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Concept for a Knowledge Base on ICT for Governance and Policy Modelling regarding eGovPoliNet

Konzept einer Wissensbasis im Bereich IKT für Steuerung und Politikgestaltung am Beispiel eGovPoliNet

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Zusammenfassung

Das EU-Projekt eGovPoliNet beschäftigt sich mit der Forschung und Entwicklung im Bereich der Informations- und Kommunikationstechnologien (IKT) für Steuerung und Politikgestaltung. Zahlreiche Communities verfolgen in diesem Themenbereich ähnliche Ziele der IT-unterstützten, strategischen Entscheidungsfindung und Simulation sozialer Problemfelder. Die vorhandenen Lösungsansätze sind bislang jedoch recht fragmentiert.

Ziel von eGovPoliNet ist es in diesem Zusammenhang der Fragmentierung zu begegnen und durch die Förderung der Kooperation von Forschung und Praxis einen internationalen, offenen Dialog zu etablieren. Dieser wird durch die Beteiligung der Akteure auf diesem Gebiet der IKT die Diskussion und Entwicklung verschiedener Problemfelder voranbringen. Hierbei werden Akteure aus Forschung und Praxis ihre Expertise und Best-Practice Erkenntnisse teilen, um Politikanalyse, Modellierung und Steuerung zu unterstützen. eGovPoliNet wird zur Unterstützung dieses Dialogs eine Wissensbasis bereitstellen, deren konzeptuelle Ausarbeitung Gegenstand dieser Arbeit ist. Die Wissensbasis soll mit Inhalten aus dem Bereich der IKT zur strategischen Entscheidungsfindung und Simulation sozialer Problemfelder gefüllt werden, beispielsweise mit Publikationen, Softwarelösungen, oder Projektbeschreibungen. Diese Inhalte gilt es zu strukturieren, nutzenstiftend zu organisieren und zu verwalten, sodass die Wissensbasis letztendlich als Quelle gesammelten Wissens dient, welche die bislang fragmentierten Forschungs- und Entwicklungsergebnisse an zentraler Stelle vereint.

Ziel dieser Arbeit ist es also, ein Konzept einer Wissensbasis zu entwerfen, welches die nötige Struktur und die nötigen Funktionen bietet, Wissen bezüglich IKT-Lösungen zu verwalten. Das bedeutet in diesem Zusammenhang Wissen zu sammeln, aufzubereiten und dem Nutzer zugänglich zu machen. Die Wissensbasis soll außerdem nach Inhalten durchsuchbar sein. Desweiteren sollen die Nutzer motiviert werden, selbstständig an der Weiterentwicklung und Pflege der Wissensbasis mitzuwirken.

Abstract

The EU project eGovPoliNet is engaged in research and development in the field of information and communication technologies (ICT) for governance and policy modelling. Numerous communities pursue similar goals in this field of IT-based, strategic decision making and simulation of social problem areas. Though, the existing research approaches and results so far are quite fragmented.

The aim of eGovPoliNet is to overcome the fragmentation across disciplines and to establish an international, open dialogue by fostering the cooperation between research and practice. This dialogue will advance the discussion and development of various problem areas with the help of researchers from different disciplines, who share knowledge, expertise and best practice supporting policy analysis, modelling and governance. To support this dialogue, eGovPoliNet will provide a knowledge base, which's conceptual development is the subject of this thesis. The knowledge base is to be filled with content from the area of ICT for strategic decision making and social simulation, such as publications, ICT solutions and project descriptions. This content needs to be structured, organised and managed in a way, so that it generates added value and the knowledge base is used as source of accumulated knowledge, which consolidates the previously fragmented research and development results in a central location.

The aim of this thesis is the development of a concept for a knowledge base, which provides the structure and the necessary functionalities to gather and process knowledge concerning ICT solutions for governance and policy modelling. This knowledge needs to be made available to users and thereby motivate them to contribute to the development and maintenance of the knowledge base.

Table of Content

List of Tables

List of Figures

1 Introduction

1.1 Motivation

In 2011 the European Commission launched the eGovPoliNet[1] project. eGovPoliNet sets up an international community in ICT solutions for governance and policy modelling. Besides experts of the field, every interested citizen can join the community and participate. Researchers and practitioners will constitute an international community and share knowledge resulting from research and practice, concerning these topics. Furthermore they will discuss and advance content based on experiences brought together by leading actors of the field (eGovPoliNet).

To overcome the fragmentation across disciplines, capabilities, methods and tools brought forward by academia, ICT industry, policy consulting firms, policy operators and governance experts will be studied, processed and collected in a knowledge base. To define the collected content more precisely, comparative analyses and descriptions of cases, tools and scientific approaches are used. This will be the base of an open, international dialogue which will also be supported by physical and virtual meetings and conferences (eGovPoliNet).

Using this sharing-approach, eGovPoliNet will advance research and practice in using ICT for governance and policy modelling worldwide. To support this dialogue and to make fragmented knowledge available in a central access point, the knowledge base is needed. Knowledge assets will be collected, processed, stored and users will be able to search the knowledge base for specific content. In this thesis, the term 'knowledge asset' is understood as any kind of information carrier appearing in the knowledge base context.

1.2 Objective

The objective of this thesis is the development of a concept for eGovPoliNet's knowledge base, which provides the structure and the necessary functionalities to perform proper knowledge management concerning the topics mentioned above. In this context knowledge management is understood as the collection, evaluation,

[1] full project title: eGovPoliNet—Building a global multidisciplinary digital governance and policy modelling research and practice community (http://www.policy-community.eu)

processing and distribution of knowledge to users. To achieve this, the structuring of knowledge assets is of central importance. A procedure has to be developed, to describe and categorize knowledge assets and to organise them, using meta-data. In this context it is essential to provide a search function to offer the possibility of searching the knowledge base for specific content. This implies the use of an ontology and ontology management. Content will be depicted precisely and cross-linked to related content in order to establish meaningful descriptions of content and its relations.

