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CREATION AND DESIGN OF ELECTRONIC SERVICE DESK FOR PUBLIC ORGANIZATION. CASE STUDY OF THE EUROPEAN DIRECTORATE FOR THE QUALITY OF MEDICINES & HEALTHCARE (EDQM)

Master's thesis

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AVALIKU ORGANISATSIOONI TEENINDUSLAUA LOOMINE JA KUJUNDAMINE. EUROOPA RAVIMITE KVALITEEDI JA TERVISHOIU DIREKTORAADI JUHTUMIANALÜÜS

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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 rapid development of e-government services has changed the way the citizens access and consume the services. E-services vanish the need for a citizen to go to the office, to deal with papers, or to sign something by hand when receiving a particular service. However, the human factor has not disappeared yet and the citizens still make mistakes, do not read the tutorials and instructions, forget passwords and find themselves in various situations where they need help in using an e-service.

The current thesis explores the prospects of having an electronic service desk in place to support the provision of principal services. Employing the case study method, the thesis objective is to propose and develop the electronic service desk for a public organisation. For this purpose, the intergovernmental European organisation was selected, which offers e-services to citizens. The current state of service desk in a case organisation was examined, the areas for improvement identified and the internal requirements collected.

The outcome of the research was the new working service desk system for the case study organisation. The system was built based on the organisational internal processes, stakeholders' requirements, theoretical foundation and latest IT service management practices. It was tested internally and received positive feedback.

This thesis is written in English and is 99 pages long, including 8 chapters, 35 figures and 8 tables.

Annotatsioon

Kiire areng e-teenuste valdkonnas on muutnud kodanike juurdepääsuviise teenustele ning nende tarbimisharjumusi. E-teenused likvideerivad vajaduse külastada erinevaid ametiasutusi, tegeleda paberimajandusega või allkirjastada dokumente kirjalikult. Inimfaktor aga ei ole siiski veel täielikult kadunud. Kodanikud teevad endiselt vigu, ei loe instruktsioone, unustavad oma paroole ning leiavad end olukordadest, kus nad vajavad e-teenuste kasutamisel abi.

Käesolev magistritöö uurib võimalusi kasutada elektroonilist teeninduslauda, mis toetaks põhiliste teenuste pakkumist. Magistritöö eesmärk on juhtumianalüüsi põhjal pakkuda välja ning arendada avalikule organisatsioonile elektrooniline teeninduslaud. Juhtumianalüüsi subjektiks valiti valitsustevaheline Euroopa organisatsioon, mis pakub kodanikele e-teenuseid. Valitud asutuses analüüsiti teeninduslaudade hetkeseisu, identifitseeriti võimalikud kohad, mis vajaksid täiustamist ning koguti kokku asutusesisesed vajadused.

Magistritöö tulemusena loodi analüüsitavale organisatsioonile uus elektroonilise teeninduslaua infosüsteem. Süsteemi loomisel toetuti asutuse sisemistele protsessidele, osapoolte vajadustele, teoreetilistele teadmistele ning IT-teenusehalduse parimatele tavadele. Loodud lahendust testiti organisatsioonisiseselt ning tagasiside süsteemile oli positiivne.

Lõputöö on kirjutatud inglise keeles ning sisaldab teksti 99 leheküljel, 8 peatükki, 35 joonist, 8 tabelit.

Acknowledgement

Writing a thesis is never easy. I would like to thank everyone who helped me in this journey.

I would like to start with my *alma mater*. I am extremely grateful to my academic supervisor Valentyna Tsap for all support, knowledge and constructive criticism. Her constant availability and responsiveness defined our cooperation. Further, I must also thank all professors in the study program. Thanks to your efforts, I extended my knowledge in e-governance, developed analytical and creative thinking.

I am also expressing the deepest gratitude to my professional mentor Hans-Joachim Bigalke. With his help, it was possible to conduct the case study, which is the core of the thesis. Furthermore, his attention to the details and remarks sharpen the content. On the professional side, I have also greatly benefited from Elvir Dzeladin, Certified Atlassian Expert. With his expertise and knowledge sharing, I deepened my skills in the industry software that was used for problem solving in the thesis.

Lastly, without the support and encouragement of my family and friends this journey would not have finished. Thank you for believing in me.

Sincerely yours,

Yurii Zhatkin

List of abbreviations and terms

EDQM	European Directorate for the Quality of Medicines & HealthCare
AS-IS	The state that something is in at the present time
TO-BE	The state of something in the near future
IT	Information technology
ITIL	Information Technology Infrastructure Library
SPOC	Single point of contact
ITSM	IT service management
SLA	Service level agreement
CRM	Customer relationship management
FAQs	Frequently asked questions
KPI	Key performance indicator
G2C	Government-to-citizen
G2B	Government-to-business
G2G	Government-to-government
UI	User interface
UX	User experience
AI	Artificial intelligence

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1 Introduction

More and more services become available online. The digitalisation transforms companies, industries and even countries. The demand for digital services is constantly growing. European Commission reported that in 2018 digital public services across the EU reached 64%, it is the highest number ever and it will continue to grow [21]. Fast distribution of digital services can be explained by different factors, in particular the blossom of information technologies and direct benefits to organisations and users that go digital. Organisations profits by saving labor, money and having higher mobility. Service users benefit from the ease of access, use and practicability.

Digitalisation makes not only the service itself digital, but the whole customer experience around it. The important aspect of providing e-services is to make sure that at any stage of using a service, the customers receive proper support. To elaborate on the point of customer support, when the services are provided in a traditional way, i.e. physically at the counter, the service users can get help directly by addressing the person that is in front. If the service provided online, such possibility is not available anymore.

Service users, in case they are blocked or having a problem using a service, should be supported in some way. It does not matter, if the service user is a “digital native” or “digital immigrant” as Prensky (2001) classified, everyone might need support [54]. Especially, it is of vital importance to the public services - no one would like to make a mistake when using financial, medical, tax and other services. Support of e-services can be done through implementation of electronic service desk, which serves as point of contact to get help, to report service errors and incidents, to capture customer feedback and requests for changes.

This master thesis will focus on the topic of customer support of e-services via the electronic service desk. The relevance of the topic lies down on the several pillars. Firstly, customer support is a part of modern IT service management practices. Secondly, any customer-centric organisation is interested in helping its users, in case they experience

troubles. Lastly, customer support facilitates the provision of the principal services and boosts customer satisfaction.

1.1 Thesis motivation

The idea of the thesis was born from my personal and professional experience. Few times, I had a situation where I needed help with e-services and it was difficult to get it. There was no online chat or service desk on the website, so I had to either call or write emails. When calling, I was answered by automatic responder asking me to press numbers and I had to spend a lot of time waiting to reach the specialist. When it comes to emails I usually received the reply, but it was too late, after a week or two.

My professional experience has allowed me to look closer at the relevance of this topic. Back in 2015, I was working for a private company that was developing a farm management software. We had users in many countries and I was in charge of the customer support. All support was provided via phone or by email. From that experience, I saw that the channels that we used for support were inefficient. We did not have a single support channel. If the service is digital, the support should be digital as well. However, I was pleased what value it brought to us by simply helping customers to use the software. We acted on the main pain points and improved the service. In the first place, customer loyalty comes from the value and quality of the main service, in the second place - from how the customers are treated when they have problems.

Later I started to work in the public sector. I am currently working in the IT department of the European Directorate for the Quality of Medicines & HealthCare (EDQM). The organisation has already an electronic service desk in place, but the current state of this service is obsolete. The transformation of the current or development of the new service desk has been discussed for many years, but not yet acted on. Hence, after my experience and additional readings, I realised that research in this field would benefit many public organisations that provide e-services and would like to assist customers in correct use of the services.

1.2 Research problem and research questions

The preliminary literature review showed that the topic of customer support via electronic service desks is poorly examined. Surprisingly, almost nothing can be found when it comes to customer support of public e-services and most of the available literature talks about support of business services. This research contributes to the customer support of public e-services and can trigger more lively development in this field.

Poor research of this field might explain the current state of support in many organisations. For instance, there is no customer support on the state "one-stop-shop" portal of Estonia (https://www.eesti.ee). To get help in using any of the service on the portal, the customer should go to "Contacts". Then the customer browse through the hierarchy of institutions, and after clicking on the particular agency, the customer can see the email, address and phone number. This already demonstrates that the process is not easy. Such service support raises various questions, such as how the customer should exactly contact the agency: by phone, mail or go physically to the address. It can happen that the customer does not know to which agency the service belongs to, then who should be contacted. Ukrainian portal of the Ministry of Internal Affairs (http://hsc.gov.ua) also has no single and consolidated support and offers to contact them via phone, email or even facebook page.

From the perspective of the EDQM, the case study organisation, the main problem is that the current service desk is no longer state-of-the-art and it is challenging to maintain it. The service desk is difficult to use and it is dissuasive for external customers. Considering the above, the research objectives are:

1) Identify good IT service management practices towards setup of electronic service desk.
2) Investigate the current use of service desk in the case study organisation.
3) Collect requirements from the internal stakeholders.
4) Build and design new TO-BE service desk.
5) Discuss the outcomes, lessons learned and make recommendations.

The main research question of the thesis is: **How to design and implement electronic service desk for public organisation?**

The research question should generate the practical knowledge of how to build and implement electronic service desk in public sector. To answer the research question, we need theoretical and practical inputs. Practical part will come from the development of new service desk for the needs of case study organisation. Besides, the direct benefit to the EDQM, the master thesis could be a reference source for any study that would deal with e-service support in the public sector. From the main research question, the following sub-questions were drawn:

SQ1. What is the value and benefits of having an electronic service desk?
SQ2. What requirements should be taken into account when developing a service desk?
SQ3. What could be a working service desk set up (architecture, process, interface)?

The first sub-question would allow to justify the need of service desk for the organisation within IT service management practice. The second sub-question should give the inputs for the development of TO-BE service desk for the case study organisation. Last sub-question gives the clue about how the service desk should function and how it should look like.

1.3 E-government context of master thesis

The master thesis focuses on the implementation of electronic service desk in public organisations. This lies within the scope of e-government, since service desk represents a particular value in the flow of information between government and citizens. Moreover, in the e-government context this topic is part of broader phenomena such as digital transformation, and change management. This section explains how the thesis topic fits into the e-government domain.

Digital transformation. The exploitation of digital technologies leads to the transformation of processes, structures and working methods of the governmental organisation [35]. Digitalisation of customer service support in the governmental agencies should be integrated into the overall strategy of digital transformation. If the e-service is provided to the citizens, it should come together with built-in digital customer support, so to avoid the problems mentioned in the previous chapter.

Government innovation. Diffuse of digital technologies creates an environment for innovation in the governments. Establishment of the electronic service desk is a timely, online and on demand citizen support on one side, and an example of potential innovation in the e-government on the other side.

Change management. Whether the public organisation have a traditional support center (at the counter, calls, emails) or do not have it, implementation of digital service desk involves changes. Such shift could mean modification or creation of new processes, methods, channels, etc. Change management is a critical success factor in implementing e-government initiatives [50]. In this thesis, the change management process occurs through transition of service desk in the case organisation from current state (AS-IS) to desired state (TO-BE).

Digitalisation of organisation. The case organisation, selected for the study in the thesis, corresponds to the e-government profile. The EDQM is an inter-governmental organisation, which provides services for many states. Implementing of electronic service desk in this organisation would mean making it more digital, increasing its technological maturity and sophistication. The member states and stakeholders will benefit from a better service quality provided by the EDQM.

2 Research approach

The chapter explains the methodology used in this thesis. The first section presents the research structure, elaborates on the research methods, unit of analysis and data collection. Section 2.2 describes the limitations in the research approach of this thesis.

2.1 Research method

The research approach can be characterised as a combination of applied research, design science research and action research methods. Additionally, the elements of quantitative and qualitative research methods can be found within the primary methodology.

Applied research is done in the form of a case study. Case studies usually used for in-depth examination of a phenomenon within its environment and real-life context [14], [63]. In case study method, the researcher is an observer, that describes the current state of the phenomenon. In the context of this thesis, case study was used when examining the current state of support in the EDQM. The researcher used the current support system in different roles (acting like customer, acting like support agent); participated in the meetings with the staff of case organization; had access to the internal documentation; support metrics; surveys. Within the case study the author also used quantitative analysis when evaluating raw data of AS-IS service desk usage and results of the EDQM customer survey.

Action research and design science research have as similarities as differences. According to Collatto et al (2011) action research uses traditional science to find, explore and solve problems [11]. The results of such research can deliver hypothesis or actions for a specific problem. Design science research develops and prescribes satisfactory solutions to the problem using design science. It offers constructs, design proposition and applications of how things should be for a certain type of problems. Despite the differences, the elements of action research and design science research can be integrated and used together [11]. In this thesis, the combination of these two methods resulted in problem identification with the current service desk and subsequent proposal of configuration for the new service

desk based on the IT service management principles. Researcher participated in the workshop meetings; gathered technical and functional specifications; contributed to the creation of user stories; transformed service process; designed and presented new service desk solution.

When doing the fieldwork, a series of meetings were organised between the author and staff of case study organisation. The meetings were run in the form of workshops. The workshop is considered to be a qualitative approach, which allows for data collection by means of engagement and collaborative discussion between the participants and the facilitator. The participants are selected on the "purposive sampling technique" and they attend the workshop voluntarily, the data is gathered through "collaboratively shared experience" [1]. The workshop focuses on the domain-related cases and consists of a development dimension, meaning that the participants create something (process, design). Workshop is beneficial for the research by providing a reliable and valid data, as well as for the participants when achieving something that is important to their own interests [52]. The workshops allowed the author to collect service desk requirements and to create a new process and interface according to the needs of the organisation.

The research structure of the thesis is visualised on Figure 1. The inputs that were received from literature review, case study, and fieldwork served as a basis for proposal and development of a new TO-BE solution. The research finishes by taking an action and developing a functioning modern electronic service desk.

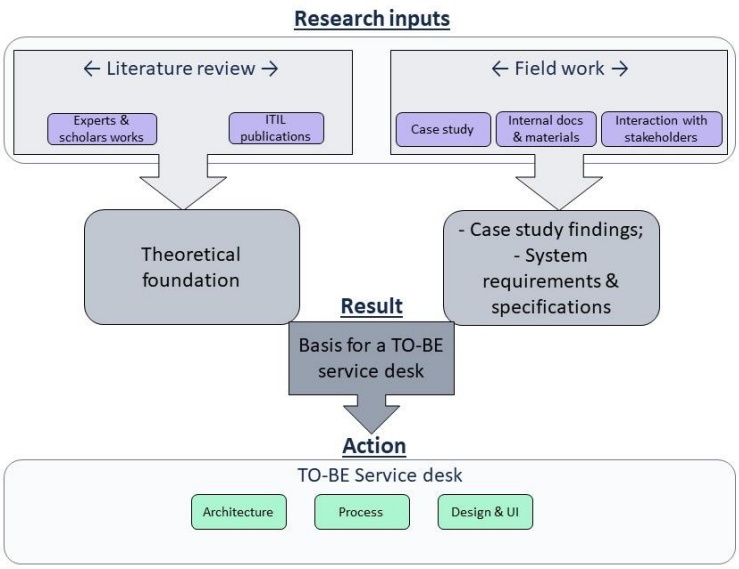


Figure 1. Research structure.

Selection of case study object: a single case study organisation was selected for the research. The object of the case study is the EDQM, which is the inter-governmental public organisation in Europe. The EDQM has a rich experience of using a service desk system for over 13 years.

Unit of analysis: the unit of analysis is an electronic service desk in the EDQM.

Data collection: Data were collected in various ways and from multiple sources. The sources of evidence were the following:

- internal documentation (service catalogue, process description, roles descriptions, service desks manuals, project charters, etc);
- records (database records, requests records);
- raw data exports and extracts (service desk usage, performance numbers, data extract from global customer survey);
- participation and observation (meetings, workshops, discussions);
- physical artifacts (access to AS-IS service desk system).

2.2 Limitations of research method

No research is completely inclusive and there are always some aspects that can be criticized. The main limitation of the case study research method is that there is a lack of rigour and that the outcomes cannot be generalized [65]. Such limitations are shaped by the external or internal validity. The researcher, when doing the case study, collects the data over a single longitudinal case, as a consequence the findings have an internal validity, i.e. can be applied only to similar cases. The findings cannot be generalised and lose its external validity [20]. However, considering the objectives of this master thesis, the generalisation is not a goal, so research approach should produce a valid data to address the objectives.

Another shortcoming of the current research method is the difficulty of replicating it and thus to reaffirm the outcomes. Usually, the case studies are labor-intensive and require a high involvement in every aspect of data collection from researcher [24]. Moreover, the case studies examine the phenomenon within its real-life context and at a specific period. Within the time, the case study object can evolve as well as the environment of that object.

Reproducing the past conditions can be simply impossible. This limitation is beyond the author’s control.

3 Theoretical background

In this chapter, at first it is clarified what is service desk as a term, the similarities and differences to other concepts, such as help desk. Further, it is explained the place of service desk within IT service management practice, demonstrated the value of the service desk in the organisation, explained service desk integration with other processes. The chapter finishes by synthesizing metrics on how to evaluate and measure support services.

3.1 Service desk within IT service management

Customer-centric organizations always try to provide good quality services. The support service stands in line with the core activities in the service portfolios of many organizations. Efficient support management improves the relation with customers, brings high satisfaction and results in continuous improvement of services. The support can be provided in many ways - in-person support desks, phone calls, emails, electronic support desks, online chats.

There can be different words to call the support service, such as help center, help portal, service desk, information center, online help, help desk, support portal, etc. The HDI report on Support Center Practices & Salary Report (2015) reveals the data that give the idea how companies name their support (Figure 2).

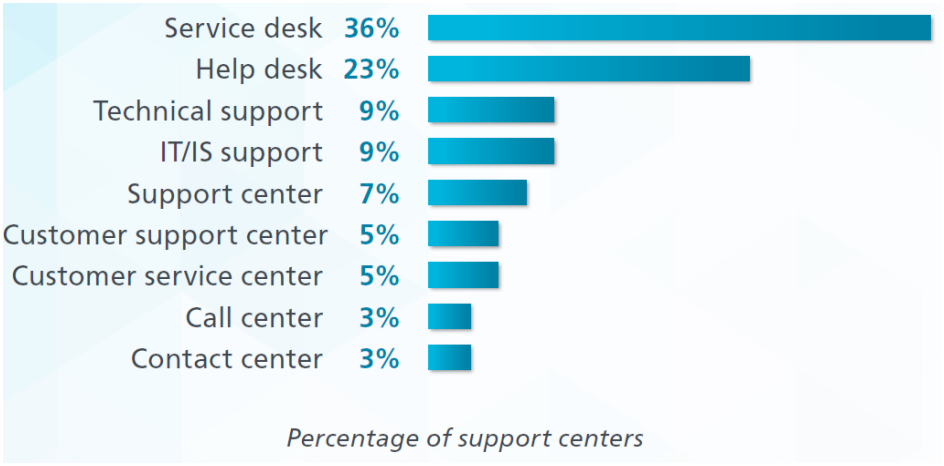


Figure 2. How companies call their support. Source: [28].

Figure 2 presents many terms, though the most common are two names: service desk and help desk. Are there any differences or those are the synonyms? There is no academic evidence that would compare or synthesize the terminology on how to call support service.

Works of different scholars can also lead to the confusions when defining on how to name support service function. Several scholars describe help desk as the first point of contact between IT and customer in need of support [12], [22]. Amanullah et al (2017) named support service as "Service Desk System" and say that it is a system for collecting, monitoring and processing request for IT support within the organization [5]. Suryotrisongko (2017) thinks that service desk and help desk is "kind of the same things" [58]. Based on such reasonings, it is possible to assume that support service function is of little importance of how it is called and the main role of it is dealing with incidents or provide IT support.

The industry experts have different thoughts when it comes to the terminology. According to Stephen Mann, an IT service management consultant, the terms help desk and service desk has a lot in common and were often used interchangeably throughout the evolution of technology. In his opinion, the concept of help desk was introduced in the late 1980s and it served to fix IT problems, focused on the IT and not at the end users. In other words, the help desks deal solely with IT-related issues. Later the help desk evolved into wider service than only fixing IT issues, which was called service desk, based on ITSM best practice framework [47].

Another industry expert and an owner of the customer support software, Alexander Yumashev, also thinks that the help desk is more of "break/fix" concept to provide "help", whereas service desk provides a "service" and that can include "help" as well [64]. This thought is supported by scholars Al-Fedaghi and AlMusallam (2019), who described service desk as a support for a wide range of things, not only "break/fix". In addition, service desks handles requests for information, service requests, feedback, change requests, etc [2], [38]. Yumashev listed the characteristics of each concept, which are presented in Table 1.

Table 1. Comparison of help desk and service desk. Source: [64].

Help desk	VS	Service desk
▪ "break/fix" concept; ▪ tactical, not strategic; ▪ single point of contact for all IT issues; ▪ incident tracking and resolution; ▪ level 1 and level 2 of support; ▪ SLAs (service level agreement).		▪ provides a service, not only help; ▪ more strategic; ▪ single point of contact for all IT areas/applications/business processes; ▪ case management; ▪ change management; ▪ knowledge base; ▪ self-service/ service catalogue.

After looking at the definitions of scholars and experts' opinions, it is clear that the terminology will vary depending on how we look at the support - more of "help" perspective or more of "service" perspective. Help desks are operating on the tactical level, service desks are more of strategic tool. Service desks, besides offering support, also integrate with other organizational processes, such as problem management, case management or change management.

Information Technology Infrastructure Library (ITIL) describes service desk as "single point of contact (SPOC)" that "manages incidents and service requests" [30]. Most of the scholars accept ITIL definition of service desk as the most definite. It can be that it not only comes from a respective source, but it is also the most relevant for today's realities. Support services become diverse and not solely focused on the IT issues.

