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Master's Thesis

Process improvement for problem management: A case study of Basware

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Abstract

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This master's thesis researches an internal improvement project regarding the problem management process at Basware as a case study. Problem management had been previously implemented at Basware but improvements were needed due to identified knowledge gaps in the current process. The main objectives were to find out how problem management was currently done, how the related incident management and its resolution times can be reduced and how can the effectiveness, i.e. ability to reduce the number of recurring incidents, of problem management be measured.

Process development is usually more effective if it is based on an existing framework. Basware's problem management was highly relying on ITIL's version of the process so that was used as the basis for the process improvements. Utilization of the known error database, customer communication templates and cleared roles and responsibilities were amongst the improvements made.

In order to evaluate the success of the implemented improvements, a set of metrics to measure the success is needed. During this project, key performance indicators, also known as KPIs were defined to enable this. Additionally, operational level agreements as a prerequisite to meet promises made to customers in service level agreements were discussed and several new metrics identified in the process.

Keywords
Problem management, ITIL, process development, case study

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1 Introduction

1.1 Background of the thesis

Basware decided to upgrade their out-dated customer support ticketing system, BMC's Action Request System, in late 2011 to a newer one. Remedy ITSM, also made by BMC was chosen to be the successor. As Remedy ITSM is designed to support ITIL with its aligned incident and problem management modules (BMC, 2014), the software was seen as a possibility to drive Basware's internal processes to follow the ITIL framework more closely. ITIL (2014) is defined as "the most widely adopted approach for IT Service Management in the world. It provides a practical, no-nonsense framework for identifying, planning, delivering and supporting IT services to the business." The strongest benefits of Remedy ITSM were considered to be its dedicated and interoperable modules for incident, problem and change management, knowledge base, enhanced reporting possibilities amongst others.

The initial implementation of Remedy ITSM was done in late 2011 and taken into production in the start of 2012. Supplier's sales pitch about every module working "out-of-the-box" was soon realized to be untrue and in reality, all modules needed extensive configuration to suit the needs of Basware. The utilization rate of the modules was restricted to incident management and even that left room for improvement. In August 2013, after a year of Remedy ITSM's production use, top management made a decision to review and improve both incident and problem management processes. Internal projects were launched to achieve this. The author of the thesis was appointed the project manager for the problem management project.

The benefits of implementing ITIL can be financially very beneficial to the organization; Avaya (Hewlett-Packard, 2011) was able to reduce its budget by 30 percent with more efficient reporting, better decision making, and lower service delivery and problem resolution times, while improving the end user experience and business continuity. Similarly, Procter & Gamble started a worldwide effort in 1999 to streamline the number of applications their help desks were supporting. IT departments were able to reduce the operating costs by six to eight percent and achieve

a 15-20 percent reduction in technology personnel. Root cause analysis of trends in help desk requests resulted in a 10 percent reduction in total number of help desk calls (Khan, 2012).

BMC's Remedy ITSM provides excellent opportunities to utilize the ITIL framework to the fullest extent. Therefore, this framework was the basis for finding best practices in terms of process improvement. As mentioned before, Basware's internal processes were already following ITIL to a certain degree, but there was room for improvement. Proper implementation of the problem management process can highly benefit Basware by preventing unnecessary service disruptions, helping in maintaining the promised service levels, meeting service availability and uptime requirements, as well as increasing support staff efficiency and thus improving customer satisfaction.

1.2 Aim and purpose

Problem management as a process was not properly implemented or trained to the relevant stakeholders in the initial launch of Remedy ITSM in 2012, as described in the previous chapter. This has resulted in lack of ownership, unclear instructions and confusion in the problem management process. The project was launched to streamline the process, make the roles and responsibilities clear for all stakeholders involved. Additionally customer communication of the progress of an on-going problem investigation needed clarification.

1.3 Research problem and questions

Problem management as a process had been introduced at Basware during the implementation project of Remedy ITSM but as majority of all change management projects fail (Harrington, 2006), this project had not been successful either. Since problem management was not adapted as a process throughout the organization, at least not in the same way, the first thing that must be investigated is the status quo, the existing state of problem management at Basware. The aim of the study is to recognize the most beneficial changes to the problem management process with the minimum amount of change management. The effectiveness of problem management is

determined by its ability to decrease the number of recurring incidents and shortening the incident resolution time lifecycle.

Therefore the research questions are as follows:

Q1: How is problem management currently done at Basware?
Q2: How to reduce the incident resolution time?
Q3: How to measure the effectiveness of problem management?

1.4 Scope of the study

Basware as a company is internally split into three different business units, depending on nature of the offered services of products. There are Solution Services for license products, Network Services for transaction services and SaaS for license products that are offered as SaaS. This research will mainly concentrate on the Network Services unit since this is the author's own business unit and therefore the most familiar. Through personal experience it will be therefore easily identified whether improvement is achieved with this project or not. The research will not extend to the training nor the actual implementation of the new process.

1.5 Structure of the thesis

This thesis is divided into seven chapters. The structure follows a linear analysis case study design (Yin, 2009). An overview of each part is summarized in this subchapter.

Chapter 1 presents the background and brings insight to the investigated topic, presents the aim and purpose as well as the scope of the study and the research questions that this study aims to answer.

Chapters 2 and 3 present the relevant theoretical framework for this study. Chapter 2 focuses on process development; its development tools and ways of measurement whereas chapter 3 presents the problem management process framework designed by ITIL.

Chapter 4 sheds light on the used research method for this study and further describes the ways data was gathered for analysis.

Chapter 5 illustrates the course and progress of the project that was investigated for this study and summarizes the results and outcomes of the project. Key meetings and their results are presented as well as other deliverables of the project.

Chapters 6 and 7 summarize this thesis by providing discussion and conclusions for this study. Also suggestions are provided for further actions that could be pursued at Basware.

2 Process Development

One way of approaching processing development, is to start it from scratch but a wide list of frameworks provide a much more efficient starting point for this. As Knapp states (2010) a framework is a logical structure for classifying and organizing otherwise complex information. A process framework describes the best practices that can be used to define and also continually improve a process of a set of processes. Additionally, process frameworks also provide organizations with a common vocabulary that they can use when describing and executing these processes. A framework does not contain the mandatory requirements found in a standard compliancy, therefore organizations can choose to adopt some the practices and choose to disregard others.

2.1 Process Improvement Tools

Balanced Scorecard Institute (1996) defines process improvement as means of making things better, not just fighting fires or managing crises. Successful process improvement sets aside the common practice of blaming people for problems and failures, but instead focuses on how things can be done in a better way. Improvement in a process is accomplished by seeking to learn what causes things to happen in a process and to use this knowledge to reduce variation, remove activities that contribute no value to the product or service produced, and improve customer satisfaction. (Balanced Scorecard Institute, 1996).

Understanding processes so that they can be improved with a systematic approach requires the knowledge of a set of tools or techniques. In order to use these tools and techniques in an effective manner, they should applied by the people who are in fact working with these processes. The assurance of management's will to improve the quality of the processes is crucial to the commitment of the people involved. Managers must show they are committed by providing support in the training and implementation (Department of Trade and Industry, 2014).

2.1.1 DRIVE

DRIVE is an approach to problem solving and analysis that can be used as part of process improvement. The process consists of five stages:

- Define
- Review
- Identify
- Verify
- Execute

In the first step of the process, the scope of the problem, the criteria by which success will be measured and the deliverables and success factors are defined. Second stage reviews the current situation and aims to understand the background of the situation. It further identifies and collects information, including performance, identifying problem areas, improvements and so-called quick wins. Quick win is an improvement that is visible, has immediate benefit, and can be delivered quickly after the project begins. Quick wins can boost the morale of the people working on the project and increase the probability of a successful project.

Third stage identifies improvements or solutions to the problem at hand, as well as the required changes to enable and sustain the improvements. Fourth stage checks that the improvements will deliver benefits that meet the defined success criteria that were defined in step 1 and prioritises and pilots the improvements. In the fifth stage, a plan to implement the solutions and improvements is made, a review on the success of the implementation is planned and feedback is gathered and reviewed (Department of Trade and Industry, 2014).

2.1.2 Mindmapping

A mind map is a very popular tool and can be used for a number of purposes, e.g. brainstorming, note taking, drafting of documents, project planning and other tasks that require hierarchical structuring of information. Mind maps start with a central node, also known as the root, which represents the main topic the mind map is about.

Child nodes branch out from the root in order to describe sub topics. A mind map outlines the topic but has a strong focus in the graphical representation. Mind maps that created on a computer can also contain links to related files, hyperlinks to websites, pictures and notes (Beel & Langer, 2011).

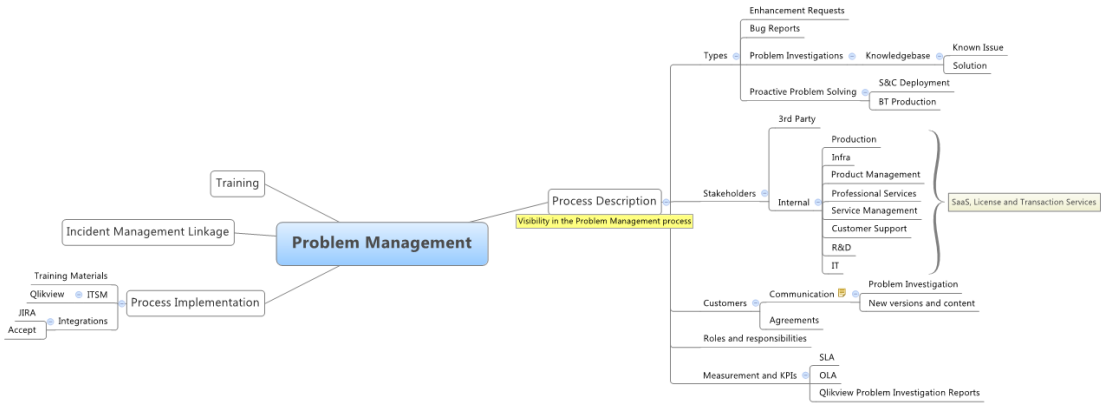

Figure 1. Example of a mind map. Basware (2013a).

2.2 Key Performance Indicators

Key Performance Indicators or KPIs can be defined as "a set of quantifiable measures that a company or industry uses to gauge or compare performance in terms of meeting their strategic and operational goals" (Bauer, 2004). Office of Government Commerce (2007a) defines KPI as "a specific, agreed level of performance that will be used to measure the effectiveness of an organization or process".

KPIs can be seen as instruments to control the status of the organization. They make it easier to concentrate on the important matters and enable in time notion of potential dangers (Norat, 2008). In addition, they help to improve morale in an organization and stimulate healthy competition between process owners and help to better align the IT department with organizations business goals. Managers, process owners and staff can also use those KPIs to measure their task status.

In order to select appropriate KPI for respective business, it is better to consider these basic strategic concepts such as be Meaningful, Proactive, Readily Available, Oriented to Department Goals and Specific (MPROS) characteristics. Meaningful – ensure that

the KPI is measuring a meaningful are the specific business. Sometimes metrics are aligned to represent very accurate information but from a totally meaningless area. Proactive – Commonly KPIs are set based on existing data because it is familiar. Instead, the metrics should focus on measuring proactive indicators. Readily available – KPIs should available in real-time, if not possible, then at least towards in the end of the month when these figures are usually needed. Oriented to Department Goals - The KPIs should be included into the set of departmental goals to assure two important benefit. Firstly, to get support from department top management. Secondly, to ensure that the KPIs are being used by the executioners. Specific – In order to get the required data, it should be specific. (Norat, 2008).

2.3 Service Level Agreement

Hiles (2010) defines a service level agreement as "an agreement between the service provider and its customers quantifying the minimum acceptable service to the customer". It is always a mutual agreement between two parties, the provider and the recipient and it defines the service level. This is clearly an extremely important item of documentation for both parties.

According to Gaiser and Schreiner (2009) SLA will be able to:

- Identify and define the customer's needs
- Provide a framework for understanding
- Simplify complex issues
- Reduce areas of conflict
- Encourage dialog in the event of disputes
- Eliminate unrealistic expectations

Figure 2 aims to illustrate the correlation between the cost and risk in service level definition. The non- or self-support represents low priority, non-critical services whereas high service level represent mission critical or otherwise high value services (Hiles, 2010).

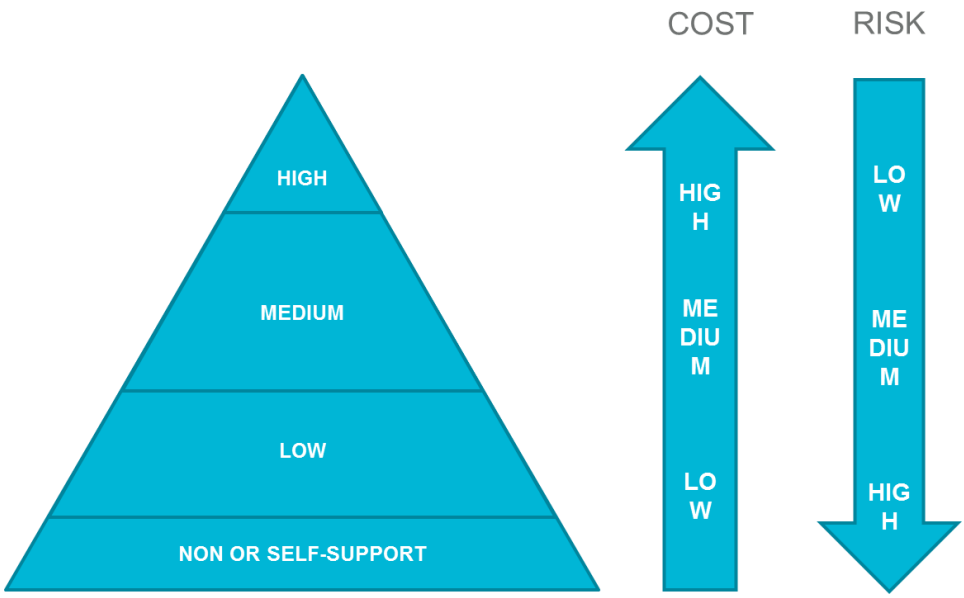

Figure 2. Pyramid Model of Service Level. Adapted from Hiles (2010).

According to Office of Government Office (2007b) the emphasis must be on agreement and the SLA should not be used "as a way of holding one side or the other to ransom". The SLA should be seen as a mutually beneficial agreement; a true partnership should be developed between the IT service provider and the customer, so that a mutually beneficial agreement is reached. Otherwise the SLA could quickly fall into disrepute and a 'blame culture' could develop that would prevent any true service quality improvements from taking place.

2.4 Operational Level Agreement

Agarwal (2013) defines operational level agreement, commonly abbreviated as OLA, as an agreement between the service provider and another party within the same organization. An OLA can be seen as a prerequisite to help the service provider to meet the SLA requirements. In other words an OLA defines how various groups within a company plan to deliver a service.

The ITSM Encyclopedia (2007) further describes that the promises made in the SLA have to be measurable and completely supported by the OLAs that the service level agreement relies on.