Online communities depend on user activities and involvement to evolve dynamically and stay up to date. As the user plays a central role in the enrichment of the eGovPoliNet knowledge base, a process has to be identified to motivate users to actively participate and to keep them motivated for further participation. Users should contribute new knowledge assets, discuss them, critically review content, comment and edit content or report inappropriate content.

1.3 Approach

Literature review is the first step to begin the thesis. It is used to acquire basic knowledge concerning the different disciplines of the field and to perform a state of the art analysis to get an overview of current knowledge base models and technologies. As mentioned in chapter 1.2, it is important to identify a process for knowledge gathering and user participation. This means finding a way of motivating the community to participate actively in community building by sharing, validating and using knowledge and to keep this whole process going on. Once this process is developed, the collected knowledge needs to be structured, organised and provided within the knowledge base.

The description and categorisation of artefacts are of crucial importance and a reasonable way of handling meta-data has to be identified to enable the performance of proper knowledge-structuring. This structuring is performed via System Engineering and Design Research, using UML class diagrams and textual description. Moreover, an ontology is used to support knowledge structuring and to offer the possibility of searching the knowledge base for specific content. Therefore, sensible connections (links) among content need to be established, so that

congeneric topics are related to each other and a search function for content can be integrated.

1.4 Structure of the Thesis

The following chapter is about theoretical fundamentals concerning knowledge, knowledge management and knowledge in organisations. In chapter three stakeholder theory is presented reconciling to community building basics and related work of the field. Chapter four introduces the methods and work approach used for the thesis. Chapter five presents the eGovPoliNet project in more detail, as well as an analysis of its stakeholders. A requirements analysis for the knowledge base is shown in chapter six and therewith leading over to the actual knowledge base concept in chapter seven, which provides the knowledge base structure, an ontology conception and possible processes within the knowledge base. Chapter eight critically reflects the thesis and chapter nine finally closes it by drawing conclusions and giving a short outlook.

2 Theoretical Background

2.1 Foundations for Knowledge

Knowledge engineering and knowledge management are defined in various ways but according to Schreiber et al. (2000) there is no ultimate definition of knowledge (Schreiber, et al., 2000). In this context the words *data*, *information* and *knowledge* are often part of the discussion, as they seem to be three components of a potential definition of knowledge (Schreiber, et al., 2000). Schreiber et al. (2000) define data, information and knowledge as follows (see also table 1):

- Data are uninterpreted signals that reach our senses like a red, green or yellow light for example, though computers work with signals consisting of numbers or characters.
- Data equipped with meaning is information. When a car driver sees a red traffic light it is interpreted as an indication to stop whereas the baby on the backseat does not attach any meaning to the red light. So the data is the same, but the information is not.
- Knowledge finally is the combination of data and information which people use to carry out tasks and to generate new information.

Table 1 clarifies the different levels explained above.

	characteristic	**example**
Data	uninterpreted, raw	...---...
Information	meaning attached to data	S O S
Knowledge	attach purpose and competence to information, potential to generate action	emergency alert → start rescue operation

Table 1 - Distinctions between data, information and knowledge (Schreiber et al., 2000)

It is difficult to answer the question what knowledge is because it also depends on the context (Schreiber, et al., 2000). Assumed, a computer scientist talks to a biologist about software engineering, the biologist might not understand anything, so that this is just data to him, as Schreiber et al. (2000, p. 5) cite that *"one person's*

knowledge is another person's data". Having a common context they could understand each other without any problems. Handling this problem is part of knowledge management which is introduced in the following sub-chapter.

2.2 Knowledge Management

People know more than they can tell (Sternberg & Horvath, 1999) because a large part of knowledge is not explicit, but tacit, which means it is experience-related and cannot be explicitly described, hence it is more or less unconscious (cf. Schreiber et al., 2000; Sternberg, R. J., & Horvath, J. A., 1999). Figure 1 visualizes the four modes of knowledge production and conversion developed by Nonaka and Takeuchi (1995) which Schreiber et al. (2000) describe as follows:

- The conversion from tacit to tacit knowledge, called socialisation: we can teach each other by showing how to do something, rather than talking about it, for example carpentry.
- The conversion from tacit to explicit knowledge is called externalisation and is realised by formulating and writing it down, for example how to perform project management.
- The conversion from explicit to explicit knowledge is called combination, which means creating new knowledge by combining existing explicit knowledge, for example a reference book.
- Internalisation means converting explicit knowledge to tacit knowledge, which happens for example when carrying out a task by means of instructions so that the task is internalised and carried out successfully in the future without thinking about it.

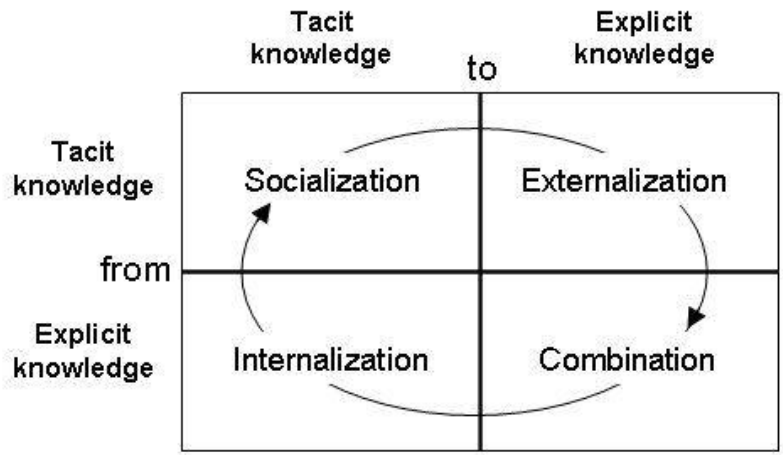


Figure 1 - Nonaka's model of knowledge creation (Schreiber et al., 2000)

As organisational knowledge creation needs all four types of knowledge production continuously, the aim of knowledge management is to facilitate and stimulate these processes to keep the knowledge production dynamic. Literature provides several frameworks for knowledge management that try to map the complete life cycle of knowledge within an organisation (Schreiber, et al., 2000). The life cycle consists of seven main activities which are displayed using the knowledge-value chain (Schreiber, et al., 2000):

