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ANALYSIS AND IMPROVEMENT OF IT SERVICE OPERATIONS AND PROCESSES IN LARGE-SCALE ORGANIZATION BASED ON EXAMPLE OF KUEHNE+NAGEL INTERNATIONAL AG.

Bachelor's thesis

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IT TEENUSTE HALDUSE JA PROTSESSIDE ANALÜÜS JA TÄIUSTAMINE SUURES ORGANISATSIOONIS KUEHNE+NAGEL INTERNATIONAL AG NÄITE PÕHJAL.

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Author's declaration of originality

I hereby certify that I am the sole author of this thesis. All the used materials, references to the literature and the work of others have been referred to. This thesis has not been presented for examination anywhere else.

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Abstract

The main objectives of the current study is to review and analyze current IT Service Operations in Kuehne+Nagel International AG and to find optimal tools and processes that would help a centralized team of IT specialists to manage IT ecosystem across the region as well as provide operational support to business units and end-users.

During the study I review the setup of IT Service Operations in the main Kuehne+Nagel branches in EMEA region as well as analyze possibility of propagating their current setup to entire Kuehne+Nagel EMEA region.

The results of the study show what processes and tools would be beneficial for the company to use in terms of centralization and harmonization of IT Service Operations, also giving explanation why does it make sense to use exactly these tools and processes.

Based on the current plan of Kuehne+Nagel in next 5 years all EMEA branches of the company will be consolidated under one IT Service Operation umbrella, which will potentially have a tangible benefit on the main company business as well as enable utilizing company IT budget in a more effective and efficient way.

This thesis is written in English and is 42 pages long, including 6 chapters, 15 figures and 4 tables.

Annotatsioon

IT TEENUSTE HALDUSE JA PROTSESSIDE ANALÜÜS JA TÄIUSTAMINE SUURES ORGANISATSIOONIS KUEHNE+NAGEL INTERNATIONAL AG NÄITE PÕHJAL.

Käesoleva töö eesmärk on analüüsida Kuehne + Nagel International AG tööd ja leida optimaalsed töövahendid ning aidata IT spetsialistide meeskonnal hallata IT ecosüsteemi kogu EMEA regioonis ning pakkuda opereerimistuge äriühingutele ja lõpptarbijale.

Töö käigus ma vaatan üle IT toe ülesehituse peamistes Kuehne+Nageli EMEA regiooni osakondades ning analüüsin võimalusi kasutada nende praegust IT ülesehitust kõigis EMEA regiooni Kuehne+Nageli osakondades.

Töö tulem näitab, et firmale oleks kasulikum tsentraliseerida ning harmoniseerida IT süsteemi opereerimist ning samuti annab põhjenduse miks kasutada just pakutuid lahendusi.

Hetkel käimas oleva plaani kohaselt läheb Kuehne+Nagel järgneva 5 aasta jooksul üle ühise IT lahenduse alla kogu oma EMEA regioonis mille tulemusena saavutatakse märgatav materiaalne tulu kui ka eelarve parem ning effektiivsem kasutus.

Käesolev töö on kirjutatud inglise keeles ning sisaldab teksti 42 leheküljel, 6 peatükki, 15 graafikut ja 4 tabelit.

List of abbreviations and terms

KN	Kuehne + Nagel
EMEA	Europe, Middle East and Africa
SCCM	System Center Configuration Manager
IT	Information Technology
FOSS	Free and open-source software

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1 Introduction

IT Service operations for large-scale corporations have always been a problematic topic. In this work I will try to describe the challenges faced by IT department of Kuehne+Nagel International AG when trying to consolidate and harmonize IT services in EMEA region as well as share experience of bringing this to live.

1.1 Research Problem

Historically all branches of Kuehne+Nagel across the world were acting as separate legal entities with their own budgets, including budgets for IT Services. It has brought the company to situation when every country was handling IT in their own way. The biggest countries like UK or Germany had their own complete IT Infrastructure, including Data Centers, Service Desk departments, back-end teams, and even separate development units which were developing similar logistics software with similar functionality, while some smaller countries like the Baltic states were either buying IT Services from a third party vendors or were having limited count of "any key" specialists who were literally saying responsible for everything, starting from 1st line user support and ending with setting up Microsoft Exchange environments and supporting complex applications. Of course in the modern world where good business-oriented IT Services have become one of the main competitive advantages this lie of the land was pulling company down by causing significant investments. The problem has become more and more visible when IT Services duplication and de-centralization started to have business impact to the main company sectors.

1.2 Objective

In this thesis I will analyze the challenges faced by the IT Infrastructure department when running IT services for EMEA region – the biggest operation region for the company with 30 000+ workstations and 1700+ servers.

The main objectives are:

- to find optimal tools and processes that would help a centralized team of IT specialists to manage IT ecosystem across the region as well as provide operational support to business units and end-users.

- to find the best way to assure a smooth transition from distributed and de-centralized IT operations environment to centralized IT model

1.3 Methodology

I will review the current strategies that are utilized by the main branches in the region and check if their way of providing IT services can be applied to other countries.

The following country branches were chosen for review and analysis of their approach to IT Service Management as biggest organizations inside Kuehne+Nagel (the choice is based on two main factors - people count and business share):

- German IT organization

- UK IT organization

- Netherlands IT organization

- France IT organization

Also industry best practices will be evaluated and checked against the needs of the company. As de facto standards in IT Service Management the following frameworks will be analyzed:

- ITIL

- COBIT

- MOF

The last but not least I will try to describe optimal set of tools that are essential for effective IT Service Management. This will be done based on current experience of IT Infrastructure departments in the company.

2 Review and analysis of current IT Management strategies

As the main objective of current work is to find optimal processes for IT Service Management – it makes sense to review current service strategies utilized by the main players. Out of 26 countries in EMEA region we have chosen the biggest ones and try now to review the following

- IT Management processes they have

- IT Management tools they use

- Availability to propagate current set of tools/processes to other countries

After reviewing of common IT management practices and comparing them to the day-to-day company needs we have come down to the list of most vulnerable processes of IT Service Management. IT Management strategies will be analyzed against this list in order to have better overview and being able to compare processes side by side.

Process	Process description
Demand Management	Demand management is the process that seeks to understand, anticipate and influence customer demand for services and the provision of capacity to meet these demands [1].
Change Management	Change Management aims to control the lifecycle of all Changes. The primary objective of Change Management is to enable beneficial Changes to be made, with minimum disruption to IT services. Change Management also aims to ensure

	that only changes of an acceptable quality are implemented [2].
Incident Management	Incident Management aims to manage the lifecycle of all Incidents. The primary objective of Incident Management is to return the IT service to users as quickly as possible and minimize the adverse impact on business operations, ensuring that agreed levels of service quality are maintained [3].
Request Fulfilment	The objective of Request Fulfilment is to fulfil Service Requests, which in most cases are standard well-documented minor change requests (e.g. purchase order, password change, software install).
Service Catalogue Management	The aim of Service Catalogue Management is to ensure that a Service Catalogue is produced and maintained, containing accurate information on all operational services [3].
Service Level Management	The aim of Service Level Management is to negotiate Service Level Agreements with the customers. Service Level Management is also responsible for ensuring that all Operational Level Agreements and Underpinning Contracts are appropriate, and to monitor and report on service levels [3].