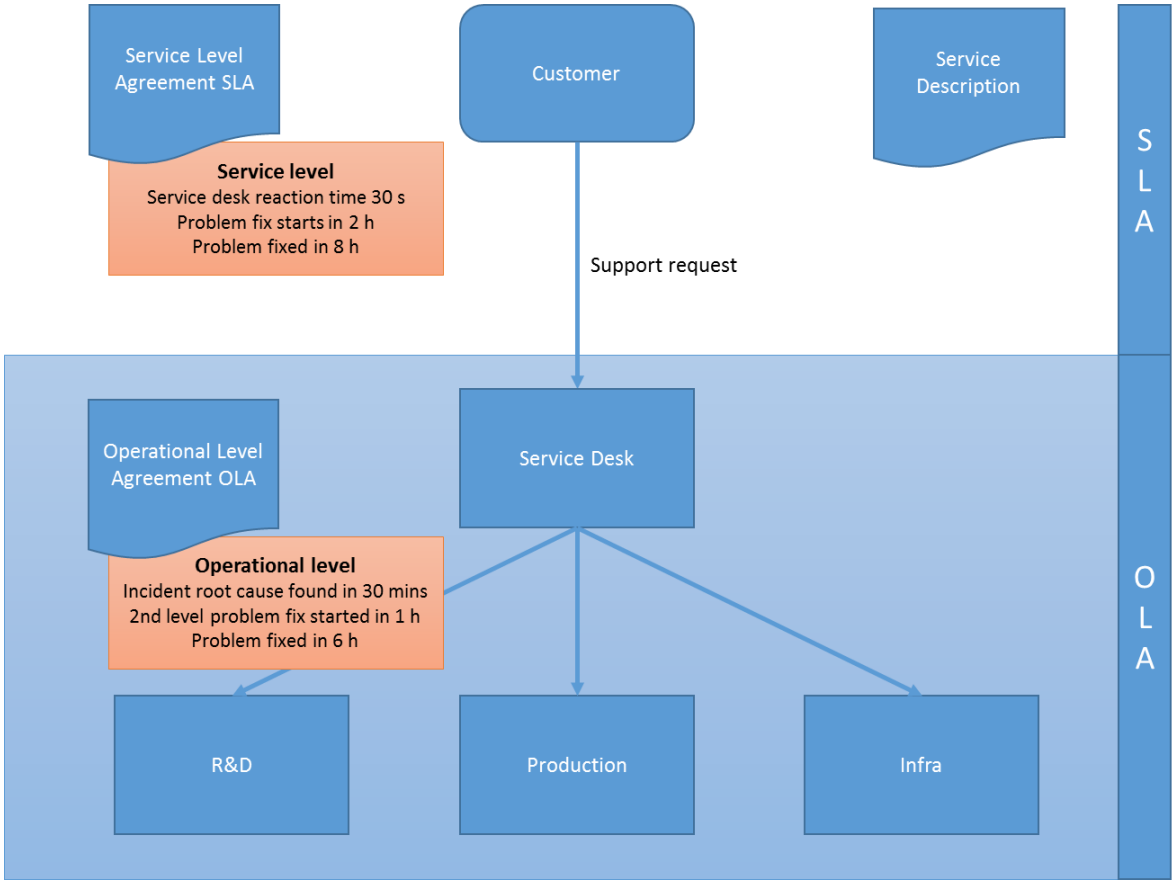

Figure 3. Operational level agreement. Adapted from Hytönen (2007).

Figure 3 describes the differences and interconnectivity of the service level agreement and the operational level agreement. The service level agreement along with the service description are mutual agreements between the customer and the service provider. In this example, the supplier has agreed with the customer that their service desk will react to new support requests within thirty seconds. Additionally, it has been agreed that the customer's problem fix should start within two hours and the problem should be fixed within eight hours from the initial contact from the customer. The service desk can be highly dependable in the effort of other internal stakeholders, such as R&D, production or infra. In order to fulfil the resolution time promise made to the customer, operational level agreements have been established between the service desk and the internal stakeholders. Furthermore, the agreed timeframes must reflect the promised timeframes to the customer. Internal tasks should be performed under the SLA promise to meet the customer expected deadlines. OLA should contain targets that underpin those within an SLA to ensure that targets will not be breached by failure of the supporting activity (Office of Government Office. 2007b).

3 Problem Management According to ITIL

In this chapter the problem management process framework according to ITIL as well as its relation to other ITIL process modules is explained.

3.1 Definition of problem management

The Information Technology Infrastructure Library, abbreviated as ITIL (Office of Government Office, 2007a) defines an incident as "an unplanned interruption to an IT service or reduction in the quality of an IT service. Failure of a configuration item that has not yet impacted service is also an incident, for example failure of one disk from a mirror set."

A problem is defined as the unknown cause behind one or multiple incidents. In other words, it is not known why certain incident or incidents are occurring because the underlying root cause for the incident is not known.

Problem management is the process that manages the lifecycle of all identified problems. The key objectives of problem management are eliminating recurring incidents, preventing problems and coincidently the resulting incidents from happening as well as minimizing the possible impacts of the incidents that are unpreventable (Office of Government Office, 2007a).

The ultimate goal of problem management is to minimize potential problems to the business and thus the number and severity of incidents. According to UCISA (2013) problem management should aim to reduce the negative impact of incidents by preventing the recurrence of incidents that are caused by errors within the IT infrastructure.

Problems should always be handled with a priority order, starting with solving problem that potentially have the highest risk of causing disruptions to critical services. It is problem management's responsibility to make sure all the incident information is available once the problem solving commences (UCISA, 2013).

Problem management has both reactive and proactive approaches. In reactive problem management, the problem solving is done when one or more incidents occur and the problem investigation is initiated based on that. Proactive problem management involves identifying and solving problems thus turning these investigations into known errors before the incidents occur (UCISA, 2013).

3.2 Relation of Problem Management to other Service Operation modules

ITIL's service operations consist of the following modules; even management, incident management, problem management, request fulfilment and access management. Event management monitors all events that occur during normal service operations, if needed, any exceptions can be escalated to be investigated further in problem management. Request fulfilment manages customer or internal user requests that are not raised as an incident due to a service disruption or unexpected service delay. Request fulfilment can be handled as a category in incident management and may not therefore require a separate process. Access management is the process of grating access to users or user groups. In order to do this successfully, the user roles have to be well defined (Office of Government Office. 2007a).

As covered before, the main objective of incident management is to restore the service as fast as possible. Therefore, the incident stays open until the service is verified to be restored. The objective of problem management, on the other hand, is to minimize the financial impact of a service disruption by investigating the root causes of incidents, providing workarounds as well as permanent fixes. Additionally, problem management consists also of proactive activities that are detecting and preventing future problems and therefore the related incidents also. A known error sub-process allows a quicker diagnosis and resolution if further incidents do occur (Office of Government Office. 2007a).

As can been seen from Figure 4, incident management represent a section of the overall process of dealing with problems in the organization. Incidents are often caused by error and problems that "bubbling under", which must be resolved in order

to prevent the incident from happening again. Incident management provides a point of contact where these issues are reported (Office of Government Office. 2007a).

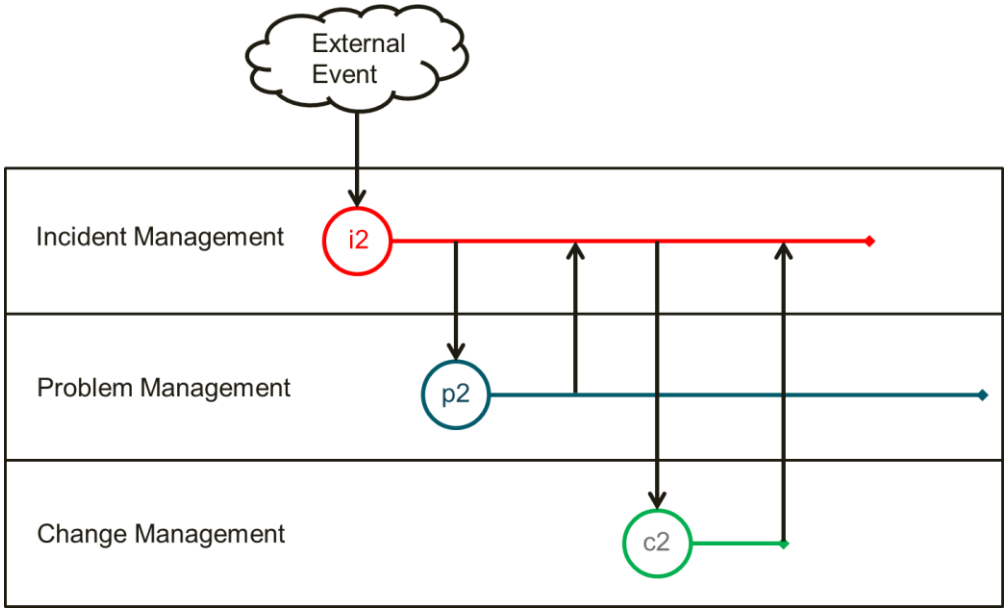

Figure 4. Itil Key Process Relationships. Adapted from Computer Economics (2005)

Thus, while an incident is active only until service is restored, a problem continues to be under investigation until appropriate the results, e.g. workarounds and a permanent fix are published and implemented. As can be seen in Figure 4, this means that incidents and problems are not synonymous. All incidents do not necessarily initiate a problem investigation. Incidents, problems, and changes can each have a many-to-many relationship with the other two management processes (Computer Economics, 2005).

3.3 Problem Management Process Flow

The reactive problem management process can be seen in Figure 5. This is a simplified version of the process chart to demonstrate the most common process flow, but in real life, some of the process steps may be iterative and need revisions. Problem management includes a series of activities that can occur consecutively, simultaneously, or not at all. These activities include:

3.3.1 Problem detection

There are multiple ways to detect a problem (Office of Government Office, 2007a). These can be:

- Detected unknown cause
- Technical analysis
- Automated detection
- A notification from a supplier
- Proactive problem management

Detection, or even a suspicion of an unknown cause that is causing one or more incidents in the service desk will result in a problem investigation ticket. A more in-depth analysis of an incident by a technical support group, e.g. a third tier support group can reveal an underlying problem. Also automated alerts from the event management can raise an incident which may result in instigation of a problem investigation. A supplier or a sub-contractor may contact the service desk and notify that a problem exists that needs to be resolved. Proactive analysis of incident errors may also result in a problem investigation. To enable the possibility to conduct a frequent and regular analysis incident and problem data as a part of proactive problem management, the data itself has to be categorized very precisely in order for it to be useful.

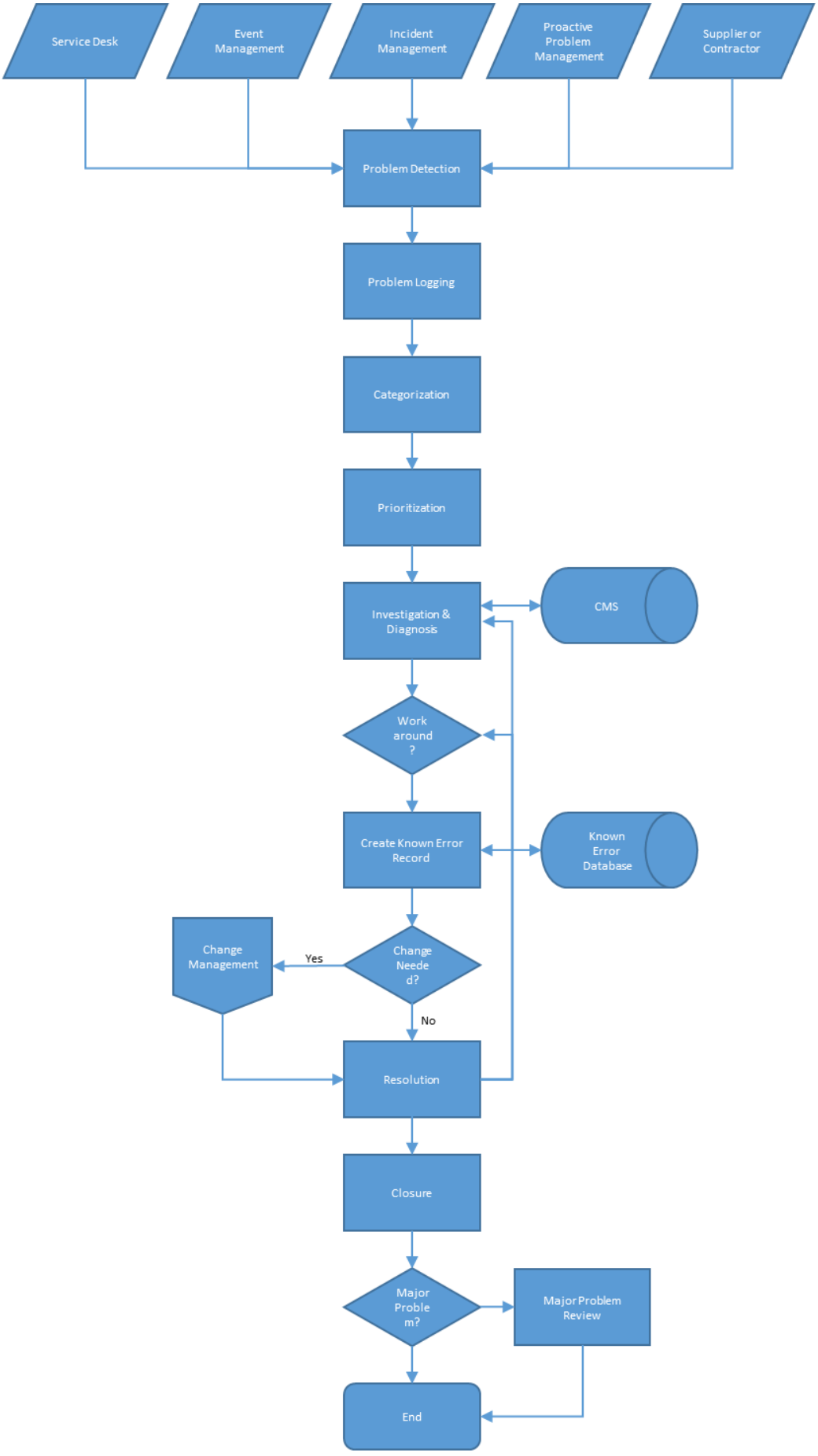

Figure 5. Problem Management Process. Adapted from Office of Government Office (2007a)

3.3.2 Problem logging

Problem logging includes categorizing the problem, often using the same categories that were used to log the corresponding incidents. Other task performed in the problem logging stage is prioritization. Similar to incidents, the priority of a problem is based on its impact and urgency. As Knapp (2010, 152) states, "the criteria used to define impact and urgency of a problem will typically be slightly different than those used to define incidents. The target resolution time also tends to be longer to allow time for a thorough investigation".

3.3.3 Problem investigation and diagnosis

Problem coordinator, who is the owner of the problem investigation, is ultimately responsible for getting the assistance needed to solve the problem. It is the problem coordinator's responsibility to run lead the investigation and determine the root cause of the problem using available resources to analyze the problem using proven problem-solving techniques. The speed and nature of a problem investigation will differ depending upon "the impact, severity and urgency of the problem" (Office of Government Office. 2007a).

It is often also helpful to recreate the failure, securely in a test environment to understand what went wrong. For some of the problems that are investigated, a workaround, a temporary way of overcoming difficulties (Office of Government Office. 2007a), can be found. For example, a manual task could be performed to replace a broken automated task to ensure process continuity before a more permanent fix is made to the root cause.

A root cause is the underlying reason for an undesirable condition or problem, which if eliminated or corrected, would prevent it from existing or occurring. Root cause analysis is a methodical way of determining why the problem occurs and the identifying permanent ways to prevent them (Knapp, 2013). One of the reasons why ITIL considers incident and problem management as separate processes; performing root cause analysis can often take a longer time to accomplish and will therefore prolong

the restoration of the service. This is like a firefighter who first puts out a fire and then calls for an arson inspector to determine the root cause. Another reason to keep the two processes separate is that not all incidents require root cause analysis (Knapp, 2013).

