man kan läsa in siffrorna i ekonomisystemet

1.6 Roller

Ex. Roller som indirekt eller direkt berörs av processen. Operativa roller (gör moment i processen), beslutande roller, informerande roller, it-roller etc.

1.7 Risker som påverkar processen

Definiera både risker som kan påverka verksamheten (och affären) samt robotiseringen.

Nr.	Identifierad Risk	Åtgärd
	Ex. Systemen blir överbelastade vid ca. 12-14 dagligen, vilket leder till fördröjningar i systemen som i sin tur påverkar processens handläggningstider.	Ex. Mellan kl. 12-14 körs ej processen
	Ex. Vid månadsbrytning inkommer fler ärenden än normalt.	
	Ex intranätet är väldigt ostabilt i perioder	
	Ex Stor systemuppgradering av ekonomisystemet planerat till nästa år	
	Ex. Mejlutskick görs till kund vilket innebär att varje felaktigt utskick ger en missnöjd kund.	

1.8 Nyckeltal

Nr.	Beskrivning
	Ex. Tidsvinst, kvalitetsökning, processefterlevnad, stressreducering, volymökning etc.

A2.3 PDD
Follows on next page, the document is in Swedish.

PDD – Process Definition Dokument	(Processnamn (Använd namnstandard))
Författare:	**Datum: 2019-10-02**
Versionsnummer: 0.1	**Antal sidor Klicka eller tryck här för att ange text.**

VÄSTRA GÖTALANDSREGIONEN

Dokumentinformation

Dokumenthistorik

Version	Beskrivning av ändring	Datum	Författare

Godkännande

Version	Godkänd av	Titel, avdelning	Datum

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	Ex Stor systemuppgradering av ekonomisystemet planerat till nästa år	
	Ex. Mejlutskick görs till kund vilket innebär att varje felaktigt utskick ger en missnöjd kund.	

1.8 Nyckeltal

Nr.	Beskrivning
	Ex. Tidsvinst, kvalitetsökning, processefterlevnad, stressreducering, volymökning etc.

2 Processinformation

2.1 Processflöde

Ex. Övergripande processkarta

2.2 Processens indata

Ex. Data från en Excellista etc.

2.3 Processens utdata

Ex. Färdig faktura, rapportering etc.

2.4 Krav

Nedan detaljeras samtliga krav på processen.

Händelseflöden

Ex. Välj alltid Bankgironummer om det finns registrerat hos kunden. Månad för perioden ska väljas före år vid registrering av en ny faktura

Urvalskriterier och/eller definitioner

Ex. Mejl med bilaga har dokumentkod ”Brev i Dittjänsten” medan i Postlådan används ”Endast bilaga”.

Felhantering, undantag och avvikelser

Ex. Ärenden som blivit registrerade i system A måste reverseras om de inte kan registreras i system B. Alla ärenden som inte kunde hanteras måste meddelas handläggare för manuell hantering. Handläggaren ska få information om personnummer, adress och datum för icke hanterade ärenden.

Rapportering

Ex. Närmaste chef ska få en rapport på alla dagens fakturerade fakturor innan nästföljande dag.

Säkerhet och datahantering

Ex. Inga personuppgifter får mejlas i flödet. Personuppgifter får inte lagras på annat sätt än i System A.
Ex. Endast personer utan skyddad identitet får behandlas. Endast svenska leverantörer får behandlas i processen.

Systeminteraktioner

Absoluta krav på systeminteraktioner. Ex. System A får endast interageras med filöverföring, ingen direkt access till System A.

Tidsramar

Processen måste vara klar innan kl 18 på söndagar.

3 Robotiseringsinformation

3.1 System och applikationer för samtliga miljöer

Ex. Vilka miljöer ska användas för att kunna köra Test?