Table 1. Core IT Management Processes with description

2.1 German IT Organization

German IT organization is the largest in the EMEA region numbering over 10 thousand workplaces (approx. 1/3 of EMEA region). If we are talking about consolidation of IT services in the region - it will be much easier for the company to utilize the service model which is currently in use by the biggest branch.

Table 2 is describing the setup and tools for IT Management processes in German branch.

Process	Process setup and tools utilized
Demand Management	Separate department responsible for demand management process. Any employee (not only IT) can potentially submit a demand request. Demand is then reviewed and assigned with priority. Tool utilized for the process – Atlassian JIRA.
Change Management	Change management process is very poorly organized. Mostly operation teams are responsible for change management and most of the changes are emergency-driven. Tool utilized for the process – Atlassian Confluence
Incident Management	Incident management process is divided between 1st and 2nd level operational teams, 1st level is acting as a SPOC for any incoming incident and if incident is categorized with high Priority/Severity – then also 2nd level is being involved in resolution.

	Tool utilized for the process – Request Tracker
Request Fulfilment	Request fulfillment is in jurisdiction of distributed 1st level team. Tool utilized for the process – Request Tracker
Service Catalogue Management	Teams responsible for particular services are maintaining Service Catalogues. They are stored on intranet and are available to internal customers. NB! When reviewing these service catalogs it was discovered that description for most of the services is outdated. The reason for that was non-existing process for timely review of these documents. They were created only once and in majority of cases not being reviewed after implementing changes.
Service Level Management	Operational teams are responsible for Server Level Management process. Every service has its own defined SLA. Problem is that these SLAs are sometimes not competitive to t same services provided by the third party companies. KN internal strategy is to use internal providers for IT Management, and this "monopoly" has a negative impact in terms of the quality and service delivery figures reflected in SLAs.

Table 2. Core IT Management Processes for the German branch.

The tools utilized by German branch are common to KN in general except for the Incident and Request management tool – Request Tracker. RT is a ticket tracking system written in Perl. RT is open source (FOSS) and distributed under the GNU General Public License. In Chapter 4 we will have a closer look at its abilities and Pros\Cons of using it.

2.2 UK IT Organization / Netherlands IT Organization

Although Kuehne+Nagel has separate legal entities in UK and Netherlands, as well as their IT infrastructure is separated, in terms of our work it still makes sense to review them at once. Firstly – these two countries have very similar IT Management processes, second – they utilize the same software for managing their IT Infrastructure. Also these two countries together have approximately 8 thousand employees which makes it worth analyzing their IT Management processes for possibility of implementing in EMEA region.

Table 2 is describing the setup and tools for IT Management processes in UK/Netherlands branches.

Process	Process setup and tools utilized
Demand Management	Demand management process lies in the hands of local IT management. They are responsible for reviewing demands (mostly based on requirements from business units) and then trigger the change management process. Tool utilized for the process – Atlassian JIRA.
Change Management	Change management is mostly covered by the IT operational teams. Same as for the German organization most of the changes are emergency-driven.

	Tool utilized for the process – Atlassian Confluence
Incident Management	Incident management is handled by a dedicated Service Desk team. This team is SPOC for all incoming incidents and is responsible for classifying them. Depending on Priority/Severity level incidents can be escalated further to operational team. Tool utilized for the process – Topdesk
Request Fulfilment	Incident management is handled by a dedicated Service Desk team. Tool utilized for the process – Topdesk
Service Catalogue Management	Teams responsible for particular services are maintaining Service Catalogues. They are stored on intranet and are available to internal customers.
Service Level Management	Operational teams are responsible for Server Level Management process. Every service has its own defined SLA. Some of the services are being provided by external parties (which is not in accordance with general company policy!) so partly this process is not handled by KN

Table 3. Core IT Management Processes for the UK/Netherlands branches

2.3 French IT Organization

French IT organization is relatively small comparing to 3 main players described above, covering a bit more than 2 thousand users. The reason why it is worth reviewing its IT strategy is that they have chosen totally different way of managing their IT. French organization has outsourced most of their IT services to external providers, leaving major part of all 6 IT Management Processes we try to review to third party companies. Of course this strategy has its own Pros: a) Company can focus on its main business, not spreading resources on managing own IT infrastructure b) Sometimes it can be more cost effective because of very tough competition on IT services market.

But according to current company strategy all IT infrastructure has to be managed by own IT organization. And from the business perspective it makes sense for the following reasons:

- Security. Company has to have full control on its own data. Commercial property and liability questions always arise when talking about outsourcing IT. For Kuehne+Nagel this is a major concern because company's competitive advantage is last but not least based on IT know-how.

- Priority. Service providers have long list of customers and even though enterprise clients like Kuehne+Nagel are most likely in priority list – you never know how your requests are treated in reality. Basically you get very little overview on process management getting a "black box" service model.

- Control. Outsourcing own IT means losing control on it. It doesn't have to be a negative factor if you rely on a professionalism of service provider and have a high level of trust. But like in any business, and especially for large-scale enterprise, it is essential to have full control on main business affecting aspects of operations. And IT for sure is one of the top factors.

For the reasons described above it has been decided that KN will concentrate on insourcing IT where it is possible and reasonable. But those factors were not the only ones. Company strategy is to centralize and harmonize IT operations as much as possible – and this is one of major reasons not to go with the French IT model. Having EMEA (with its 26 countries) IT Services centralized means being able to manage core

infrastructure from few main locations and having IT services harmonized means being able to manage IT with certain set of standardized tools – which is hardly possible with outscoring. Of course there are companies who do provide IT management services on a global/regional scale, but they can hardly take over all IT operations and there is a high risk to fall dependent on their services which in its turn would put business at risk.

3 Review and analysis of IT Service Management best practices

Talking about centralizing and harmonizing IT operations it is essential to decide on standard set of practices to follow. In this chapter we will evaluate few common IT Service Management frameworks. Some of them have already become de facto industry standards and KN has been trying to implement some individual components in its own IT Management model.

3.1 COBIT

Control Objectives for Information and Related Technology (CobiT) is one of the most recognized frameworks which was developed in 1996 by Systems Audit and Control Association (ISACA). It went through the several revisions since then, most recent version (COBIT 5) was introduced in 2012. Comparing to other frameworks on the market COBIT is more process-oriented and focuses more on "what" to do rather than "how" to do it. For this reason it delegates "how-to-do" aspects to other tools and frameworks. ISACA has developed multiple methodologies describing the mapping of COBIT concepts to other "what-to-do" oriented frameworks [4].