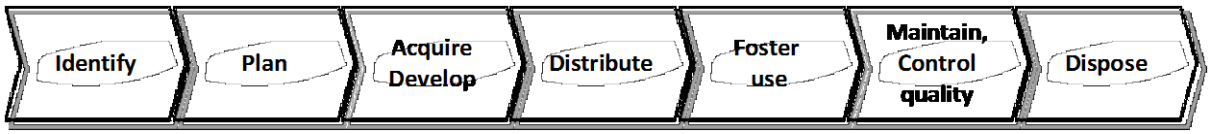


Figure 2 - Knowledge-value chain (c.f. Schreiber, et al., 2000)

In the first step internally and externally existing knowledge is identified and based on these findings the need for knowledge in the future is planned in step two. In step three the needed knowledge is acquired and/or developed, corresponding to the previous planning. Subsequently, the gained knowledge is distributed to where it is needed in step four. In step five the application of knowledge in the business process is fostered and knowledge is internalised. Knowledge is maintained and its quality is controlled in step six, until it is no longer needed and finally disposed in step seven (cf. Schreiber et al., 2000).

Building on the knowledge-value chain, Schreiber et al. (2000) define knowledge management as "*a framework and tool set for improving the organization's knowledge infrastructure, aimed at getting the right knowledge to the right people in the right form at the right time*" (Schreiber et al., 2000, p.72). Hence, knowledge management activities should be people-oriented, as people are the main knowledge carriers and grant knowledge its actual value by using it (c.f. Schreiber et al., 2000).

According to Schreiber et al. (2000) the information society is about to face "*information infarction*" (Schreiber et al., 2000, p.74) as it shows the tendency to overload society with information.

To counteract this, knowledge management has to introduce selectivity functionalities and focus on goal-oriented sharing of knowledge to create knowledge pull instead of information push (Schreiber, et al., 2000). Knowledge cannot simply be handed over like a thing (Schreiber, et al., 2000), rather it has to be communicated from a sender to a receiver who subsequently has to recreate the knowledge in order to internalise

it. eGovPoliNet's knowledge base aims at supporting the knowledge-pull driven learning process by filtering out information and presenting them in a clear and compact way, inter alia with the use of comparative analysis. This approach should motivate users to extract information they are interested in and thus gain new knowledge and share it within the community. It is important to organise and effectively manage knowledge, in order to support the process of creating and sharing knowledge. Hence, proper knowledge management is an essential part of a successful knowledge base concept. In order to process knowledge and finally make it available in the knowledge base, it has to be gathered first.

2.3 Knowledge Elicitation

Knowledge elicitation is the process of getting data, respectively information from domain specialists, also called experts (c.f. Schreiber et al., 2000). The gained data will be modelled as knowledge, processed and added to the knowledge base. Dominating in knowledge elicitation are the questions of how to get experts to tell, respectively show what they do and how to determine what constitutes their problem-solving competence (Schreiber, et al., 2000).
In the process it must be noted that experts can appear in different shapes and with different characteristics which concern the way of their deliberations, their problem-solving environment and responsibilities (Schreiber, et al., 2000). In this context Schreiber et al. (2000) distinguish three types of experts:

- **The academic** is focused on theoretical understanding and regards his domain as having a logically organised structure. This type of expert talks a lot about his topic in order to explicate his well-structured knowledge to others. The academic type solves problems based on theories and thus may not be an expert for everyday problem-solving.
- **The practitioner** is well experienced in day-to-day problem-solving in his domain. For the practitioner heuristics dominate the way of problem solving and theories more or less vanish in the background. That is why the practitioner's knowledge may principally be of implicit nature and thus not well explicable.

- **The samurai** "*is a pure performance expert*" (Schreiber et al., 2000, p.190). The execution of actions in order to secure optimal performance is the samurai's daily business and he usually explicates his knowledge verbally.

One can find these types of experts in the knowledge base context. There are academics and practitioners from the domain as well as samurai in the form of IT-experts or website administrators.

When performing knowledge engineering, one has to pay attention to these differences mentioned above because the actors may perform very differently in knowledge elicitation (Schreiber, et al., 2000). Academics will focus on theories, the scope and limitations of the domain, whereas the practitioner is driven by his routines of practical problem solving (Schreiber, et al., 2000).

Usually there are different actor-related techniques used to gain knowledge which may be quite complex inherently and even more complex with regard to the amount of contributors (Schreiber, et al., 2000). To face this difficulty, the eGovPoliNet knowledge base is structured in a way so that every contributor can select a domain and a type of knowledge asset he or she wants to add or edit. Moreover, eGovPoliNet's comparative analysis approach offers the possibility to describe and categorise knowledge assets in a way that it is understandable for everyone. Thus, every member can add knowledge on his or her own which offers the contributor the possibility to share knowledge in a way he or she deems to be the best. This approach of working with knowledge and sharing it makes the eGovPoliNet community a so called learning organisation.

2.4 The Learning Organisation

Garvin defines the learning organisation as *"an organization skilled at creating, acquiring, and transferring knowledge, and at modifying its behavior to reflect new knowledge and insights"* (Garvin, 1998, p. 50).

According to Garvin (1998), five main activities characterise the learning organisation. Fundamental activities are systematic problem solving and experimentation with new approaches, which means using scientific methods instead of guesswork for diagnosing problems and using data instead of assumptions for decision making (Garvin, 1998). Searching for new knowledge and testing it defines

the experimentation activity, whereat in a learning organisation not only new things are important but also the past (Garvin, 1998). 'Lessons learned' is the key term here, which means that organisations should learn from their own experience and past history to identify chances and weaknesses from former projects (Garvin, 1998).
Summing up the results of past events into recommendations for future projects can make a huge difference as Garvin (1998) points out, using the example of Boeing, which launched the 737 and 747 series with serious problems. To avoid these problems when introducing new series, a group called "Project Homework" was commissioned to compare the development processes of the above-named series with those of the 707 and 727 series, two of Boeing's most profitable planes back in the days (Garvin, 1998). The group developed a set of lessons learned which was used during the 757 and 767 development and lead to the most successful and error-free launches in Boeing's history (Garvin, 1998).
A further activity is learning from the experiences and best practices of others to acquire new knowledge, which means to review others' manners of performing projects but also talking to stakeholders to receive direct feedback (Garvin, 1998). Transferring knowledge is also one of the major activities because ideas carry maximum impact when they are shared broadly, so it is important to communicate knowledge quickly and efficiently throughout the organisation and to eliminate boundaries which hinder the dissemination of knowledge (Garvin, 1998). Boundaries can be overcome for instance by holding conferences or meetings, which is also one matter of concern to eGovPoliNet.
Hence, one can consider eGovPoliNet as a learning organisation, since it searches for and develops new knowledge using scientific approaches, collects expert knowledge like lessons learned and disseminates this knowledge throughout the policy community. Members can participate in creating and processing knowledge but they can as well extract knowledge for own projects and other activities.