Last but not least, the organization decides how to call its support service. When calling the support service one way or another, the organization may underestimate or overestimate its capabilities, including the IT support technology. If the organization provides support only to IT issues, then the service should be called "help desk". If the organization provides support to many areas, including IT issues, then such service should be called "service desk". However, one organization's help desk can be another organization's service desk and vice versa.

This master thesis focuses on the support service as such. Support service that is integrated with other organizational processes and covers various service requests, rather than solely IT-related issues. The support service should be a coordination point for managing incidents and service requests, for communication with customers, for

continuous business process improvement and value creation. With regard to the above facts and discussion, the term “service desk” is used throughout the paper.

Organizations can use various IT service management frameworks that exist today: Control Objectives for IT and related Technology, Microsoft Operations Framework, IT service management standard ISO/IEC 20000, ITIL and others [39].

ITIL describes the set of rules and practices for IT service management (ITSM). It was developed by the Office of Government Commerce in the United Kingdom and is the most widely used framework to managing IT services in the world. ITIL sets standards to service providers regarding the provision of IT services, quality management, and regarding the procedures, functions and capacities to support them [33].

ITIL is focused on the IT industry, but it can be easily implemented in public organization or e-government. ITIL can help governments in delivering the services within digital channels. The framework allows managers to track, review and act upon service processes, and thus boost the efficiency in the governmental organizations [58].

ITIL proposes a service lifecycle that consists of 5 components: Service strategy, Service design, Service transition, Service operation and Service continuous improvement (Figure 3). Together they form the core of ITIL practice. There can be found a separate book for each of those elements.

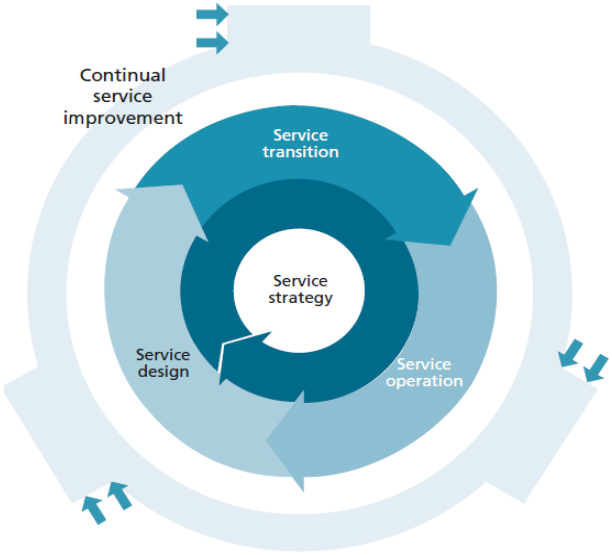


Figure 3. The ITIL service lifecycle. Source: [33, p 3].

ITIL Service operation guides on how to carry out the activities and processes required to deliver services at agreed quality level to customers. Service operation outlines the necessary methodology and tools used in the service management, its execution and also how to provide support to the services. ITIL places service desk as one of the key part of IT operations management and says that "service desk is a vitally important part of an organization" [32, p 157], [41].

3.2 Functionalities and design

The value of effective running service desk should not be underestimated. Even though the service desk can be seen as solely technical function, the business value of it is increasing. Starting up a service desk is relatively easy and return on investment is proven to be potentially short [41]. The effective service desk is not only the way of interaction with users, but it is also a valuable source of information, therefore it should be seen as an asset, rather than a cost center [48].

The data and customer feedback gathered through the service desk can further be used by any organization to improve its services and better address customer needs. Companies can act upon such data and integrate service desk information flow to other business processes, such as change management, for instance. Moreover, the information that service desk generates can be also used for improving the service desk itself. There is already an example of Big data usage in the service desks, with the aim to automate service desk functioning and tickets distribution [45]. Big data potentially can optimize the knowledge base utilization and request processing time.

Suryotrisongko (2017) argued that the service desks can be successfully used in governments. For public and governmental organization service desk brings enhancement of service provision. The service desks are needed to meet citizens' demand, to help them to use public services and to reassure the transparent government. Even though, the service desks can be deployed in both traditional governments and e-governments, their value in the e-governments is even bigger. If in the process of using e-service, the citizens have any questions or need help, they would not be happy to come to physical premises to receive support. Service desks allows them to receive support directly through the device. Moreover, the electronic service desk operates all the time, so that the citizens

can submit requests even outside of working hours. The service desk is a mediator, a point of contact between citizens and government [58].

ITIL defines the service desk functions as following:

- Recording all relevant incident/service requests;
- Provide categorization;
- Provide investigation;
- Resolve incidents/service requests;
- Keep customer informed of the progress and communicating with them;
- Escalating incidents/service requests;
- Conducting customer satisfaction surveys [32, p 158].

The primary and the key function in the list is recording of service request. This process sometimes can be called request fulfilment, which happens through interaction of customer and service provider and through the handling of the request until it is resolved [41]. When the request is recorded, the service desk categorizes it and investigates the issue to provide resolution. About 60% of the requests are information inquiries or easy to fix issues that are resolved at the first contact, i.e. by service desk staff [59]. The rest of the requests concern complex phenomena and need more investigation. Service desk escalates those tickets to the higher level in the organisation.

Service desk is responsible for assigning the incoming service request to a related person. It should evaluate the service request according to the rules of Service Level Agreements (SLA) and monitor the compliance to the agreed times of response. If SLA has changed, the stakeholders must be communicated. Service desk manages the whole life-cycle of the service request [59]. SLA proved to be an effective mean of providing service in the committed time frames. Nevertheless, there should be a balance when setting up SLA. It should not be too high, as it will result in extra costs to the organisation, neither too low, - will result in negative business value. SLA should be decided by organisation according to the customer groups that it serves [25].

Some service desk models offer a simple set of functionalities than those suggested by ITIL. Bober (2014) proposes the service desk model that consists only from requests logging, management the lifecycle of requests, cloture of requests and update users about the status [9]. Such variations in the service desk features is due to the industry,

organisation's profile and business practice [22]. The service desk software should be easily customizable and scalable. Features should be tailored to the needs of a particular organisation. Growth of the organisation and service complexity elevate the needs and requirements [12]. Through its functions, the service desk adds extra value to the service portfolio of the organisation (Figure 4).

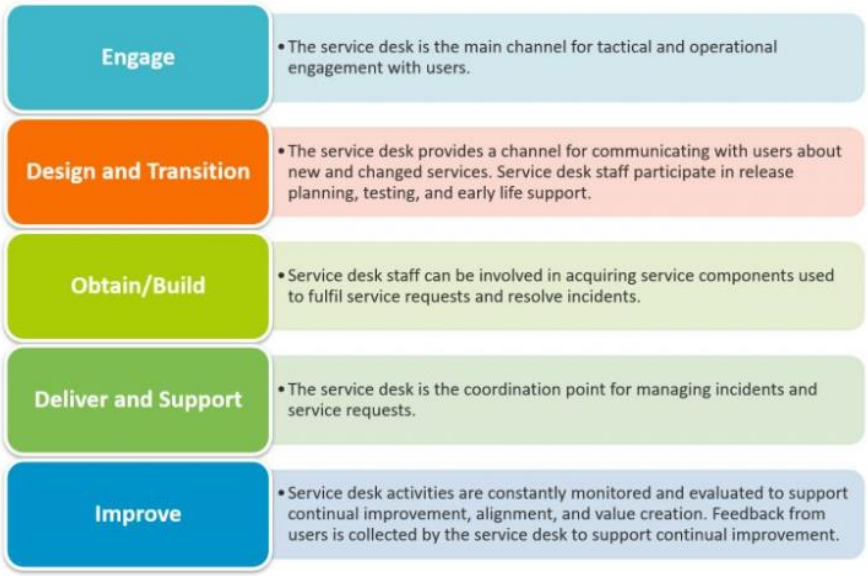


Figure 4. Service desk value creation. Source: [49].

According to BMC article, an IT management company that serves most of Forbes Global 100, service desk activities are involved throughout all service operation processes, except planning activity [49]. Service desk engages customers, as it is the main channel of contact. Transition role of service desk means that it communicates with customers about new or modified services. Building and designing implies the participation of service desk staff in the process of development, testing and release of services. Deliver and support is understood as principal ability of service desk to manage and resolve requests. Improving role stands for the continuous improvement and value creation.

In the work of Leonard and Strydom (2010) service desk generates input for continuous improvement, as customers share thoughts about all kinds of interactions they had with the company. The organisations in such a way create a "loop learning" and act based on what they learn from their experience [43]. Additionally, organisation can conduct surveys to measure the satisfaction with service desk support. Such practice reveals potential problems in the functioning of service desk. By surveying customers,

organisation discovers how useful and competent was the support, was the communication sufficient, etc [25].

To sum up, service desk plays an important role in any ITSM framework and it adds business value to the organisation. Besides providing support, it acts as channel of communication between customers and organisation. Service desk contributes to many service operation activities and integrates with other organisational processes.

3.2.1 Design of service desk

When it comes to the design of service desk systems, Botha and Leonard state that it should be based on customer requirements, technical knowledge, organisational needs, any available software that can support service desk, the metrics needed to measure the service [10].

According to Rahman et al (2014), designing can be influenced by the technologies and services that service desk is meant to provide support for. Rahman conducted a literature analysis and found that service desk support is accumulated around either Functional IT, Network IT or Enterprise IT. Functional IT is a stand-alone task or solution, a word processor for instance. Network IT facilitates communication and interaction between stakeholders (platforms, email clients). Enterprise IT is the organisational wide tools that are in use, such as procurement software, CRMs [55].

Paramesh (2019) when described the interface and machine learning in service desks, highlighted that most organisations have a web-based user interface in place. The common service desk customer interface consists of structured fields that user have to select from suggested options and free input fields. Structured fields are general fields like request category, urgency, severity, system status, etc. Free form fields require manual input from the user, and it can be a description of an issue for example. However, Paramesh also pointed out potential problems in the user interface. The most common one is when the user selects wrong category, so the ticket is classified wrongly and sent to the wrong agent, which leads to the reassignment of the ticket, delaying in the resolution. To tackle such case, it is suggested to use artificial intelligence, which would

categorize the ticket based on the user manual input of problem description. It will also mean less fields for the user, as some fields can be omitted in the interface [53].

ITIL publication on service design does not have any precision for the service desk design. However, it suggests general guidelines on how to design any IT solution that would meet organisational needs, which could be applicable when designing a service desk as well.

From the high level perspective, service design is a complex process, which includes the number of sub-processes in it. In order to design and make operational new service, the requirements must come. The requirements comes as inputs from many organisational areas: financial, customer relationship, strategy, incident, access, change, configuration, etc. When the new requirements are defined, they should be incorporated in the service strategy. The service design activities start by analysing requirements and documenting them. Further the actual design of a service starts, followed by the evaluation of alternative solutions. When the organisation selects preferred solution, the development of a tool begins. New service becomes a part of service transition cycle and eventually transforms into a fully operational service [31, p 85].

3.2.2 Self-service support

A good practice is when the service desk includes a self-support, so that the customers can find the information on their own, especially outside of working hours. Popular ways of having a self-support are proposing frequently asked questions (FAQ), offering public forums for discussions, knowledge articles and tutorials [40]. Dean and Kadambi (2015) claim that self-support is there to allow customers browsing and searching through the knowledge base, and thus resolving the question or problem without creating a ticket. In case the customer cannot find the resolution, it should be possible to create a service desk request [15].

Many can criticize self-support as not a customer-oriented solution, because it would require extra efforts in finding the right knowledge article or FAQ. Self-support should not be seen as leaving the customers on their own, but rather than an easier and quicker way to receive support than waiting for reply. Knowledge articles, compared to an

ordinary answer to the ticket, can be richer in content, and contain media to help customers fix the issue and learn [40]. Furthermore, self-service support can benefit from automation. The first appearance of support automation was introduced in the telephone support. When calling a service, the phone is answered by auto-receiver and then the user is asked to press 1, press 2 and so on for different options. Nowadays, when the web-based support takes over, the automation of support can be done using artificial intelligence. Such automated technologies can include instant messaging computer programs, interactive voice response systems, automated FAQ [38].

Service desk enhancement and automation can be carried through using bots. Waghmare (2019) suggested that in the context of service desks, chatbots can answer simple customer questions or perform simple operations, like resetting forgotten password [62]. Service providers see chatbots as a technology that brings high customer engagements and as a valuable supplement to the help desk personnel [23]. Chatbotes can be used as one-stop-shop channel, where the customer does not need to leave the interface to complete what he wants [19]. For the service desk, chatbots can be a one-stop point to receive support, for example to direct users to the right request form, pre-fill the forms, suggest knowledge based articles that could help.

Enabling self-support to the customers is relatively easy and requires low investments. Usually, some knowledge base documentation is already available internally in the companies, it is just a matter to share it with customers. Go (2006), Kuck and Czempiel (2014) suggest that knowledge base should be integrated with service desks, customer relationship management databases. Organisations can consider sharing knowledge as a competitive advantage, as its reuse can eliminate the amount of labor, save time and facilitate learning for staff and customers [26], [42].

Kekkonen and Arasmo (2016) advertise the benefits of self-support even further. According to them, self-support is more efficient, by giving an argument that 20 people can find an answer all at once, than one person will answer them one by one. To some extent, it reduces the need for first level support and the cost of running the service desk. Self-support is more customer-oriented way of service, and if done right, the customers can find answers easily without waiting in line. Nevertheless, the organizations should acknowledge that self-support will reduce only the volume of simple and most common requests [40].

3.3 Service desk integration and measurement

Service desk in ITSM practice integrates with such organisational processes as: Incident management, Problem management, Change management, Configuration management, Release management, Service-level management, IT service continuity management, Security management, Event management [61], [59], [27]. The sophistication of service desk depends on each organization and the level of interoperability between the processes. This chapter provides an overview of the most common service desk integrations - Incident management, Problem management and Change management.

3.3.1 Incident management

Incident can be defined as unplanned service disruption or significant drop in the quality of service. Service desk records incidents and is the owner of incident management [59]. Incident management handles the lifecycle of the incidents, from the reception until the service is restored [41]. The purpose of incident management process is to recover the system or service as quickly as possible.

The value of well set up incident management to the organization is that it reduces the amount of unplanned time and costs for the company. It also gives the ability to allocate resources and align organisational activities to real-time priorities. Moreover, incidents are a direct evidence of a potential service improvement or bigger problems. Incident management is responsible for:

- incident identification and logging;
- incident classification and prioritization;
- investigation and diagnosis;
- escalation;
- resolution and recovery [61].

The priority of incidents is based on the impact and urgency. Very often incident impact is calculated as the number of customers affected. Urgency is defined based on how fast the resolution is required. The bigger impact and the higher urgency will result in high

priority. If there are temporary fixes available or workarounds, then the priority of incident might be lowered [8]. ITIL suggest the following matrix for incident classification:

Table 2. Incident priority matrix. Source: [32, p 79].

		Impact		
		High	Medium	Low
Urgency	High	1	2	3
	Medium	2	3	4
	Low	3	4	5

ITIL provides urgency-impact matrix (Table 2). To allocate priority correctly, clear instructions must be given to support staff. ITIL digs deeper inside this topic and suggest that impact and urgency are not based only on the number (i.e how many users cannot use the service, how many services are down). It can also be affected by the level of financial loss or business reputation damage.

Incident management process should foresee linking the requests. When the service is down, the identical requests to restore service will be created by different customers. Those requests should be possible to link between each other. Furthermore, good practice is to connect incident management to knowledge base. The knowledge base should contain articles on how to proceed in case of a particular incident and to propose temporary workarounds. A well-organized solution database will quicker the process of incident resolution, especially the known ones [36].

3.3.2 Problem management

Problem and incident management are related and frequently can be considered as the same processes. However, they are two separate processes. The definition of a problem is a collection of many recurring incidents [60]. Problem management in ITSM is responsible for managing problem life cycle and has the following objectives to deliver:

- prevention of problems and incidents;
- reducing recurring incidents;
- minimize the negative impact of incidents [32].

Problem management process has some similarities with incident handling process, but it also includes other activities as shown on Figure 5 [32], [7].

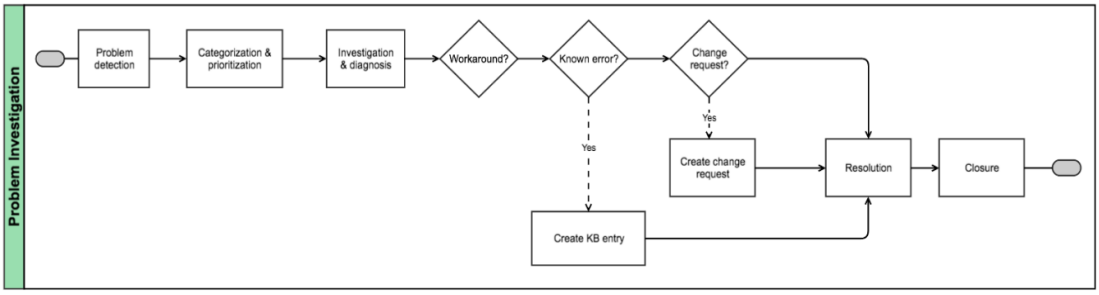


Figure 5. ITIL representation of problem management. Source: [7].

Typically, the process (Figure 5) starts from the problem identification. Related and known incidents must be associated with the problem. The problem should be categorized and prioritized, similar to what was described in the section above. Further the problem investigation and diagnosis starts. The actions at this step are to calculate problem impact, conduct root cause analysis, document symptoms. After problem analysis, there might be two scenarios: 1) diagnosis showed that the problem is the known error; 2) diagnosis showed that the problem is a new issue. In the first scenario, the service desk team should create a knowledge base entry and suggest a workaround for the problem. It can be also connected to the existing knowledge base documentation. In the second scenario, when the problem is a new phenomenon, there must be a request for a change. After workaround is suggested and/or request for change is made the problem can be closed, which is the end of problem management process.

Problem management can be of reactive or proactive nature. Reactive approach is concerned to deal with problems as a response to current incidents. Proactive approach means that the problem management tries to identify problems and issues before the incidents related to them happen. Both approaches should be conducted in the service operation practice [32, p 97]. Problem management leads to another process that service desk can facilitate, called change management.

3.3.3 Change management

The objective of change management process is to use a defined procedures and methods for ensuring prompt execution of all changes. It controls change stages and tries to facilitate change with the minimum disruption of service operation [56].

Service desk not only logs the requests for changes, but also pushes on the progress. Service desk is one of change triggers, because customer feedback and requests for changes come from this channel [59]. Moreover, service desk collects incidents, and as it was described in the section above, some incidents can be reoccurring and have the same nature which can be considered as a problem. After problem diagnosis, the organisation might decide if there is a need for change or not. This demonstrates the connection between three processes: incident management, problem management and change management.

Change is mentioned in different books of ITIL. In ITIL Service strategy looks at the change from organisational perspective. It brings a three-step process to get any change done in the organisation. At first, there must be a change diagnosis in place, so that the change is justified and the organisation "unfreezes" from the present state. Second step is to define actions for making the change. Third step is to implement change and to "freeze" the organisation in the new state [33, p 323].

ITIL Service operation describes the change from operating angle. Generally, it says that service operation should be trying to achieve stability and any change must be carefully studied before. The guide brings the main triggers of change from service operation domain, such as new or updated hardware, software; legislative, governance changes; obsolescence of some elements in service provision, etc. It is highlighted the importance of service operation staff to be involved in the change assessment and implementation [32, p 227].

In ITIL Service transition edition the change management is explained in the most detailed way. In principle, any change is a part of service transition. ITIL gives the scope of change and provides the life cycle for change management. Scope of change management covers three levels: operational change, tactical change or strategic change. Operational change concerns the organisational operations, and is the least impactful and is mostly corrective in nature, for example, repair of a computer at the service point,

modifying database entry. Tactical change brings transformation of organisational processes. Strategic change is about transforming departments, or whole organisation. Strategic changes usually should be a part of service strategy [34, p 62]. Change management process includes the following activities:

- change acceptance, filtering and classification;
- change approval;
- scheduling;
- change execution and testing;
- change evaluation [56].

In conclusion, ITIL and studies of different authors have proved that service desk, besides being a support service, is a coordinator of many organisational processes.

3.3.4 Measurement of support services

Measurement of the service creates a foundation for continuous service improvement, as was discussed by Jantti (2012). He researched the prospects of service desk function in tax administration and one of the lessons learned was that the service desk measurement program should be in place, including critical success factors and key performance indicators (KPIs). Service desk metrics should be linked to KPIs, which has to be reviewed systematically. Such practice allows to create a bridge between business objectives and operational measurements [37].

Service desk metrics serve as input data for other processes, as was discussed in Chapter 3.3. To take advantage of service desk records, the tools of business intelligence can be used to process and dashboard the KPIs [29], [16]. Dover (2017) also proposed two types of metrics to employ in service desk systems: performance metrics and resource planning (cost) metrics. Nevertheless, the scholar assumes that the metrics are defined by the company and there can be different sets of indicators measured.

Table 4 provides some common service desk performance indicators that were generalised based on the literature sources. In practice, the indicators and the approach to measure them are defined by the organisation individually according to the objectives and needs.

Table 3. Common indicators to measure service desk activities. Source: [29], [16], [44].