Below figure represents 5 main principles COBIT is built on. We will try to describe them in short.
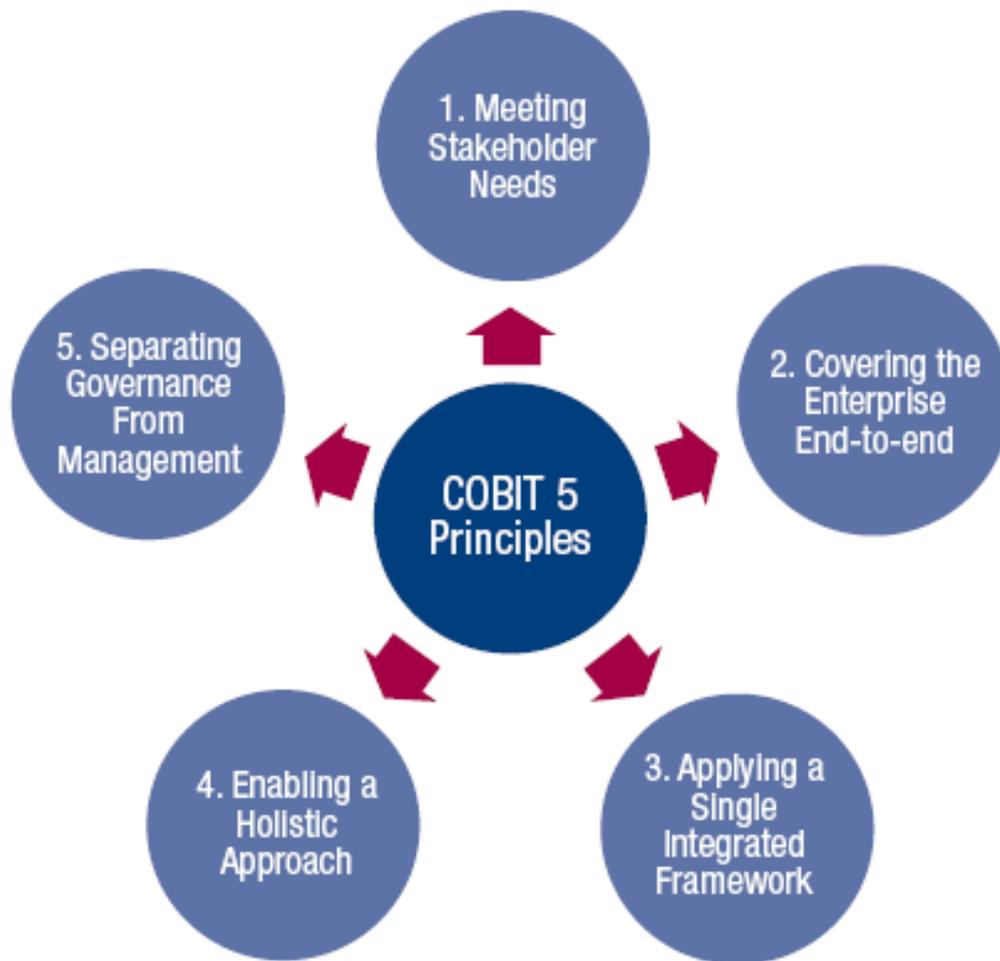
Figure 1. Main principles of COBIT 5 framework [5]

- Principle 1. Meeting Stakeholder Needs. This principle represents the value driven
  decision concept. Every move you make in IT organization has to come from the
  understanding of the value that it brings to the company. Values are defined by
  the main stakeholders, and decisions should be made considering possible
  benefits, risks and resources needed to implement these decisions to live. Meeting
  Stakeholder Needs principle should be transformed to Enterprise Goals and then
  cascade down IT-related Goals. This will allow to assure the right priorities for
  the IT organization and define goals that IT has to achieve. In one short sentence
  this is tool to assure that "IT is for Business – not Business for IT"

- Principle 2. Covering the Enterprise End-to-End. The idea of this principle is to
  integrate governance of IT into general enterprise governance. In other words IT
  governance should be seen as one of many assets that company has, and all these
  assents should serve one common target – value creation. In that sense IT has

common components to other company assets (e.g. specific scope, enablers and activities). Below figure shows common governance process proposed by COBIT. And this governance process is not unique for IT Management only.
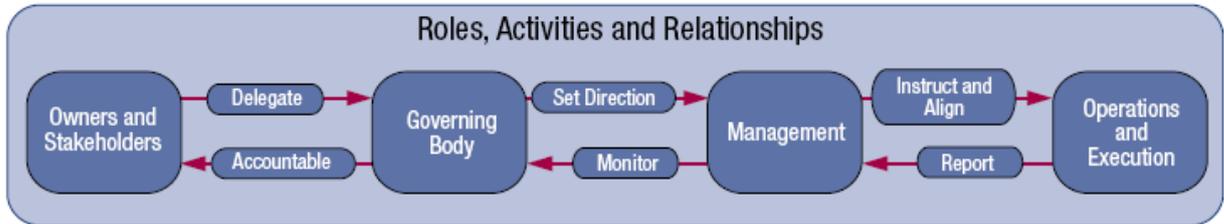
Figure 2. Governance system roles, activities and relationships offered by COBIT 5 [5]

- Principle 3. Applying a Single Integrated Framework. This principle represents the universal approach that COBIT is offering for IT Management. As mentioned before, COBIT is more of process-oriented framework focusing on how to do things. At the same time it aligns with the relevant industry standards, allowing organizations to utilize specific tools, practices and standards, mapping them to the general COBIT strategy. For example COBIT aligns with such general standards like ISO 31000, ISO 9000 and IT-related standards like ITIL, TOGAF and PRINCE2.

- Principle 4. Enabling a Holistic Approach. This principle describes factors that influence all-in-all effectiveness of IT Management by being interconnected and working together. COBIT divides these factors into seven categories:

21
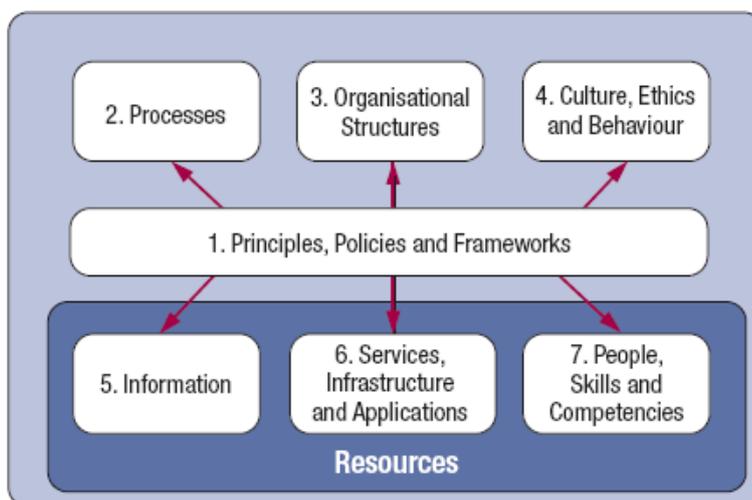
Figure 3. COBIT categories that enable a holistic approach for IT Management [5]

- Principle 5. Separating Governance from Management. COBIT 5 distinguishes Governance form Management stating that these two disciplines cover different types of activities, require different organizational structures and serve different purposes. Governance is mainly responsible for evaluating the needs of stakeholders prioritizing them and making decisions, while Management is responsible for planning, building and running activities in alignment with the decisions made by Governance [5]