Applikations-namn	Ägandeskap [Extern/Intern]	Typ	Version	Behörighet krävs	Modul/ Transaktion	Tillgänglighet
Ex. Collectum	Ex. Extern	Ex. Web	1.3.4.	Ex. Ja	Ex. Download_invoice	Ex. 24/7

3.2 Behörighet till Mappar och Funktionsbrevlådor

Ex. Filer sparas i P:xxxxxx?

Namn	Ägandeskap	Typ
Ex. C:\xx1\Desktop	Ex. Enhetsnamn	Ex. Mapp/FBL

4 Detaljbeskrivning av processen

Dokumentera steg för steg hela processen, ett klick – en ruta, tillsammans med en print screen. Här finns all specifik information, ex vilken URL-länk man ska använda, kolumn-namn i excelfil, mappfilsnamn, sökvägar etc

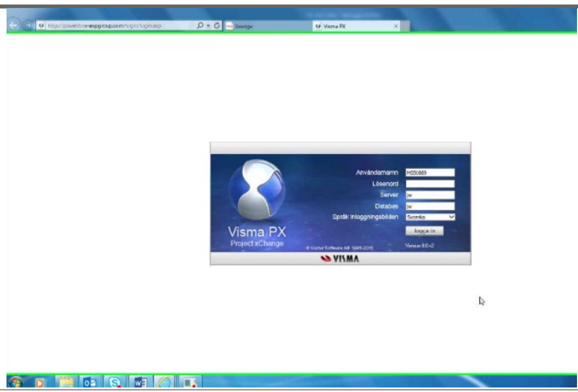
4.1 Process-specifika manuella krav för kund

För att processen ska fungera ordentligt behöver kunden säkerställa dessa krav. Nedanstående lista är särskilt användbar för felsökning vid incidenter.

Checklista för kundens inputdata och system. Nedan listas dem delar som kan påverka RPA processen samt säkerställas innan felanmälan.

Nr.	Beskrivning
	Ex. Är inputdata korrekt, uppdaterad och ifylld?
	Ex. Har datafiler, excelfiler, dokument, mallar ändrats?
	Ex. Ny namngivningsstandard?
	Ex. Nya kolumner? Fält? Dropdowns? Menyer?
	Ex. Datafil i samma mapp? Samma sökväg? Korrekt format? (txt, jvs, pdf)
	Ex. Tid /datum korrekt?
	Ex. Uppdaterat eller ny version av system?

4.2 Detaljbeskrivning av processen

ID	Beskrivning	Screenshot
	Öppna XYZ Logga in	

A2.4 Process descriptions & Data

Process name	***Hours saved/year***	***Class***
Customer-id list Barium	52	Finance
Customer-id list Serviceweb	48	Finance
Notice analysis	30	HR
Attachments supplier invoice	-	Finance
Supplier invoice copies	120	Finance
Applicant interest - COVID19	385	HR
Applicant interest - Mail	220	HR
Cash reconciliation - NH/RH RD	980	Finance
Cash reconciliation-NH/RH StgC	420	Finance
Contact person list - Barium	52	HR
Customer invoice attachments - Barium	-	Finance
Supplier invoice statistics	40	Finance
Monthly reconciliation - subscriptions	114	Finance
New foreign supplier	110	Finance
Reminder - debt collection	3800	Finance
Healthcare journeys - Invoice creation	1910	Finance
Healthcare journeys - BOM-journeys	240	Finance
Healthcare journeys - VGI letters	3800	Administration
Statistics närhälsan - cash reconciliation	1520	Finance
SU attachment handling	-	Finance
X-ray results	7200	Administration
Data transfer - StecketNu to VÄJ	-	Administration
Infection tracing - Covid 19	-	Administration
Reconciliation - KPP Files	84	Administration
Health declarations	-	Administration
The Cordarone process	-	Administration
The sick leave process	-	Administration
Healthcare journeys – out-of-region	72	Finance
Reference import - VAN-service from marketplace	195	Finance
Invoice count & report	390	Finance
Total time saved	21720	