Indicator	**Measure**	**Description**
Number of tickets	Integer	The total number of requests for a specific period of time (week, month, year).
Number of unresolved (open) tickets	Integer	The total number of open requests for a specific period of time (week, month, year).
Number of resolved tickets	Integer	The total number of closed requests for a specific period of time (week, month, year).
Average resolution time	Time equivalent	Average time spent to resolve one service request.
First-contact resolution rate	%	Percentage of requests resolved in the first reply, with no follow-up from a customer.
SLA compliance ratio	%	Percentage of requests that were resolved within agreed SLA
Incidents ratio	%	Percentage of reported incidents from total number of requests
Customer satisfaction	Score	The level of customer satisfaction with the received support
Reopen ration	%	Percentage of tickets that were reopened

4 Case organisation and its description

This chapter introduces the profile of case study organisation. It presents the brief history, activities and functions of the organisation. Chapter 4.2 looks at the organisation from e-government dimension and service maturity level.

4.1 Brief description of the EDQM

The Council of Europe, the largest public organisation, was founded in 1949 with the goal to uphold democratic principles, human rights and the rule of law in a united Europe. The organization currently includes 47 member countries with a population of around 820 million people. The headquarters of the Council of Europe is located in Strasbourg, France.

The European Directorate for the Quality of Medicines and Healthcare (EDQM) is a child organisation of the Council of Europe. The European Pharmacopoeia was created in 1964, and was renamed to EDQM in 1996. The main goal of the Directorate is to ensure the quality and accessibility of medicines and medical care [17]. The organisation has around 400 employees and is headquartered in Strasbourg (France) [13]. The EDQM is lead by a Director and consists of nine departments. The EDQM works on the basis of ISO 9001 certification to provide high-level results to the stakeholders. Geographical reach of the EDQM influence is presented on Figure 6.

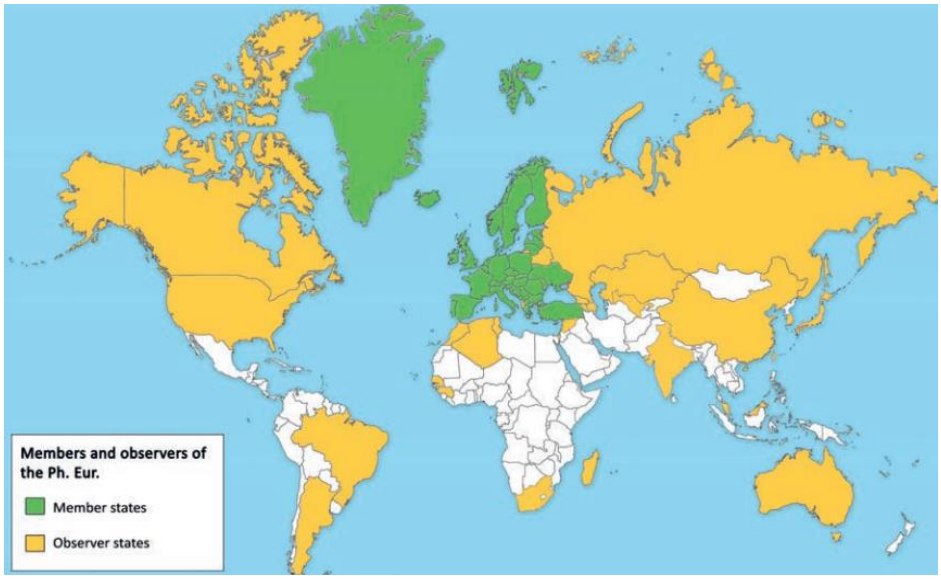


Figure 6. Geographical scope of the EDQM activities. Source: [18].

As of September 30 2019, the EDQM has 38 membership countries and the European Union that elaborated the European Pharmacopoeia. There are also 30 observers from around the world. Among the observers, there are independent states as well as international organizations, for instance the World Health Organization. The interests towards the EDQM and the demand for its work is constantly increasing, as the pharmaceutical industry becomes globalized. Nowadays, the EDQM is a public organisation with a global reach. The importance and role of the EDQM can be expressed through a variety of services it provides. Those are:

- creating and disseminating the European Pharmacopoeia;
- certification procedure and related inspection programmes;
- providing control of medicines on the market via the Official Medicines Control Laboratories (OMCL);
- combating falsified medicines;
- establishing policy in the area of blood transfusion, organs and sell transplantation;
- establishing policy in the area of safe cosmetics and food contact materials [13].

The main function of the EDQM is to manage the ongoing work of the European Pharmacopoeia Commission, as well as the publication and distribution of the European Pharmacopoeia. The European Pharmacopoeia is a major guidance document that provides quality standards to control the manufacture and distribution of medicine. By the time of the signing of the Convention on the Establishment of a European Pharmacopoeia in Europe, there were 19 different national pharmacopoeias, devoid of any intersections and cross-links. Currently, the European Pharmacopoeia is recognized in all 38 member countries. The European Pharmacopoeia is introduced into the legal systems of the participating countries directly and has, in accordance with EU legislation, priority over national pharmacopoeias.

Figure 7 depicts the relation of the EDQM activities on the inter-governmental level. The EDQM cooperates with European Union and European Medicines Agency via various force groups to facilitate the development of safe medicines policy. With the national authorities of the member states the EDQM builds the work through dissemination of Pharmacopoeia, and through conduction licensing and inspections. With the observer states, the work is organised in a consultation and advising manner.

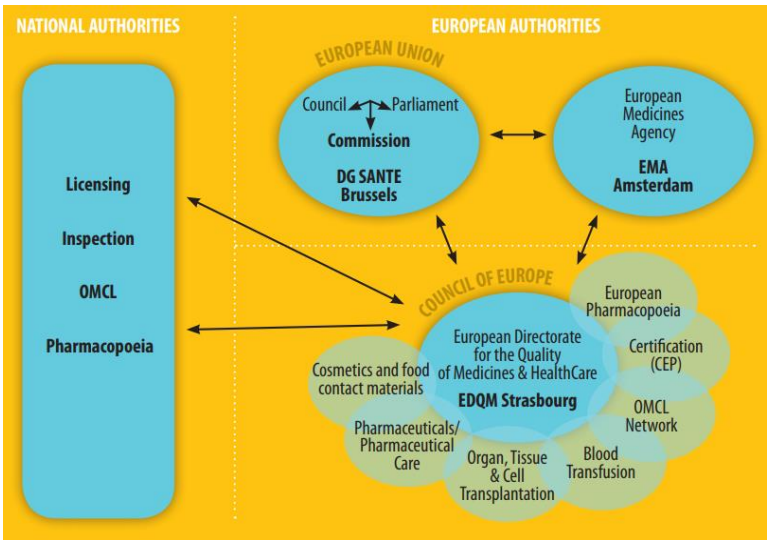


Figure 7. EDQM functions and its relations with other European organizations. Source: [13].

The legally binding mechanism of the European Pharmacopoeia and its controlling methods ensure high quality medicines for everyone in Europe. All medicinal care must follow strict rules on the composition, production and distribution. For the ordinary citizen, it means that he or she can buy medicine (for example, paracetamol) in any pharmacy in Europe and it should have the same quality regardless of the company that produced it.

4.2 Organisational e-government dimension and service maturity level

Government organisations can be classified into different dimensions such as government-to-citizen (G2C), government-to-business (G2B), government-to-employee (G2E) and government-to-government (G2G) [4, p 207], [57]. The EDQM as organisation can be viewed mostly as a combination of G2G and G2B dimensions. G2G part of the EDQM comes from streamlining and coordinating activities in the pharmatheutical field for governments and public bodies in Europe and beyond. G2B part lies in the cooperation of the EDQM with business (manufacturers and producers of medicine), in particular via distributing Pharmacopoeia, reference standards, databases.

Nowadays, it is hard to imagine the life of any organisation without information technologies. The EDQM has its own IT department which is responsible for the provision and support of IT services within the organisation. Information services are standardised and integrated into organisational and business processes. The information system for service management exists, which allows to measure and analyse the services.

Some examples of the EDQM digital services are: main EDQM work The European Pharmacopoeia Online - is an electronic version of Pharmacopoeia, which provides quick and easy access to texts and monographs; Pharmeuropa Online - free online source that covers news on Pharmacopoeial harmonisation, public inquiries, latest adopted monographs and official announcements. Additionally, the EDQM developed and supports various databases for external use: KNOWX database - contains information of falsified medical products; Melclass database - provides legal classification of medicines; OMCL database - for Official Medicines Control Laboratories, etc.

When analysing the EDQM services through the lens of IT service management [49, p 191] and e-government maturity model [6], the organisation can be placed between 3 and 4 level of technological maturity. The EDQM has a defined service portfolio with a complex processes that are mostly integrated with one another. There is a good quality of services that the EDQM provides and complete service transaction for a customer can be done without going to the office. However, there is no single one-stop-shop point for the customers to access all services at once. This would not allow to consider the EDQM as a 4th level of service maturity.

5 Case study object (AS-IS electronic service desk)

This chapter analyses the current state of support technology in the EDQM. It presents the AS-IS business processes, user interface and flow of information. The chapter covers the technology that was used for current service desk, gives the metrics of current service desk usage and examines the results of recent customer survey. Chapter finishes by synthesising the findings and proposing areas for improvements.

5.1 AS-IS interface and process

Before having a service desk, the EDQM was using a shared mailboxes to answer customers' inquiries. Shared mailbox could be accessed by many employees and the customers had to send requests to a dedicated email address. Internally, it was difficult to manage the customer requests via emails. In 2005 the EDQM took a decision to launch its first service desk.

The service desk was not built as an independent platform and was a part of Publications Registration project (Figure 8). This platform provides access and overview of registered products of the EDQM that the customer purchased; the customer can also connect to databases and go to the EDQM Store.

Figure 8. Home page of EDQM current HelpDesk, being part of Publications platform.

Throwback point about the terminology, one can notice that the EDQM named its support desk as *HelpDesk*. In order to sustain consistency, author continues to use the term *service desk* as was discussed in literature review (Chapter 3.1) and based on the reasoning that: 1) how organisation calls their support, it is up to the organisation and it is out of the author's control; 2) the EDQM *HelpDesk* provides not only IT support, so it is in principle a wide-range *service desk*.

The old service desk was a part of the EDQM electronic publication project. The tool was written in PHP programming language. The EDQM launched its first service desk in March 2006 and it was intended for contacting the EDQM:

- New clients about general questions on the EDQM publications, products and services;
- Ordering or obtaining the EDQM publications, products and services;
- Existing registered users to request clarification or provide information on the registered EDQM publications, such as, the European Pharmacopoeia editions and Supplements, PharmEuropa and Standard Terms;
- To provide feedback on the EDQM publications, products and services.

The service was not intended for requesting things that are out of scope of the EDQM. An example can be, advise on topics such as information on publications of other organisations. The service desk was also not intended to request information anonymously, so all users must be the EDQM customers or must be registered.

Business process of EDQM AS-IS service desk is demonstrated in Appendix 1. There are four key actors involved in the process: Customer, Dispatching center level 1, Dispatching center level 2, Support agent.

Process starts by the customer that is looking to get help or information. Customer enters the EDQM website, and then finds a link *FAQs and HelpDesk*. There is no possibility to submit request right away and the customer must browse through the FAQs first, in order to make a request. Most FAQs have several levels of hierarchy, so customer needs to click a few times to get to the particular question. For example, indicator “1” on the Figure 9 shows the FAQ tree and it takes four clicks to get to that question. Only when the customer is inside a particular FAQ, the link to service desk form is available (indicator “2” on the Figure 9).

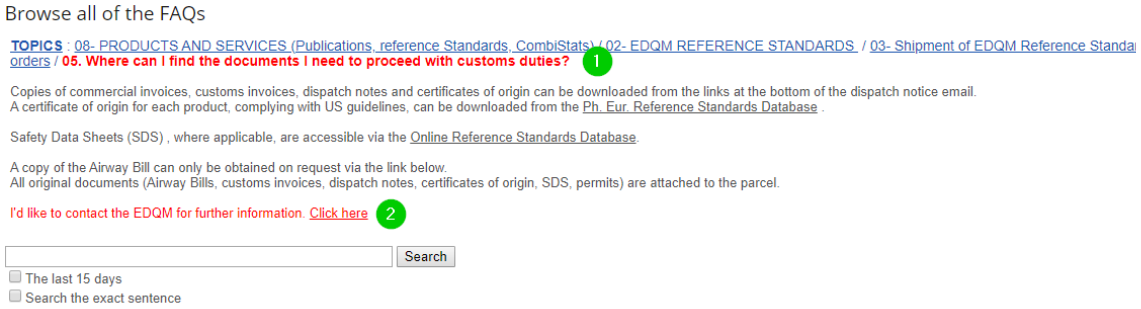


Figure 9. Look and feel of the FAQ in AS-IS service desk.

Each FAQ leads only to a specific form, thus if the customer went the wrong way and has a different question than the FAQ he opened, he has to go back and browse again through FAQs. If the customer finds the required information in the FAQ, the question can be considered as resolved. If the customer does not find an answer, he clicks on the link to service desk (indicator "2" on the Figure 9) and the registration/login window opens. Once inside the system, the customer is asked to fill in the form (Figure 10). It is possible to add maximum three files as attachments to the request form.

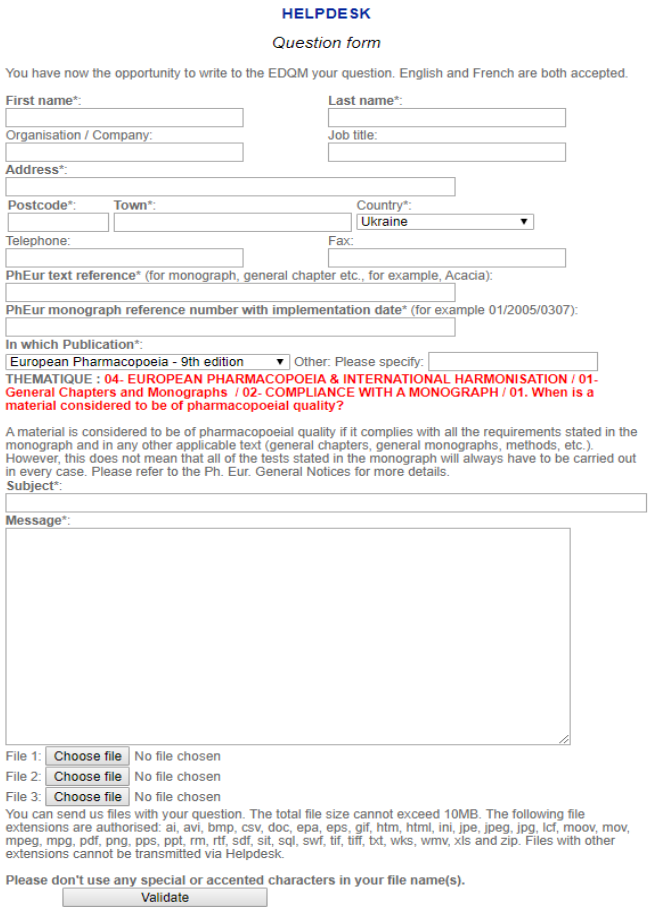


Figure 10. Look and feel of request form in AS-IS service desk.

When customer submits the form, he will be redirected to the confirmation screen and the confirmation email will be sent. In the email, there is a link to login to service desk to follow the request. Once logged in, the customer has to go to *My message box* in the service desk menu, to see the answer and status of the request. This tab contains all customer's requests. It is possible to see the request ID, subject, status, date of submission and request information with answers, when clicking on the request subject (Figure 11).

Figure 11. View of the request body in AS-IS service desk (customer side).

When the customer submits requests it is not possible anymore to modify or to add extra information (attachments, comments). The customer is blocked and cannot provide more details, if those emerged before the EDQM answer. The following statuses exist for the customer:

- *Message submitted* - means that the EDQM received the request and currently working on it;
- *Reply in process* - there is case when the EDQM answers the customer question, but leaves the possibility to ask for clarification. When the customer asks for further clarification, this is considered as another question for support team, so the status becomes "Reply in process". This example is demonstrated on the Figure 11, when Question 1 was answered by Response 1, and then customer asked Question 2 and now waits for the reply;

- *Treated* - means the question is answered and it is closed by the EDQM.

The customer can only follow the requests from the tab *My message box*. The tab *HelpDesk* (Figure 12) serves as information, by giving a link and saying *"The EDQM regularly updates the list of FAQ's on its web site. It is a comprehensive list covering all the activities of the EDQM. It should be consulted first before sending your question to the EDQM."* In order to create new request the customer has to do the process described above in this chapter (website-FAQs-request form).

Figure 12. Look of HelpDesk tab in AS-IS system.

There is also email communication set up for the customer. The customer receives an email following particular events: request created; the EDQM extends SLA; the EDQM provided an answer; the EDQM closed a request (Appendix 9).

Dispatching center level 1 (Figure 13) plays a mediator role and in the first places analyses all incoming requests. Its task is to verify the topic attribution, whether the customer question corresponds correctly to the topic that was selected in the FAQs and if the corrected form was filled. Further, it attributes the correct group, meaning the correct department. All attributions is done manually by staff members in charge.

The interface of Dispatching center level 1 is in French. It has a refresh button on top *actualiser* to update the board and see if new tickets arrived. Ticket backlog does not update in real-time. There is a simple search engine available, to search through the requests. After the search there are some filters to group tickets by different internal statuses. Those statuses are:

- Attributed *"attribué"* - request that is assigned to a service desk agent;

- Re-attributed *"ré-attribué"* - request has already been assigned to someone, but now is assigned to another agent;
- Transferred *"transfert"* - request is transferred by the agent to another group;
- For advice *"pour avis"* - if one agent, asks a manager or supervisor for advice;
- On hold *"en attente"* - pre-answer is sent to the customer, notifying the extension of SLA;
- Answered *"répondu"* - an answer is provided but the request is still open (the customer can ask for further clarification);
- Closed *"clos"* - the answer is provided and the request is closed (the customers cannot ask for clarification);
- Follow-up *"retour client"* - the customer asked for clarifications.

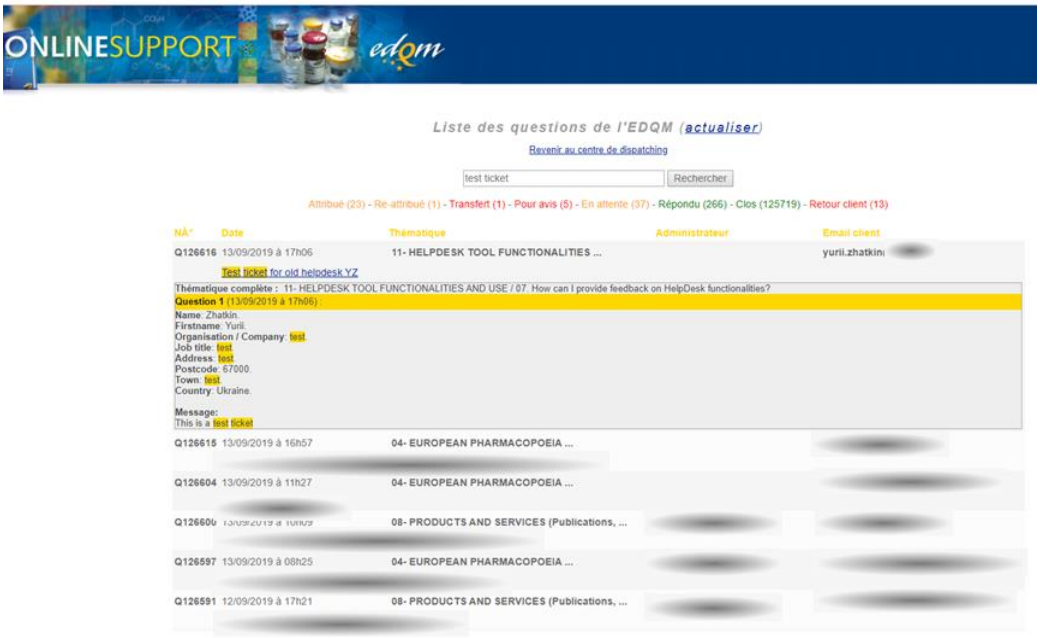


Figure 13. Look of Dispatching center level 1 in AS-IS service desk.

Further, Dispatching center level 1 contains a list of requests. The attributes on the screen include request ID, date and subject, topic, administrator or agent that is assigned, and the email of customer. By clicking on request subject, the details will be opened.

The process of Dispatching center level 2 (Appendix 1) is similar to what Dispatching center level 1 does. Level 1 attributes a request to the department (group) and then level 2 pushes the request to the specific staff member. This work is done manually inside each department. There is a person (dispatcher) who checks the tickets that arrived from level 1 and then assigns it to the agent, based on the availability and workload.

The look of Dispatching center level 2 (Figure 14) is similar to level 1. Though, it does not have the search and filtering by statutes. There is only the list of tickets shown. Figure 16 gives an idea of how the dispatching works. The author, in this example, acts as a dispatcher and on the right side of each request there is a drop-down selector available to select a person to whom the request should be assigned. After the person is selected, the dispatcher clicks on "*Affecter les questions aux administrateurs...* " and the request is assigned to a specific agent.

Figure 14. Look of Dispatching center level 2 in AS-IS service desk.

The service desk agent participation in the process (Appendix 1) starts even before the request was assigned to him. When the Dispatching center level 1 attributes the request to the department, all agents in the department will receive an email notification. Then, when level 2 attributes a request to a particular agent, the person will receive a notification again.

When agent logs in, the system interface will be similar to what is on level 1 or level 2 of dispatching. The major difference is that agent will see only the tickets assigned to him. Upon clicking on the ticket subject, the ticket details together with the editor will be opened.

When working with the ticket (Figure 15), at the top is shown the customer information and message. This information cannot be changed or modified by the agent. Below there is a comment field to provide the response to the customer. On the right side from the response field, the agent can attach up to three files to the answer. Before answering to the customer, the agent has the possibility to save the response as a draft *"Enregistrer*

comme brouillon", send it to another agent and ask for advice *"Envoyer pour avis…"*, or provide internal comment *"Commentaire interne, justification"*. It is also possible to attribute a ticket to other agent *"Nouvel administrateur"* or return it back to the Dispatching center level 1 *"Retourner ce message au centre de dispatching"*. In order to execute the mentioned actions or reply to the customer, the agent clicks on the *"Valider les informations"* which is validate the information. The agent can click the option *"Clore"*, which will close the ticket together with the response provided.