Figure below shows the processes carried out by Governance and Management as well as direction of information flow in their cooperation:
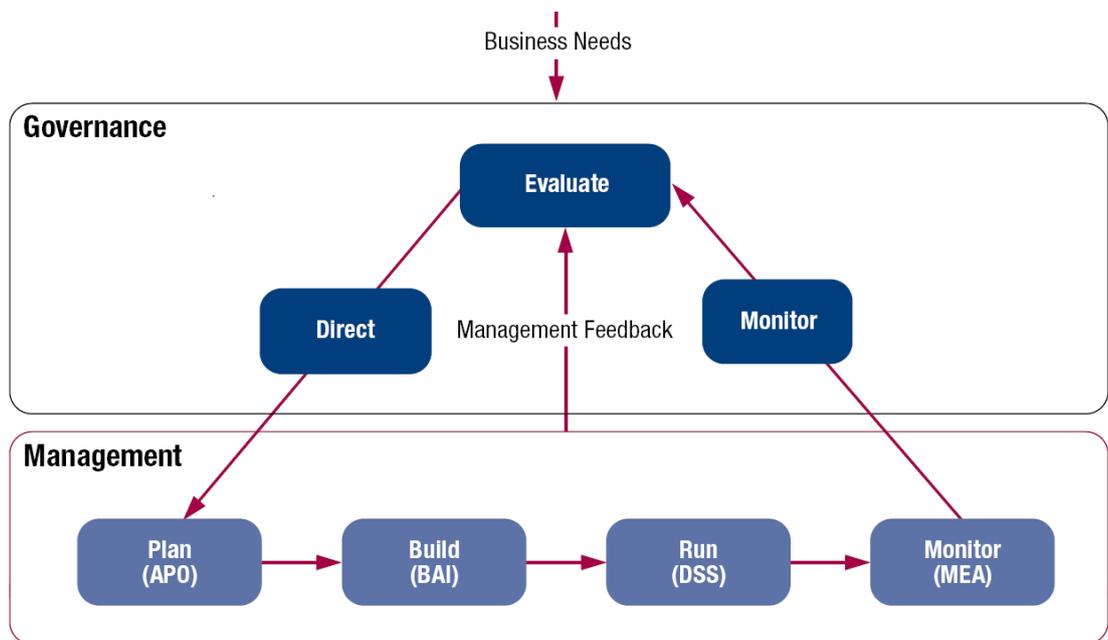
Figure 4. Separating Governance from Management processes overview [5]

Although every enterprise depending on its size and industry can have their own set of processes, COBIT 5 also references processes that needed to be carried out in order to achieve successful IT Management model. COBIT 5 offers a process reference model which describes in detail all processes that are carried out by Governance and Management. All-in-all COBIT offers a complete set of products for different aspects of IT Management including professional guides for such aspects as Implementation,

Assurance and Security (added to COBIT portfolio in 2013). Below please see a figure representing current COBIT products:
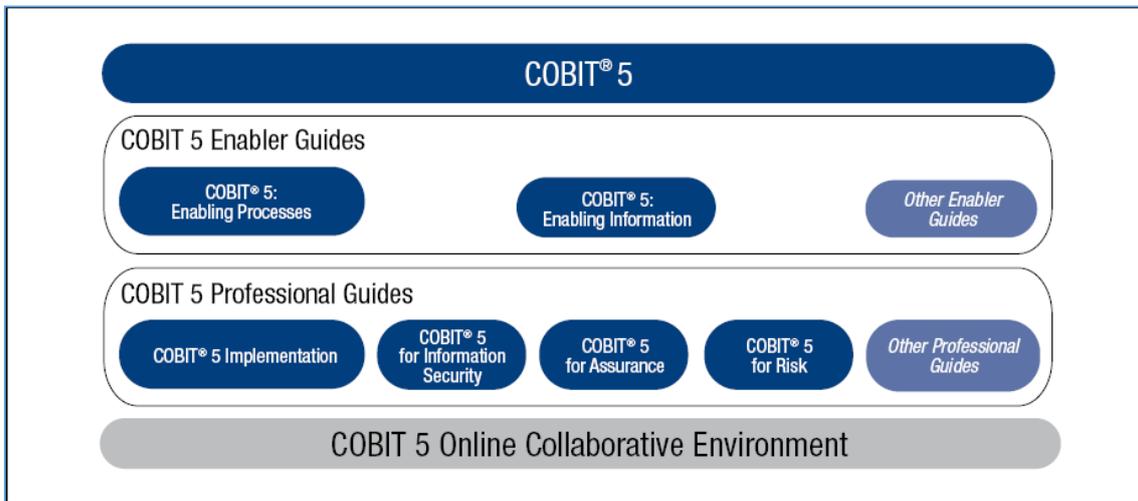
Figure 5. COBIT 5 product family [5]

3.2 ITIL

ITIL (Information Technology Infrastructure Library) is a set of practices for IT Service Management. ITIL was initially developed by Central Computer and Telecommunications Agency (CCTA) in 1890s. Since then ITIL has gone through several revisions, changed its owner and evolved into sustainable IT Service Management framework. ITIL has gained enormous popularity due to its focus on service quality and continuity, offering practices which are very scalable and are not organization- or industry-specific.

Current version of ITIL framework (ITIL V3) is represented by 5 core books covering the following IT Service disciplines:

• Service Strategy

• Service Design

• Service Transition

• Service Operation

- Continual Service Improvement

Each of these 5 core disciplines have their own related functions and processes. There is no need to go through all of them in detail as it is out of scope for current thesis. Please see a below figure for general overview of all functions covered by 5 core ITIL disciplines:

Service Strategy	Service Design	Service Transition	Service Operations	Continual Service Improvement
Demand m.	Service Catalogue m.	Knowledge m.	Incident m.	Service Measurement
Financial m.	Service Level m.	Change m.	Problem m.	Service Reporting
Strategy Generation	Capacity m.	Asset Configuration	Event m.	Service Improvement
Service Portfolio Management	Availability m.	Realease and Deployment	Request Fulfillment	
	Service Continuity m.	Transition Planning and Suport	Acess m.	
	Information Security m.	Service Validation and Testing	Operations m.	
	Supplier m.	Evaluation	Service Desk	
			Application m.	
			Technical m.	
			TI Operations	

Figure 6. Core ITIL Disciplines with Processes and Functions [4]

Since the main focus is to find common processes for centralizing and harmonizing IT Operation Services in Kuehne+Nagel – we will review ITIL recommendations for Service Operations in more detail. Service Operations discipline covers essential processes that every IT organization has, and these processes are applicable on organization of any size - they perfectly fit into large-scale corporation with focus on IT services. The main idea of Service Operation is to provide best practice for delivering the service to customers. It includes such processes as Event Management, Access Management, Request Fulfillment, Problem Management and Incident Management.

Also this discipline covers functional aspects of operations, such as Service Desk Function (handling incidents and requests, being SPOC for the customer), Technical Management Function (technical support of IT infrastructure), Application Management Function (maintaining software policies, tracking inventory, ensuring license compliance and managing software life-cycle) and IT Operations Management Function (day-to-day technical supervision of IT infrastructure, network and system monitoring, assuring stable operations). In one way or another all these functions are represented in IT Operations of Kuehne+Nagel.

3.3 MOF

Figure 7. MOF IT Service management high level representation [6]

Microsoft Operations Framework (MOF) is a structured series of guides to help Microsoft customers with their operational tasks. First version was published in 1999 and since then the framework was continuously updated. MOF was originally focused on processes for managing Microsoft platforms. Main reason for choosing MOF framework for review is that Kuehne+Nagel IT utilizes a lot of Microsoft products. Starting from end user OS, messaging service (Microsoft Exchange) and ending with backend services – almost all infrastructure servers are of Microsoft Windows Server family and as well as most of the backend services like DNS, Active Directory etc.

MOF is a lifecycle oriented framework and on its high level it is represented by 3 IT Service phases: PLAN, DELIVER and OPERATE.