The content of chapter two is important for the comprehension of knowledge, how it can be gained and managed. There are many factors influencing the collection and sharing of knowledge. It depends on the kind of knowledge to be shared and who wants to share it with whom.

As the knowledge base primarily provides codified knowledge transfer (document based), it is essential to express one's knowledge and deliver it in a way that is understandable for members with other knowledge backgrounds as well.

As it is very difficult to phrase tacit knowledge, eGovPoliNet provides a comparative analysis template which points out the fundamental characteristics of knowledge assets that are to be described. Knowledge assets can be described and compared by means of similar characteristics. Thereby the assets are specified and the essential core information is extracted in order to provide compact information. In addition each asset is also described in detail, in case a user wants to know more about it. In this context a knowledge asset is understood as a resource that provides information and can be clearly described and identified. An issue is to gain information, merge them into a knowledge asset which is inserted into the knowledge base and therewith share information within the community.

After this introduction to the basics of knowledge and knowledge management, chapter three introduces concepts for community building and how to engage the stakeholders who form the community.

3 Concepts for Stakeholder Engagement & Community Building

3.1 Stakeholder Theory

Freeman (1984) defines stakeholder as "*any group or individual who can affect or is affected by the achievement of the organisation's objectives*" (Freeman, 1984, p. 46). In the economic sense this may be owners, suppliers, managers, customers and other groups which affect the value creation process of a firm (Freeman, 1984). Freeman's stakeholder theory (1984) describes this correlation and its primary assumption is that generating value and distributing it to stakeholders is the main function of a firm and stakeholders can influence the success of this process (c.f. Freeman, 1984).

The business-ethic-based approach seeks to formulate reasonable ethical norms for managerial behaviour towards stakeholders, as it assumes that every stakeholder has an essential value for the organisation (Scholl, 2002).

Stakeholder theory on the one hand deals with stakeholder management, which explains how to manage peole, concidering their role for the organisation, and on the other hand with corporate social responsibility, regarding activities outside the organisation's core business that generate added value for society (c.f. Orts & Strudler, 2009). It also indicates that firms need to analyse where their stakeholders share interests and find ways to adress all stakeholders in a way that motivates them to make the firm better and thereby profit from the increased added value created by the firm (c.f. Freeman, 1984).

In addition, Freeman (1984) distinguishes between narrow stakeholders who are closely connected to the survival and success of the organisation and broad stakeholders who are affected by the organisation or affect it but not so intensively (Freeman, 1984). Thus, one can identify two groups, one that affects and one that is affected. This leads to stakeholder engagement which is a crucial part of corporate social responsibility and has been defined as the ambition and practices to involve stakeholders in organisational activities in a positive way (Greenwood, 2007).

One can apply this approach to the policy community, although it is a non-profit organisation. The commnuity consists of researchers and experts who act as managers and contribute to the community enlargement. Policy practitioners and citizens can be considered customers who benefit from the results developed by the

community. eGovPoliNet's stakeholders, their needs and demands need to be identified and addressed because the community lives on its stakeholders' interactivity which needs to be preserved, using a proper way of stakeholder engagement.

Therefor it is useful to define the community first, which is to be built. When the basic characteristics of the community are formulated, the classification of stakeholders and their demands is easier to perform. The adaption of the community structure and the stakeholders' demands is a reciprocally process, as they influence each other. For that purpose, chapter 3.2 presents basic information about community building.

3.2 Community Building

An online community consists of *"people who freely interact over time through an ICT-based communication environment and recognize a common interest that holds them together for sharing knowledge about that specific topic, and define implicit or explicit policies for regulating their interactions"* (Cindio & Ripamonti, 2010, p. 269). When building a community, one should ask oneself three central questions to define one's purpose and therewith make the community successful, as potential members are far more motivated to participate when the community's purpose is clear (Kim, 2000):

1. What type of community am I building?
2. Why am I building it?
3. Who am I building it for?

As the community and its members evolve gradually one has to ask these questions periodically to face the current status and possible changes of needs in the community (Kim, 2000). For eGovPoliNet, these questions have been answered in the first chapter and will be further explicated in chapter four. Besides defining the purpose of a community one

Figure 3 - Maslow's hierarchy of needs

has to identify the community's needs and try to satisfy them in order to keep the members motivated and to indicate that the community offers added value (c.f. Kim, 2000).

Maslow's hierarchy of needs (see Figure 3) may be useful to identify and address the members' needs. Maslow's theory indicates that people are motivated by the urge to satisfy their needs which range from basic survival-needs up to self-fulfilment and as long the lower-level needs are not satisfied, they do not fill the higher-level needs (Kim, 2000). According to Kim (2000) this hierarchy can be applied to online communities, as is shown in Table 2.