Figure 15. Request look in agent UI in AS-IS service desk.

The current EDQM service desk is integrated with the European Pharmacopoeia monographs. Thus, it is possible to link the client request with the monograph number, since the service desk operates and was built on the basis of the same database and register as monographs publication database. There is no other integration with the internal system or internal processes.

5.2 Usage statistics

Based on the usage indicators of old service desk, it is possible to see how and to what extent the service is used by the EDQM customers. Figure 16 gives insights about overall popularity of the service. The number of service desk requests fluctuates from year to year, in the range from about 7 thousands requests to almost 11 thousands requests per year. The average number of requests between 2011 and 2018 was 9283 request per year. It shows that the EDQM service desk is in high demand for the customers.

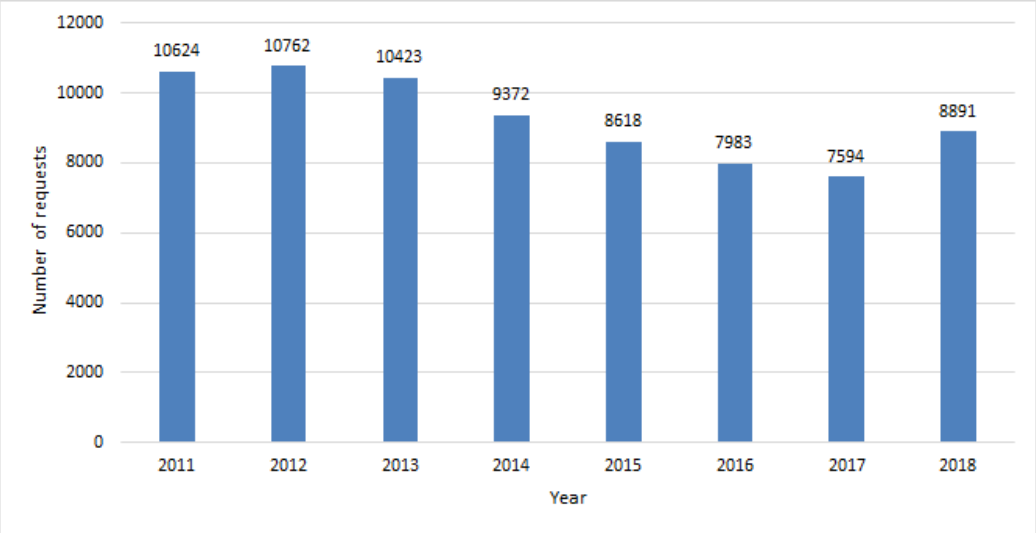
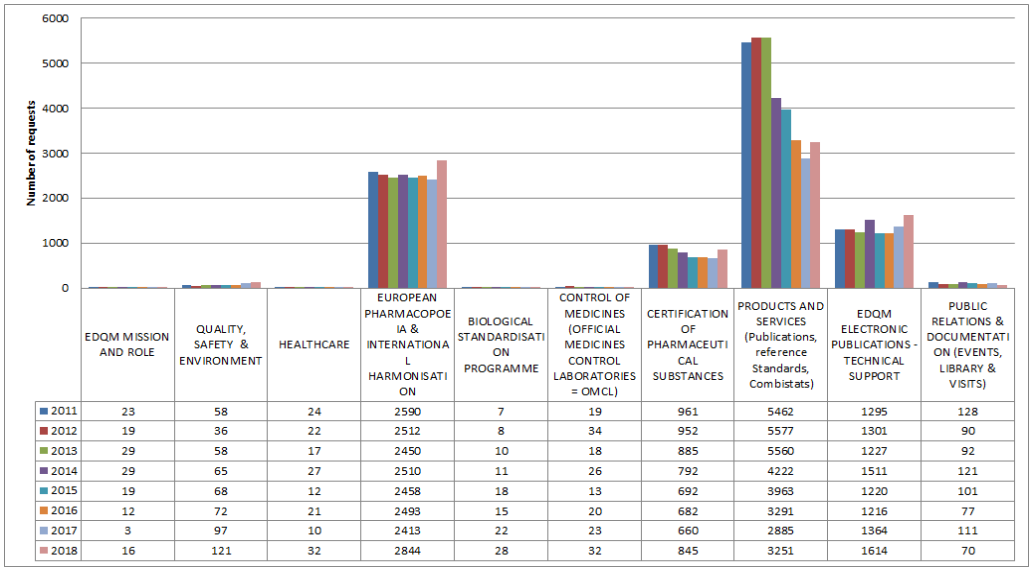


Figure 16. Total number of service desk requests per year.

Request breakdown per topic or category demonstrates that there are domains with different levels of interest (Figure 17).



	EDQM MISSION AND ROLE	QUALITY, SAFETY & ENVIRONMENT	HEALTHCARE	EUROPEAN PHARMACOPOEIA & INTERNATIONAL HARMONISATION	BIOLOGICAL STANDARDISATION PROGRAMME	CONTROL OF MEDICINES (OFFICIAL MEDICINES CONTROL LABORATORIES = OMCL)	CERTIFICATION OF PHARMACEUTICAL SUBSTANCES	PRODUCTS AND SERVICES (Publications, reference Standards, Combistats)	EDQM ELECTRONIC PUBLICATIONS - TECHNICAL SUPPORT	PUBLIC RELATIONS & DOCUMENTATION (EVENTS, LIBRARY & VISITS)
2011	23	58	24	2590	7	19	961	5462	1295	128
2012	19	36	22	2512	8	34	952	5577	1301	90
2013	29	58	17	2450	10	18	885	5560	1227	92
2014	29	65	27	2510	11	26	792	4222	1511	121
2015	19	68	12	2458	18	13	692	3963	1220	101
2016	12	72	21	2493	15	20	682	3291	1216	77
2017	3	97	10	2413	22	23	660	2885	1364	111
2018	16	121	32	2844	28	32	845	3251	1614	70

Figure 17. Number of service request per category.

Two of the most popular categories among service request are products and services and European Pharmacopoeia questions (Figure 17). Together they reach about 75% of total amount of requests that come to the EDQM. This is no wonder, as within these two categories customers get support for the main work of the EDQM, such as implications of European Pharmacopoeia and monographs, harmonisation, ordering and shipment of the EDQM publications or reference standards and so on. The IT support (EDQM electronic publications - technical support) amounts about 10-15% of all requests. The last topic which generates quite high interest is the inquiries about certification procedures, which reaches around 10% yearly. All other topics shows considerably less number of requests and can be assumed as of less interest to the customers.

Usage data and request distribution by category shows that most customer inquiries concern the scientific services. Thus, the EDQM service desk has the characteristic of typical wide-range support service, rather the one focused only on IT support.

Another important indicator that was possible to get from old help desk statistic is the average time to handle one request. In EDQM practice, resolving one service request takes about 3,5 working days. This indicator is in line with the 4 days response rule that is shown in the business process of AS-IS service desk in Appendix 1.

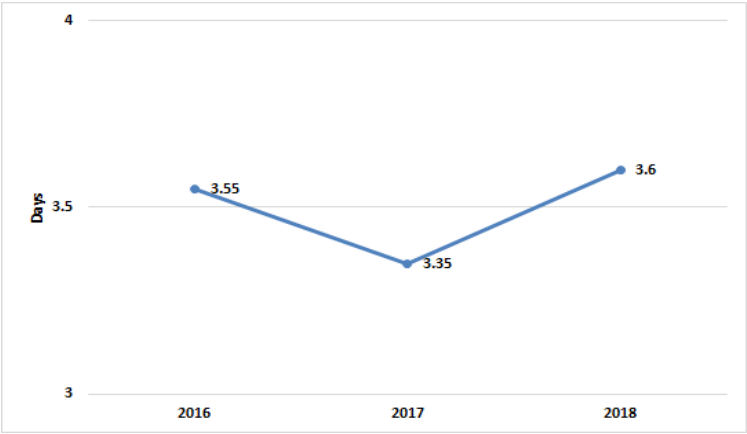


Figure 18. Average time that EDQM spends to resolve one request.

Within the old service desk data it is not possible to get other meaningful statistic for the purpose of this thesis. For example, there is no collection of customer feedback or satisfaction, there is no evidence of how many requests can be considered as incidents, request for changes or new features, etc. This can be done by running a text analysis of previous request by using artificial intelligence [53], however this is beyond the scope of this paper.

The metrics, that was possible to generate, emphasise the important role of service desk in the life of an organisation. With the amount of around 10k annual requests, the service desk is undoubtedly the main channel for the customers to get support. It demonstrates also the huge amount of information that the EDQM can get and act upon to improve the services and to deliver a higher value.

5.3 Customers' survey

The EDQM periodically does the customer surveys in order to get feedback and improve its services. During the last survey that was run at the end of 2017 beginning 2018, there was a section included about the service desk (Appendix 2).

From the total amount of almost 2000 respondents, the number of those who answered *Yes* to question *Have you ever used EDQM HelpDesk & FAQs (www.edqm.eu/hd)?* was 670 respondents. The answers reveal the customer perception of the current support system. From the follow-up questions (Appendix 2), the options that addressed service desk usability and accessibility were analysed further. The options that asked about service desk staff competency, such as politeness and professionalism, were not analysed, as this is out of scope of this master project.

In general, majority of the EDQM customers are happy with the current level of support and service desk tool (Figure 19). From the potential improvements perspective, we can see that 14% of respondents said that the EDQM service desk and FAQs is not easy to find and 17% think that the tool is complicated to navigate. Additionally, 29% of participants felt the need to contact the EDQM after reading FAQs.

The percentage of those who finds support desk as a useful means of communication with the organisation reached 88%, while 91% confirm that they had a good quality support via service desk when contacting the EDQM. These findings, on the one hand, show the importance of keeping service desk, and on the other hand, show the room for improvement of current solution. Most of the dissatisfaction were expressed about ease of access and usability of current service desk.

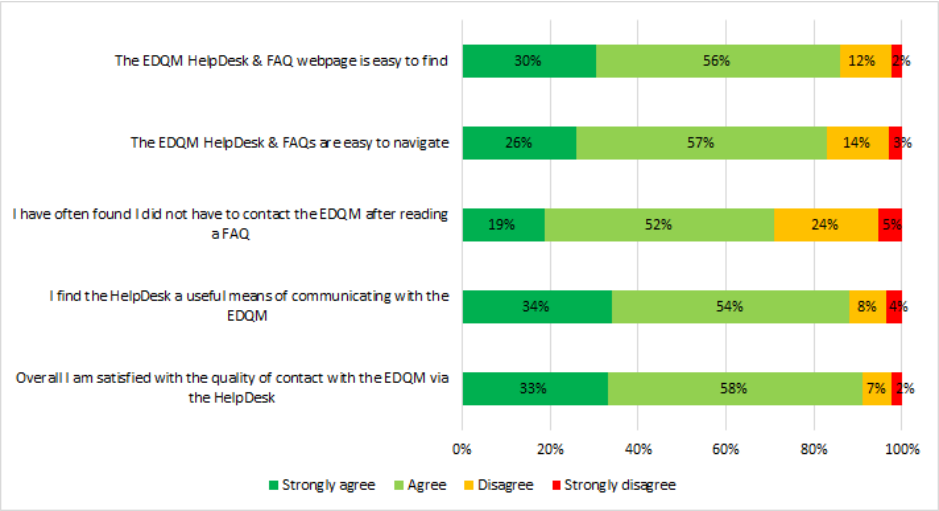


Figure 19. Customer survey statistics.

When we looked inside the customer comments to open question *"If you answered disagree/strongly disagree, could you please tell us how we could improve?"* (Appendix 2), we spotted the main pain points for the users:

- Ease of finding and accessing the service desk. Users have to click multiple times (at least 7 times) through the FAQs to have the option for submitting request. No possibility to address the question directly.
- Navigation. Customers find the current tool difficult, with unfriendly design and layout. Many customers experienced troubles with interface when either creating the request or following on it. There is no mobile or tablet mode.
- Process related issues. A couple of issues addressed process establishment and not the technology. Some customers objected that they had to log in each time to their account to see the response. Others would like to have support that is more flexible in regards of time zones.

The main conclusion that customer survey brings is that the customers are happy with the quality of service when they contact the EDQM service desk. Nevertheless, the customers would like to have easier access, friendlier interface and simpler process.

5.4 Synthesis of case study findings

Analysis of AS-IS service desk allows to bring together areas of improvements that should be taken into account when developing new service desk. Referring to what was discussed above in this chapter the domains for improvement can be: technology, interface, features, process (Figure 20).

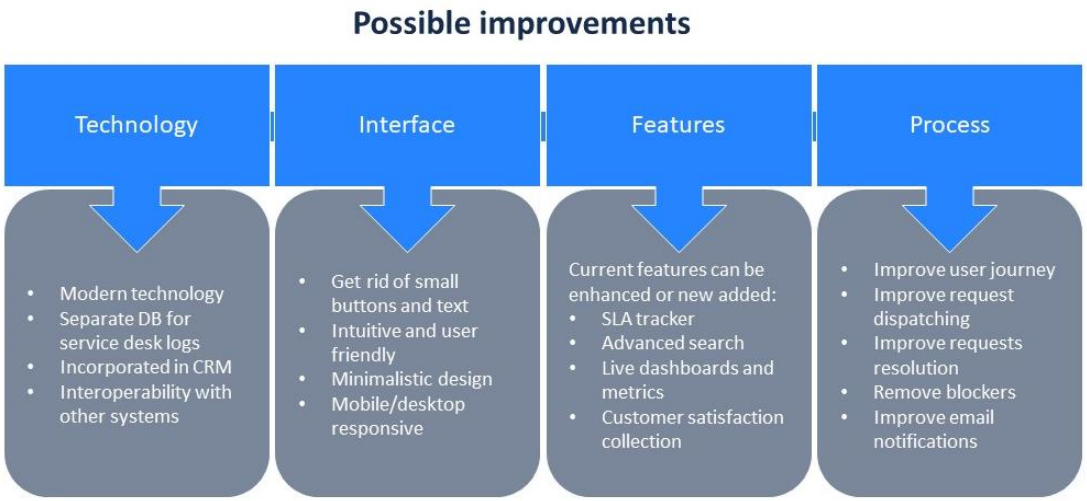


Figure 20. List of potential improvements within AS-IS service desk.

Technology wise, it is obvious that it is challenging to maintain the current system. When we tried to use it, sometimes it was too slow and not responding. There is no interoperability with other tools and the EDQM systems, except the registration system and the FAQs on the public website. AS-IS tool was built in 2006 and it had no major update since then. It may involve various risks if continue to operate the old technology. New service desk should use a modern technology and, ideally, be the part of customer relationship management and should communicate with the other processes such as incident management, problem management, etc.

Interface improvements are quite explicit. The current interface it too basic, not intuitive, not responsive. The text and buttons are small. It is difficult to navigate for both customers and agents, as they need to click back and forth many times to do a particular action. The current service desk does not support tablets or mobile devices, and even in the desktop version the layout is too small on most modern browsers.

Features in the current system can be described as a basic support bundle. On a high level, AS-IS tool serves solely to record the customer request and resolve it. The new system

can be empowered by new functionalities to please all stakeholders. For example, it can be SLA tracking, powerful search, live reporting and metrics, customer satisfaction collection, etc.

Process improvements can be narrowed down to the following:

- Improve user journey - the customers should have the choice whether to contact support directly or to consult the FAQs. Customer should not be blocked. In the current system, the customer cannot add extra comments or attachments when the ticket is created.
- Improve requests dispatching - at the moment, dispatching is done two times, which is already inefficient. Dispatching and categorisation of the tickets can be automated and thus saving a lot of time. Moreover, it will allow to speed up the process and to resolve tickets faster.
- Rework on resolution procedure - in AS-IS process, the agent can answer and close the ticket at the same time or can answer and leave the possibility for the customer to follow up. This practice is confusing, as it is up to the agent to decide when to close the ticket or give the right to customer to comment back.
- Remove blockers - some major blockers were identified in the current process. Customer cannot add extra information when the ticket is created. Customer cannot asked additional information when the ticket is closed. Ticket cannot be reopened. The comments are also blocked for the agent, when he answered to the customer, so no possibility to provide extra information if such came later.
- Improve email notifications - there should be a reasonable amount of emails and the users must not be spammed. With the current service desk can be found unnecessary email flow, for example when Dispatching center level 1 attributes a ticket to the group of users, all users in the group will receive an email.

Customers' survey (Chapter 5.3) amends the improvements proposed above. The major pain point for the customer is the accessibility of current tool. Many do not like that firstly they have to browse through FAQs (can even reach up to 7 clicks) to contact the EDQM. This corresponds to the improving user journey.

The second pain point is the interface which is difficult to use and confusing. Customers find the current interface and design as not user-friendly. This stands in line with the overall interface improvements, proposed above in this section.

The last pain point for the customers is the limitations that are presented in the current process and system. For example, customers stated that system does not remember the last log-in. Complaints were also about possibility to ask follow-up questions. It was proposed by few customers even to improve with the time zones management, as the reply takes too long sometimes.

6 Input from stakeholders

This chapter provides further input for the TO-BE service desk that was collected from internal stakeholders. It explains how the data were collected, presents the user story mapping, data list, wireframes of the new service desk.

6.1 Gathering information

As it was mentioned in Chapter 2.1 the internal stakeholders' input was collected qualitatively via workshops. Four workshops were organized between May and July 2019. The duration of one workshop was 2 hours.

Internal stakeholders can be classified into roles: administrators, dispatcher, agent. We invited staff members from every department of the EDQM that work with the current service desk. It total 56 participants took part in the workshops. The variety of topics that were discussed is presented in Table 4.

Table 4. Workshops participation and topics covered.

	Number of participants	**Topics discussed**
Workshop 1	12	▪ Customer feedback and service desk metrics ▪ Problems with the current service desk
Workshop 2	13	▪ Process transformation ▪ User journey ▪ Tickets flow
Workshop 3	17	▪ User stories ▪ Data to be collected ▪ Customer portal ▪ Requests organisation
Workshop 4	14	▪ Sketches of customer portal ▪ Sketches of internal interface ▪ KPIs (dashboards)
Total	**56**	

During each workshop, we used a collaboration tool for documenting the information, which is called Confluence. Confluence is used internally in the EDQM as a team-

collaboration software and allows working together on many things (documents, graphs, etc). Because the tool is open and everyone has access to it, the participants could even comment post-factum, when they came up with new ideas. Additionally, other stakeholders, who could not participate, could look at the notes and give their comments. Such organisation was very efficient, reassuring that no one was left behind.

The series of workshops resulted in generating qualitative information such as notes, process sketches, user stories, data list, features list, design sketches, notifications, etc.

6.2 User stories

User stories are an efficient way to express system requirements, features and acceptance criteria [46]. One of the key information that was collected during the workshops was the user stories, which are mapped in Appendix 3.

The user stories were organized into larger categories – epics. One epic is a large user story that can be divided into smaller user stories. The were 9 epics identified during the workshop.

The user story map starts with the *login* epic, that includes the features of creating a user account in a service desk, signing in and landing on a screen, which would show the relevant request depending if it is a customer or service desk agent.

Under *ask a question* epic, the participants mapped the scenarios for the customer to submit a request in a service desk. It foresees that when landing on a support page the customer should be offered either to consult FAQs or to submit request directly. Agent can create a request on behalf of the customer, in case contacted by phone or email.

The *consult FAQs* epic covers the stories where the customer should be able to access the list of knowledge articles. For the agents, the requirement is the ability to add or edit existing articles.

Epic *dispatch a question* includes a set of stories for the mobility in the ticket dispatching. The dispatching is desired to be automatic and the agents should have a flexibility in re-despatching or changing the department in case the ticket was wrongly dispatched.

Epic *answer a question* is the most extensive one and the stakeholders defined various functionalities for the agent when answering the ticket:

- internal comments
- safe answer as a draft
- tagging another agent
- formatting requirements
- adding attachments
- linking tickets
- reopening tickets, etc.

Both the customer and the agent have to be able to consult past requests. This feature should be enhanced by the availability of searching and filtering through past inquires (epic *consult past questions*).

Tracking request progress have to be incorporated as a set of explicit statuses for internal and external users. The change in status should be carried out by the system automatically.

Epic *email alerts* consists of definition of scenarios when the process stakeholders have to be alerted. The requirements define the events such as ticket creation, comment added by agent or customer, ticket closed, and at the same time foresee that the actor has to be able to opt-out from notifications.

Last epic in the user story map is *reporting*. This epic incorporates the internal requirements and scenarios for the agent to get a meaningful and timely statistics of the current or past requests.

6.3 Request types, fields and customer data to collect

During the stakeholders workshops we noted down all the request types that should be presented on the customer portal (Appendix 4). The request types is grouped in 10 categories and each category has the specific requests. The request organisation presents the scope and the variety of services that the EDQM provides.

List of fields that will be presented on the customer form is defined by what information has to be collected. The EDQM conducts many activities and the data, needed for ticket resolution, varies in nature, as was observed during the workshops. However, the

consensus was to ask the customer only the data that is needed for processing the request, as part of a good practice set up by GDPR regulation [51]. Thus, each department has limited the form data only to the most essential, and not collecting extra information.

At the creation of new account, the customer will be asked for the full name and email. Further, the data collection depends on each department and starts from a minimum of three fields: request subject, description, attachment.

Some departments, like IT unit, require only the problem summary and description to provide a support to the customer (Table 5). Other departments, especially those that deals with scientific inquiries, need to ask for extra fields like Ph. Eur. text name or publication name in order to solve the request.