- Plan phase focuses on planning and optimizing IT Service strategy. The goal it to support the business with the right IT services and solutions.

- Deliver phase responsible for assurance of IT Services. Services have to be have to be delivered and ready for operations.

- Operate phase responsibility is effective service operations and maintenance. During operations phase it's also important to support IT Services so they could meet business expectations.

Each of 3 phases in its turn contains so called service management functions that define the activities and parties responsible for certain processes. Every service management function has its own guideline explaining how the processes have to be organized.

On top of the 3 phases of IT Service lifecycle there is a "Manage layer". This layer covers such topics as IT governance, risk, compliance, roles and responsibilities, change management, and configuration. All processes in this layer apply to each phase of MOF IT Service lifecycle.

4 Standardizing IT Service Operation processes for Kuehne+Nagel

All of IT Service Management frameworks described in previous chapter are well known in the industry and can be adapted for use within big enterprise. Our goal is to define the best suitable framework that would be possible to adapt within Kuehne+Nagel IT infrastructure and make it effectively utilize this framework for managing IT services for the whole EMEA region. As we are trying to define a service management process for relatively big IT organization with over 30 thousand end-users I think it makes sense to start with high-level process definition. In that case logical choice would be COBIT framework which offers more tactical and high-level vision on IT Service Management. It concentrates on a strategic business objectives which is very important for the large enterprise. The concepts that COBIT offers would be applicable on a management level and give a clear view on what are the main objectives of the IT Service Management and how IT in the organization can better support business and really reflect on company needs. Since Kuehne+Nagel strategic plan is to centralize and harmonize IT Service

operations – COBIT will help executives and higher management to have a better oversight of new bigger IT organization and with the help of COBIT 5 principles it will provide instruments for delivering IT Services that meet company needs and push business forward, allowing at the same time to mitigate risks and avoid wasting resources.

At the same time there is a need for operational framework which will clearly define the processes and how they need to be carried. Here I see the weakness of COBIT high-level approach. A possible solution would be to combine this framework with one of operational frameworks we have reviewed. Information Systems Audit and Control Association (ISACA – the creator and owner of COBIT framework) - has created several detailed documents on aligning COBIT to other IT Service Management frameworks allowing effective adoption of best practices. In terms of our big organization it will be logical choice to separate tactical and operational concerns. Operational framework focusing on what to do will help to establish standard IT Operations lifecycle. But here the choice is not so obvious, on one hand Kuehne+Nagel has been successfully utilizing some of the ITIL operational concepts, but on the other hand MOF is perfectly applicable operation framework, because KN IT Infrastructure, as we mentioned previously, is manly based on Microsoft products. In terms of approach both frameworks have some similarities, both are operating with processes and functions, although ITIL describes services in terms of processes and activities, while MOF is concentrating on Service Management functions.

Although both ITIL and MOF can be considered as even alternatives for implementing in Kuehne+Nagel, our choice will still be ITIL for the following reasons:

- On operational level ITIL concepts are already being utilized in several bigger countries in the region

- The tools utilized for IT Service Operations are compliant with the ITIL framework and it will be easier to propagate these tools across the region (both from cost perspective as well as process wise)

- Nearly 30% of IT operational stuff in Kuehne+Nagel have completed ITIL trainings and most of them have been certified on at least foundation level

- MOF is concentrating more on Microsoft ecosystem, which can be a potential problem in the future if company will also start utilizing *nix environments in IT infrastructure or any other non-Microsoft technologies. Big part of MOF best practices is based on Microsoft Solutions Framework (MSF), so switching to MOF would bind IT Infrastructure Services to Microsoft products. This will limit the flexibility of IT organization and the business itself – this is definitely something company would want to avoid.

When choosing an IT Management Framework for Kuehne+Nagel a certain criteria list has been defined. Below please find a demonstrative graphical comparison of above frameworks against KN IT framework criteria list.

IT Management Framework Criteria	ITIL	COBIT	MOF
Business Orientation	Operational and service life-cycle focus. Concentrates on customer satisfaction, availability and optimization.	Enterprise-oriented. Concentrates on governance and management. Principles based on achieving company goals.	Operational framework (similar to ITIL). Concentrates on operational excellence delivering Microsoft-based services.
Comprehensiveness	Can be used as a single complete framework within organization, although lacks some tactical high-level vision.	Can be used as single complete framework. For the big organization which is trying to separate service threading it makes sense to use in combination with operational framework.	Preferable to use in combination with high-level tactical framework. Does not cover all aspects of IT Service Management.
Support and Integration Capabilities	Integrates with COBIT. Supported by majority of ITSM tools. Supported by a Topdesk ITSM - a strategic KN choice.	Supports integration with major industry standards/frameworks like ITIL, MOF, ISO/IEC 38500, ISO/IEC 27000.	Supports integration with COBIT, ITIL and other industry standards. Best to use in Microsoft ecosystem (eg in combination with Microsoft System Center products).
Implementation	Relatively easy to implement in KN. Already in use by some of the biggest branches. 1/3 of IT Operations personnel is certified.	Would require some efforts and additional investments to implement. Additional training for IT managers.	Easy to implement on operational level. Very detailed documentation for Microsoft products (MOF Technology Library).

KN preferred   KN considered   KN rejected

Figure 8. A graphical comparison of IT Management frameworks against KN IT framework criteria list.

5 Analysis of IT tools and vendors

One of the cornerstones of IT Service Operations is a set of tools that IT Infrastructure team is using for service provisioning. Centralized IT Operations department would need reliable tools for providing IT Services to internal customers on a regional scale. In this chapter we will review the tools and vendors that are currently in use within the company and analyze how they fit into future setup of IT organization.

When analyzing the tools we need to have a strong criteria which we build our judgments on. And before analyzing the software itself, it is important to assess the vendor who is actually providing the software. From the history of choosing software vendors for Kuehne+Nagel it is clear that in some cases vendor assessment was performed superficially, not taking into account such important aspects like vendor maturity and software product scalability and flexibility. To avoid such risks in the future we would like to introduce the following evaluation criteria list for the software vendor when choosing future tools for IT Service Management:

Overall Viability	This includes overall assessment of organization. Software vendor has to have strong market position, being financially stable and show interest in long-term product development and support. It has to be visible that company provider has a clear product strategy and is willing to invest into product development enhancing its functionality according to client needs.
Customer Experience	Ability to provide technical and account support, clear service-level agreements.

	Availability of customer support programs.
On-premises Deployment Model	A vendor of choice for Kuehne+Nagel must be able to provide on-premises deployment solutions. Although SaaS model is becoming more and more popular, for the large enterprise keeping all their data on-premises is still a strategic choice. We have already touched the Security and Control aspects of outsourcing and their applicability to Kuehne+Nagel strategy when describing the setup of French IT organization.
Integration Capabilities	Kuehne+Nagel as any other large organization has a big portfolio of IT management instruments. When choosing a software for particular domain, integration capability is one the major concerns. Lot of vendors are declaring so-called "code-free customization", but this statement has to be investigated in order to avoid possible costly investments when it comes to integration with current IT management tools (e.g. license management, hardware inventory etc.) [8]
Total Cost of Ownership	License and subscription costs are very important as well. Although it is not the company strategy to save as much as possible on such important component as business-critical software, it still something to be considered especially

	when choosing a strategic tool for harmonizing IT environment on a global or regional scale.
Geographic Strategy	It is essential for the software vendor to have resources and consultancy offerings available in the region where the software is being used – in our case the EMEA region. Also if the software has front-end – it would be beneficial for the vendor to provide UI at least in core regional languages.
User Experience	Last but not least is the user experience. For the end-users to understand the benefit of switching to the new software, it has to offer rich user experience, intuitive UI on the front-end, as well as manageability and flexibility for the back-end operation teams.