Even before the actual root cause is found for the issue, a known error record should be made to the known error database in order to prevent further incidents and problems. The known error database contains known errors, i.e. already known problems that are either being fixed or it has been decided that they will not be fixed.

3.3.4 Problem resolution

In the problem resolution stage, it is evaluated whether permanently fixing the root cause will require a change. Change can be a bug fix in the software code or another permanent alteration to the system. Ideally, all changes would be handled via the change management process through request for changes (RFC). In the event a permanent solution cannot be justified, a workaround is used to quickly resolve related incidents (Knapp, 2010). Typically in these situations, the impact is limited but the cost of resolving the issue would cost substantially (Office of Government Office, 2007a).

3.3.5 Problem closure

Once the changes, if applicable, have been successfully completed, the problem investigation and all relevant incidents can be closed. At this stage, it should be verified that the record contains a full description of all events. The status of any related known error record should be updated accordingly (Kempter, 2014).

3.3.6 Major Problem Review

Major problem reviews are an invaluable tool for organizations committed to a culture of continuous process improvement, as they allow the lessons learned in execution of the process to be incorporated into subsequent operations (Cisco, 2007). If a problem investigation is classified as a major problem, it is advised that while recollections of

the investigation are still recent, a review should be conducted to learn any lessons for future references.

According to Office of Government Office (2007a), the review should answer the following questions:

- Those things that were done correctly
- Those things that were done wrong
- What could be done better in the future
- How to prevent recurrence
- Are there any third-party responsibilities
- Are follow-up actions are needed

The aim of the major problem review is to identify what was done well in the process of resolving the problem, what were the things that could have been done better and what should be avoided in the future. Usually a set of follow-up actions, e.g. bug reports or enhancement requests are created based on the review.

According to Cisco (2007) successful organizations are those that conduct reviews that incorporate the views of multiple stakeholders involved in managing the problem to resolution, act on the lessons learned, and can measure the impact through the metrics that are used to report on the effectiveness of the problem management process.

3.4 Problem Management Metrics

It was Lord Kelvin who once said "If you cannot measure it, you cannot improve it." In problem management, establishing a set of measurable goals and objectives is crucial. Metrics are the key to any successful program and process. Subsequently, breaking down high level organizational goals and objectives into smaller, team level goals and objectives so that they can be distributed and understood by individual team members as a part of their daily operation of the process (Cisco, 2007).

According to the Office of Government Office (2007a) the following metrics could be used to judge the effectiveness and efficiency of the Problem Management process, or its operation:

- The total number of problems
- The percentage of problems resolved within SLA
- The backlog of outstanding problems
- The number of major problems
- The number of known errors added to the KEDB

The total number of problems can be from any recorded period in time, for example a week or a month. This figure is used a control measure to see a trend in the amount problems that occur. As SLAs are agreements are a promise to the customer, the percentage of resolved problems should correspond with that promise. To identify bottlenecks in the problem management process, it is good to monitor the backlog of outstanding problems and how that trends from month to month, i.e. is it static, reducing or increasing. The number of problems that have been identified as major problems is also interesting to follow since only a small percentage of all problems should be identified as major problems. The number of added known errors should correspond with the total number of problem investigations to ensure the root causes are found for the problems. All metrics should be split into different segments by category, urgency impact, severity and priority level. This dataset should be compared with previous periods periodically (Office of Government Office, 2007a).

3.5 Known Errors

According to ITSM Review (2012), "a known error is a description of the problem as seen from the user's point of view". For example when attempting to upload an attachment to be added to an invoice, the browser will give an error message saying "Javascript exception at line 123". The known error should be written from the perspective of the customer, in other words, how the customer experiences of the issue. (ITSM Review, 2012).

3.5.1 Known Error Database (KEDB)

An effective known error database, often abbreviated as KEDB, should allow simple way to record and retrieve the known error data from on-going and past problem investigations. (Office of Government Office, 2007a). It is good to note that it is not uncommon to use third-party vendor solutions for the known error database.

3.5.2 Benefits of Using a Known Error Database (KEDB)

ITSM Review (2012) lists seven different benefits for using a known error database:

1. Faster restoration of service to the user
2. Repeatable workarounds
3. Avoid rework
4. Avoid skill gaps
5. Avoid dangerous or unauthorized workarounds
6. Avoid unnecessary transfer of incidents
7. Get insights into the relative severity of problems

Probably the most useful application of the known error is the possibility to restore the service faster for the user or customer by offering them a known solution to the issue or providing a workaround if a permanent fix is not possible yet. "Having a good known error which makes the problem easy to find also means that the workaround should be quicker to locate" (ITSM Review, 2012). To ensure the quality of the service, the workaround should be repeatable. "The KEDB is a method of introducing repeatable processes into your environment" (ITSM Review, 2012). One of the biggest benefits of a known error database along with fast restoration is the ability to avoid rework: A lot of time and energy can be saved by multiple agents not trying to find a resolution to the same problem at the same time. Without a searchable known error database this may not be possible. Skill gaps can be avoided by having a centralized location for known issues. There could also be a need to control what kind of workarounds are being provided to the customers. As an example (ITSM Review, 2012) "disabling antivirus to avoid unexpected behavior, upgrading whole software

suites to fix a minor issue" are terrible solutions potentially causing more issues in the future. Related to faster resolutions, enabling the first level support to handle the incidents themselves with the help of a known error database, reduces the number of unnecessary assignment of incidents resulting in extended resolution times. Linking incidents to known errors gives the company insight to the occurrence of certain issues therefore determining the priority of what should be fixed next.

3.6 Implementation of ITIL framework

Shifting from a strictly technical, ad hoc based solution supplier to an increasingly dynamic and service oriented provider has been a noticeable trend in the field of ICT during the past few decades. As Demirkan et al state that "service-oriented thinking is one of the fastest growing paradigms in IT" (2008).

What exactly is a service? A service can be described as "how certain functionality is provided to a customer by a provider" (Brenner et al. 2007). The service-centered approach is forcing organisations not only to tackle the challenges of managing their information technology infrastructure, functionalities and capabilities to meet their customers' requirements, but also to face the challenge of providing services that would create organisational value (Spohrer et al, 2007). The transformation from a technology oriented towards a customer oriented service provider requires that the organizations' processes are engineered in a systematic, methodical manner to support this (Hochstein et al. 2005).

At a more practical level, IT service management can be defined as the "management of all processes that co-operate to ensure the quality of live IT Services, according to the levels of service agreed with the customer" (Office of Government Office. 2007a). At an organisational or strategic level, IT services should be managed and delivered to serve the business requirements of the organisation (Office of Government Office, 2007a).

Mann (2012) suggests that the "5 steps to successful ITIL" are

- Understand what ITIL is all about
- Be realistic about existing ITSM processes
- Evaluate technology goals, people and processes
- Plan beyond the "technology project"
- Regularly communicate ITIL's value

Even though ITIL is a suggested framework of processes, people operating in these processes are the first priority (Mann, 2012). The maturity of the existing processes is usually overestimated resulting in a more optimistic adaptation rate than what the reality is. All change efforts should be gradual in order for the adaptation to be permanent (Mann, 2012). The evaluation of the used or future technology should be the last priority and should start with the evaluation of goals, people and processes (Mann, 2012). In order to make the project sustainable, it used be planned beyond the technology. The value of following the ITIL framework should be communicated regularly through “small victories”.

3.6.1 Difference between a framework and a standard

It is good to understand the fundamental difference between a framework and a standard. Both terms and concepts are used when describing processes but there are distinctions between them. Figure 6 lists the most common differences between these two concepts. A framework may describe concepts that can be used to solve or address complex issues. A process framework, such as ITIL, describes best practices that can be used to define and continually improve a given set of processes. Frameworks also provide a common vocabulary that organizations can use when describing and executing processes. Because a framework is not an actual standard, but more of a proposition, organizations can choose to adopt some practices and not others. As an example, ITIL Version 3 describes more than 20 processes and hundreds of best practices, but only a few organizations have the resources to focus on all of these processes at once. Instead, most organizations initially adopt a basic set of

practices for a small subset of processes and expand their use of the framework over time (Knapp, 2010)

Frameworks	Standards
Describe best practices	Define an agreed-upon repeatable way of doing something
Provide guidance and suggestions	Define a formal specification
Support organizations' efforts to design and continually improve processes	Prescribe a minimum set of practices organizations must have in place to assure quality processes
Lack the mandatory controls needed for an organization to demonstrate compliance	List mandatory controls that an organization must have to be certified

Figure 6. Characteristics of frameworks and standards. Adapted from Knapp (2010).

Compliancy is a term that is sometimes used too loosely when discussing frameworks. An organization can be said to be ITIL compliant. A framework is not a standard and thus lacks the mandatory controls needed for an organization to demonstrate compliance (Knapp, 2010). A standard is a document that contains an agreed-upon, repeatable way of doing a certain thing. A standard contains a formal specification and lists mandatory controls that an organization must have in place to be certified. The world's largest developer and publisher of international standards is the International Organization for Standardization, also known as ISO (Knapp, 2010).

3.6.2 Benefits of implementing ITIL Problem Management

Problem management best operates together with incident management and change management to increase the quality of a service by ensuring that the service is available. When incidents are resolved, information about the resolution is recorded. Gradually over time, all of this information can be used for speedier resolution times and a tool to identify permanent solution reducing the number altogether. This results in less downtime and less disruption to critical business systems (Office of Government Office, 2007a).

Two sources (ProcessFirst, 2013; UCISA, 2014) lists these five items as the benefits of implementing the ITIL problem management process in particular:

1. Improved service quality
2. Incident volume reduction
3. Permanent solutions
4. Improved organisational learning
5. Better first time fix rate at the service desk

Putting efforts in the improvement of the service quality always pays off. Having a high quality, reliable service is highly beneficial for the organisation. Problem management is a key tool in reducing the number of incidents, both reactively and proactively. Also, by providing permanent solutions to reoccurring incidents, over time the number of problems and known errors will gradually reduce. "The problem management process is based on the concept of learning from past experience" (UCISA, 2014). The process provides historical incident data to enable an organization to identify trends and the ways to prevent and reduce the impact of failures, resulting in improved productivity. Problem management also facilitates the service desks to be aware of how to deal with problems and incidents that have previously been resolved and can be found as documented known errors (UCISA, 2014).

3.6.3 Challenges in implementing ITIL Problem Management

Even though the service-oriented problem management is able to resolve many shortcomings of traditional defect management models, it also results in new challenges and difficulties.

The actual implementation of a framework and the processes requires thorough analysis of the organization's unique requirements and priorities. Mohamed et al (2008) stated that "ITIL framework does not offer clear-cut implementation techniques. The implementation mechanism is left for the implementer to decide upon".

Jäntti (2008) lists six challenges that can be associated with service-oriented problem management.

1. Terminology
2. Concept distinction
3. Unclear connection to software development
4. Unclear relation to knowledge base
5. Lack of incident assignment policy
6. Lack of a comprehensive service support diagram

All of the challenges listed by Jäntti clearly demonstrate that service management frameworks are simply suggestions for how to manage services within a company but are not able to provide out-of-the-box solutions that would fit for every scenario.

There have very few studies that cover the implementation of ITIL's problem management process. It was concluded by Niessink and van Vliet (2006) that the problem management process could not be executed properly due to the lack of solid incident management process. Their study assessed the quality of the problem management process in a Dutch organisation responsible of the nation's social security system. "30% of the incidents were coded incorrectly" (Niessink and van Vliet 2006). The maturity of the incident management process has to be high in order for problem management to work.

There also studies that have concluded that even when problem management has been implemented, the process has not been given the same priority as e.g. incident management, change management amongst others. Even once the problem management process has been implemented, this important process was "rarely done well" (Addy, 2008).

Additionally, Addy (2008) lists the following common issues that are usually encountered in implementation of problem management:

- Insufficient focus
- Insufficient time and resources dedicated for preventive action
- Lack of sufficient data for meaningful analysis
- Incapability to collect the data to facilitate analysis
- Poorly defined relationships between configuration items
- Relationship structure does not allow indirect cross object analysis
- Limited involvement of appropriate technical specialists
- Unrealistic expectations for issue prevention
- Control measures fail to prevent recurrence of incidents
- Problem management is used to find a scapegoat for outages and incidents instead of finding the root causes
- Employees are reluctant to participate in the process

As can be seen from the list, there are a substantial number of underlying factors that can prevent a successful implementation of problem management as a process. Insufficient time and resources, lack of dedication and general reluctance are quite common for all change management efforts. Lack of relationships and defined interdependencies amongst the configuration items can be showstoppers for the project implementation if it is not understood what configuration items the provided services use. It also good to note that problem management should not be used to look for a scapegoat for an outage or an incident but instead aim to figure out the root cause of the problem in a purely analytical manner in order to prevent similar issues in the future.

Other sources also mention certain challenges that manifest with problem management, ProcessFirst (2013) mentions the following possible problems:

- Wrong staff are assigned to problem analysis
- Lack of overall discipline in carrying out the process
- Management doesn't want to hear bad news about weaknesses in either systems or people
- Overlapping resources in incident management and problem management

- No distinction made between incident management and problem management
- The incident management process is too immature

The ITSM Academy (2005) lists a good set of arguments as well:

- Lack of a good incident management process
- Failure to link incident records with problem and known error records
- Lack of management commitment
- Undermining the service desk role
- Failure to build and maintain a useful knowledge base
- An inability to determine the business impact of incidents and problems
- Confusing incident and problem management goals

Both of the lists above clearly indicate that in order to make problem management process successful, it requires clear responsibilities and roles, it requires management level commitment, a distinction between incident and problem management. In addition to the challenges and difficulties listed above, problem management requires interactions between other ITIL processes to fully work.

4 Case Study as research strategy

This chapter covers the research strategy and methods that will be used for this thesis. A big emphasis will be put into case study research with additional qualitative data analysis to support the decision making process.

The problem management project was conducted prior to starting the research. Therefore the research method will be retrospective, looking into the past to see how successfully was the project conducted and expected outcomes fulfilled. According to Campbell (1989) a case study design for investigating real-life events, including organizational and managerial processes. Yin (2009) prefers the case study for examining contemporary events when the relevant behaviours cannot be reasonably manipulated for scientific research.

Case study research is a very beneficial method of bringing "an understanding of a complex issue or object and can extend experience or add strength to what is already known through previous research" (Yin, 2009). Case study focuses in detailed contextual analysis of a limited number of events or conditions and their relationships.

Yin (2009) defines the case study research method "as an empirical inquiry that investigates a contemporary phenomenon within its real life context, especially in scenarios where the boundaries between phenomenon and context are not clearly evident and in which multiple sources of evidence are used."

The reliability of case studies has been criticized claiming that single cases offer a poor basis for generalizing (Yin, 2009). Critics of the case study often argue that the study of a limited number of cases cannot offer basis for creating any reliable or generalizable findings. According to Yin (2009) "others feel that the intense exposure to study of the case can bias the findings. Some dismiss case study research as useful only as an exploratory tool." Yet researchers continue to use the case study research method with success in planned studies of real life situations, issues and problems.