Table 5. List of data to collect and fields to use on the customer requests forms.

Name	**Field type**	**Possible values**	**Used by**
Request summary	Single line text	Any text entered by the customer	All teams
Description	Multi-line text	Any text entered by the customer	All teams
Attachment	Attachment field	Any added attachment by customer	All teams
Job title	Text field	Any text entered by the customer	Specific teams
Organisation	Text field	Any text entered by the customer	Specific teams
Town/City	Text field	Any text entered by the customer	Specific teams
Country	Select list	Predefined options	Specific teams
Name of Ph. Eur. text	Single line text	Any text entered by the customer	Specific teams
Implementation date & Ref. number of Ph. Eur. text	Single line text	Any text entered by the customer	Specific teams
Catalogue code	Number field	Number entered by the customer	Specific teams
Publication	Select list	Predefined options	Specific teams

The list of customer fields is supplemented by system fields and the fields that agent puts manually. The list of these fields is invisible for the customer and their specifications are presented in Table 6. The field is automatic if it is filled by the system. Manual input means that the agent adds data.

Table 6. List of fields defined by system and/or agent

Name	**Field type**	**Possible values**	**Requirements**
Reporter	User field	Customer Name or email address	Automatic
Assignee	User field	EDQM agent name	Automatic/Manual
Team	Select list	EDQM departments	Automatic/Manual
Created	Data field	18/Jun/19	Automatic
Updated	Data field	18/Jun/19	Automatic
Due	Data field	18/Jun/19	Automatic
SLA	Select list	4 days 1 month 2 months	Automatic/Manual
Time to resolution	Time field	3d 20h	Automatic
Customer request type	Select list	List of all customer requests available on the portal	Automatic
Component/s	Predefined multi select list	Complaint Incident Problem	Automatic/Manual
Labels	User defined multi select list	Any value entered by the user	Manual

Most of the fields that are hidden from the customer will be injected by the system automatically. Those can include date fields, request classification fields, identification of actors involved.

Based on the collected information, we prepared the wireframes of the TO-BE customer portal (Appendix 5). The wireframes cover the main page of the portal, where the customer browses through the categories. The sketches of the request form and the request body shows how the new customer interface could be. The last sketch shows the dashboard, where the customer can consult all submitted requests and follow their statuses.

7 TO-BE service desk

This chapter presents new TO-BE service desk for the case study organisation. It describes the new organisational process, justifies the technology that was used to build new system, and explains how the service desk was configured. The chapter includes sections that demonstrate the look and feel of user and agent interface, real-time dashboards. Chapter finishes by bringing the outcomes from internal system testing.

7.1 Justification of TO-BE technology

When developing a software the organisation has to decide whether to do it in-house or outsource the development. Both options have pros and cons. For non-IT organisations, it is advised to use a commercial applications or outsource the development. Gliedman (2005) explains the benefits of using commercial software as it is already built based on the best practices of other organisations and exploits industry standards. Moreover, such software is designed to integrate easily and the organisation will benefit from leveraged development - new releases will bring new functionalities, fixes [25].

In the case of EDQM, AS-IS service desk was developed in 2006 and have not had a major updated since then. This once again shows the problem with the internal software development and maintenance in the non-IT organisation. The solution can be developed in-house, and then slowly becomes obsolete. For proposing a TO-BE technology, we decided to use a commercial tool developed by Atlassian, which is called Jira Service Desk. The justification of the TO-BE technology is based on the following:

- Credibility and reliability - industry accepted software, ITSM compliant, developed and regularly updated since 2002.
- Ready-to-use and customizable - Jira Service Desk is already preconfigured, but also flexible. It is easy to configure it.
- Used internally – the EDQM already benefits of Jira as internal service desk. Internal service desk of the EDQM is a point of contact for all employees regarding various services, such as IT support, inventory requests, linguistic services. Using the same technology will allow to minimize the resistance when conducting digital transformation.

- Interoperability - Jira Service Desk can be easily integrated with other systems via application programming interface (API).
- Community and open source components - Jira provides tools and flexibility to developers for features development and integrations. There is a community available with rich know-how and best practices.
- Academic references - there can be found traces of using Atlassian software when modelling service desk [2].
- Author's experience with the software - author had an experience with Jira during the professional career.

In order to configure and design TO-BE solution, we installed Jira Service Desk version 4.5.1 on the local servers of the EDQM.

7.2 System architecture

Atlassian software uses MySQL databases. The database schema and its description can be publicly accessed. The schema is quite complex and defines the integrity between sets of tables - the main data objects [3]. In TO-BE solution, we do not change database configuration and use the native relation database of Jira Service Desk. The schema of Jira Service Desk domain objects is presented on Figure 21.

When looking at the schema on Figure 21, it is important to understand that there are some service desk objects, which are peered with other Jira counterparts. Initially, Atlassian presented Jira Software bundle, which includes issue tracking, project management and business process management software, and only later the service desk was added to the bundle. The objects like *Project*, *Field* is the part of Jira software and in the service desk they have different names. Thus, *Service desk* object is peered with *Project*, *Request* is peered with *Issue* and *Request type* is peered with *Issue type*.

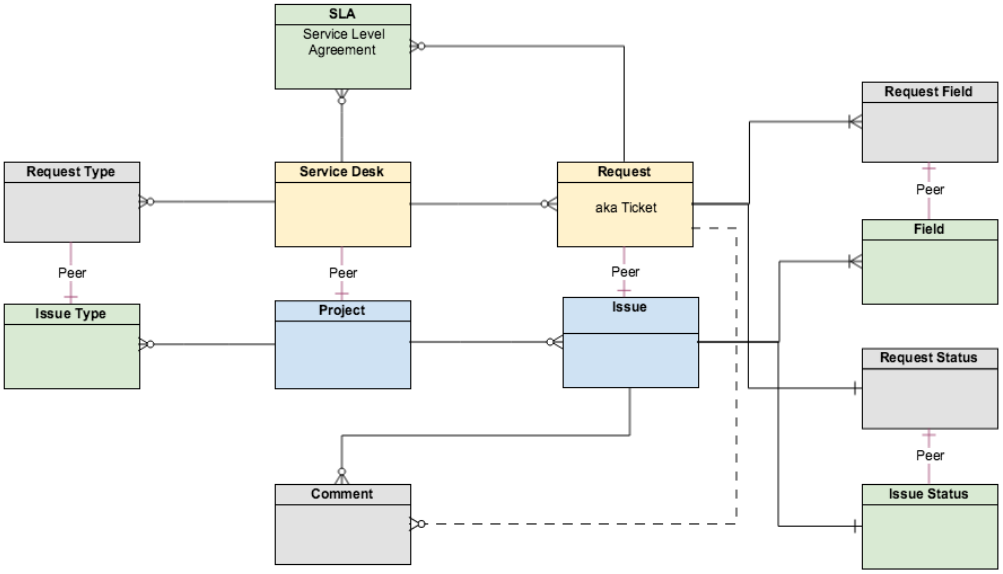


Figure 21. TO-BE service desk system architecture.

The schema contains specific objects that are essential parts of the service desk software. *Request field* object serves to capture all the information in the request form. *Request status* is there to store and show all statuses that the request can be in during a particular point of time. *Comment* object contains all the communication that is happening in the request. *Service level agreement* is used for time calculation and track how much time is spent on the request.

7.3 TO-BE process

The new TO-BE business process was designed based on the findings and potential improvements that were identified during analysis of AS-IS state of case study object. The process incorporates the main requirements of stakeholders. In the TO-BE process, there are three acting roles: Customer, Service desk system, the EDQM service desk agent.

In the TO-BE process (Appendix 7) customer journey is reworked. The customer, upon entering a service desk portal, can submit the request directly. Alternatively, the customer can still consult the knowledge base articles. By typing the words in the special search field the matching articles will be shown automatically.

In the new process there is no manual dispatching centres. The service desk system dispatches the tickets automatically and attributes them to the departments/persons in

charge. The automatic dispatching is based on the request type. The system is programmed to match a particular request type with the relevant department or person. At the moment of receiving a ticket, the system will also run two sub-processes: one is for tracking the SLA and adjusting it if needed and the second process is for tracking request status. System listeners update the status of the request automatically, when a particular event occurs.

When service desk system assigns a ticket to the agent, he will be notified and the ticket will be visible on his dashboard. The agent handles the request and replies to the customer. The customer upon receiving the answer, can either follow-up or confirm that the answer resolves his problem. When request is resolved, the process actors are not blocked and can comment on the request. For example, the customer can share the words of gratitude, or the customer can come back and ask additional questions under the same request. In this case, the agent can reopen the ticket.

The message flow in the new process is optimized, especially for the service desk agents, who received unnecessary notifications in the old system. The notifications are sent to the customer when the request is created, when the reply arrives and when the request is closed. Agent receives the notification when the ticket is assigned to him or when the customer follows up.

7.4 Service desk configuration

Jira Service desk has baked-in tools for the configuration and customization. No programming knowledge is required, so the service desk is easy to set up. The service desk was configured based on the improvements and stakeholders inputs discussed in the previous chapters. The list of things that were configured:

- fields
- request types
- request statuses
- ticket workflow
- automation rules
- screens

- permissions
- notifications
- customer portal look and feel
- agent interface

The custom fields and request types identified in Chapter 6.3 were added to the system. Jira allows to define the field type and behaviour by deciding whether the field should be visible or hidden, optional or required. It is also possible to add a field description, which appears for the customer that edits the field. Further, we created the request types and configured the hierarchy of requests on the customer portal.

In the new TO-BE process (Appendix 7), there is a sub-activity about ticket status tracking, made by the service desk system. In Jira, ticket status tracking is represented by a workflow (Figure 22). The workflow is simply how the ticket travels through its lifecycle. The status visually tells the customer or the agent what is happening with the ticket and who should take the action. At a specific point in time the ticket is always in some statuses. The arrows between statuses is called a transition, which is a link that moves ticket from one status to another. The transitions between statuses happen automatically, once the preceding event takes place.

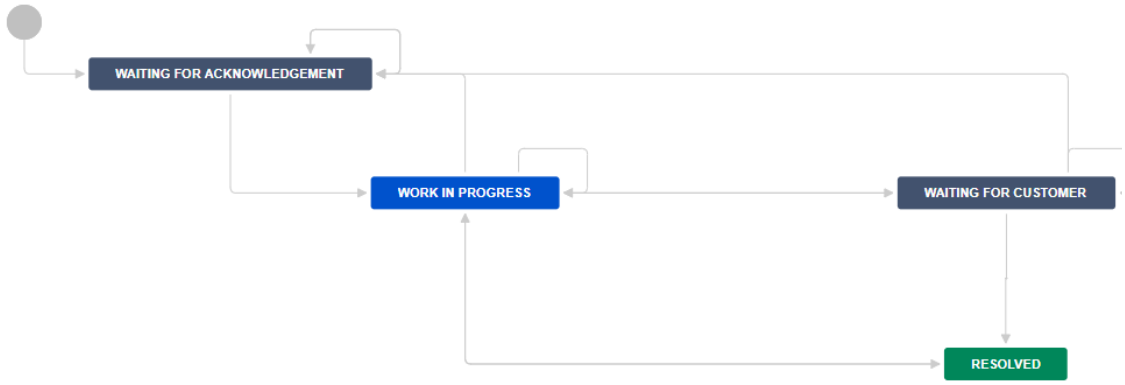


Figure 22. Ticket flow and statuses.

The status of the ticket is visible for the customer and the agent, however there are slight differences of what each party sees (Table 7). Due to the internal procedure of acknowledging the ticket, that was expressed during the workshop, when the ticket is created the customer status is *Work in progress*, while the agent status is *Waiting for acknowledgement*. Acknowledgement of the request does not concern the customer, while for the agent it means that the request should be acknowledged by him before the work

starts. In case the agent cannot work on the ticket, he can unassign himself and the ticket will arrive to the team queue or he can send the ticket to another queue if the customer put the question in the wrong request type.

Table 7. List of statuses within the ticket lifecycle.

Action (event)	Status of the ticket	
	Agent view	Customer view
Ticket created	WAITING FOR ACKNOWLEDGEMENT	WORK IN PROGRESS
Ticket acknowledged (work starts)	WORK IN PROGRESS	WORK IN PROGRESS
Agent replies to the customer	WAITING FOR CUSTOMER	WAITING FOR CUSTOMER
Customer replies back	WORK IN PROGRESS	WORK IN PROGRESS
Resolve ticket	RESOLVED	RESOLVED
Reopen ticket	WORK IN PROGRESS	WORK IN PROGRESS

The other statuses are the same for the agent and for the customer. When the agent replies to the customer, the status becomes *Waiting for customer*, so that the customer can either ask for clarifications or confirm that the provided response resolves the problem. When the customer replies back, the ticket status becomes *Work in progress*. Depends on the customer reply, the work can be carried further or the ticket can be *Resolved*. If the ticket is in status *Resolved*, the customer always can comment and the agent has the possibility to reopen a ticket, which changes the status to *Work in progress*.

Jira allows to automate the service desk activities by using conditional operators. It is done by firstly defining a trigger event (*when*). Then, with the conditional operators *if* and *else if* we selected the list and order of conditions to be met to execute the function. Finally, we specified in *then* block what the system has to execute if the function conditions are met.

On the Figure 23, the example of automation is presented, when the system changes the statuses between *Work in progress* and *Waiting for customer*. The trigger event is when comment is added. The system consider the conditions in *if* and *else if* block. When agents adds a public comment i.e. replies to the customer, the ticket is transitioned automatically

to *Waiting for customer*. When the customer replies back, the ticket goes back to status *Work in progress*.

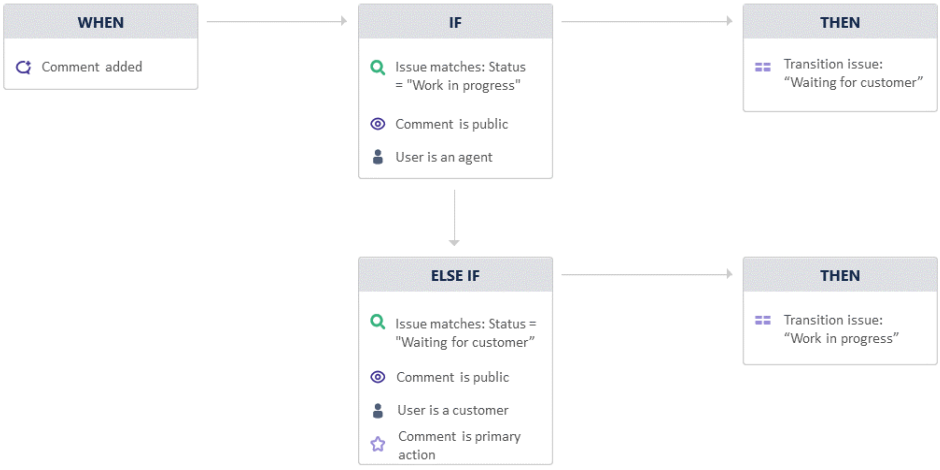


Figure 23. Service desk automation logic.

Following the set up of automation, we configured the screens in Jira. Screen is the combination of fields that a user can see in the system. For example, we grouped the fields to be shown in the view mode of the ticket, in the edit mode etc. The screens have shaped the agent interface that is presented in Chapter 7.5.

Further, we set up system notifications. The new notifications (Appendix 9) are more welcoming and written in simple, polite language. Moreover, the customer can already see the reply in the notification, together with the ticket subject and number, so it gives a better understanding of what is discussed in the ticket. The customer has the possibility to click the link in the notification, which opens the full request details on the portal. Additionally, the new case has been added, so that the customer can directly reply to the email notification and his answer will be attached to the ticket as a comment.

7.5 TO-BE customer portal

Based on the inputs from the stakeholders and customer feedback, we designed a new customer portal. It has lean, intuitive design, corporate identity and system of visual icons for better distinguishing of request types.

New customer portal has everything placed on the one page (Figure 24). Upon entering the portal, the customer sees the list of request types organized into different categories,

i.e. the services that the EDQM provides. By clicking on the request type, a web form opens, so that the customer provides details and submits the request.

Figure 24. TO-BE customer portal (landing page).

The customer is not forced to consult FAQs anymore in order to create a request. FAQs are still available on the portal in the form of smart search. In the search bar, the customer can start typing the problem or key word and the system will automatically show the relevant articles (Appendix 8). The full knowledge base can be accessed via the link *Visit the EDQM FAQs*. Figure 25 depicts the look of new customer request form. Each form is different and depends on the request type.

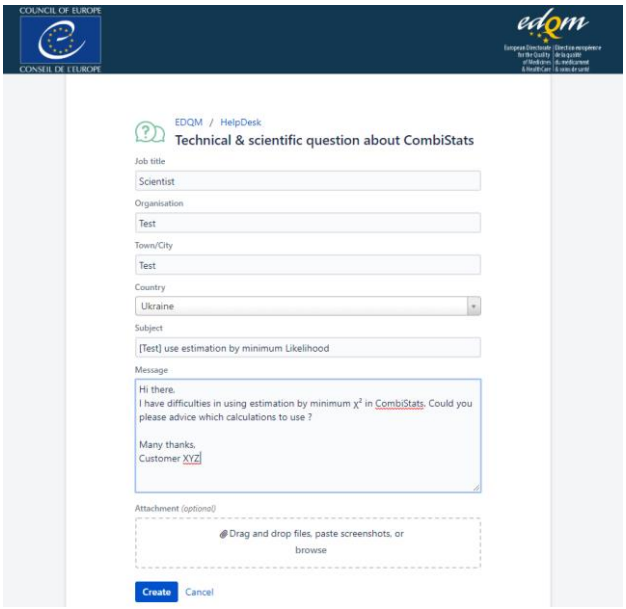


Figure 25. TO-BE request form.

On the example shown, the customer is asked to provide contact data, put the subject of the request, provide detail description and attachments. When request is created, the customer will receive a confirmation (Appendix 9). The customer can always track the progress of all requests (Figure 26). Quick filters are available on top to narrow down the requests by status, creator, request type and also to search by keywords. The dashboard shows the list of requests, with the key information. To check the particular request the customer clicks on request ID (reference) or summary.

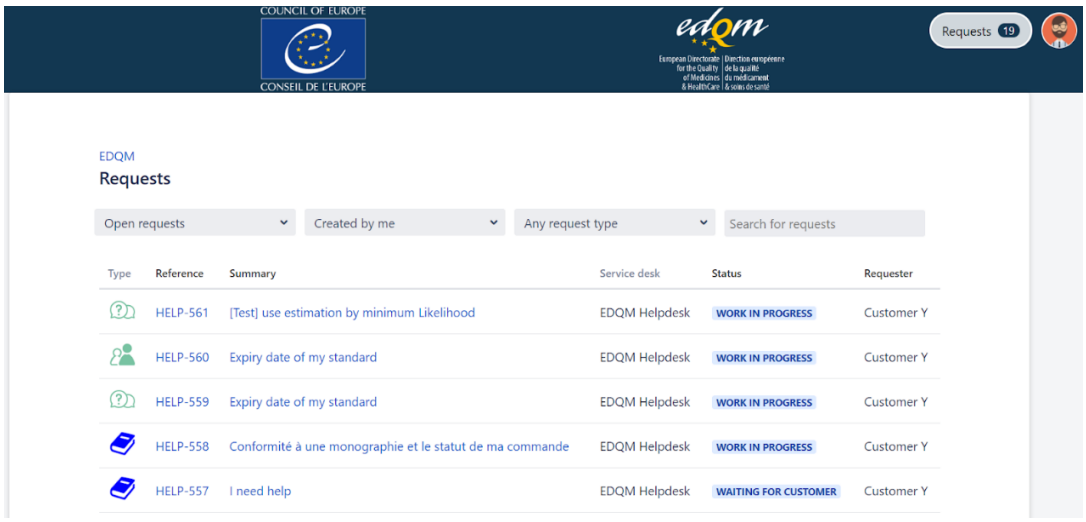


Figure 26. TO-BE customer portal dashboard.

In the detail view of a request, the customer can see all the communication activity, attachments and status changes (Figure 27). The customer can always comment on the request and add files, no matter in which status the request is.

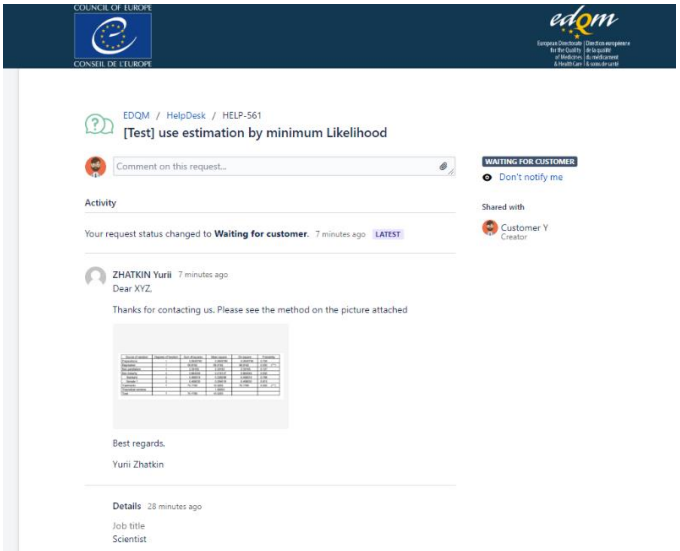


Figure 27. TO-BE request body (customer look).

The customer portal presented in this section can be accessed by a variety of devices (desktops, tablets, mobiles). The design responds to user behaviour, environment and reassures smooth and intuitive experience throughout the use of the portal. The user journey is simplified and the customer can create a request in just 2 clicks.