Table X. Kuehne+Nagel evaluation criteria for the software vendor.

Having this table of criteria it would be easier now to have a holistic evaluation of tools measuring not only their functional benefits but also the software vendor suitability of being a long-term reliable partner for Kuehne+Nagel.

5.1 Service Management Software

When providing service to more than 30 thousand users across 26 countries a choice of the right Service Management software is crucial. Currently Kuehne+Nagel utilizes several different solutions for registering and managing Service Requests, Incidents, and

Changes. The two of them – TOPdesk and Request Tracker are used to manage IT Services in nearly 75% of EMEA region. Because of that before turning to the market of IT Service Management tools, it makes sense to compare these two and decide if any of them is sufficient for use in future IT organization setup.

5.1.1 Request Tracker

Request Tracker (RT) is a ticket-tracking system released in 1996. It is an open source tool and is distributed under the GNU General Public License. Since 2001 RT is being developed by Best Practical Solutions LLC, who is offering different support models for the tool as well as engagement services like installation, upgrade and trainings. It is important to mention that the company is located in US and has no offices in Europe. Although Kuehne+Nagel has never utilized external consultancy and was managing RT with its own workforce – this is one of the of important vendor assessment criteria when choosing a software solution for harmonized IT environment in EMEA. From a technical preview RT is a server-side web application which supports all modern browsers and has a mobile interface as well. On the backend it requires a database (supporting MySQL, MariaDB, PostgreSQL, and Oracle) and a web server (Apache, Lighttpd or nginx).

RT was introduced in KN many years ago and was successfully utilized by IT Operations teams in different countries. One of the main advantages of RT is its integration with Email functionality. Every department responsible for the certain service has its own so-called queue in the RT system. All user needs to know is the email address of the queue where he has to send the request. At the same time it is possible to use web interface for creating tickets.
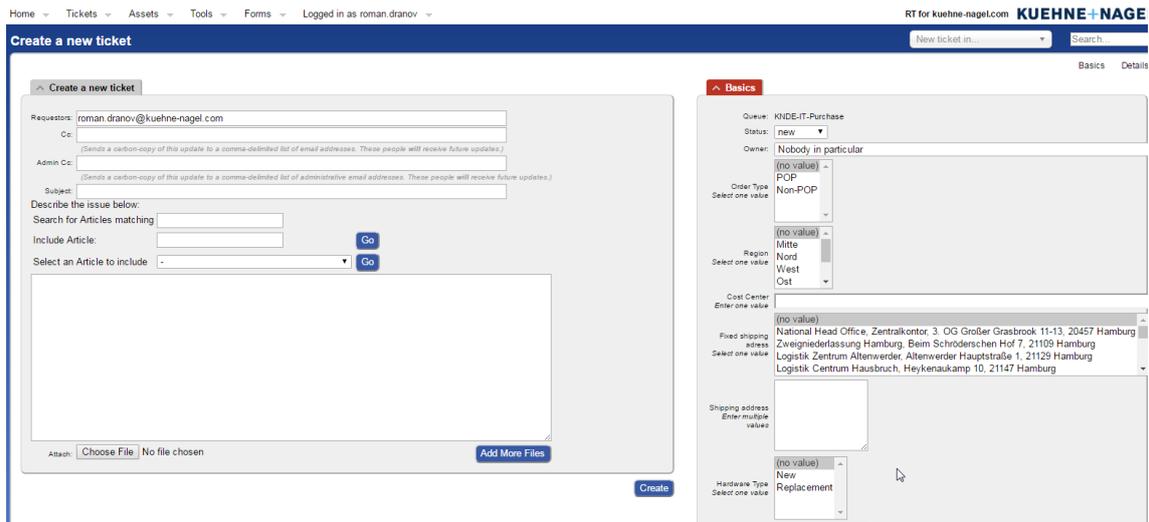
Figure 9. Creating a ticket with RT web interface.

Collaboration between different departments is organized with ticket cloning functionality, so operational teams can easily distribute tickets between departments. For future statistic metrics it is possible to use custom fields which can be added to the queues. This allows building custom dashboards with specific ticket information as well as creating statistical charts for visualization of ticket data.
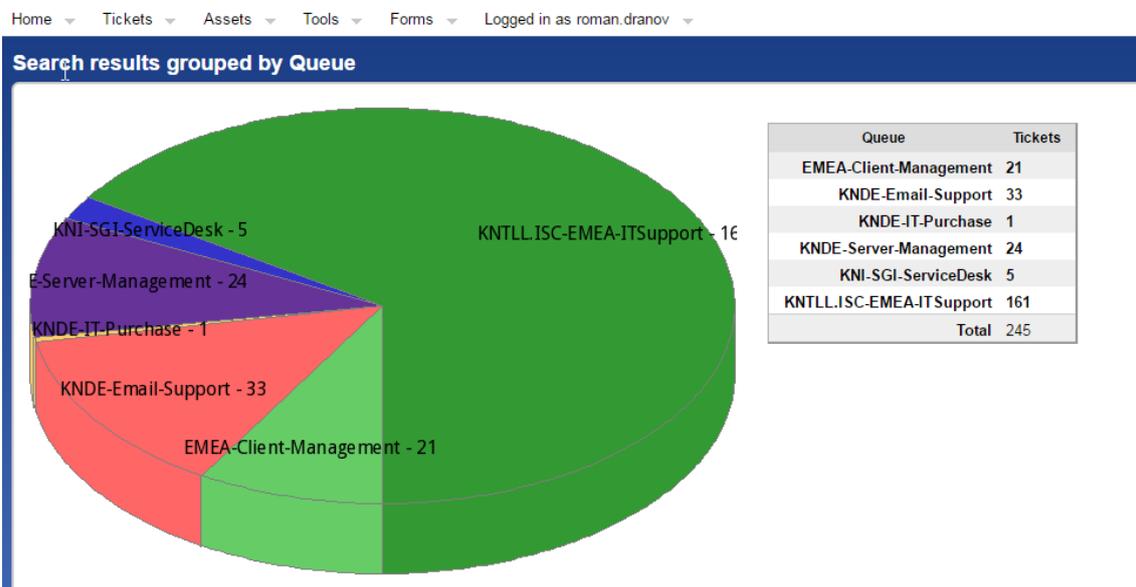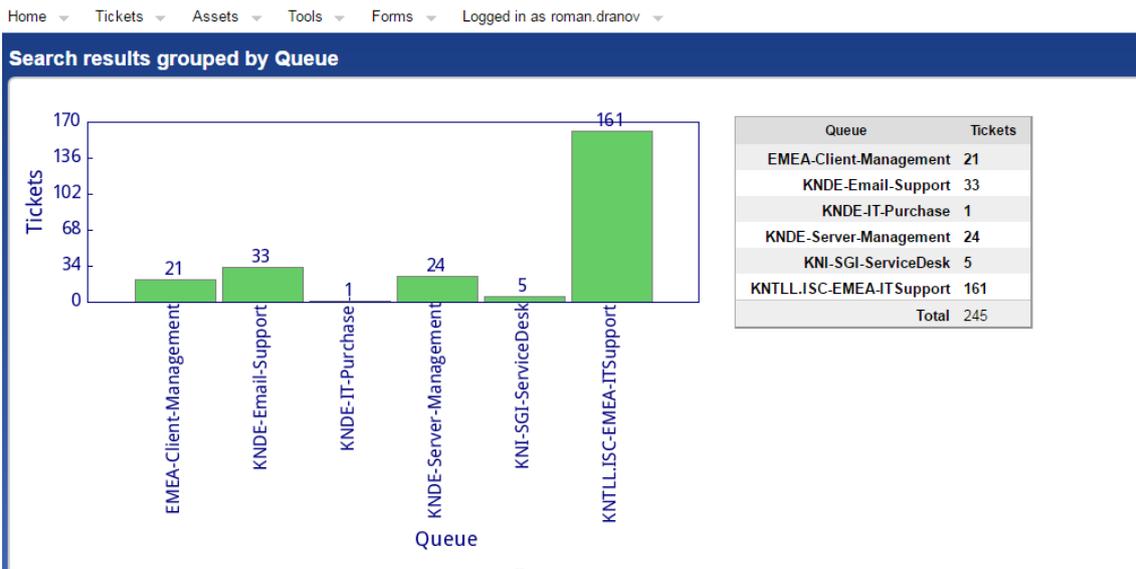
Figure 10. Example of statistical reports within RT ticketing tool