Need	Offline	Online
Physiological	Food, clothing, shelter, health	System access; ability to participate in a web community and maintain one's identity
Security and safety	Protection from war and crimes; sense of living in a fair and just society	Protection from hacking and personal attacks
Social	Giving and receiving love; feeling of belonging to a group	Belonging to the community as a whole and to subgroups within the community
Self-estem	Self-respect; the ability to earn respect of others and contribute to society	The ability to contribute to the community and be recognised for those contributions
Self-actualisation	The ability to develop skills and fulfil one's potential	The ability to take a role within the community that develops skills and opens up new opportunities

Table 2 - Maslow's hierarchy of needs applied to online communities (c.f. Kim, 2000)

When checking on eGovPoliNet for the fulfilment of these needs, one observes that the needs are fulfilled to the greatest possible extent. Every person who has access to the internet can access the eGovPoliNet website. Unfortunately, at this point it is not verifiable whether the website protects its users from cyber crime. As it is one aim of the community to evolve, enlarge and gain more members, the need of belonging to the community is satisfied per se. The classification to different subgroups happens during activities amongst members in the community, for example by interacting with experts of certain disciplines. The two peak needs of a person, namely self-esteem and self-actualisation are somehow part of the objective eGovPoliNet pursues, as it aims at gaining participating members who actively contribute to the community and therewith advance it. So eGovPoliNet seems to

serve most needs and thus meets the essential conditions to become a successful online community.

3.3 Related Work

Related work refers to projects and attempts that pursue the same, or at least a similar principle as eGovPoliNet. More precisely, these are web-based knowledge networks and communities dealing with governance and policy modelling. Based on this common point of origin, these projects address different problem and research areas of the field and in the course of this they can benefit from other project's results. In the following, some related projects are presented.

3.3.1 Crossover

A good example for related work is the Crossover[2] project as it is a collaboration partner in the eGovPoliNet project and also co-funded by the European Commission under the FP7 Programme. Crossover aims to consolidate and expand its existing community by bringing together the different global communities and experts of the field (crossover - Bridging Communities for Policy-Making 2.0). Strengthening the links amongst these protagonists supports animating the knowledge exchange across communities. Crossover also seeks the attention of non-experts and potential users by providing detailed content as well as organising workshops and events which support the establishment of the scientific and political basis for next generation policy making (crossover - Bridging Communities for Policy-Making 2.0). Another commonality is the provision of a knowledge base which provides a multitude of information.

3.3.2 PEP-NET

PEP-NET[3] (Pan European eParticipation Network) is an e-participation network based in Hamburg that was funded by the European Commission and started working in May 2009 (PEP-NET - Pan Europpean eParticipation Network). Like eGovPoliNet, PEP-NET is a point of contact for interested stakeholders. It supports networking, discussing and the exchange of information and best practices. Every

[2] http://www.crossover-project.eu
[3] http://pep-net.eu/

organisation interested in e-participation can join this community. In September 2010 the project funding ended and since then PEP-NET stands on its own feet, coordinated by TuTech Innovation GmbH[4] and driven by regular contact, events and online activities.

3.3.3 DEMO-net

DEMO-net[5] is an e-participation network of excellence project which started in 2006. It is funded by the European Commission under the sixth framework programme (DEMO-net - The eParticipation Network). The project aims at strengthening scientific, technological and social research concerning e-participation by engaging individuals and organisations from Europe. Like eGovPoliNet, DEMO-net aims at overcoming the fragmentation of knowledge in the field of governance and policy modelling. The advancement of research regarding quality, efficiency and innovation is one main aim of the project (DEMO-net - The eParticipation Network). Thereby, DEMO-net pursues the strategic goals set by the European Council. Research activities among members are coordinated and information exchange is performed by providing the necessary technological infrastructure. Moreover, the project aims to improve the co-operation between government and academia to establish a common understanding on both sides and thus improve research quality (DEMO-net - The eParticipation Network). Experts are brought together, themes are discussed and the outcomes are disseminated among the community and other communities.

3.3.4 CROSSROAD

CROSSROAD[6] is a further FP7 project funded by the European Commission which aims to build a roadmap for ICT research in the field of governance and policy modelling. The outcomes of other FP7 projects of the domain and the involvement of the research community support CROSSROAD's development (IPTS). The aim is to drive the identification of new technologies, governance models and application scenarios in the field of participation, e-governance and policy modelling in order to set up a research agenda for research and practice communities. Furthermore CROSSROAD aims to raise the awareness and consensus-creation on new research directions concerning participation, governance and policy modelling. Moreover, the

[4] http://tutech.de
[5] http://www.demo-net.org/
[6] http://crossroad.epu.ntua.gr

development of socio-technological scenarios for governance and ICT applications as well as the provision of a decision support tool for managing the roadmap and steering research on governance and policy modelling are among the main objectives of the project (IPTS). To achieve these objectives, CROSSRAOD determines the state of the art, checks on future needs for ICT tools and applications of the field and where further research is needed in particular.

3.3.5 NET-EUCEN

NET-EUCEN[7] is a multidisciplinary e-government community which is interested in the enhancement of the application of the user-centric paradigm in Europe (SpA). The project is co-funded by the European Commission under the CIP-ICT-PSP funding programme. The network consists of multiple stakeholders like users, associations, software developers, experts of the field and many more. Every interested organisation can contribute to the network activities, as the participation follows simple procedures, carried out by a smooth management (SpA). The community members aim at enlarging the community, formulating guidelines and scouting ICT-based e-governance solutions in order to implement the principle of user centricity (SpA).

These are four examples of a wide variety of projects in the field of participation, governance and policy modelling. They all follow the basic idea of bringing society and policy together, to involve citizens in policy making and to create a common understanding on both sides for each other's needs and interests. When going further into detail, it can be seen which purpose the projects pursue in particular and what directions of the field are affected. All in all, one can determine that this field is intensively researched and advanced. After these impressions, chapter four will introduce the methods and research design used for this thesis.

[7] http://www.net-eucen.org/

4 Methods and Research Design

This chapter presents the methods used in this thesis. A method is understood as a kind of procedure which is characterised by a certain set of instruments for the goal achievement (Wilde & Hess, 2006). Herrmann (1999) defines scientific methods as

- communicable systems of rules,
- that can be purposefully used by actors as action plans,
- that contain provisions for the intersubjective understanding of rules and terms used therein and
- of which compliance or non-compliance can be detected because of the normative and prescriptive nature of the rules .