7.6 TO-BE agent interface and functionalities

In the new process (Appendix 7), the service desk system executes dispatching and attributing of tickets. Automation of ticket dispatching should save a lot of time, as previously it was done manually. The agent does not need to check the service desk everyday and does not have to worry about missing a ticket - the system will send a notification to the agent (Appendix 9).

As it was done with customer portal, in Jira it is possible to customize agent interface and to configure it to specific organisational needs. Wireframes of an interface, that were designed together with the EDQM agents, are included in Appendix 6. In accordance with the sketches, we created internal service desk interface (Figure 28).

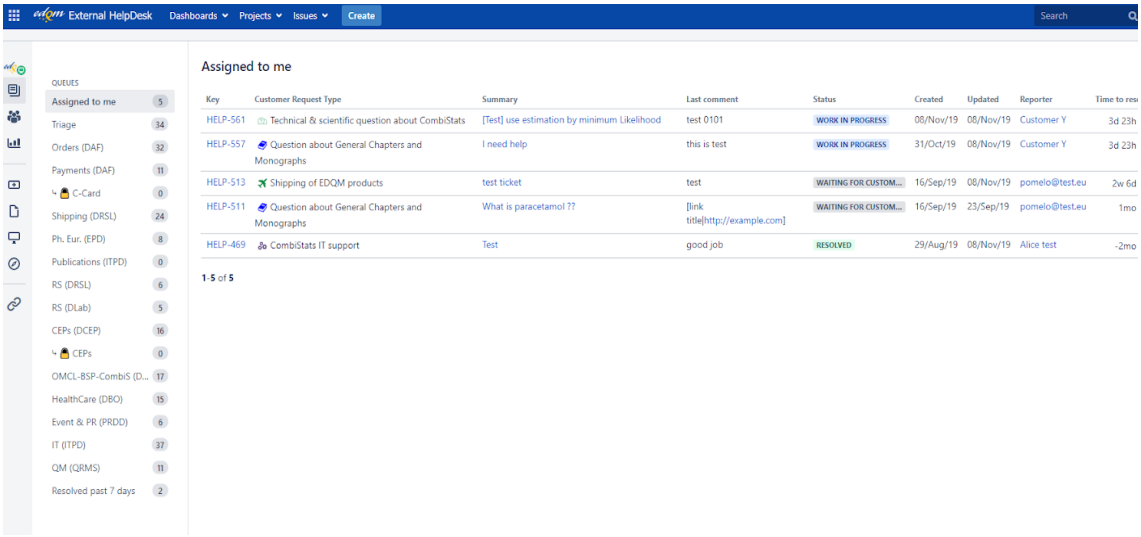


Figure 28. Tickets presentation in TO-BE agent interface

All ongoing requests are organized into queues. Queue is the presentation of tickets by predefined parameters. Behind each queue there is a saved search query. After we set the queries, we defined the list of high level fields that the agents can see at first sight. For example, the fields like request type and ticket summary allow having a brief

understanding what is the ticket about. Ticket status and assignee field show what is happening with the ticket and who is dealing with it.

Customer requests organisation in the form of queues, as presented on Figure 31, allow to achieve transparency and collaboration between agents. Each agent can navigate freely between the queues and see precisely what is happening with the ongoing tickets in his department or others. During the workshops, each EDQM department expressed the need to have its own queue and sometimes to have even more than one queue, if the department deals with various topics.

We recreated the queues for all departments, and added the queue *Assigned to me*. This is a specific queue to easily distinguish the tickets assigned only to the agent that are logged in to the system. By clicking on the ticket ID or summary, the detail view of the ticket opens (Figure 29).

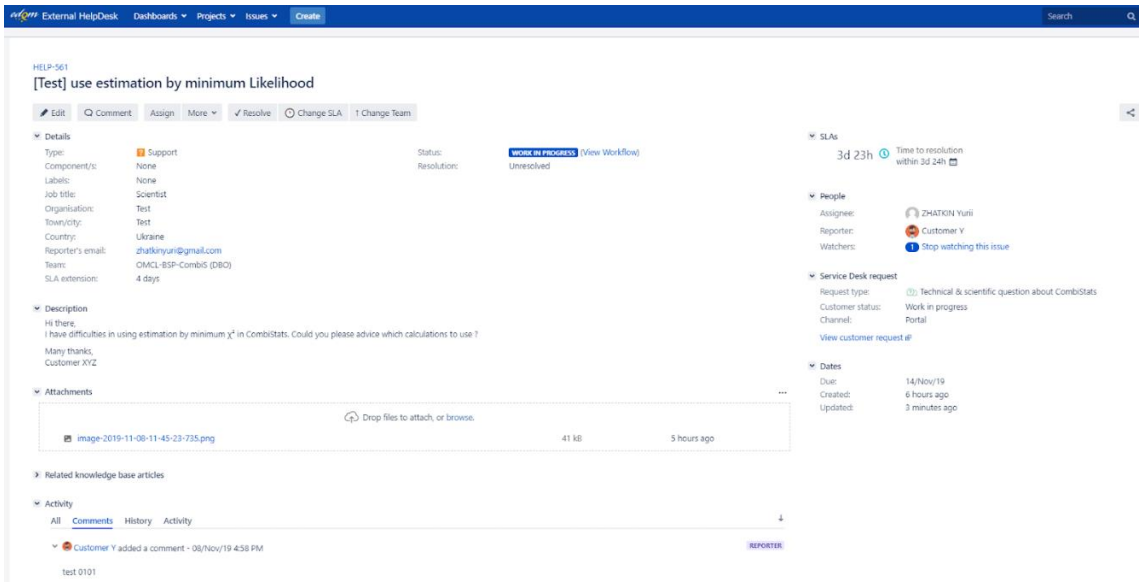


Figure 29. Ticket detail view from agent UI.

The ticket view from top-down consists of the following attributes: ticket ID followed by the subject; action buttons (edit, comment, etc) to perform a specific operation with the ticket; ticket details with the status; ticket description; attachments; all communication in the ticket. On the right of the ticket, there is a supplementary information, which represented by SLA tracker; people involved (customer and assignee); portal details and dates.

When agent deals with the ticket the set of action buttons are at his disposal (Figure 29). *Edit* button opens a ticket in edit mode, where it is possible to change the values of the custom fields. *Comment* button brings the agent down to the activity section, where he can provide internal or external comment. Internal comment, on the contrary to external, is not no visible to the customer. System listeners process the activity that agents do, and transition the ticket automatically between statuses using the automation, as was shown on Figure 23.

Assign allows to change the assignee of the ticket, which was initially given by the system. This is to be used in case the agent cannot deal with the ticket and has to assign it to someone else. *Resolve* leads to the screen, where the agent can select the resolution for the ticket and provide the resolution answer to the customer. *Change SLA* is to be used when the SLA should be extended. *Change team* is there to change the queue, in case the ticket was mistakenly dispatched (for instance, due to the customer mistake of selecting wrong topic).

Most of the above mentioned action buttons (except *Comment*) open a pop-up, which is called a screen in Jira. Set up of screens was part of the customization that is described in Chapter 7.3. Example of a screen shown on Figure 30. This is a transition screen, which opens when clicking on the button *Change SLA*. The agent is asked to select the new SLA, and provide a comment if necessary, it is also possible to define the comment visibility.

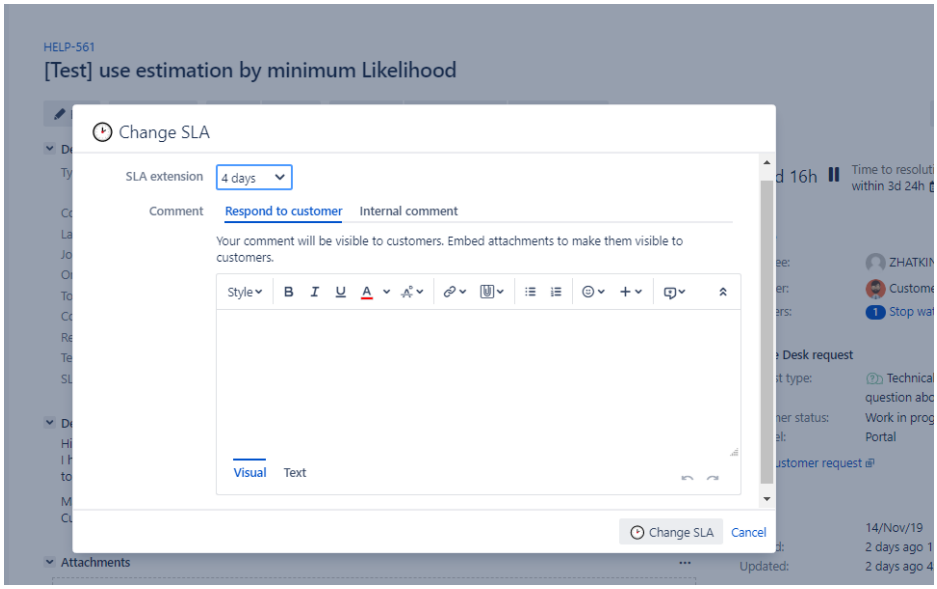


Figure 30. Example of a screen in agent UI.

Jira service desk proposes a rich set of functionalities that can be available for the agents. The list of main features that we configured in new service desk are:

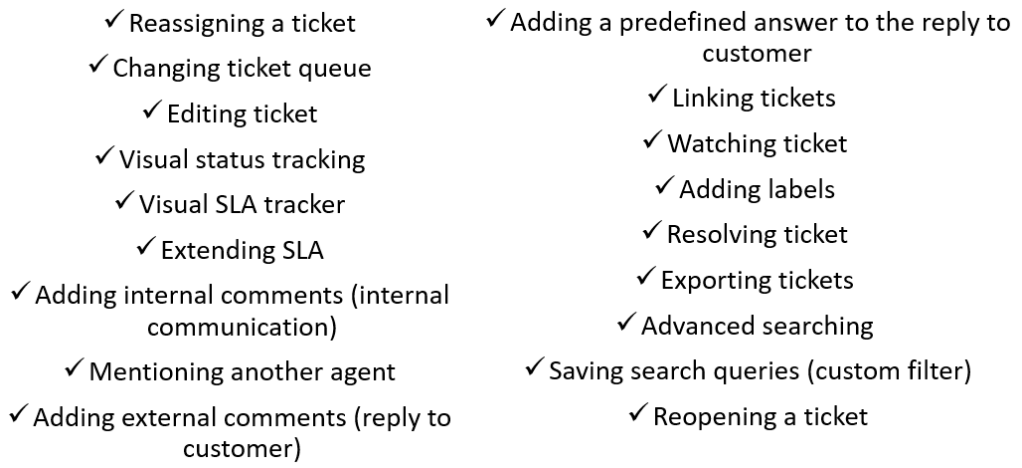


Figure 31. List of agent UX functionalities.

Extensive set of functionalities would allow to organise the work more efficiently in the new service desk. Whenever the agents work with a single ticket or viewing a group of tickets at the same time (queue view), the interface is intuitive and simple.

TO-BE process removes blockers, which were in the AS-IS process. Both agent and customer, can comment or add attachments at any point to the request. This is particularly practical when new information comes during handling of the request. For example, after ticket creation the customer might find extra evidence and can attach it to the request even before the reply from the EDQM.

7.7 Metrics and dashboards

In the AS-IS service desk there were no live metrics and to analyse the data. Jira has an analytical module, where it is possible to set up live dashboards. The dashboard can be accessed from the top menu “Dashboards”. The advantage of dashboards is that they present an actionable real-time metrics that can be accessed by the whole team. The graph can be made for any type of quantitative field that we set up before. Dashboards can be created as for the separate department or be more global.

On Figure 32 we demonstrate the possible global dashboard that can be used by the whole organisation. The dashboard shows real time statistics for the tickets that are in the system. In the first table, it is presented a two dimensional statistics for “team-status”

field. The viewer can see how many tickets are in each team and in which status. On the right, there is a pie chart to see how many tickets overall in each status. By clicking on the number or part of graph, the viewer is redirected to the ticker navigator, with a detailed look at the set of tickets.

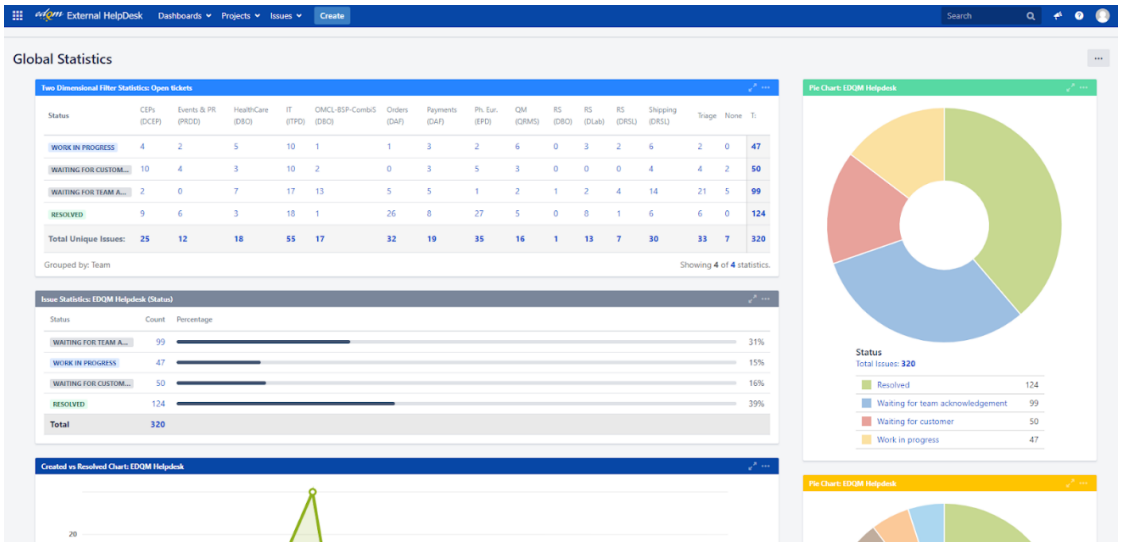


Figure 32. Example of TO-BE dashboard.

Internal stakeholders can also access a report on a specific indicator. Figure 36 displays the report for the number and dynamic of created versus resolved tickets for a specific period of time. The time period can be selected by user below the graph. It is also possible to export the results for further study by clicking on *Export CSV* button in the top right corner.

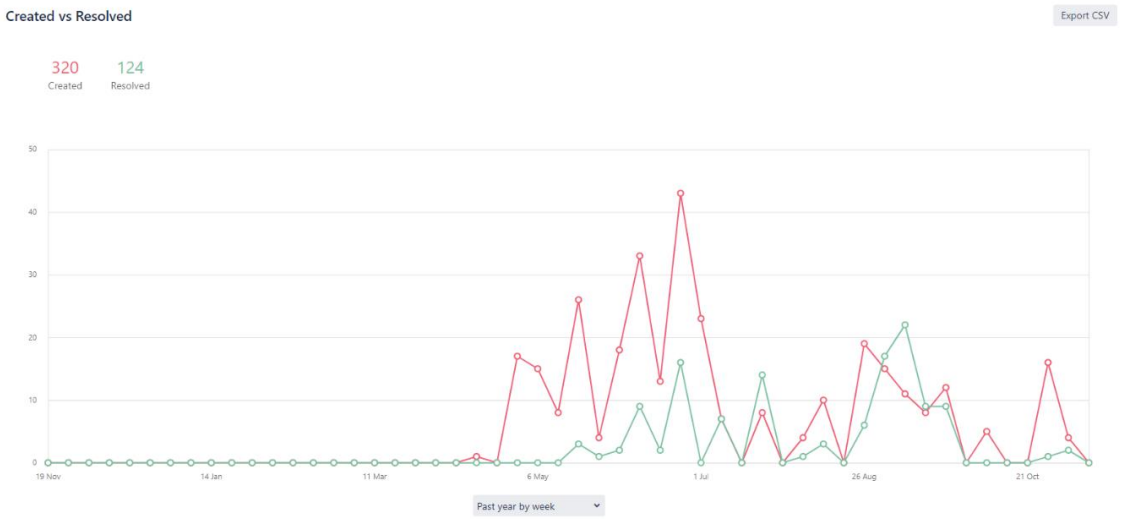


Figure 33. Created vs Resolved tickets statistics.

For the needs of the EDQM we propose to monitor the indicators described in Table 8. The set of KPIs is aimed to monitor the efficiency and performance of new service desk. The KPIs will be shown in the form of dashboards and visual reports, as was demonstrated earlier in this chapter.

Table 8. List of KPIs to track in a new service desk.

KPI name	**Measure**	**Description**
Tickets created in X period	Integer	Total number of tickets per given time
Resolved tickets in X period	Integer	Total number of resolved tickets per given time
Created vs Resolved	Integer	Dynamic of created and resolved requests for a specific period of time (week, month, year)
Tickets per department	Integer	Number of tickets per specific department
Tickets per status	Integer/%	Number and distribution of tickets per status
Tickets per status and per department	Integer/%	Breakdown of tickets per departments and per status at the same time
Average time to resolution	Time	Average time spent on the ticket
SLA completion rate	%	Tickets for which SLA was met
SLA breach rate	%	Tickets for which SLA was breached
Workload per agent	Integer	Number of tickets in progress per agent
Number/ratio of problems	Integer/%	How many tickets were marked as problems
Number/ratio of incidents	Integer/%	How many tickets were marked as incidents
Reopened tickets	Integer/%	How many tickets were reopened
Knowledge base article usage	Integer/%	Articles views from the customer portal and the number of problems solved by articles
Satisfaction	Score	Average score on a scale from 1 to 5 (1- poor performance, 5- excellent performance)

In the new service desk, we incorporated the customer satisfaction collection about the quality of received help. This process is simple: when the request is resolved, the customer receives an email with the last answer, which contains the scale of stars that customer can click directly in the email (Figure 34). No long and time-consuming surveys to fill.

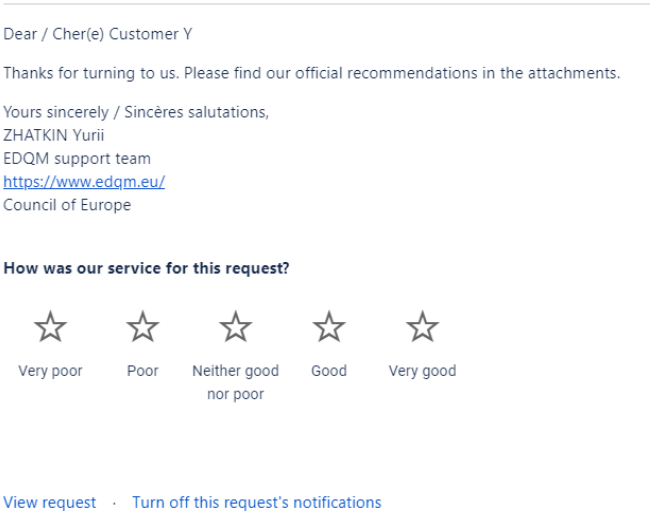


Figure 34. Customer satisfaction collection.

When the customer clicks on any star in the email (Figure 34), he is redirected to a screen telling that the rating was recorded. Moreover, it is possible to add a comment if customer wants to share the thoughts (Figure 35).

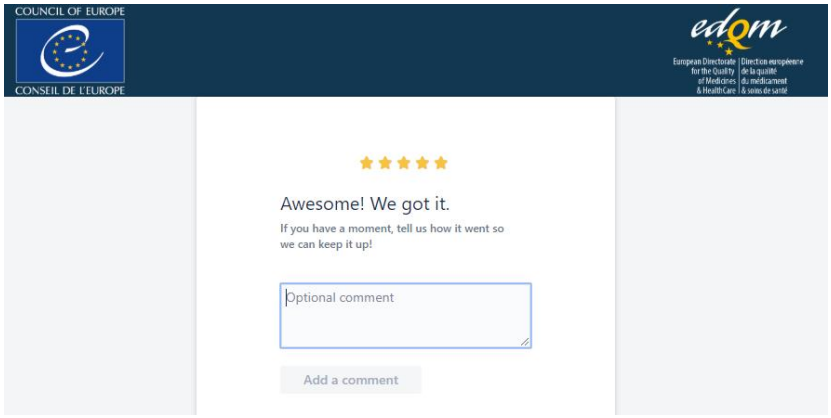


Figure 35. Customer feedback screen.

Most of the satisfaction surveys consist of a long forms to fill and many customers ignore them or reply to them only if they had a very bad experience. The satisfaction survey that we propose is very humble, but at the same time should stimulate more customers to leave feedback. It takes only one click to select the star-rating in the resolution email. For the EDQM, this process has the potential to reveal what is good and what should be improved with their support service. Customer satisfaction gathering will close the loop in the service desk lifecycle, which was never done before.

7.8 Further considerations: integration and system testing

The features and process of TO-BE service desk in this chapter were shown through the lens of principal function of any service desk, i.e. to collect and record the service requests, incidents and customer questions. However, as it was discussed in the theoretical part, a good practice is when the service desk is integrated with other organisational processes.

The first integration that we propose is with the incident management and problem management processes, which are already in place in the organisation. It will be easy to integrate it, because the EDQM uses Jira internally for this process, and since the TO-BE service desk is built on the same technology, the connection can be done via application link using secure authentication method.

Integration of TO-BE service desk with problem management will allow to associate the incidents that customers report to known problems or will result in identification and investigation of new problems. In the further iteration of service desk, we would also recommend to integrate the tool with other processes and systems, so that there is a seamless flow of information within the organisation.