5.1.2 TOPdesk

TOPdesk has a shorter history in Kuehne+Nagel and is mainly used in 2 bigger countries in EMEA – UK and Netherlands. TOPdesk is developed by the company of the same name - Topdesk, with its headquarter in Netherlands. Topdesk has at least of 85% of his customer base located in Europe [9], actively trying to expand to other markets. The IT Service Management software they are offering has a modular structure, offering

solutions not only for IT departments but also for HR, Facility Management, Stock Management, Order Management and many other areas. For now Kuehne+Nagel is utilizing only the IT Service Management modules offered by TOPdesk. But looking at its extensive portfolio it is clear that we are dealing with very flexible and scalable solution that is able to support not only IT Operations but also other business processes. In regards to cost of ownership it is also possible to scale advantages of this solution depending on organizational needs. Topdesk pricing model is based on number of end-users and the solution modules that are being utilized. This also allows flexibility of paying for only these modules that are currently being used, adding any additional modules on request.

One of the biggest advantages of TOPdesk IT Service Management solution is its compliance with ITIL methodology. TOPdesk modules are designed to comply with processes described in ITIL framework. Service Operation processes like Incident Management, Problem Management, Change Management and Request Fulfillment are directly reflected in TOPdesk modules. Also the modular nature of the tool enables smooth integration of TOPdesk in current IT Infrastructure environment – it is not necessary to switch all IT Services to TOPdesk at once, and this is very important when establishing IT Service Operations in a big company. For example, it is possible to integrate modules required for Service Desk operations, phasing out other services for the next iteration.
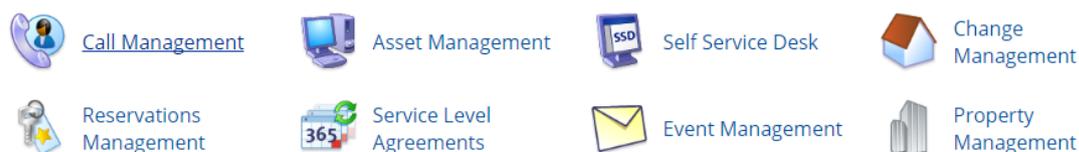
Figure 11. Some of the most popular modules offered within TOPdesk [10]

Talking about Service Desk operations, it is worth mentioning that TOPdesk has few very important components which may really push forward front end IT Services – these are Call Management module and Self Service Desk module. First one is helping to register and organize incoming calls, establishing processes for faster resolution and enabling immediate assignment or forward to any operator group or supplier. Self Service Desk module in its turn allows requestors to log in their requests directly through the web interface. It is completely customized portal offering different possibilities for the end

users. One of the important features of Self Service Desk is possibility to maintain a Knowledge Base, helping users to resolve their own problems without direct interaction to Service Desk team.

Figure 12. Customized TOPdesk Self Service Desk portal within Kuehne+Nagel intranet.

For the operational staff TOPdesk offers a highly customizable web-based backend. So-called Task Board provides overview on task statuses and gives overview on all operational activities and statistics. For the supervisor role there are different tools like Plan Board, which provides such information as resources availability and current workload.
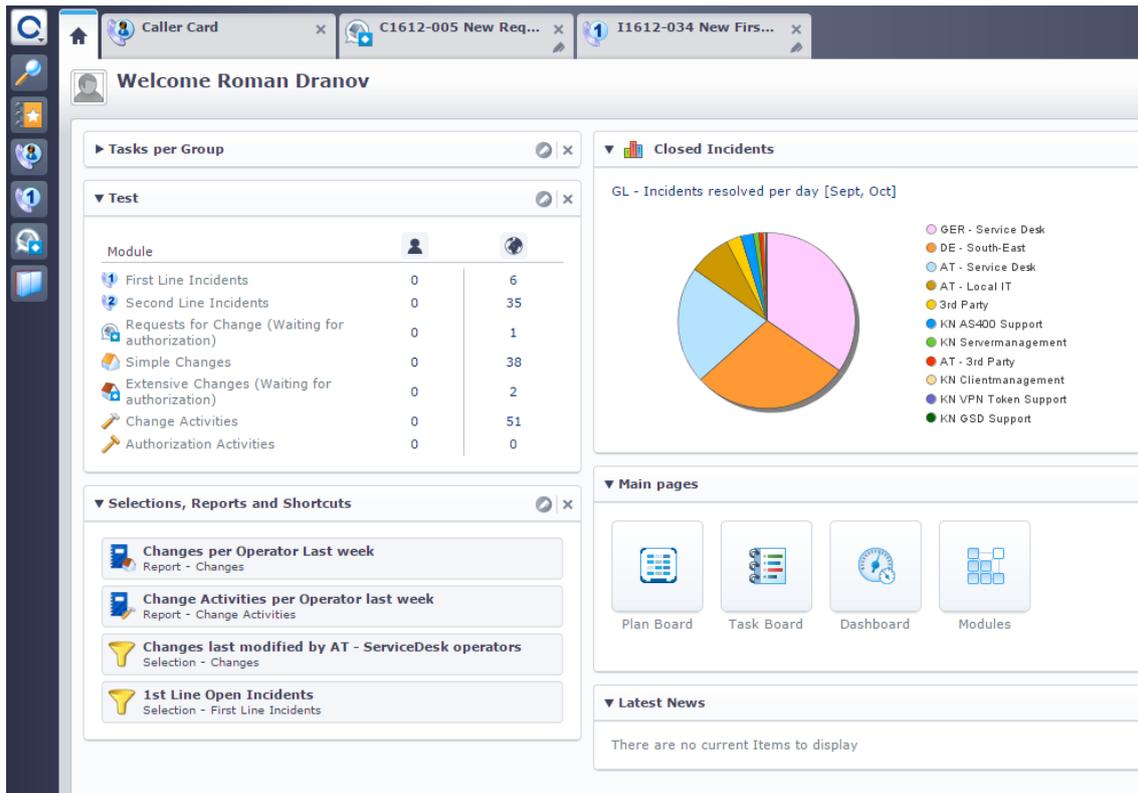
Figure 13. Example view for backend service operator in TOPdesk.