4.1 Types of Case Study

A general approach to designing case studies was proposed by Jensen and Rodgers (2001) who classified case studies as follows:

- Snapshot case study – a detailed and objective of a research entity at one particular point in time.
- Longitudinal case study – a quantitative and also or either qualitative study of one research entity at multiple points in time
- Pre-post case study – a study of one research entity at two time points that are separated by a critical event. A critical event is one that is expected to dramatically change the course of events
- Patchwork case study – a set of multiple case studies of the same research entity, using snapshot, longitudinal and pre-post designs. This combined approach is intended to get a more holistic view of the research subject
- Comparative case study – a set of multiple case studies of multiple research entities for the purpose of cross-unit comparison

The case study that is researched in this case will be longitudinal case study since it is researching the whole project from the beginning to the end. The data used for the research comes from varied sources, from personal experiences as the project manager to meeting memos, flow charts, discussions and email.

4.2 Process of the case study

Soy (1997) defines the six necessary steps to be considered in the case study process:

- Determine and define the research questions
- Determine data gathering and analysis techniques
- Prepare to collect the data
- Collect data in the field
- Evaluate and analyse the data
- Prepare the report

In the following subchapters, the different steps of a case study are further explained and additionally how these steps are conducted in the research in question.

4.2.1 Determine and Define the Research Questions

During the first step in case study research is to establish a clear research focus to which the researcher can point to over the course of the study. The researcher establishes the focus of the case study by forming questions about the situation or problem to be studied and determining a purpose. The research object in a case study is often a program, an entity, a person, or a group of people (Soy, 1997). Each object is likely to be intricately connected to political, social, historical, and personal issues, providing wide ranging possibilities for questions and adding complexity to the case study. According to Soy (1997) "the researcher investigates the object of the case study in depth using a variety of data gathering methods to produce evidence that leads to understanding of the case and thus answering the research questions"..

Case study research answers one or multiple questions that begin with words like how or why. The questions are targeted to a limited number of events or conditions and their inter-relationships. According to Swanborn (2010) in the majority of case studies, the researcher will initially start with a rather broad and perhaps sometimes still vague question or a set of questions. If the knowledge of the subject is limited the researcher may start by posing pose broad 'what' and 'how' questions. This does not exclude the fact that the researcher, after defining the problem, proceeds by selecting some possibly applicable theories. Generally, during the actual research process the broader questions develop into more defined and precise set of questions.

4.2.2 Determine Data Gathering and Analysis Techniques

During the design phase of case study research, "the researcher determines what approaches will be used in the selection process; whether single or multiple real-life cases will be examined in depth and which instruments and data gathering approaches will be used" (Soy, 1997). When using multiple cases, each case is treated as a single case. Each case's conclusions can then be used as information contributing to the

whole study, but each case remains as a unique, single case. In this study, only Basware's problem management project is studied as a single case study.

A key strength of the case study method involves using multiple sources and techniques in the data gathering process. "The researcher determines in advance what evidence to gather and what analysis techniques to use with the data to answer the research questions" (Soy, 1997). Data gathered is normally largely qualitative, but it may also be quantitative. Tools to collect data can include surveys, interviews, documentation review and observation.

The methods for data collection in this particular study include workshops, interviews, meetings and the corresponding note of those meetings, personal observations, flow charts, figures, email discussions.

4.2.3 Prepare to Collect the Data

Case study research usually generates vast amount of data from multiple sources. This is why a systematic categorization of this data is indispensable to prevent the researcher from being overwhelmed. By categorizing the data, it will provide the researcher with focus to keep the original research purpose and research questions in mind. As Swanborn (2010) states, being critical about the data and the way they are gathered is one of the key requirements of the researcher's attitude.

4.2.4 Collect Data in the Field

In the data collection stage, it is crucial to keep the research questions clearly in mind. Not necessarily in a way that these questions would be asked by the researcher in a particular interview, but for the researcher to be used as a guide to formulate the questions that are asked. The researcher must collect and store multiple sources of evidence in a comprehensive and systematic manner.

4.2.5 Evaluate and Analyze the Data

It is the researcher's responsibility to examine raw data using many interpretations in order to find linkages between the research object and the outcomes with reference to the original research questions. As Soy (1997) states, "the case study method, with its use of multiple data collection methods and analysis techniques, provides researchers with opportunities to triangulate data in order to strengthen the research findings and conclusions".

According to Swanborn (2010) in the last decades of the twentieth century the combination of a survey, as a strategy 'in width', with an intensive counterpart, the 'in-depth' strategy, gradually developed as the standard approach in applied research projects. It is generally called a mixed-method approach.

4.2.6 Prepare the report

The main objective of a case study is to analyse and report the gathered data in a manner that transforms a complex issue to a more understandable form, allowing the reader to question and examine the study and reach an independent understanding (Soy, 1997). In early stage of writing the report, the researcher should use representatives from various audience groups to review and comment the draft of the document. Based on these comments, rewriting and revisions are made and the final report eventually finalized.

5 The Research Process and Results

The problem management improvementt project was launched at Basware in the beginning of August 2013. The most important events of the project are presented in a chronological timeline format, which makes it easier for the reader to follow the project's chain of events. Other deliverables of the project are presented in the preceding subchapters.

5.1 Project Timeline

In Figure 7 the most important meetings and workshops of the project can be seen on a timeline; starting from the project's initial launch in August to the steering group meeting in the beginning of December. Descriptions of the meetings are based on the meeting notes, flowcharts, email chains, conversations and the memories of the author through personal participation in the meetings. Additionally to the listed meetings and workshops, regular weekly follow-up meetings amongst the project team members were held in order to ensure that the project was proceeding according to the planned schedule and milestones were met.

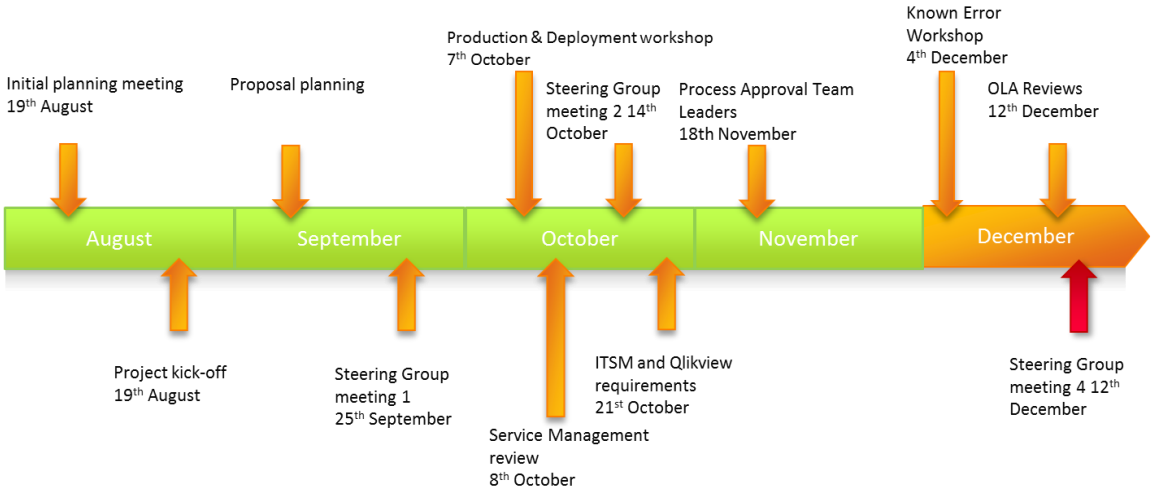

Figure 7. Project Timeline. Basware (2014a).

The project was launched in August and continued until early February, but as parts of the project are not in the scope of this study, i.e. preparing of the training material and the actual training of the new process, the timeline followed only until the end of December 2013.

5.1.1 Initial planning meeting

The first meeting was held on 19th August 2013 amongst the project manager, a team leader for a third tier support group responsible for problem management and support specialist who had been involved in the initial implementation of Remedy ITSM to Basware. The first meeting was a review of the previous implementation project and a gathering of improvement ideas for the coming improvement project. According to the meeting minutes, the current process for problem management was reviewed and analysed thoroughly.

In the meeting minutes, the following findings were listed:

- Internal role separations in 3rd line support were artificial
- Solution and known error databases were not utilized
- Integration to Jira was needed in addition to Accept
- Accept statuses were unclear to support

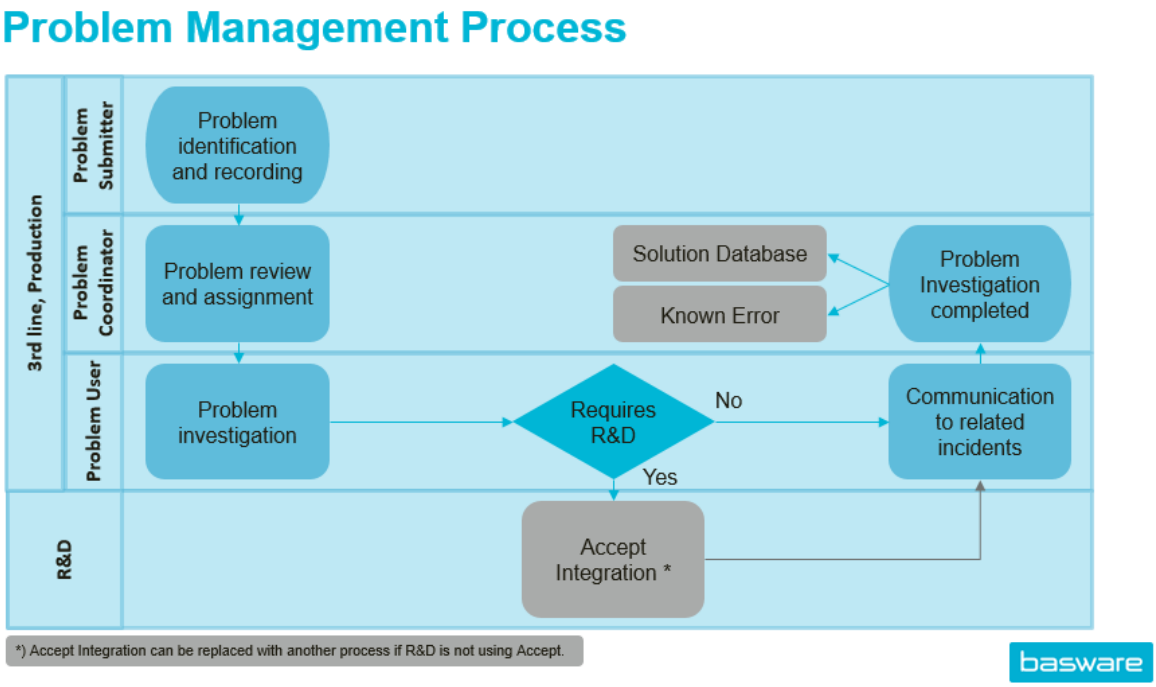

Figure 8. Existing problem management process description. Basware (2013b).

The internal roles, Problem Submitter, Problem Coordinator and Problem User, described in Figure 8 were seen redundant as these were in most cases the same agent

and no dedicated members of the team were assigned to be responsible for any particular role. The current work flow does not support clear role boundaries nor should they. It was also noticed that there were different interpretations of what should happen once the problem investigation is completed; it was apparent that the solution database and known error database were not utilized to the extent that was initially intended. In other words, there were as many ways of closing a problem investigation ticket as there were agents closing them. Also, it was mentioned that since Network Services business unit's research and development department was not using Accept, there was no direct integration from support to R&D when reporting bug reports or enhancement requests. Additionally, it was unclear for support what the status updates meant that they received from R&D via Accept integration.

Thus, it was collectively decided that ITIL will be used as the framework for problem management improvements as Basware and its processes was heavily relying on ITIL already in the existing model.

5.1.2 Project kick-off

The first official meeting for the project was held on 27th August 2013 and that was the kick-off session. Present were the aforementioned participants from the planning meeting along with two support directors responsible for the whole support process on their respective business units, first tier support manager, third tier support specialist with experience with problem management and Remedy ITSM solution owner and a project coordinator.

This meeting was the initial brainstorming sessions during which the gaps in the current process were identified and what would be in the scope of the new project. Figure 9 represents a section of the mind map that was drawn during this kick-off session, see Attachment 1 for the full mind map.

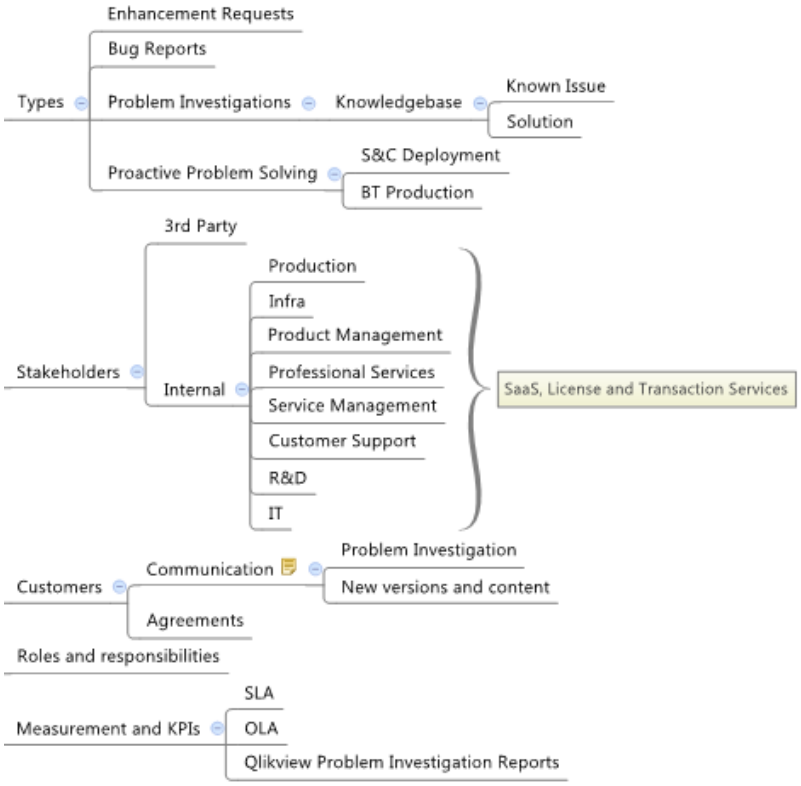

Figure 9. Kick-off mind map. Basware (2013c).

There were four different types of problem management investigations identified: enhancement requests, bug report, problem investigations and proactive problem solving investigations. According to the meeting minutes, the whole group agreed that enhancement requests were not an actual part of the problem management process but should be a part of new requirement handling process and should be reported to product management from incident management level already. As a result of a problem investigation should be an article in the knowledge base, a known error entry, making first level support aware of known issue and therefore making assignment of incidents to third line support redundant. Proactive problem solving was seen as important but practically non-existent in the current implementation of the process.

All stakeholders, both internal and external, were identified in the kick off meeting. Majority of these were logically internal since problem management is a function investigating internal issues since 3rd line support is supporting the customer facing stakeholders.

Especially keeping customers informed of the status of open issues, i.e. customer communication, was also a part of the problem management process that had gotten too little attention in the past. Clearer roles and understanding of the responsibilities and their boundaries were discussed.

Roles and responsibilities had not been clearly defined previously, so problem investigations had a tendency to end up in "no man's land" where the issue did not have an owner or a driver.

The co-operation between customer support and their internal stakeholder, especially with the R&D department stood out as something the whole group considered extremely important. The group felt like there was room for improvement in terms of agreed timelines for getting roadmap information and release notes. It was agreed that by establishing internal metrics, operational level agreements, there would be a better understanding how well the co-operation is working between customer support and the rest.