After we built TO-BE service desk, we organised two additional workshops with the internal key users to test the new functionalities and receive their feedback. Since it is a new tool, the testing was done only internally and no external customers were involved. During the testing process we used the bug/feedback collection form (Appendix 10). Our main focus was to reassure that all functionalities work as expected, no blockers in the process and to see the agents' attitude towards new system. The main testing outcomes could be summarized into the following:

- profound functionality testing. We reached 325 dummy testing tickets in the systems. The agents created different requests and tried different functionalities as shown in Appendix 10.
- small bugs and cosmetic improvements. We received the list of minor changes to do and to fix the small bugs (field was missing on the request creation form, SLA 2 months was not updating the dates correctly, etc).

- agent approval. We received a positive feedback from the testing workshop participants. They liked that new system is fast, intuitive and they really liked the new dashboards with key metrics.

Notwithstanding the above, we highly recommend that before putting into production the system should be tested with few real customers. Moreover, the testing that we did was aimed only at the functional part and did not cover the performance. In order to see if the new service desk will improve the organisational KPIs, the system should be run in the real context.

8 Conclusions

The goal of the research was to propose a working electronic service desk for public organisation in order to provide support to the citizens when using e-services. The main research problem addressed in the thesis concerns the absence or poor development of electronic support in the public sector. It was identified that various digital state services do not have an online support in place, and it is not easy for the citizens to get help in case of difficulties in using a particular e-service.

A combination of case study, action research and design science research were employed to achieve the research objective and to resolve the identified problems. In the literature review, it was justified the value and importance of running an electronic service desk. Further, the case study was conducted on the example of the public organisation – the European Directorate for the Quality of Medicines & HealthCare. The unit of analysis was the service desk in this organisation. We identified the AS-IS process, analysed interface, found blockers and areas for improvements.

After case object analysis, we collected various data and inputs from stakeholders for designing the new TO-BE service desk for the case study organisation. Using the elements of design science research, we built and configured the new service desk, following the ITSM practices and the requirements of the organisation. Both the customer portal and the agent interface were transformed into better user experience. The new service desk removes blockers and offers advanced functionalities to all parties.

The thesis provides an answer to the research question: **How to design and implement electronic service desk for public organisation?** For this purpose it was chosen a single service desk in a specific organisation and the process of its rebuilding and transformation was shown in detail throughout the thesis. The set of sub-questions answered below to fulfil the main research question:

SQ1. What is the value and benefits of having an electronic service desk?

The value of running an electronic service desk is in its mediator role between citizens and service providers. Service desk can be a single point of contact for asking help, reporting incidents, submitting requests for change and providing feedback. Its value can

be enhanced by integrating the system with other processes (problem management, CRM) and using the tools of automatic support in the service desk channels (chatbots, AI).

From the experience of the case study organisation, it can be concluded that the current electronic service desk, which is no longer state-of-the-art, still serves as a main channel to get service support. The data showed that there are on average almost 10 thousand requests annually. It represents a massive source of information that the organisation can act upon to improve the principal and supplementary services.

SQ2. What requirements should be taken into account when developing a service desk?

The requirements will depend on the nature of the services that the service desk provides support for. If the service desk is oriented at the capture of IT incidents (IT help desk), then its set up requires only the inputs from the IT department. However, if the service desk provides support for a wide range of services, the inputs and requirements come from different stakeholders.

In our study we developed the service desk that covers various activities and services of the organisation. In order to gather the necessary requirements, we organised a series of workshops, where the key users contributed to the creation of user stories, ticket flows, requests organisation, sketches of the system interface that pledged into the development of new TO-BE service desk. The internal requirements that we gathered were supplemented by the theoretical foundation (process schemas, expected functionalities).

SQ3. What could be a working service desk set up (architecture, process, interface)?

The TO-BE service desk proposed in the thesis was tested by the internal stakeholders and proved to function well. The configuration of the system was done using the industry leading software called Jira Service Desk. It is an ITSM compliant solution, which can be easily customisable and integrated into any organisation. We presented the system architecture and built ticket workflow, including different statutes that the ticket could have during its lifecycle.

The interface was designed using the set of fields, information and action buttons that should be on the particular point in the tool. When designing the interface, the minimalism style was used and same colour spectrum throughout the system. Various visual indicators

(request status, SLA tracker) were added to have better visibility and user experience in a new service desk.

The thesis achieved its objective and the outcome of the research is the working service desk system. The new electronic service desk was tested internally and is ready to be implemented in the case study organisation. Nevertheless, before launching the solution it is recommended to do the testing with real users externally. Moreover, when the new service desk is put live, it would be interesting to compare the KPIs with the old system and to see if they have improved or not. It would also be beneficial to do a benchmarking of support establishments in different public organisations. These could be the subjects for the new research in this field.

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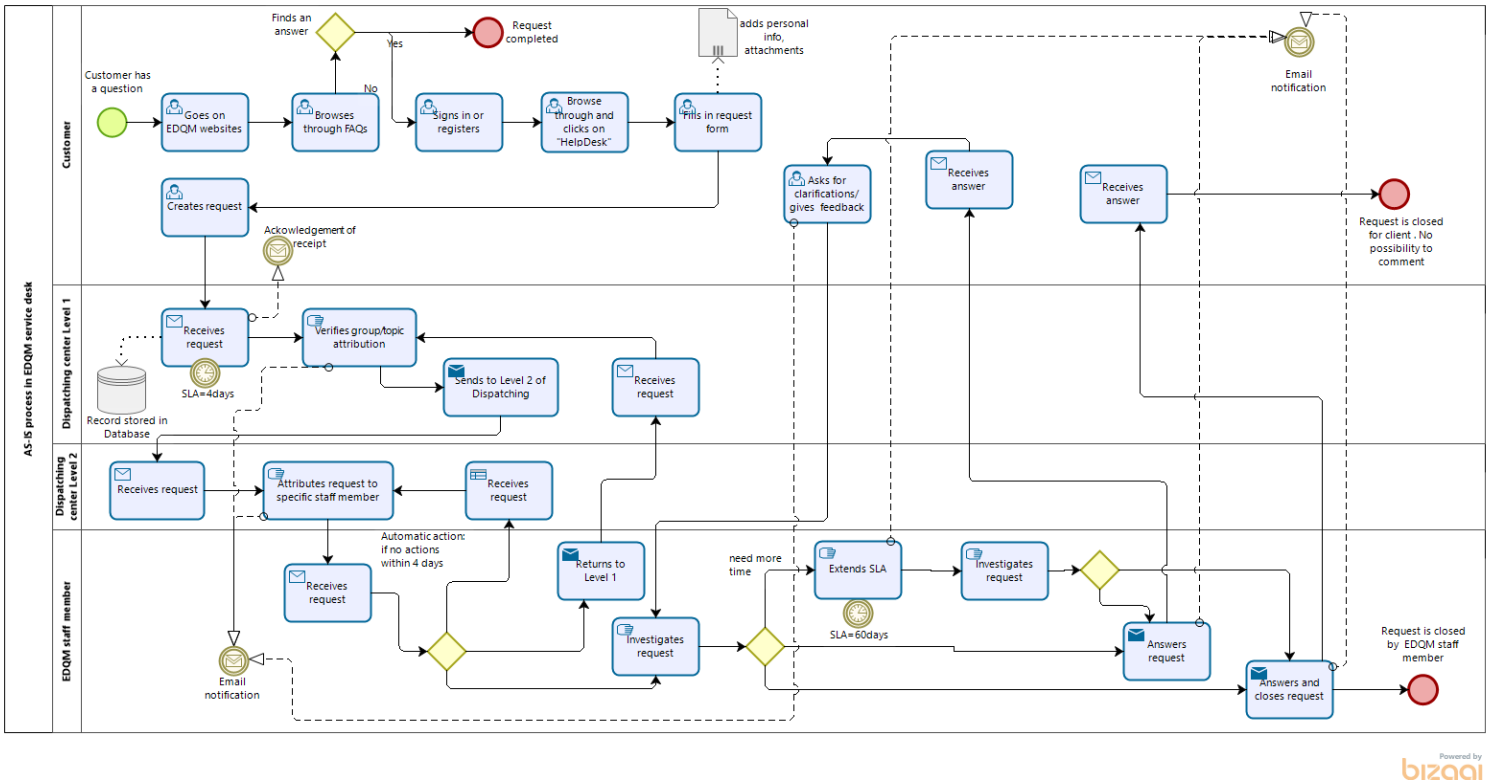
Appendix 1 – Business process of AS-IS service desk



Appendix 2 – List of questions about EDQM service desk (extract from EDQM Customer Survey 2017-2018)

1 Have you ever used EDQM HelpDesk & FAQs (www.edqm.eu/hd)?

☐ Yes
☐ No

2 Please rate the following statements regarding the EDQM HelpDesk & FAQ online service:

Please select one answer per row.

	Strongly Agree	Agree	Disagree	Strongly Disagree	N/A
The EDQM HelpDesk & FAQ webpage is easy to find	☐	☐	☐	☐	☐
The EDQM HelpDesk & FAQs are easy to navigate	☐	☐	☐	☐	☐
I have often found I did not have to contact the EDQM after reading a FAQ	☐	☐	☐	☐	☐
I find the HelpDesk a useful means of communicating with the EDQM	☐	☐	☐	☐	☐

3 Please rate the following statements regarding Helpdesk contact you have had with the EDQM Sales team on issues and complaints related to orders::

Please select one answer per row.

	Strongly Agree	Agree	Disagree	Strongly Disagree	N/A
HelpDesk queries were dealt with quickly and efficiently	☐	☐	☐	☐	☐
HelpDesk queries were answered politely and professionally	☐	☐	☐	☐	☐
The response fully answered my queries	☐	☐	☐	☐	☐
The response anticipated my follow-up questions	☐	☐	☐	☐	☐
Any complaint was dealt with quickly and efficiently	☐	☐	☐	☐	☐
I was provided with the information I needed, and/or my problem was solved	☐	☐	☐	☐	☐

4 Please rate the following statements regarding Helpdesk contact you have had with the EDQM electronic Publications Technical Support team on technical issues and complaints:

Please select one answer per row.

	Strongly Agree	Agree	Disagree	Strongly Disagree	N/A
HelpDesk queries were dealt with quickly and efficiently	☐	☐	☐	☐	☐
HelpDesk queries were answered politely and professionally	☐	☐	☐	☐	☐
The response fully answered my queries	☐	☐	☐	☐	☐
The response anticipated my follow-up questions	☐	☐	☐	☐	☐
Any complaint was dealt with quickly and efficiently	☐	☐	☐	☐	☐
I was provided with the information I needed, and/or my problem was solved	☐	☐	☐	☐	☐

5 Overall I am satisfied with the quality of contact with the EDQM via the HelpDesk

Please select one answer.

Strongly Agree	Agree	Disagree	Strongly Disagree	N/A
☐	☐	☐	☐	☐

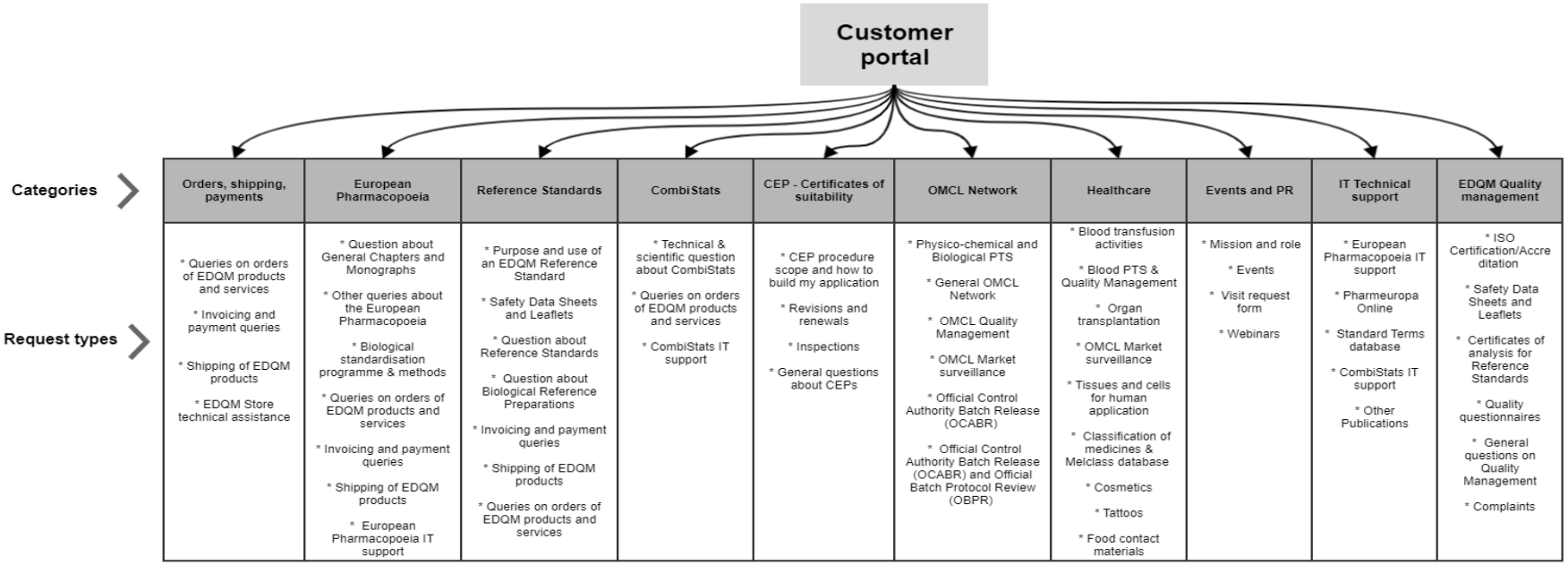
If Disagree or Strongly disagree is checked in one of the options above (open question)

6 If you answered disagree/strongly disagree, could you please tell us how we could improve?

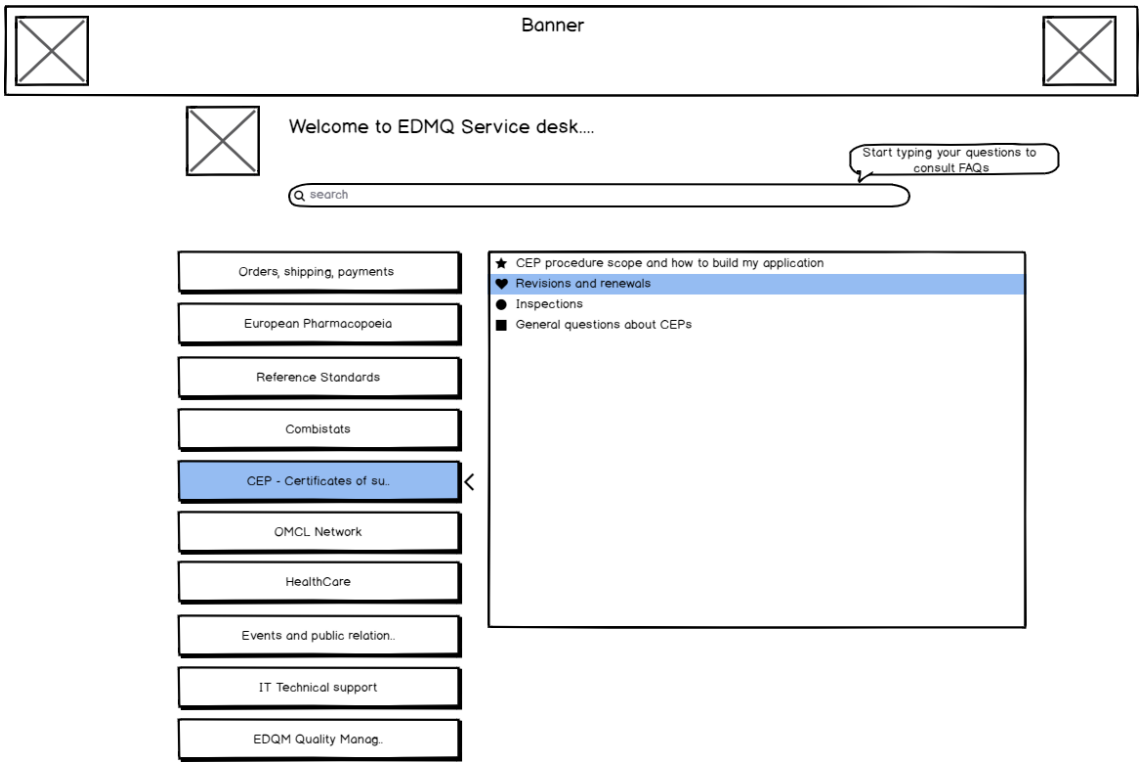
Appendix 3 – User stories mapping

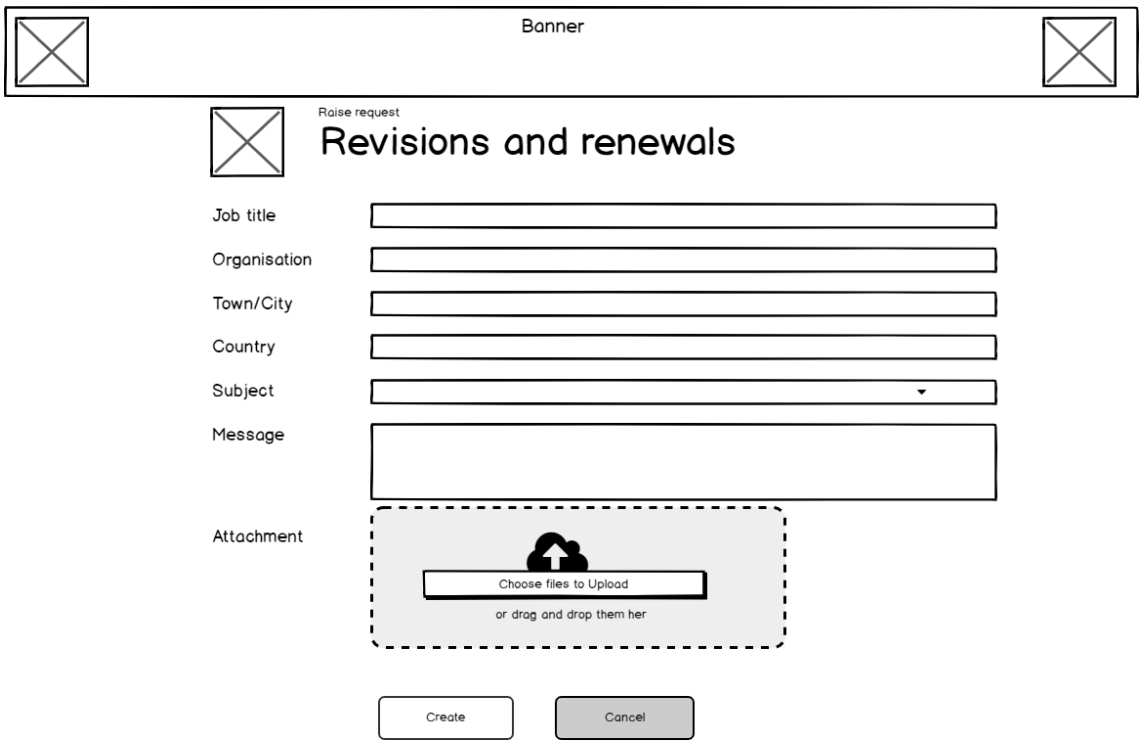
Epics	User story
Login	As a customer, I want to create an account in EDQM service desk, so that I can ask my questions
	As a customer I want to sign in with a dedicated account and land on a screen showing my questions
	As an agent, I want to sign in with a dedicated account and have a ticket management view
Ask a question	As a customer, I visit the EDQM website, and click on the "helpdesk" link. This link directs them to the service desk landing page, which shows the following: - an invitation to check the faqs before asking a question - an invitation to check the best practices in phrasing requests before asking a question - a direct link to the form to create the request
	As a customer, I want to ask a question directly to a specified email adress (the email channel must be in place, so that if the customer sends an email there it becomes a ticket and an account is created automatically if it is a new user)
	As a customer, I fill in all the fields in the request form, depending on question type
	As a customer, I receive a response when my ticket is received by the system. This standard response will contain the ticket ID.
	As an agent, I want to create a question on behalf of the customer if I am contacted by telephone or email. The question will be identified somehow so that the customer may be directed to their question in the helpdesk for further followup.
Consult FAQs	As a customer I want to consult FAQs via the EDQM website or via the helpdesk
	As a customer I want to consult FAQs in English and in French
	As a customer, I want to export individual FAQs in PDF
	As an agent, I would like to edit FAQs articles.
	As an agent, I would like to add new FAQs articles
Dispatch a question	As an agent, I want a customer question to be dispatched automatically to the team queue that I am in
	As an agent, if I receive tickets that are not accurately dispatched I would like to reassign the ticket if I know the queue the question should go to
	Tickets without a queue are assigned to one dispatching center and from there should be dispatched further
	As an agent, I want to pick up ticket from my team backlog and assign it to me
	As an agent, I want to assign a ticket from my team backlog to other person
Answer a question	As an agent I want to view a ticket and see the history of all past tickets related to the email address of asker
	As an agent, I can enter comments (invisible to the customer) on tickets that are in my queue. I want to use the internal comments for communication internally
	As an agent, I want to define answer templates that are easily available in my Servicedesk space, to facilitate answers to common questions.
	As an agent, I want to begin to type the subject of a ticket into a field that allows a similar keyword search and display of past answers as what is available for FAQs
	As an agent, I want to answer tickets more than once, and may see the entire history of the ticket communications.
	As an agent, I want to drag and drop an unlimited number of attachments to a ticket response.
	As an agent, I want to copy other agents on a ticket when commenting internally for example
	As an agent, I want to share a ticket with another internal user to obtain input on the ticket. This is invisible to the external user.
	External users receive answers via email, from a unique edqm helpdesk address. They may respond to this email by email, and the corresponding ticket is updated accordingly and automatically.
	As an agent, I want to define additional fields for my ticket view interface, that help to calssify the ticket and will be searchable or filtrable in the past question search
	As an agent, I can mark a ticket as a complaint
	As an agent, I want to link questions, to show that they are similar
	As an agent, I want to format my asnwer text (font, bold...)
	As an agent, I want to save a draft answer which is invisible to the external user
	As an agent, I want to include a link to a specific FAQ in their answers to users.
	As an agent, I would like to "re-open" resolved questions by indicating that they require further clarification
	As an agent, I would like to extend SLA if needed and the customer should be informed
	As an agent, I want to modify the information entered by the external user in a ticket to correct any errors or to make the question more findable/identifiable for the future
	As an agent, I want to open attachments included in questions. Attachments open in a new window or a new tab
	As an agent, I want to see a list of questions assigned to me, clearly and easily accessible upon entering the service desk tool
	As an agent, I want to define a signature that may be easily inserted into my replies
Consult past questions	As an agent, I want search for past questions and answers by keyword, and filter by author, date, queue, etc
	As an agent, I want to export pdfs past request in Excel or other readable format
	As a customer, I want to consult my past resolved requests
Track question progress	As an agent, I want to track and see the request statatus (New, waiting for dispatch, dispatched, waiting for client response, waiting for agent response, waiting for input, client response, resolved, closed,)
	As a customer, I want to see the current status of my request (in progress, resolved, etc)
	Internal users must provide at least a first response to tickets within 4 working days of ticket creation, otherwise I want to extend SLA and notify a customer
	As an agent, I would like that ticket status changes automatically, so that I spend less time
	As an agent, I want a ticket to be closed after 30 days if I replied to the customer and there is no response back. The customer should be notified
	As an agent, I want to reassign a ticket in case I cannot deal with it (vacation, mission)
Email alerts	As an agent, I want to receive an email alert when a ticket is attributed to me.
	As an agent, I want to receive an email alert if other collegue mentioned me on the ticket. I would like to reply to the email directly, without entering the service desk
	As a customer, I want to receive an email notifaction when my request is created, when it is answered or resolved
	As a customer, I want to opt-out the email notification if I want
Reporting	As an agent, I want to see the statistics (in the form of dashbords) about the ongoing requests
	As an agent, I want to see the statistics of past requests
	As an agent, I would like to have various reporting, regarding my request, my department, total in the organisation

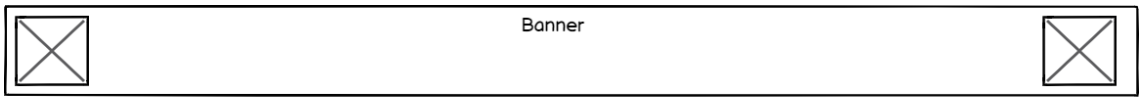
Appendix 4 - Request types organisation



Appendix 5 - Wireframes of customer portal







EDQM › Helpdesk › Request ID

Request subject

Comment on this request...