4.1 Literature Analysis

The starting point for the work is the literature analysis (desk research) which is used to gain basic knowledge concerning the field this thesis is about. It provides expertise of different authors and editors and possibilities to compare similar projects and related work. It can be summarised as a state of the art analysis, concerning knowledge base systems, stakeholders and community building. The literature this thesis is based on, is essentially about:

- Knowledge base building and management
- Knowledge management
- Stakeholder theory and management
- Community building
- Software engineering
- Requirements engineering
- Business process modelling
- Ontology modelling and management

The purpose of the literature review is to gain an overview which disciplines and domains are involved in building a knowledge base for an online community. This includes learning about online community building in general and especially how to identify stakeholders, how to treat them, so that they feel welcome and participate in the knowledge base evolvement process.

Knowledge management discusses the topic, what knowledge actually is, how it can be gained (knowledge elicitation), processed, communicated, stored and maintained. Fundamentals about stakeholders and community building are used to figure out possibilities how to engage stakeholders and therewith contribute to the interactive, collaborative idea of eGovPoliNet.
For the practical part of the thesis, thus the development of the knowledge base concept, it is of crucial importance to gain insights in requirements engineering, software engineering, ontology engineering and process modelling to be able to describe and design a system. The precise description and the actual modelling are presented in chapter 7.

4.2 Requirements Engineering

Requirements engineering is a subarea of software engineering and its task is the systematic identification, description, modelling and analysis of requirements in consultation with the client using appropriate methods and tools (cf. Balzert, 2009). Requirements specify what properties a software system should have, that means they describe the problem to be solved (Balzert, 2009). The solution to this problem is a technical solution which in turn is the problem for an engineering solution. Requirements engineering is used for the precise planning of a system and thereby serves the drastic reduction of delays and cost overruns which may be caused by insufficient planning of the system. Requirements are divided into functional and non-functional requirements (cf. Balzert, 2009):

- Functional requirements define functions or services to be provided by the system or any of its components.
- Non-functional requirements are often understood as the requirements which do not belong to functional requirements. They are also described as technical or quality requirements.

A requirement should consists of one sentence, making a clear statement about an aspect of the system and be formulated in a way, that its implementation can be checked. Requirements are first allocated to the two main groups (functional and non-functional requirements) and then to the corresponding subgroups. Each requirement is numbered, in order to guarantee traceability. Moreover, the requirements are categorized respective their importance for the system. Usually this

is indicated with 'must-have', 'should-have' and 'nice-to-have'. The first one ('must-have') indicates essential requirements which are indispensable for a working system. The second one ('should-have') indicates requirements that should be fulfilled in order to provide better service and more functionalities for the user but are not essential for the system. The third one ('nice-to-have') finally indicates requirements without great significance which just enlarge the functionality spectrum.
In order to gain information that is suitable to formulate requirements, different methods are used, like interviewing stakeholders, document analysis or questionnaires to get an overview of what is expected of the system. To clarify the expectations it is useful to draw up a system-vision.
A vision is a realistic concept of the desired future system and it describes what should be achieved but not how it should be done (Balzert, 2009). The definition of goals helps to refine the vision and to make it operable. (Balzert, 2009). Using the vision and goals, the requirements can be verified whether they are fulfilled and necessary for goal achievement (cf. Balzert, 2009).
Terms which might be understood differently by involved stakeholders are described in a so called glossary to establish a common understanding in the project context.

4.3 Software Engineering

Software engineering is used to describe and model the desired system which shall be built. *"The Unified Modeling Language (UML), is a general-purpose visual modeling language that is used to specify, visualize, construct, and document the artifacts of a software system"* (Rumbaugh, Jacobson, & Booch, 2004, p.3). UML is today's standard modelling language and it is intended to support software development and to establish a common understanding among the involved stakeholders. Furthermore it can be used for real-world projects as well (Rumbaugh, Jacobson, & Booch, 2004). Metamodelling offers the possibility to model multiple levels of a system, so every level is described abstractly by the upper level. The levels can be modelled in different grades of granularity, which denotes the grade of detailing. The top level is described very abstract and with each deeper level, the description becomes more accurate (see Figure 4). Metamodelling is used for the abstract modelling of a system and therewith eases the implementation.

UML offers different types of diagrams to model different aspects of systems, for example the static structure of a system or dynamic activities within it. Thus, it is possible to describe which actors appear in the system context, which relationships exist between them and what activities can take place.

The description of the knowledge base structure (chapter 7.1) and content is performed using class diagrams, displaying the static view of the system and the knowledge base structure.

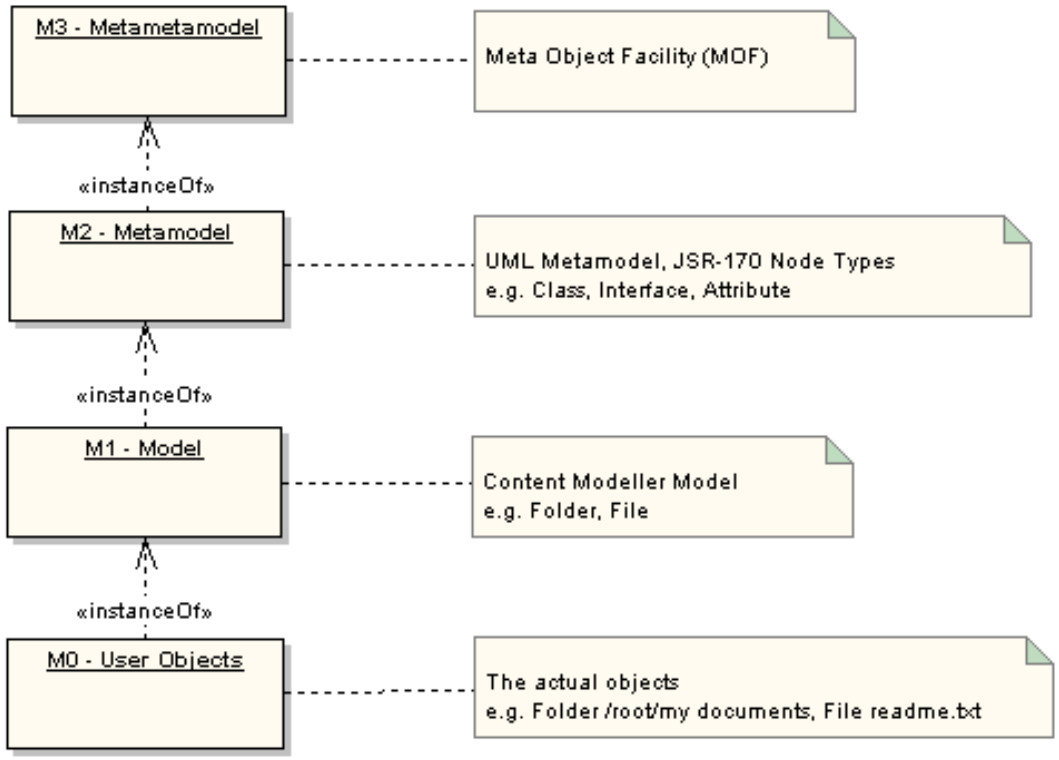
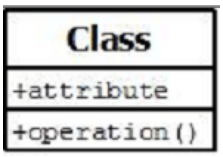