5.1.3 Proposal planning

After the scope and gaps were identified in the kick-off session, the project manager and third tier support group leader spent a few weeks in early September to study the ITIL framework, especially the problem management process and also its relation to incident management. Together, the first proposal to improve the problem management process was created seen here as Figure 10.

The first proposal (Attachment 2) aimed to clarify the responsibilities between the stakeholders by clearly indicating where in the process the responsibility changes as these were not clear in the past. The yellow sections in the process and 1st or 2nd line service desk responsibilities, green ones are for 3rd line support to handle and orange sections are R&D's responsibility. Additionally, the swim lanes on the flow chart indicate the shift in responsibility between customer support and R&D units.

The criteria to when an incident or a problem investigation were to be closed were also clarified in this proposal. Previously it was unclear for support to understand which R&D status updates required action from them and which did not.

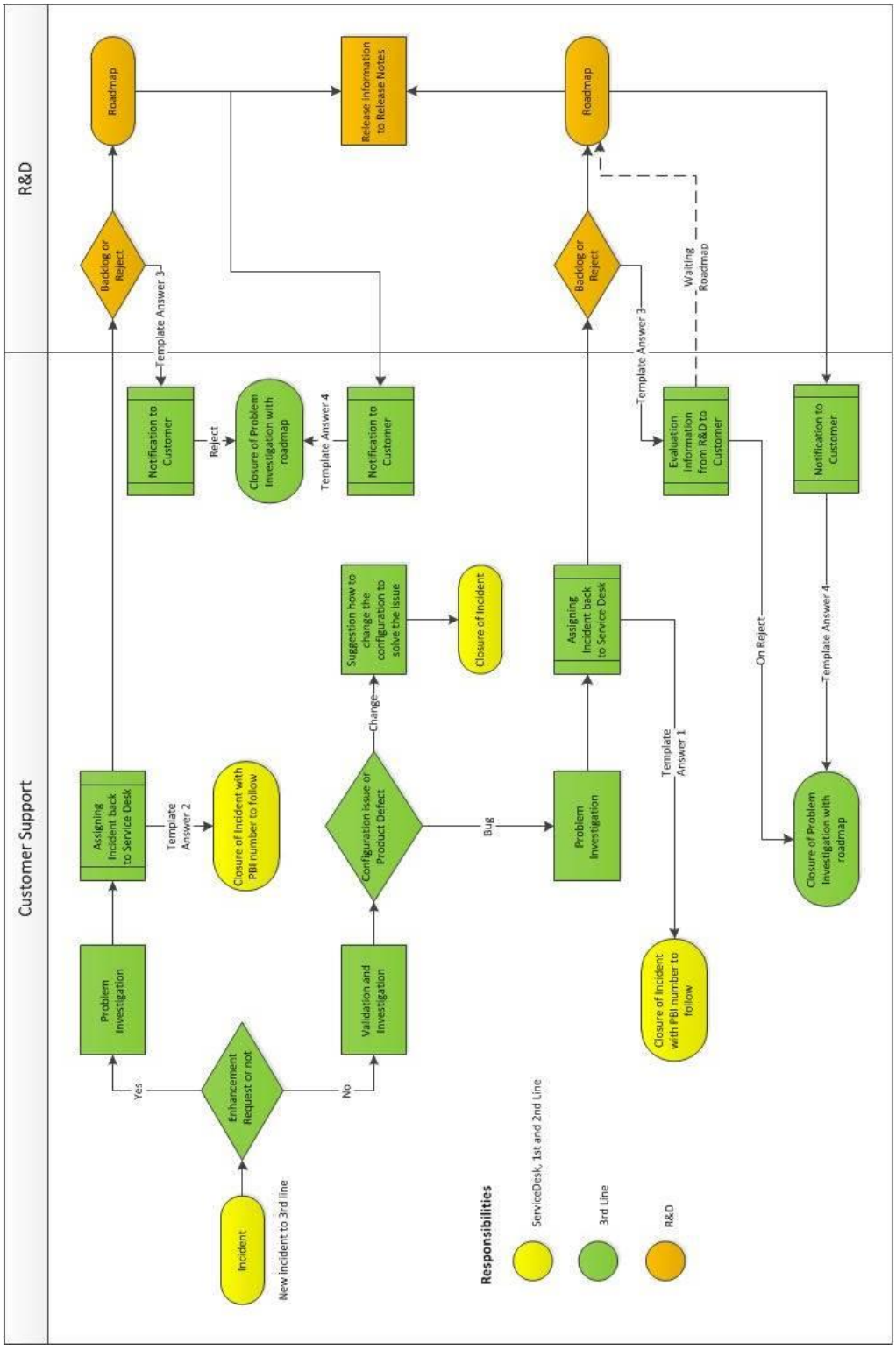

Figure 10. First proposal for the new problem management process. Basware (2013d).

Customer communication points in the process were also defined as well as answer templates to be used by support. For example in Figure 10, when problem investigation is concluded and a bug report is sent to R&D, template answer 1 is used (Figure 11).

```
-------------------------  (1) Bug Report sent to Product Development --------------------------

Hello Service Desk,

We have been able to reproduce this issue in our test and this Incident might be caused by a Product Defect.
We have requested evaluation from Product Development and we'll inform about the results as soon as possible.

Tasks for Service Desk:
1) Please keep the incident open in your queue.
2) Change the status to "Pending" and
3) set the status reason to "Problem Investigation".

Best regards,
<Your Name>
Product and SaaS Support, 3rd line

-----------------------------------------------------------------------------------------------------
```

Figure 11. Template answer for internal communication. Basware (2013e).

5.1.4 Steering Group Meeting 1

The first steering group meeting was held on 25th September 2013. Being the first steering group meeting, this was the first time the steering group sat together. The initial proposal for the new problem management process was presented.

According to the meeting minutes it was agreed that this proposal was to be reviewed by all the relevant stakeholders, including production, R&D, deployment, service management and integration support. The escalation process was missing from the proposal, it was suggested that it would be included in the final process.

The seen risks of the project at the first steering group were:

- "No implementation support available (Knowledgebase, Jira)
- Unable to agree OLAs with internal stakeholders
- Common ground not found within the different business units, e.g. Product Support, Transaction Services and SaaS"

5.1.5 Production and Deployment Workshop

The production and deployment workshop took place on 7th October 2013. The main objectives for this workshop were to find common practices how to co-operate with

support whenever the input of production team is needed to resolve an on-going problem investigation. The work flow proposed can be seen in Attachment 3. There are situations where support is dependent in the help of the production team since support do not have access to the production servers to see e.g. service logs and configuration files.

Deployment team is responsible for deploying new releases provided by R&D to the test and production environment. From customer support's point of view, it is extremely important to be aware of when a release containing a specific fix for a problem is going to be deployed in production so that they are able to notify the affected customer. It was suggested that the deployment team would update the known error tickets related to deployed items. After discussing this further, it was agreed that it is up to the problem coordinator to track the status of the problem investigation and instead the deployment team would inform support about the deployment schedule on a general level.

5.1.6 Product Management Review

Project manager met with representatives of product management on 8th October 2013. The product managers are responsible for the offering; the products and service Basware provides currently and what they will offer in the future. Therefore all enhancement requests to existing Basware solutions as well as suggestions for new services are handled by the respective product managers. Previously, an agreed process did not exist for handling the enhancements; sometimes they were sent as emails or reported as bugs when they actually were not defects. In this meeting, it was agreed that "all new feature requests would be sent to the product management and smaller enhancements would be sent directly to R&D" (Meeting minutes 8th October 2013). Figure 12 demonstrates the new work flow for enhancements.

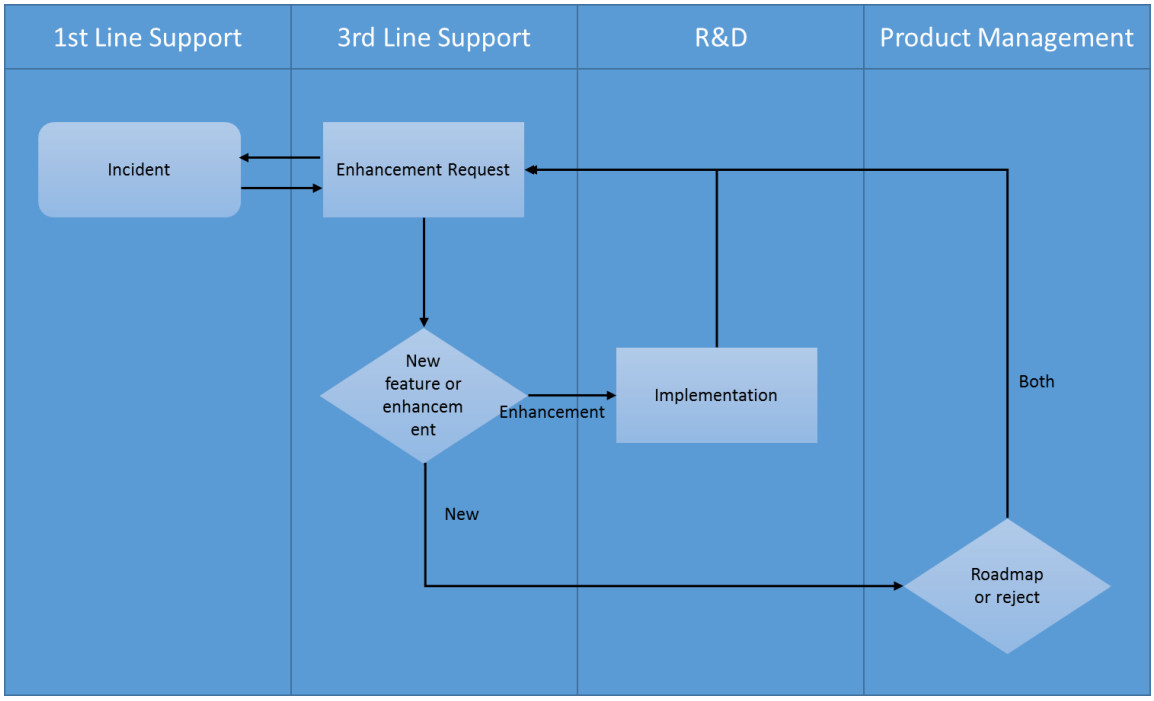

Figure 12. Co-operation with product management. Basware (2013f).

5.1.7 Steering Group Meeting 2

The second steering group meeting was arranged on 14th October 2013. According to the notes from this meeting, the project plan, seen here as Figure 13, was approved in the second steering group meeting. The project consisted of two main phases, the process description and definition phase and process implementation phase. Planning of training material and actual training have been left out of the figure since they were not a part of the scope of this study.

Process Description and Definition		26-Aug	31-Oct
	Problem Management Kick-off	26-Aug	26-Aug
	CS Internal Process Description	14-Oct	18-Oct
	CS Internal Process Pre-review	9-Dec	9-Dec
	ITSM and Qlikview Requirements	wk50	
	ITSM Requirement Approval	12-Dec	12-Dec
	Integration Requirements	28-Oct	31-Oct
	PS Stakeholder Process Description	14-Oct	25-Oct
	PS Stakeholder Process Review	2-Dec	2-Dec
	PS Stakeholder Process Final Review	wk50	
	PS OLA definition	3-Dec	10-Dec
	PS OLA agreement	wk50	
	TS Stakeholder Process Description	7-Oct	7-Oct
	TS Stakeholder Process Review	8-Oct	9-Oct
	TS Stakeholder Process Final Review	28-Oct	31-Oct
	TS OLA definition	12-Dec	12-Dec
	TS OLA agreement	wk51	
	SaaS Stakeholder Process Description	7-Nov	11-Nov
	SaaS Stakeholder Process Review	11-Nov	11-Nov
	SaaS Stakeholder Process Final Review	18-Nov	22-Nov
	SaaS OLA agreed	wk50	
	Final Process Descriptions with roles and responsibilities	wk50	
Process Implementation		1-Nov	29-Nov
	ITSM	1-Nov	29-Nov
	Integrations	1-Nov	29-Nov
	Known Error database testing and documentation	4-Dec	20-Dec

Figure 13. Project plan. Basware (2013g).

However, additional requirements were made to the plan in this meeting. Reporting requirements for the problem management were defined to include, the possibility to search for on-going problem investigations per customer and also per release provided by R&D. It was requested that one common way was to be defined for assigning and resolving problem investigations.

It was also agreed in the meeting that the processes were to be reviewed and accepted by stakeholders before any tool implementation could be made since agreeing on the process would define what tool implementations would be required.

It was also suggested that each participating team would identify key influencers within their teams. Key influencers were defined as potential trainers to be included to the

planning sessions before the final reviews and later operate as sponsors for the new process within the teams.

5.1.8 Remedy ITSM and Qlikview Requirements

This meeting took place on 21st October 2013. Present were the project manager, and the Remedy ITSM solution owner who is also responsible for the reporting tool in use, Qlikview. The missing integration between Remedy ITSM and Jira was discussed in detail. Project manager's proposal was to build a separate integration to Remedy ITSM to connect to Jira directly. The solution owner did not see this as a viable solution because it was technically challenging and might result in bug reports being sent to the wrong environment. Figure 14 presents the intermediate solution that was agreed upon in this meeting. Bug reports to Jira will be sent via the existing connection in Accept and an additional integration would be made between Accept and Jira. Biggest challenge in building this integration is to find the relevant fields for mappings as there are no direct relations between Accept and Jira.

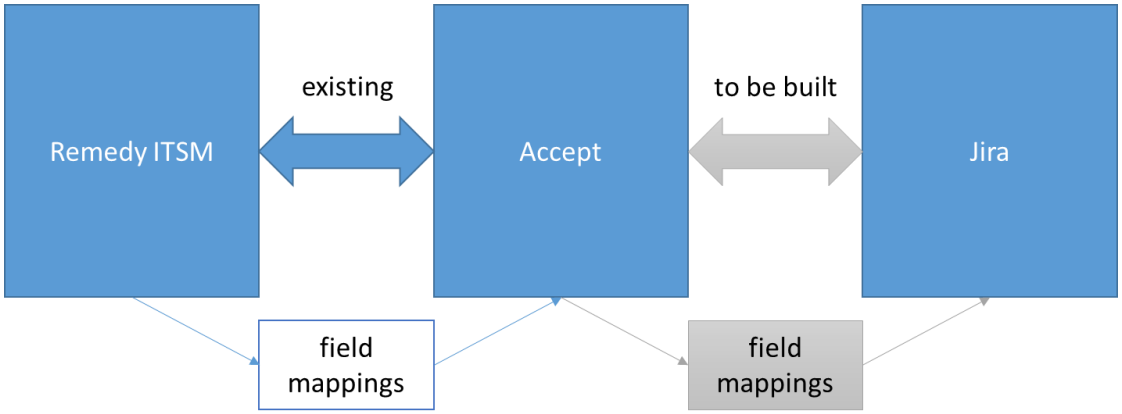

Figure 14. Integration between Remedy ITSM and other systems. Basware (2013h).

According to ITIL, a problem investigation can be closed and a related known error record is created when the root cause of the problem and a possible workaround to the problem are known (Office of Government Office, 2007a). Therefore it was proposed that when the bug is reported to Accept would also be the point where the problem investigation is closed and a known error opened. Because closed tickets cannot be updated in Remedy ITSM, it would require the integration between Remedy ITSM and

Accept to extend between known errors as well. In Figure 15, the proposal of the integration extension is presented.