Status of request

Activity

EDQM Agent dd/mm/yy hh:mm

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco

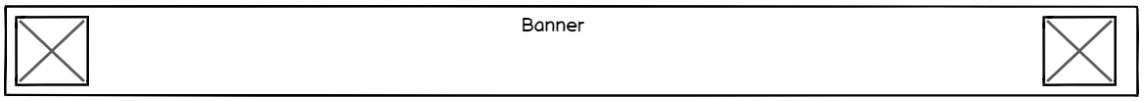
Customer dd/mm/yy hh:mm

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco

Request details

Description Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco

Attachments



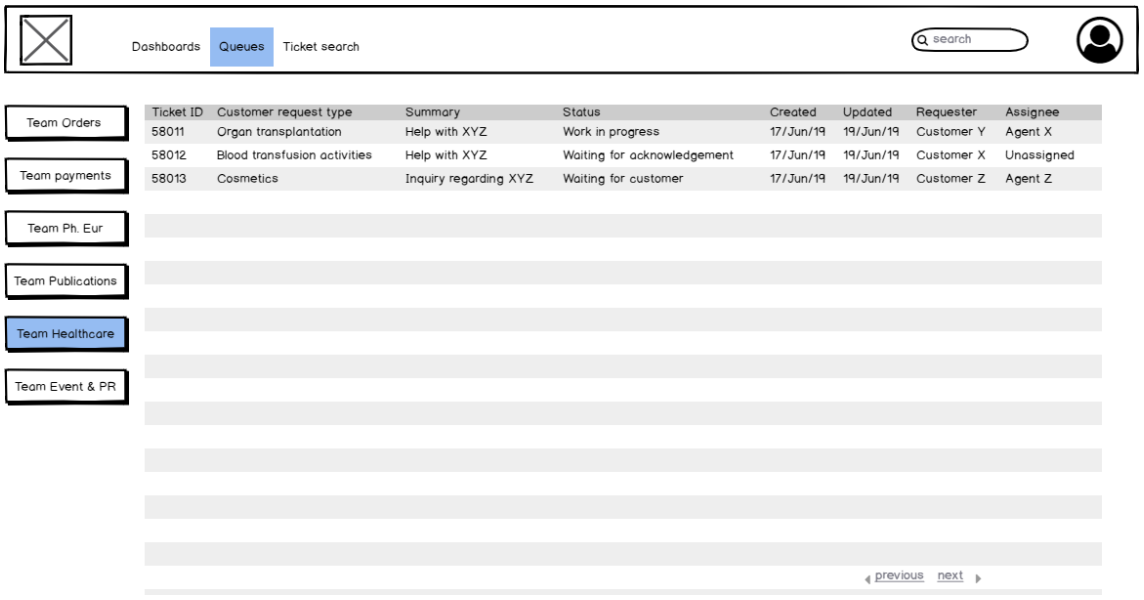
My requests

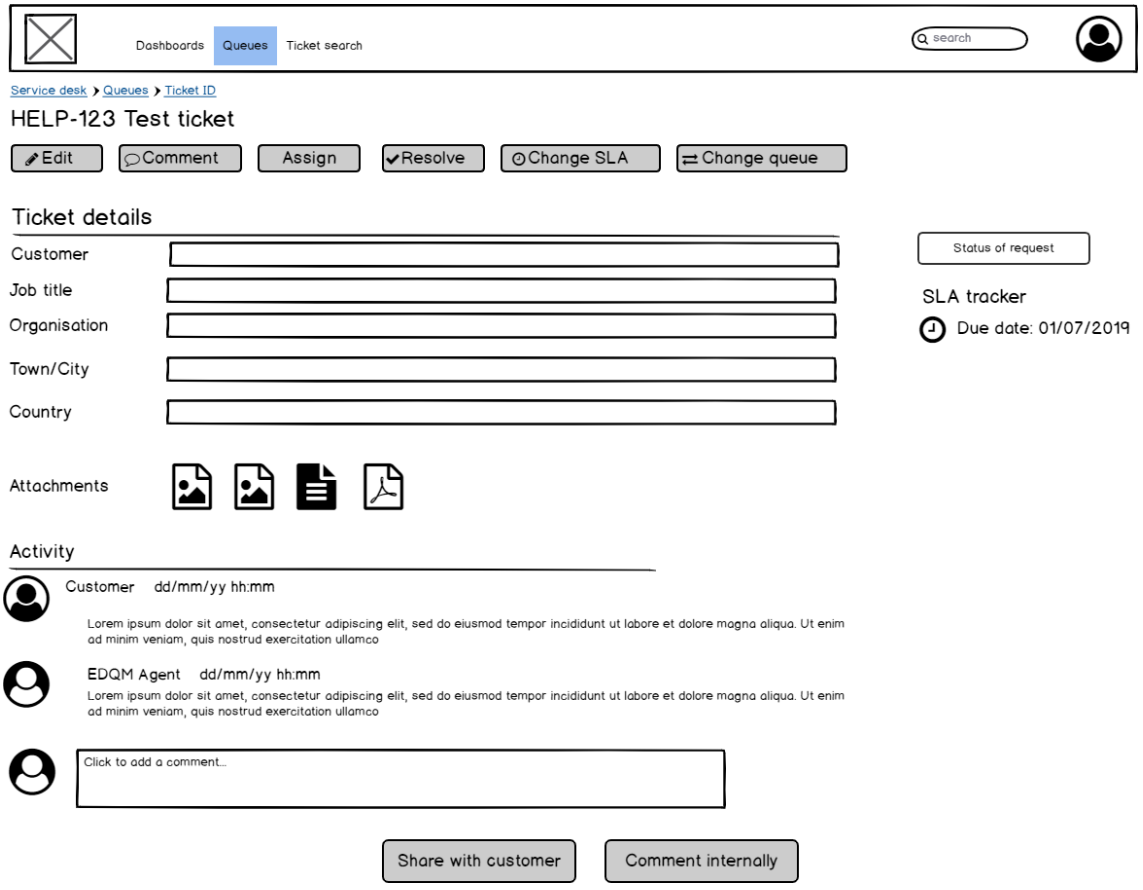
Quick filters Request status Request type Search requests

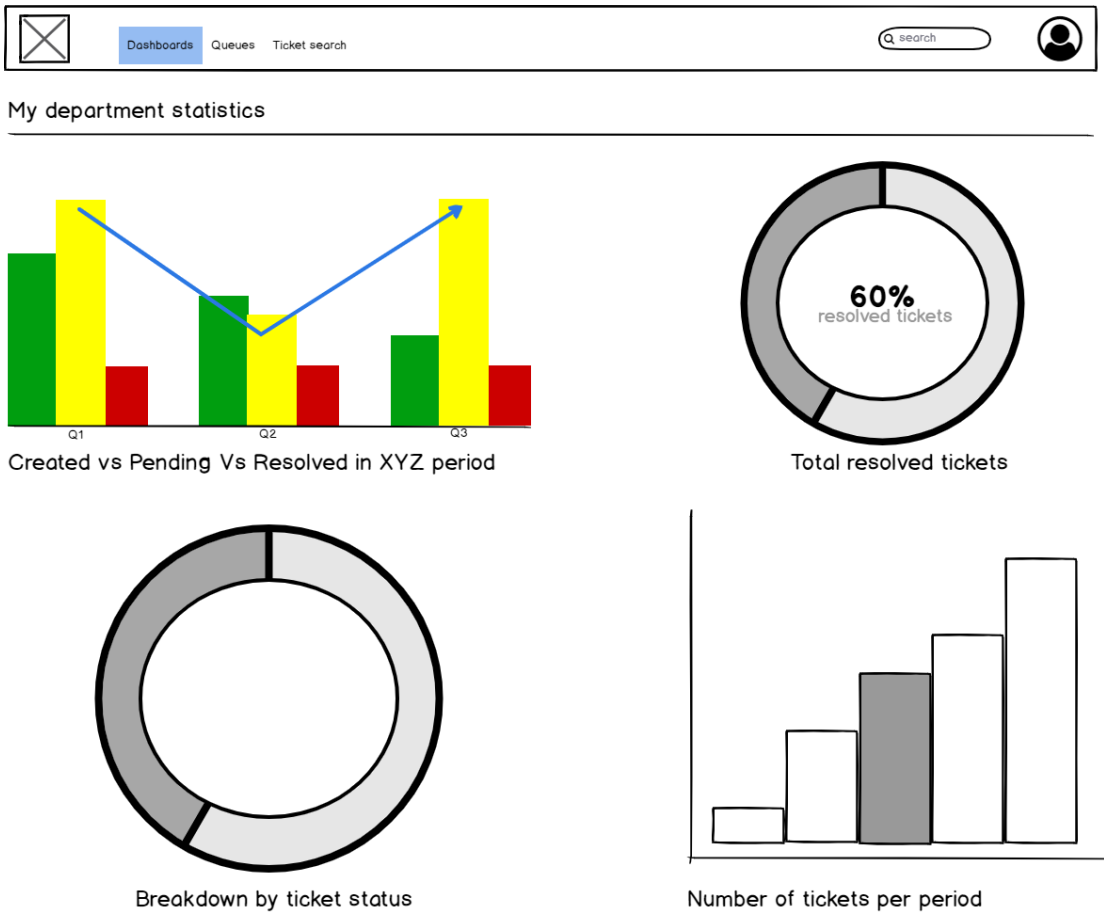
ID	Request type	Summary	Status	Requester	Date
58011	Shipping of EDQM products	My Ph. Eur. has not arrived	Work in progress	Customer name	April 21,2019 at 9:12PM (6 hours ago)
58012	Standard Terms Database	Help with Database	Waiting for customer	Customer name	April 21,2019 at 9:41PM (6 hours ago)
58013	Inspections	Changes in our inspection premises	Resolved	Customer name	April 21,2019 at 10:06PM (7 hours ago)

previous next

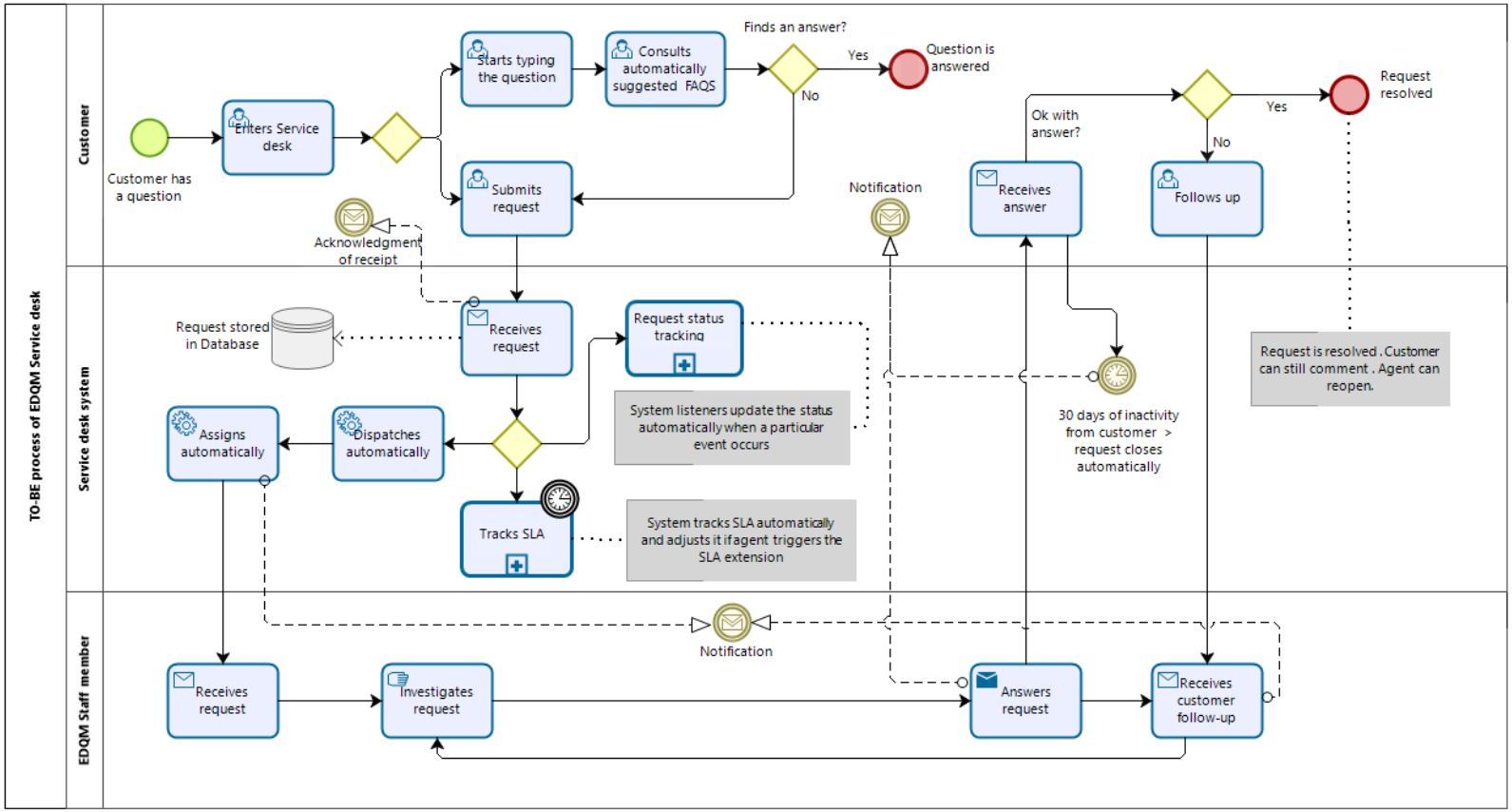
Appendix 6 - Wireframes of agent interface





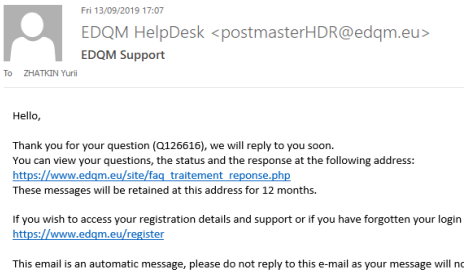
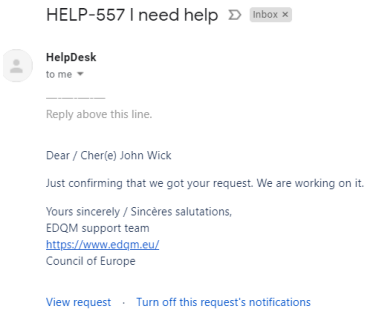
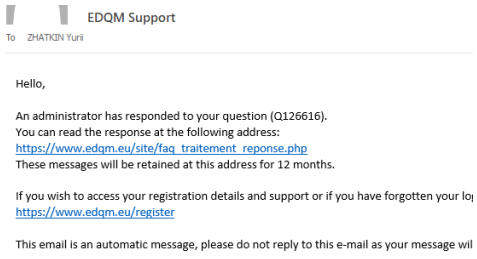
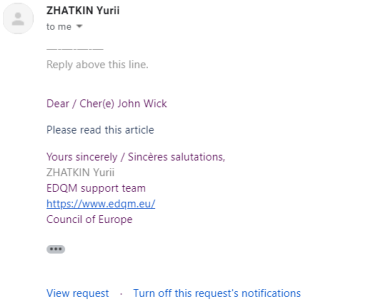
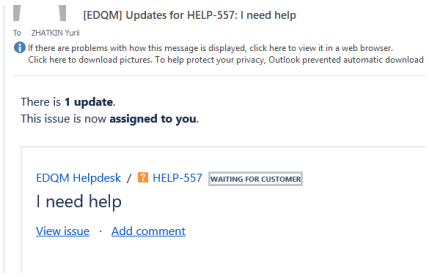

Dashboards
Queues
Ticket search
search
My department statistics
Q1
Q2
Q3
Created vs Pending Vs Resolved in XYZ period
60%
resolved tickets
Total resolved tickets
Breakdown by ticket status
Number of tickets per period

Appendix 7 – Business process of TO-BE service desk



Appendix 8 - Smart FAQs on the TO-BE customer portal

Appendix 9 - Examples of email notification AS-IS vs TO-BE

Event	AS-IS notification	TO-BE notification
Customer notification – request created		
Customer notification – answered received		
Agent notification – request assigned		

Appendix 10 - TO-BE service desk testing forms

Acting as a customer

№	Test name	Description	Test status PASS / FAIL	Comment
1	Log in	☐ Go to the customer portal ☐ Put your valid username and password		
2	Portal look	☐ Check if all requests are on the portal ☐ Check if the order of requests as it should be		
3	Knowledge base	☐ Type FAQ related keywords (e.g Expiry) ☐ Suggested articles from the FAQs are displayed ☐ Click on one of them and check that the display is correct ☐ Click on "Back to results"		
3	Request fields	☐ Select one request type of your choice ☐ Check if the expected fields are there		
4	Fields input	☐ Fill in the fields, ☐ Click on "Create" and see system behaviour. ☐ Fill in all the fields and add attachment, click on "Create"		
5	Request output	☐ Check the output of your request. ☐ Do you see all the information that you provided ? ☐ Do you see the status ?		
6	Share request	☐ Share the request with one of your colleague, by clicking on "Share" button		
7	Notification	☐ Check your mailbox. Do you have notification, confirming the request creation ?		
8	My requests	☐ Go back to customer portal and click on "Requests" in the right top corner. Do you see your request(s) there ? ☐ Check if the filters work correctly there.		
9	Commenting	☐ Open your last created request and add a comment to the request.		

Acting as an agent

№	Test name	Description	Test status PASS / FAIL	Comment
1	Queues presentation	☐ Open the queues ☐ Check if your team's queues are there ☐ Check if there are correct requests type in your team queue(s)		
2	Fields presentation	☐ Open the ticket(s) in your queue and check if you can see all expected fields		
3	Changing team	☐ Click on "Change team". ☐ Select other team ☐ Provide some *internal* comment and click on "Change team" ☐ Was the team changed correctly ? ☐ Has the ticket disappeared from your queue and is visible in another queue ? ☐ Go to the same ticket and change the team back to your team		
4	Assigning the ticket	☐ select the ticket that has no assignee (unassigned) and assign		
5	Changing SLA	☐ Click on "Change SLA" ☐ Select different SLA from a list ☐ Put some *external* comment and click on "Change SLA" ☐ Was the SLA changed correctly ?		
6	Adding attachment	☐ Add some attachment(s) to the ticket		
7	Adding internal comment	☐ Add *internal* comment ☐ Check the behaviour of text editor. For example, make the text in bold, underlined, add some bullet lists, etc.		
8	Adding external comment	☐ Add *external* comment ☐ Insert one of the canned responses. look for this icon		
9	Mention a colleague	☐ Bring a colleague into the discussion with "@" in the comment section		
10	Share Knowledge base articles with customers	☐ In the section "Related knowledge base articles", different FAQ articles are suggested based on keywords ☐ Select an article and share it as comment with the customer ☐ Complete your comment and click on "Share with customer"		
11	Resolving the ticket	☐ Click on "Resolve" ☐ Select the "Resolution" ☐ Put some *external* comment and click on "Resolve" ☐ Has the ticket status changed ? ☐ The resolution is there ?		