Figure 4 - Metamodelling (Source: http://wiki.alfresco.com/wiki/Type_Mechanism)

In Table 3 the essential components of a class diagram are briefly explained, according to Rumbaugh, Jacobson, & Booch (2004) and Balzert (2009):

Description	Visual notation
Application concepts are modelled as **classes**. A class describes discrete objects which contain information (attributes), perform a behaviour (operations) and have relations (associations) to other objects, respectively classes. If the name of a class consists of multiple terms, they are written as one word, using capital letters for the beginning of each term.	
An **association** models a relation between classes. Each association is described by specifying the multiplicity of each end and an optional association name or role names.	

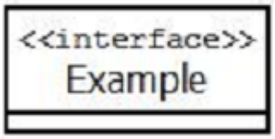
A **generalisation** expresses which sub-class inherits the structure of a super-class. The sub-class may contain further attributes and operations.	
An **aggregation** is a special case of an association. It includes a dependency between classes in the form of a 'is-part-of' or 'consists-of' relation.	
A **composition** is another form of an aggregation. The dependency is stronger here, since all parts are deleted, when the whole is deleted.	
An **interface** describes the externally visible behaviour of classes.	

Table 3 - Components of a UML class diagram[8]

This approach allows to displays the structure of the knowledge base. Each asset and actor can be described clear and unambiguously to point out the different types of assets including their attributes, operations, relations and dependencies to other assets. Class diagrams make it possible to expose the structure of the knowledge base and may serve as implementation basis.

In order to describe possible transactions between an actor and a system and thereby the system's behaviour, use cases are developed and shown in a use case diagram (cf. Balzert, 2009). Figure 5 shows an example of a use case diagram. A use case (modelled as ellipse) is a transaction between an actor (modelled as stick figure) and a system (modelled as box). The use case diagram gives an overview of possible use cases appearing within a system and which actors are involved in each case (Rumbaugh, Jacobson, & Booch, 2004). Use cases can be connected by associations. The 'include'- association expresses that a transaction imports the behaviour of another transaction. The 'extend' association expresses that a transaction's behaviour is extended by another transaction. Use cases can also be generalised when they can be allocated to a common upper range (Rumbaugh, Jacobson, & Booch, 2004). Besides the visual notation, use cases can also be described in natural language. The approach is used in this thesis to get an overview

[8] Images made with Open-Source Modelling Tool Dia© (https://live.gnome.org/Dia)

of possible use cases and the involved actors with respect to the knowledge base (chapter 7.3). Moreover, they are used to identify system requirements (chapter 6.2).

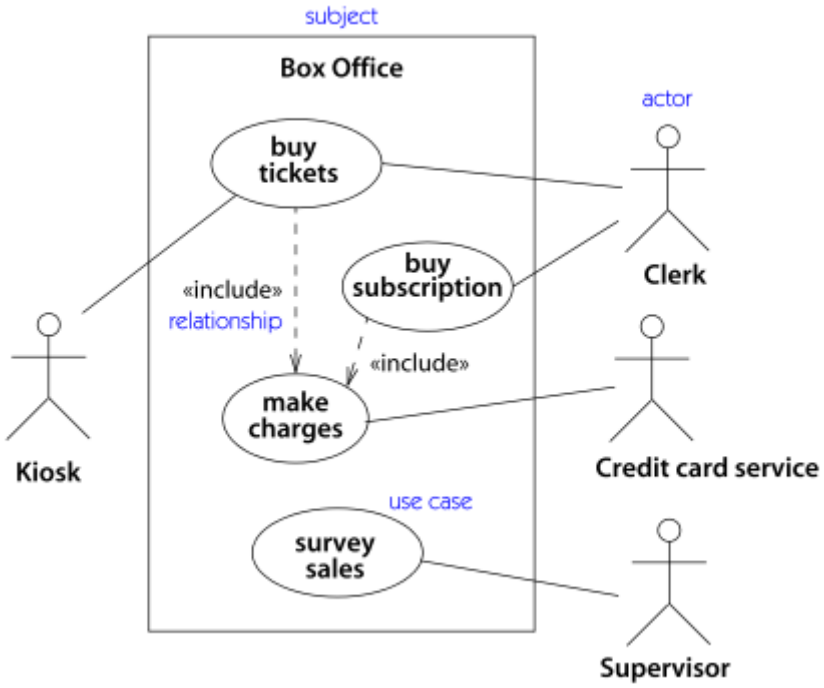


Figure 5 - Use case diagram example (Rumbaugh et al., 2004)

4.4 Business Process Engineering

BPMN[9] (Business Process Modelling Notation, or Business Process Model and Notation) is used to display processes within an organisation or a system and supports capturing, describing, optimising, steering and controlling those processes.

BPMN differs between control- and message flow and thereby offers the possibility to model processes that are connected by message flows (Balzert, 2009). Moreover, message flows can cross the borders of the different process-executing organisational units (Balzert, 2009). A business process is a set of systematic activities that take a business event to a successful outcome and thereby create value (cf. White & Miers, 2008).