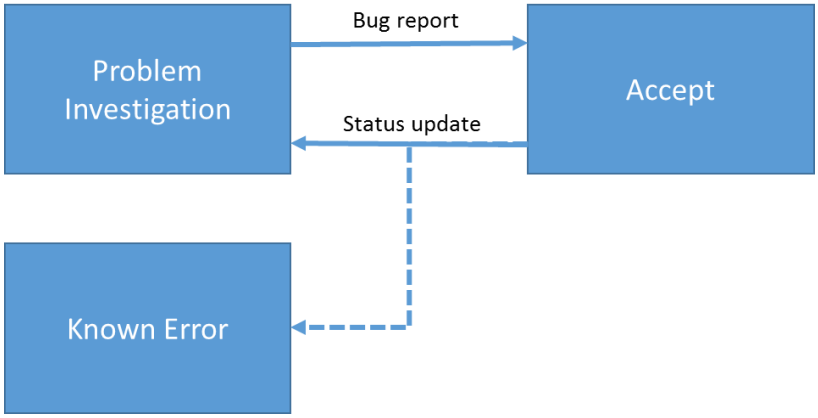

Figure 15. Proposed status update improvement to known errors. Basware (2013i).

5.1.9 Steering Group Meeting 3

The third steering group meeting was held on 6th November 2013. Amongst the things agreed in this meetings was the known error process; the practice was to be defined including roles, responsibilities and communication to the customer.

For reporting and KPI's it was agreed that problem investigations and known error measurement will be included to the 3rd line's response time and there must a possibility to generate problem investigation reports based on a product or a service so that it can be monitored which products are causing the company the most issues.

5.1.10 Process Approval Team Leaders

The meetings was held on 18th November 2013. Basware has a total of four different third tier support teams. A meeting was arranged to introduce the new process for all of them and discuss possible action points for each team leader. During this meeting, it was agreed that one of the team leaders would review the old instructions Basware had for problem management and make corrections if needed. The project manager volunteered to prepare a presentation that could be used when presenting the new process for all stakeholders. The new internal problem management process was reviewed (Figure 16). Biggest changes to the existing process were the major problem

review and the usage of knowledge base, in both solving the incident as well as updating the knowledge base when the problem investigation is finished.

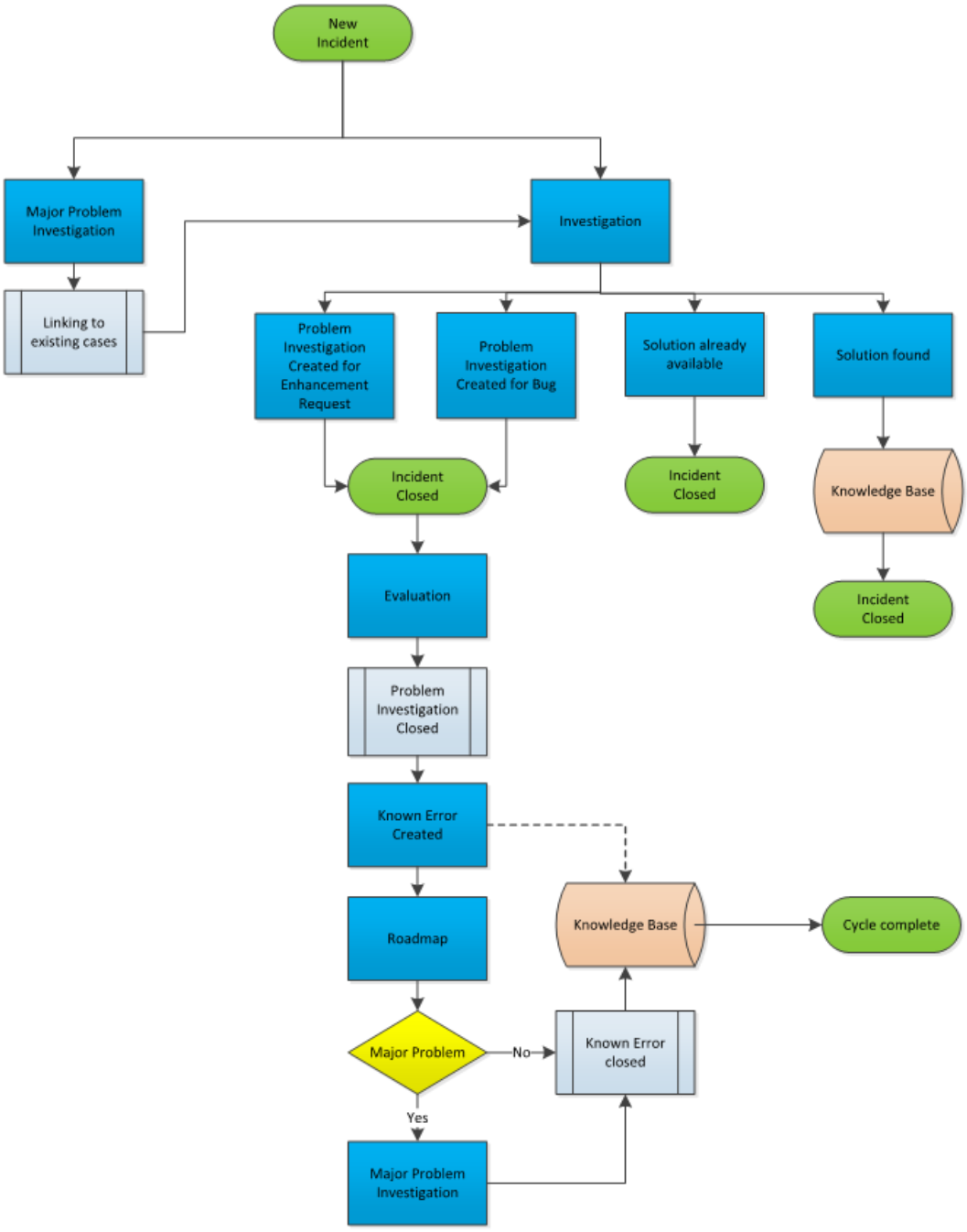

Figure 16. Support internal problem management process. Basware (2013j)

As a result of this meeting, also the high-level description of the new process was prepared (Figure 17) for the project manager and other project team members to easily explain the new process for all relevant stakeholders.

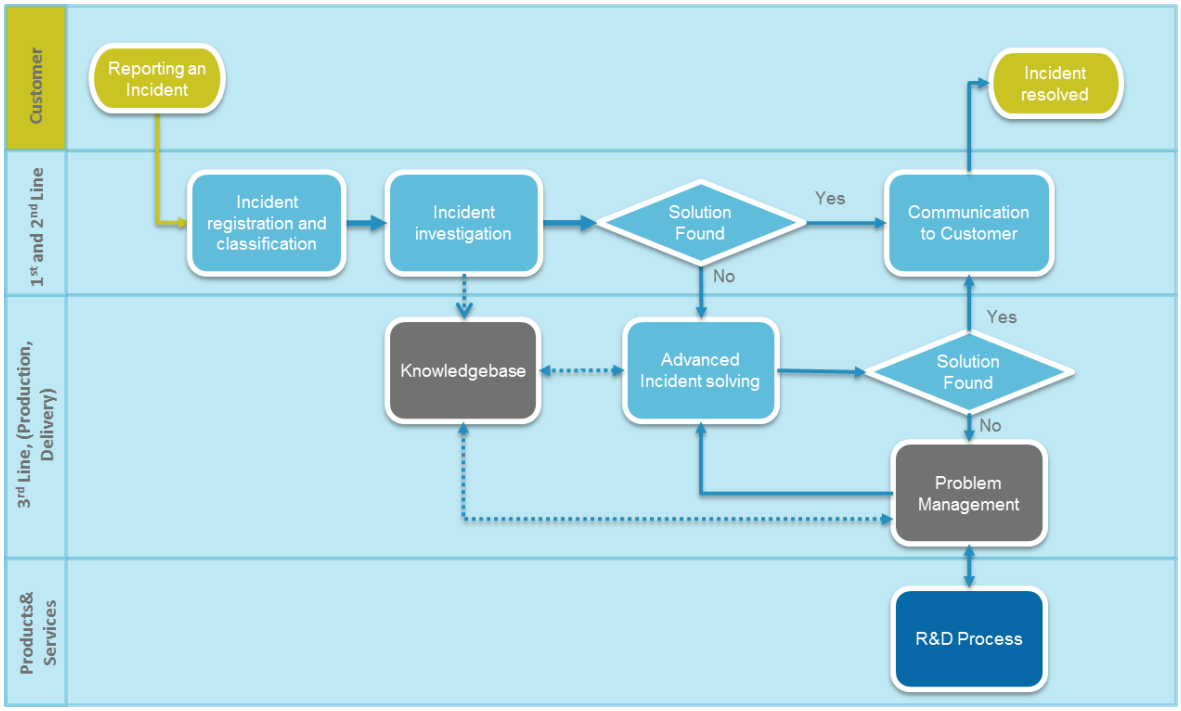

Figure 17. High-level description of new process. Basware (2013k).

5.1.11 Known Error Workshop

The known error workshop was arranged on 4th December 2013. Participants included the project manager, a senior team member from 3rd line support and a senior team member from the 1st line support. The aim of the workshop was to understand the dependencies between different ticket types, i.e. problem investigation, known error and solution, in Remedy ITSM so that all relevant information would be transferred from the original problem investigation on to the corresponding known error and solution database entries. Another aim of the workshop was to initiate a testing plan to see if 1st line agents were able to locate the correct answers from the known error database.

A number of "dummy" test cases were prepared and suitable testers selected from the various 1st line support units. Total of nine agents were approached with the test cases along with instructions (see Attachment 5) on how to search the corresponding knowledge.

The response rate for the test cases was 56 per cent with five answers out of nine requests. All respondents found the instruction provided to be useful and were able to

find the correct known errors and problem investigation by using the search. Even though the new functionality was seen mostly as positive, also criticism was received. One agent mentioned that "Usability of knowledge management is fairly bad. Console is slow and after making a selection you had to wait "a long time" before your selection was visible in the screen. Also navigation in the console was fairly funky. Search-button did not work".

5.1.12 OLA Technical Definition Workshop

The operational level agreement technical workshop took place on 12th December 2013. Along with the project manager and 3rd line team leader, present were key members of R&D unit and Accept product owner. The aim of this workshop was to identify all the different time measurements in the process of feature management. In Figure 18, the whole cycle of a bug report is explained. Based on the figure, the members of the workshop identified total of nine different steps in the process that could be measured:

1. Incident response time
2. Incident resolution time
3. Problem investigation sent to Accept or Jira
4. End of evaluation
5. Committed for correction
6. Rejected by R&D
7. Bug fix ready by R&D
8. Release released
9. Deployed into production

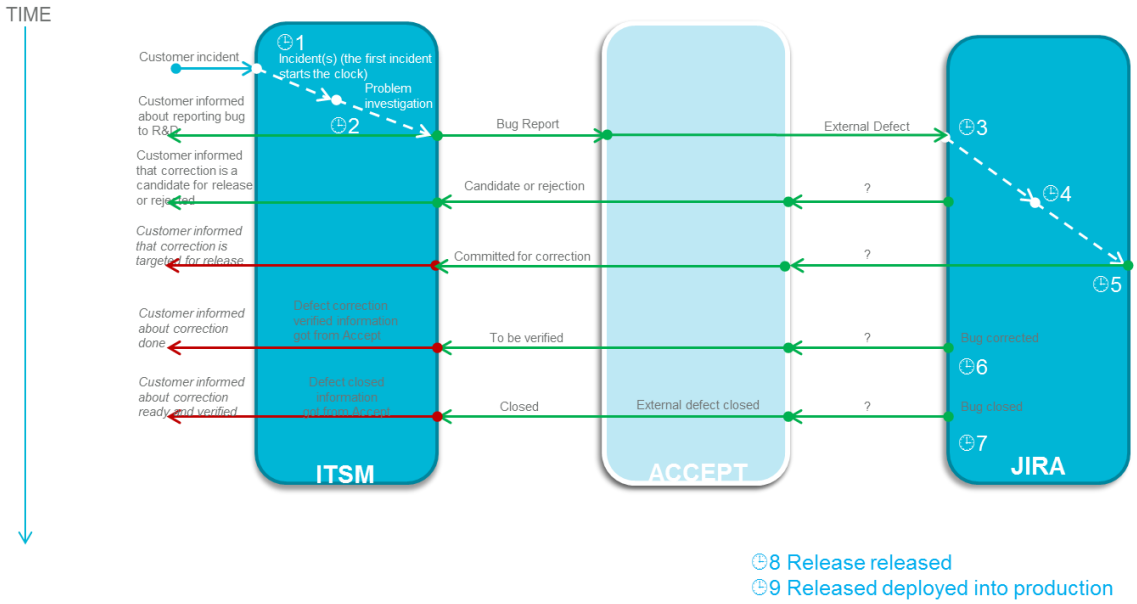

Figure 18. Operational Level Agreement time measurements. Basware (2013l).

The potential time measurements using these previously identified nine steps were as follows (meeting minutes 12th December 2013):

Incident response time – currently already calculated. The amount of time it takes support to give the initial response to the incident. *Incident resolution time* – also already a calculated metric. The moment when the incident is resolved and problem investigation is initiated. *Customer Support investigation time* – represents the total time for customer support to finalize incident investigation. Calculated as the time difference between incident response and resolution times. *Problem investigation sent to Accept or Jira* – the moment when a bug is reported to R&D for evaluation from customer support. *End of evaluation* – The moment when a bug report is evaluated and gets a status 'candidate' or 'reject'. This represents the moment when the evaluation period is finished for the defect. *Total R&D evaluation time* - total time for R&D to evaluate the defect. Calculated as the time difference between the initial bug report and the end state of evaluation. *Committed for correction* - at this stage the problem can be closed for enhancement requests and estimate communicated to customer. *Enhancement life cycle for support* – this metric is the total time it took for customer support to handle an enhancement request. Calculated as the time difference between 'Committed for correction' and incident response time. *R&D Backlog Age* – the total amount of time bug report spends in R&D's backlog waiting for an initial roadmap designation. *Rejected by R&D* – the moment in time when a bug or an enhancement is rejected by R&D and

the change will not be implemented. *Bug fix ready by R&D* – the time when a bug gets status 'Closed' or 'Implemented'. *Total bug life cycle for support* – the total lifecycle of a bug report from the customer support point of view. Calculated as the difference between Bug fix ready by R&D and incident response time. *Release released* – the time when the release is ready for deployment and customer testing. *Total throughput time total* – measures the total time a defect spent inside the organization. In other words, total time it took to fix the issue from its initial incident from a customer. Calculated as the time difference between 'release released' and incident response time. *Throughput time for R&D* – a similar metric to the previous, this measuring only the time it took R&D to handle the bug. Calculated as the time difference between 'release released' and 'problem investigation sent to Accept or Jira'. *Deployed into production* – the moment when the release including that fix is deployed into the production environment.

5.1.13 Network Services OLA Review

The operational level agreement review was held on 12th December for the Network Services business unit (Attachment 4). The aim of this session was to agree which of the sixteen measurements identified in the OLA technical definition workshop were interesting enough to be measured and reported in the future.

Additionally the meaning of this session was to make a preliminary agreement of the response and resolution times that R&D would promise obey. Previously, there were no integration existing between customer support's incident and problem management system, Remedy ITSM, and R&D's own management system Jira. Thus, the biggest obstacle of this meeting was the lack of metrics of how had all the relevant stakeholders been performing in the past. Especially R&D were not willing to agree to any specific response and resolution times without any baseline data. Therefore, it was agreed that only after the baseline data can be demonstrated could improvement actions be made.