5.1.3 Alternatives on the market

There are plenty of IT Service Management tools on the market. According to the recent research of American IT advisory company Gartner Inc. – there are over 400 offers on the market, but the majority of them are focused on basic service desk or ticketing functions [9], while Kuehne+Nagel is looking for more holistic solution with potential to incorporate all IT Service Operation aspects. Of course there are market giants like ServiceNow with its wide integration options or Axios Systems, the company who was one of the first to support ITIL best practices within its IT Service Management Solution. But taking into account that nearly 20 thousand users within the company are already supported with one of the tools described above – of course it would be easier to put all EMEA under umbrella of one of these.

Comparing two IT Service Management solution described above it is clear that TOPdesk is offering much more mature and process oriented solution when it comes to harmonizing

and centralizing IT Infrastructure Services. The problem of Request tracker is that it stays on the level of just ticketing system while Kuehne+Nagel needs a tool which is going to support the complete IT Service Management lifecycle.

5.2 IT Infrastructure Governance solution

Having the right instruments for IT Infrastructure management is as important as having the right processes and service operation tools. Here we will review the tools that are already utilized in Kuehne+Nagel and see if it is needed to consider any alternatives in order to implement harmonized IT environment. As mentioned before, Kuehne+Nagel sticks to Microsoft ecosystem when managing IT Infrastructure. Although Microsoft itself provides IT Management software like SCCM, so far Kuehne+Nagel has been utilizing Kaseya VSA IT management platform. When comparing key features of SCCM with Kaseya we see that both tools have nearly the same capabilities when it comes to managing remote and distributed environments. Both solutions provide tools for hardware and software inventory, patch management and remote-control management. However Kaseya has a comprehensive web-based environment for all of the operational tasks. This makes it extremely easy to manage and monitor assets using any of most popular web browsers

Figure 14. Web-based remote control and audit for the particular client machine with Kaseya Live Connect browser plugin.

When choosing the future solution for IT infrastructure governance Kuehne+Nagel was also taking into consideration the cost of ownership. From the cost perspective Kaseya offers their tool at much more cheaper price than Microsoft. Another major aspect is the current use of the tool. Kaseya VSA is already being utilized by major branches in EMEA region – this will definitely facilitate the process of IT governance solution harmonization.

6 Summary and roadmap

The aim of this thesis was to analyze the current setup of IT Service Operations in Kuehne+Nagel and define optimal processes and tools that are needed to build a new centralized IT Operations structure. In the previous chapters we have discussed theoretical aspects of future setup. But now the question is how to proceed further and implement all of the above in Kuehne+Nagel IT Infrastructure. Of course building a harmonized and centralized environment in such a big and distributed organization is a long-lasting process. On the current stage the company is still working on the final conceptual model for the future setup, but the process itself is already ongoing. Tallinn IT Center has become a starting point on this road. On a par with Kuehne+Nagel Hamburg office Tallinn has already started to provide IT Services on a regional scale. Now the major concern is to establish the right processes for providing stable and reliable service. This is the stage where IT Service Management frameworks like COBIT and ITIL should play their role. Implementing COBIT framework should allow to establish a high level processes for smooth cooperation between stakeholders and IT managers, and would help IT to better understand business needs and the direction where company wants to develop its IT infrastructure. ITIL in its turn will help operational teams to better perform their day-to-day work by giving best practice process definitions for all aspects of IT Service Operations. Together with a proper set of IT Service Operation tools it will help to establish a centralized IT department which will provide IT Services to all company

branches in EMEA region. The figure below is giving a visual representation of a roadmap for harmonized and centralized IT Operation Services in Kuehne+Nagel.
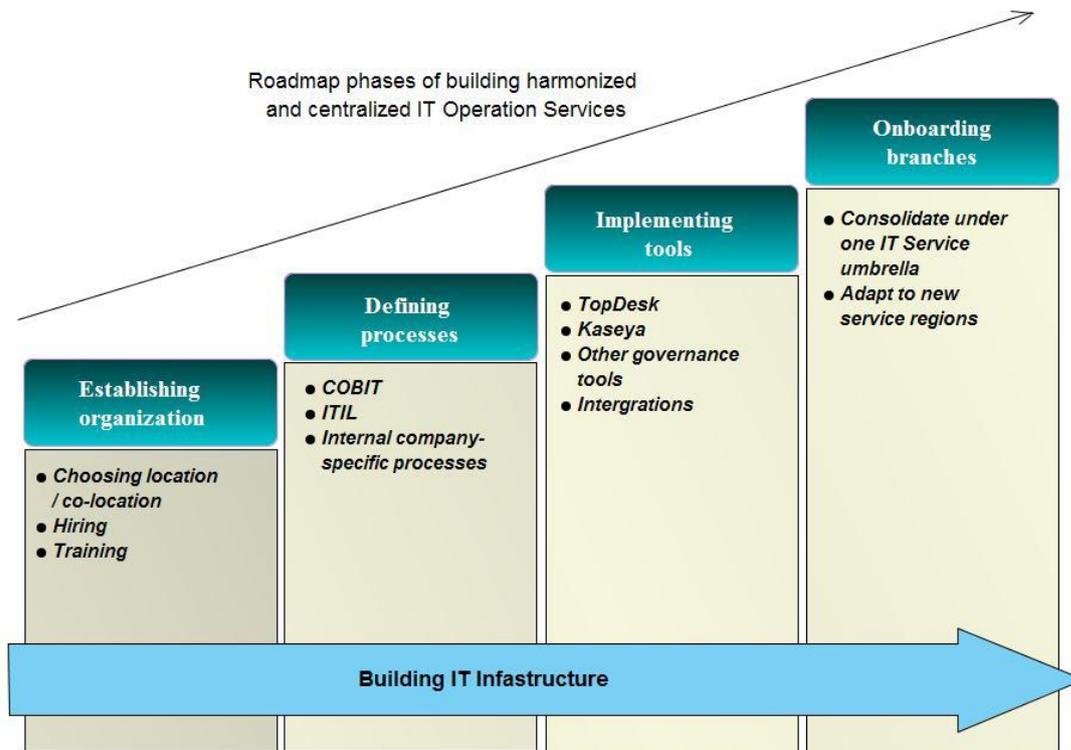

Figure 15. Roadmap phases of building harmonized and centralized IT Operation Services in Kuehne+Nagel.

Kuehne+Nagel has already established its IT organization by opening IT Center in Tallinn and enhancing its EMEA IT headquarter in Hamburg. Now we are actively working on phase 2 and 3, by implementing the right processes and tools for future centralization of IT Operation Services. At the current stage company has already switched to a single ITSM tool – TOPdesk. By means of TOPdesk ITIL-based modules Kuehne+Nagel was able to optimize IT service operations, achieve better performance and service quality. It became possible to separate service threads and define clear responsibilities for IT teams, and this had a positive effect not only on our service fulfillment indicators but also on IT personal who were confused by lacking a clear definition and scope of their duties before.

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