5.1.14 Steering Group Meeting 4

The last steering group meeting was held on 12th December 2013. According to the meeting minutes it was decided that "SaaS would need to be handled as a separate entity and not included in the on-going project". It was also concluded that since the OLA discussions were not progressing in a desired manner due to lacking baseline data, the operational level agreements will be left out of the scope of the project but will be finalized once the integrations are available for data gathering.

5.2 Other deliverables and recommendations

In addition to the problem management process improvements, other deliverables were defined to be a part of the project's scope. Amongst these were the direct integration from Remedy ITSM to Network Services R&D's internal ticketing system, Atlassian's Jira. The key performance indicators are an integral part of being able to measure the success of the improvements, in this case problem management. Operational level agreements were left out of the scope during the project but recommendations to what data would be interesting to see are explained here. In the next subchapters, the recommendations for these deliverables are described.

5.2.1 JIRA Integration

In order to understand the mapping scenarios between Accept and Jira, a category based mapping table was established (Figure 19). This mapping table will be used as the basis for the technical implementation of the integration between these two systems. The product categorizational needs are quite different in the two systems as Jira's main purpose for utilizing the category is to identify the correct high-level product, i.e. the correct project, after which further categorization is done by utilizing tags instead of sub-tier logic seen in Accept.

Accept attributes		JIRA attributes		Change Log
	Webshop Lightweight certificate		Webshop Lightweight certificate	
	Webshop SSL certificate		Webshop SSL certificate	
	Webshop E-id reader		Webshop E-id reader	
	Webshop Openra		Webshop Openra	
	Sepa Application		Sepa Application	
	Sepa Printing		Sepa Printing	
	Sepa Mandate		Sepa Mandate	
	Sepa Scanning		Sepa Scanning	
CloudScan		BT		
	CloudScan		CloudScan	
Gateway document processing		IaaS team		Gateway -> Gateway document processing 01/03/14
Gateway receiving methods		IaaS team		Gateway receiving methods 01/03/14
Gateway sending methods		IaaS team		Gateway sending methods 01/03/14
Qvantel		BT		
	Qvantel		Qvantel	
Scan & Capture		Scan and Capture		01/03/14
Operation support systems		Supplier Portal		systems 01/03/14
PRIORITY		**priority**		
Unknown		Low		
Critical		Critical		
High		High		
Medium		Medium		
Low		Low		

Figure 19. Accept-Jira category mapping table. Basware (2014b).

There are no direct links or correspondence between the prioritization levels of Accept and Jira. Figure 20 illustrates the best possible option to link the priorities of these two systems. Critical bugs from Accept's perspective are regarded as showstoppers and a very similar definition exists for Jira's blocker-priority, a bug that requires a hotfix.

Accept Priority	Jira Priority
Unknown	Minor
Critical	Blocker
High	Critical
Medium	Major
Low	Minor

Figure 20. Accept-Jira priority mapping. Basware (2014c).

5.2.2 Problem management KPIs

The following Key Performance Indicators were suggested to be measured for problem management to be reported in the reporting tool Qlikview:

- Average resolution time
    - How many hours (or days) does it take on average to resolve a problem investigation

- Problem Investigation Backlog
    - The number of old problem investigations are still open
    - Old can be for example 28 days
- Percentage of all resolved problem investigations that have an identified root cause
- Number of incidents per known error
- Number of incidents linked per PBI

5.2.3 OLA recommendations

Figure 21 describes the most relevant metrics for the operational level agreement reporting. There are total of nine different time measurements out of which only two are currently measured;

1. SLA Response Time (already measured)
2. SLA Resolution Time (already measured)
3. Actual time spent on investigation
4. R&D Evaluation Time
5. R&D Fix Time
6. R&D Roadmap Time
7. R&D Implementation Time
8. Complete R&D Cycle
9. Complete Lifecycle

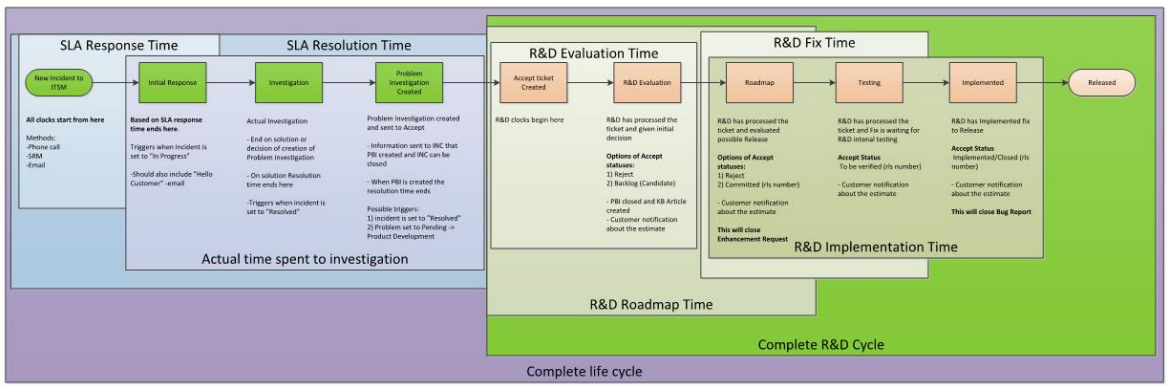

Figure 21. Proposed OLA measurements. Basware (2013m).

By utilizing these measurements, Basware will have a better understanding of their capability to react to customer demands and industry demands as well as ability to correct bugs of all priorities within the provided services.

6 Discussion

The aim of this case study was to understand the reasons why the problem management process was not working at Basware; what were the causes for the lack of ownership, unclear understanding of the provided instructions and general confusion of the process. It was successfully established what the existing process before the improvement project was initiated and during the initial kick off meeting, the gaps of the current process were identified.

The new process was not only something decided by customer support to start using but instead the relevant stakeholders were heard in the process and their opinions considered in the reviews. One of the ways to reduce the incident resolution time was the utilization of the known error database. The known error database was well received by the first level customer support agents, who could see the benefits of it in their daily operation of incident handling. Another way to improve incident resolution time was to clarify when and what will be reported to the customers regarding on-going bug fix as well as enhancement request implementation schedule. Also establishing the requirements needed for the Jira integration helps to open a communication channel between customer support and R&D.

The implementation of the new process utilizing the ITIL framework was successful since the foundation, i.e. used technology and company mind state, for adapting ITIL processes were relatively strong. Problem management was not adapted as is, but was more tailored to fit Basware's specific business needs. Additionally, it was apparent in the process that Basware is a technology oriented company making a transition to a more customer oriented approach. As mentioned by Hochstein et al. (2005) the transformation from a technology oriented towards a customer oriented service provider requires that the organizations' processes are engineered in a systematic, methodical manner to support this.

The effectiveness of problem management can be measured through the suggested KPI's. Initiated discussions for the operational level agreements is a crucial prerequisite

to the service level agreements that will be negotiated with Basware's customers in the future.

It came apparent that it is quite impossible to design a common process that would serve each business unit across the functions. The unique business needs of traditional license customers are very different from customers who only use a cloud service. Therefore the deployment cycles, customer impact of a fix, ability to react to a critical issue are very different. Having a goal to design a unified process for all business units resulted in a process that is too general for everyone.

The problem management being an internal process for customer support made it also difficult to define the correct level of involvement with the relevant stakeholders. Problem management is not something that customer support can manage on their own but they rely on the assistance of numerous teams, e.g. production, R&D, infrastructure, service management.

The problem management can only be effective if the incident management is done in a correct and effective way, as tt was concluded by Niessink and van Vliet (2006) that the problem management process could not be executed properly due to the lack of solid incident management process. Once Basware has matured with their incident and problem management processes, the author would suggest to expand the ITIL framework to other service operation modules, e.g. event management. Escalating unusual event occurrences to problem investigation items can be a very efficient way of doing proactive problem management.

It could also be suggested that involving employees to the process design very early on in the project. People who deal with the identified issues on a daily basis can usually provide very valuable feedback of what might work and what not. They also feel more motivated about the change effort if they feel that their opinions are valued.

During the research, it became quite obvious to understand that the internal functions, Network Services, Solution Services and SaaS operate in different ways mainly due to

their way they offer their services. This was the main reason why it was not possible to find common processes across the business units, because of their unique nature of providing services. It could be suggested that processes could be designed to suit the business units more; forcing a unified process may result in a compromise that is not suitable for any one.

Although the chosen research method provided adequate amount of data, one might speculate how much more systematically it would have been approached, had the data been collected more proactively. It might have also affected the evaluation of the studied project if a different research had been chosen and conducted in parallel with the project.

For future research, the success of the training of the new process, in other words how the new process has been adapted and used, might be interesting to investigate further. Additionally it would interesting to study how the suggested measurements, i.e. KPIs and OLAs, demonstrate the potential improvement in the overall performance and service quality on a longer time span.

7 Conclusions

This thesis researched an internal improvement project for problem management at Basware as a case study. The main objectives were to find out how problem management was currently done, how the related incident management and its resolution times can be reduced and how can the effectiveness, i.e. ability to reduce the number of recurring incidents, of problem management be measured.

This thesis was able to answer all three research questions. First of all, the current process and how that was conducted was documented and its areas of improvements identified. The initial implementation of the problem management project had not been able establish common practices resulting in various ways working.

Secondly, good suggestions for the improvement incident resolution times were made, e.g. the usage of the known error database, customer communication templates, cleared roles and responsibilities. Known error database was seen as a helpful tool according to the first line agents using it in their daily work.

Thirdly, measurement criteria was provided to define whether the new designed process is providing the desired improvements. The defined KPIs will be able to provide valuable information about problem management that can be used to steer business decisions within the company.

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Basware. 2013b. Existing problem management process description. Figure by Valtteri Ruohomaa and Johanna Puro-Grönblom

Basware. 2013c. Kick-off mind map. Figure by Markus Wennerström

Basware. 2013d. First proposal for the new problem management process. Figure by Rauli Kuhanen.

Basware. 2013e. Template answer for internal communication. Figure by Rauli Kuhanen.

Basware. 2013f. Co-operation with product management. Figure by Markus Wennerström

Basware 2013g. Project Plan. Figure by Markus Wennerström

Basware. 2013h. Integration between Remedy ITSM and other systems. Figure by Markus Wennerström

Basware. 2013i. Proposed status update improvement to known errors. Figure by Markus Wennerström

Basware. 2013j. Support internal problem management process. Figure by Rauli Kuhanen

Basware. 2013k. High-level description of new process. Figure by Markus Wennerström

Basware. 2013l. Operational Level Agreement time measurements. Figure by Markus Wennerström.

Basware. 2013m. Proposed OLA measurements. Figure by Rauli Kuhanen.

Basware. 2014a. Project Timeline. Figure by Markus Wennerström

Basware. 2014b. Accept-Jira category mapping table. Figure by Jyrki Tunnela.

Basware. 2014c. Accept-Jira category mapping table. Figure by Markus Wennerstörm

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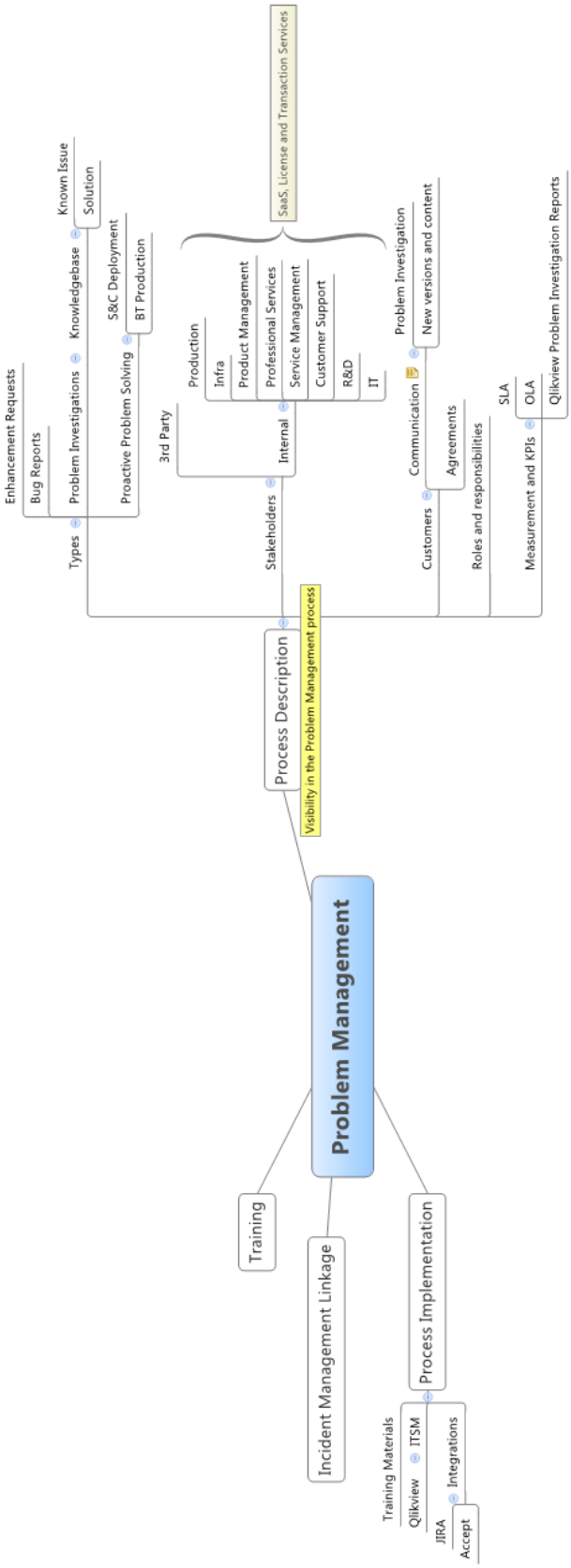
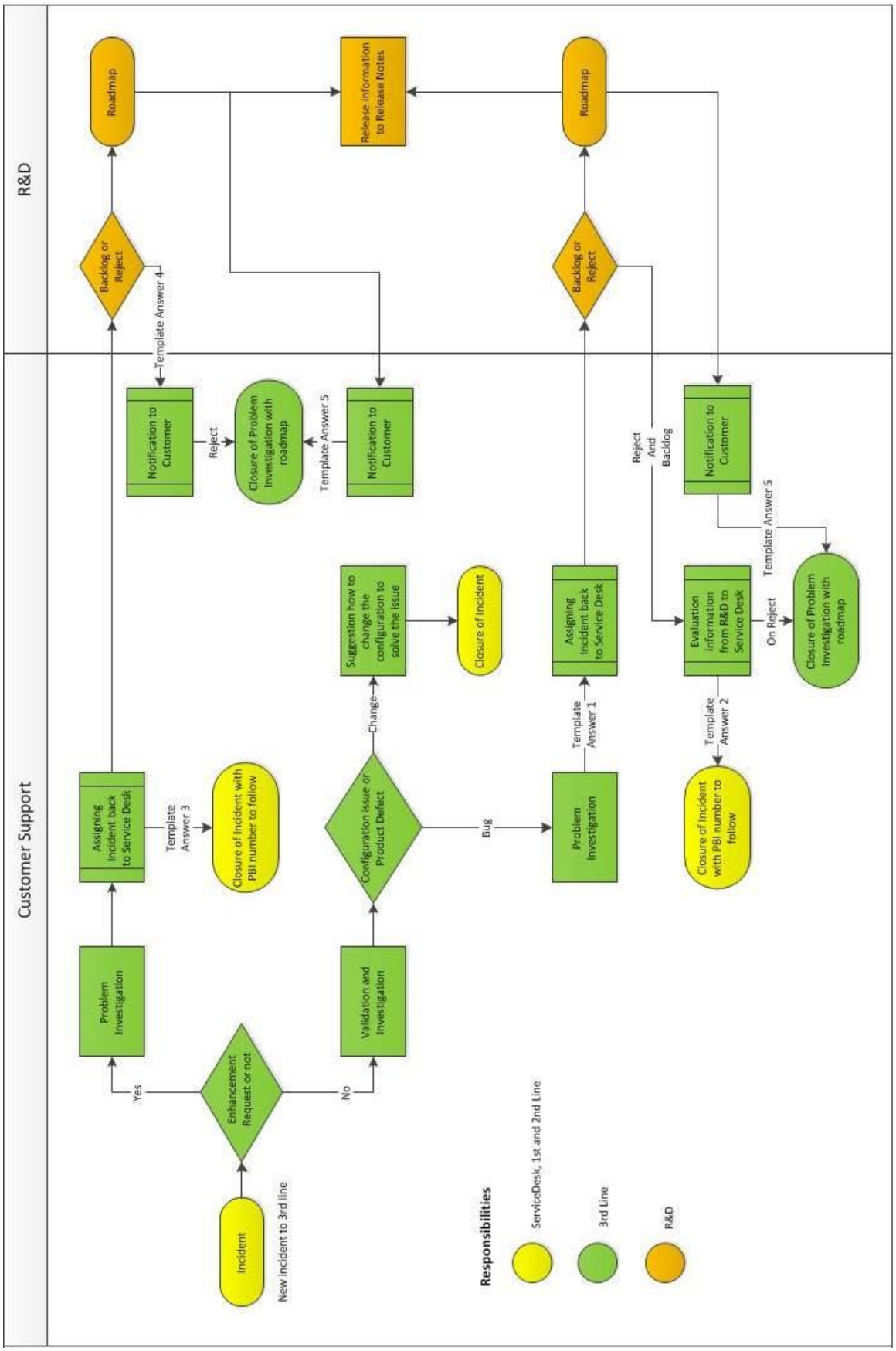
9 Attachments

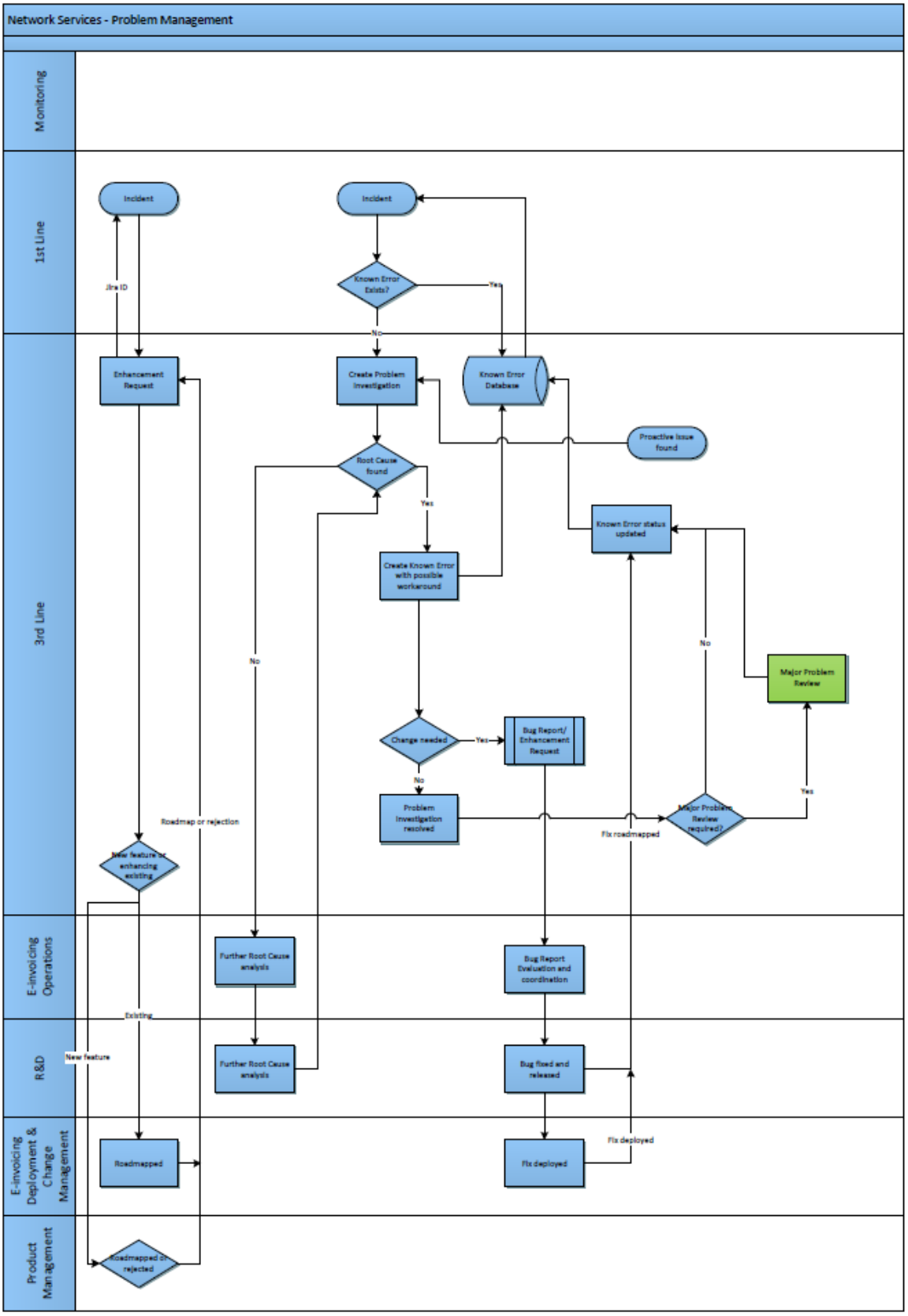
9.1 Attachment 1 – Kick off workshop mind map



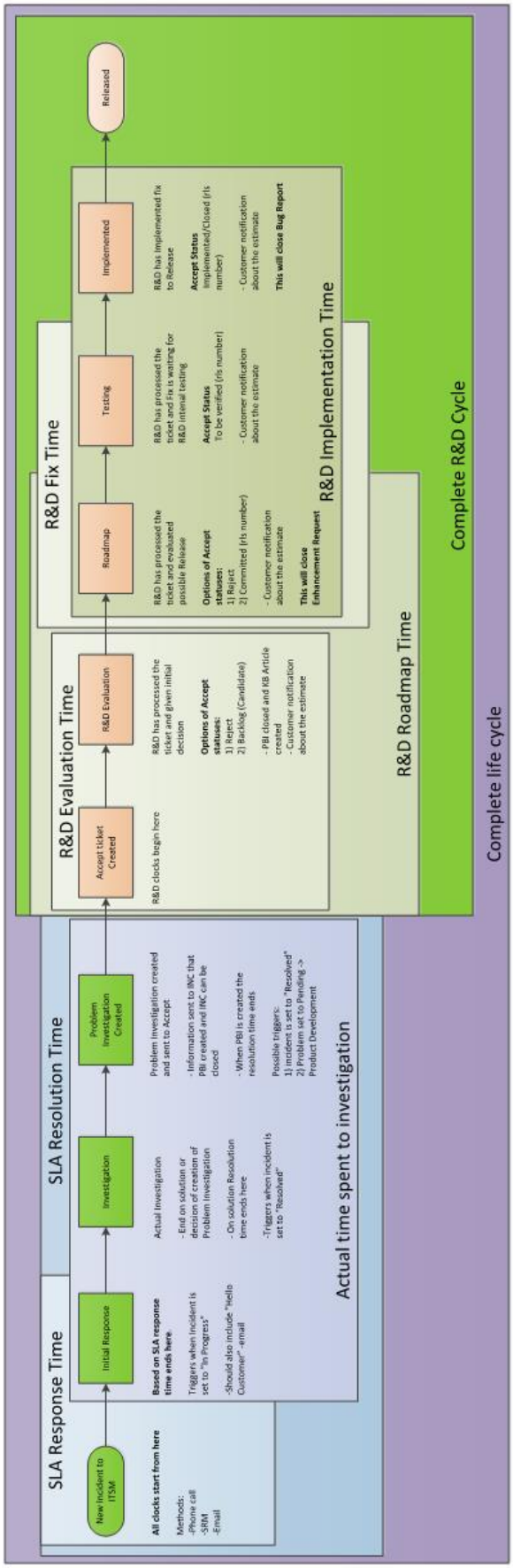
9.2 Attachment 2 – Problem Management proposal 1



9.3 Attachment 3 – Production and Deployment Workshop



9.4 Attachment 4 – OLA proposition



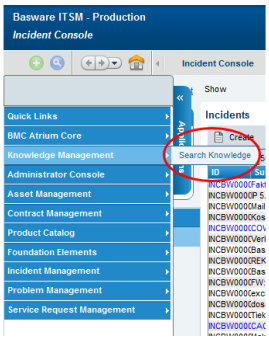
9.5 Attachment 5 – Knowledge base instructions

basware

Knowledge Management

User View

Search Knowledge

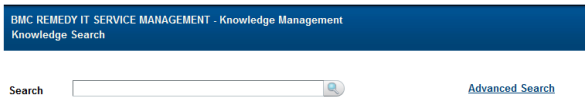


Access Knowledge Base by clicking on Search Knowledge under Knowledge Management

basware

1

Simple search

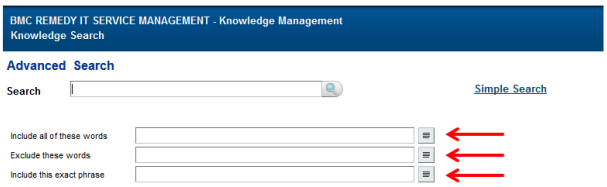


Knowledge base can be searched with a simple search

basware

2

Advanced Search



...or using using the Advanced search

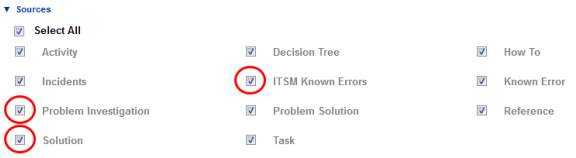
With Advanced Search you can

- List words to be included in the search
- Exlude specific words
- Include exact phrases

basware

3

Advanced Search - Sources

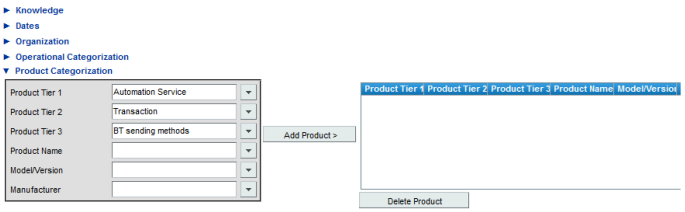


Problem Investigation, Solution and ITSM Known Errors are the ones used for search knowledge for incident solving

basware

4

Advanced Search – Additional Criteria



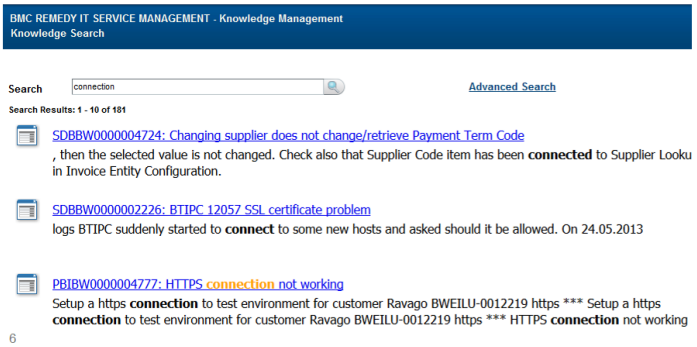
You can further define your search by adding e.g. Product Categories.
Multiple Products can be added.

basware

5

Search Results

SDBBW = Solution
PBIBW = Problem Investigation
PKEBW = Known Error



6

Knowledge type characteristics

Problem Investigation

- On-going investigation regarding a bug, configuration error, outage etc.
- Links all affected incidents under the same Problem Investigation ticket

Known Error

- created as a result of a completed Problem Investigation
- has a root cause and possible a workaround

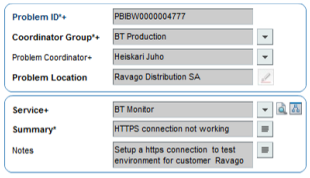
Solution

- Best Practices
- Work instructions
- User guides and manuals

basware

7

Problem Investigation



Problem ID Unique identifier of the Problem Investigation

Coordinator Group ITSM group responsible for coordinating the problem investigation

Problem Coordinator Team member responsible for the investigation

Problem Location Name of the customer affected

Service Impacted service

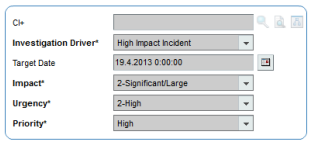
Summary Short description of the problem

Notes Details of the problem

basware

8

Problem Investigation



Investigation Driver ?

Target Date Expected resolution date for the problem

Impact Customer impact

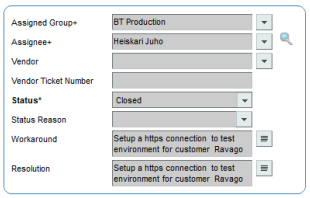
Urgency ?

Priority ?

basware

9

Problem Investigation



Assigned Group Current assigned group

Assignee Current assignee of the problem

Status Status of the problem

Status Reason Reason for the status

Workaround Way to bypass the problem with a temporary fix

Resolution Resolution for the problem when the problem is solved

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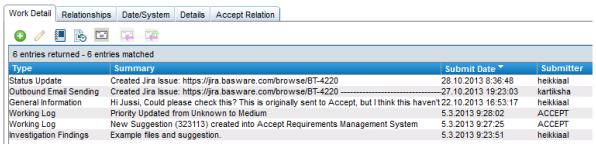
Problem Investigation – Work Detail



Type defines the type of the Work Detail

- Status Update
- Outbound Email Sending
- General Information
- Working Log
- Investigation Findings

Submitter can be either ITSM user id or ACCEPT (information received via Accept integration)

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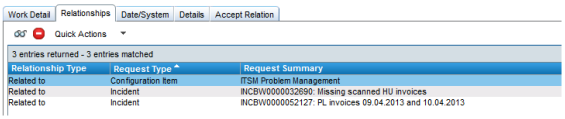
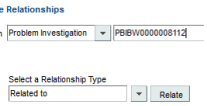
Problem Investigation – Relationships



All impacted incidents are shown under Relationships.

To add your incident to the Problem Investigation, go to the Relationships-tab on the incident and use the Create Relationships at the bottom of the page

After succesfully finding the correct Problem Investigation, confirm the linking at the bottom of the page by clicking Relate



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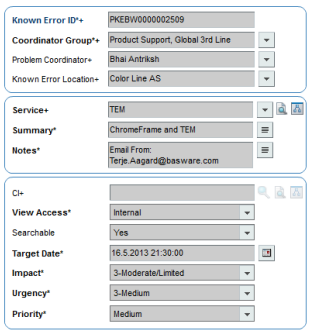
Known Error



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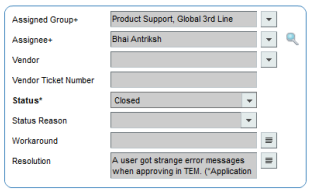
Known Error



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