The basic components which form a process and define its structure and behaviour are flow objects (activities, events and gateways) and sequence flow which connects the individual elements (White & Miers, 2008). A pool symbolises the system in which

[9] http://www.bpmn.info/

a process takes place. The lanes inside the pool display the activity area of actors or units taking part in a process and thereby clarify their interaction. Every process begins with a start event, followed by different tasks and activities. Gateways offer the possibility to split the process flow, for example by offering decision possibilities or parallel flows. A gateway can split a flow and merge flows subsequently. In the process it can be defined whether only one alternative is executable or more. To clarify the meaning of individual elements, they can be provided with text annotations. Moreover, the use of data objects and the exchange of messages during activities can be visualised. Processes that may appear within the eGovPoliNet knowledge base system are inter alia described using BPMN diagrams (see chapter 7.3). Further details concerning BPMN can be found online at http://www.bpmb.de/index.php?title=BPMNPoster&oldid=519 .

4.5 Tools

Subsequently the tools which were used for modelling aspects of the thesis are shown. Class diagrams and use case were developed in the UML 2.0 notation.

- **ARIS Express** (Version 2.4, further information at: http://www.ariscommunity.com/aris-express) is a freeware modelling tool which was used for modelling business processes (in the BPM-notation), use cases and for the development of illustrations.
- **Dia©** (Version 0.97.1, further information at: https://live.gnome.org/Dia) is another freeware modelling tool which was used for modelling UML class diagrams (see Chapter 7.1).
- **IBM Rational Software Architect** (Standard Edition, Version 7.5, further information at: http://www.ibm.com/developerworks/rational/products/rsa/) was also used to develop use case diagrams.
- **OntoStudio** (trial-version, 3.2.0, further information at: http://www.semafora-systems.com/en/products/ontostudio/) was used for ontology modelling.
- **Protégé** (Version 4.2, further information at: http://protege.stanford.edu/) was also used for ontology modelling.

During the modelling work some tools have been replaced by others due to improved functionality and performance. This is the reason why similar aspects of the system were modelled with different tools. After this introduction to the methodology of the thesis, the eGovPoliNet project is now presented in chapter five in more detail. Here, the knowledge base development is embedded in a precise context concerning the eGovPoliNet project.

5 eGovPoliNet

eGovPoliNet[10] collaborates with crossover[11] in setting up an international community in ICT solutions for governance and policy modelling. Both projects are co-funded by the European Commission under the FP7 Programme[12]. The eGovPoliNet consortium consists of 18 organisations that are experienced actors in the field of governance and policy modelling (eGovPoliNet). Due to the international shaping of the group and the participation of prominent experts of the field who bring along a wide diversity of experience, knowledge, expertise and international contacts, this consortium constitutes a good basis for a worldwide participating community (eGovPoliNet). The partners belong to nine European and seven non-European countries. Besides these members, eGovPoliNet aims to attract further multidisciplinary assessed experts to enlarge the community. The policy community tries to bring together the expertise and knowledge of researchers and practitioners of the field and thus to overcome the fragmentation across disciplines (eGovPoliNet). The expertise and knowledge in the form of capabilities, tools, technologies, methods, frameworks, practical cases and many more, brought forward by academia, ICT industry and policy actors will be subject to comparative analysis and collected in a knowledge base (eGovPoliNet). The collected topics will be exposed and communicated throughout the community and thereby advance research, development and practice concerning ICT for governance and policy modelling. Hence, the knowledge base is a means to an end in supporting governance and policy modelling development.

As the policy-community is an online community, community building will mainly take place on the internet but it will also be supported by means of physical meetings to discuss and advance content. Researchers and practitioners work together, learn from each other's experiences and thereby contribute to the improvement of theories, methods, tools and other assets supporting ICT solutions of the field.

[10] http://www.policy-community.eu
[11] http://www.crossover-project.eu
[12] http://ec.europa.eu/research/fp7

5.1 Objectives

By integrating the research and practice skills of organisations and individuals all across the world, eGovPoliNet aims at strengthening scientific, technological and social research and practice in governance and policy modelling. This is done under the inclusion of existing and future projects and the associated consolidated findings (eGovPoliNet). The results and lessons learned will be published in the community knowledge portal, discussed and further advanced.

The knowledge base will also provide best practice approaches to ensure the connection to practical use of ICT solutions in governance and policy modelling. Moreover, the policy community fosters the interaction between research and practice actors to enable them to formulate problems they could not solve on their own (eGovPoliNet). Based on the open, collaborative approach, eGovPoliNet will establish a global dialogue on ICT solutions for governance and policy modelling and expand the community by attracting new members (eGovPoliNet). The policy community will also aim at making governance and policy modelling more transparent and accessible to citizens, to exchange and advance approaches and solutions in the field and thereby contribute to the strategic objectives set by the European Council, in the Digital Agenda for Europe and in the Horizon 2020 (eGovPoliNet). By comprising behavioural and societal aspects into policy design, eGovPoliNet improves the link between policy makers and public, what makes government simpler to citizens and thereby increases the citizens' trust, acceptance and participation.

5.2 Added Value

The community might also contribute to a knowledge exchange between Europe and the United States of America, as the USA are more experienced with governance and policy modelling ICT than European organisations. Hence, Europeans could formulate their demands and the American partners could support in finding ICT solutions and providing useful information (eGovPoliNet).

It is a general added-value effect that organisations, regions and countries can learn from each other’s best practices and improve their ICT solutions in cooperation with other organisations and nations. The multidisciplinary approach enables the consideration of the different disciplines which are necessary to develop proper ICT

solutions for governance and policy modelling (eGovPoliNet). This would for instance imply collaboration between socio-political specialists, ICT specialists, and organisation- and management specialists to coordinate needs, requirements and possibilities concerning ICT solutions of the field.

As can be seen, there are many stakeholders involved with different backgrounds, needs and contributions. To manage these groups and their participation in building and using the knowledge base it is necessary to identify and describe all of them.

5.3 Stakeholders / Community

eGovPoliNet's community consists of several stakeholders who need to be clearly identified, as this is a first step in getting them to participate (Hansen, H. S. & Reinau, K. H.). eGovPoliNet's stakeholders can coarsely be divided into three groups (Figure 6). The major stakeholder group (marked green) are people with scientific

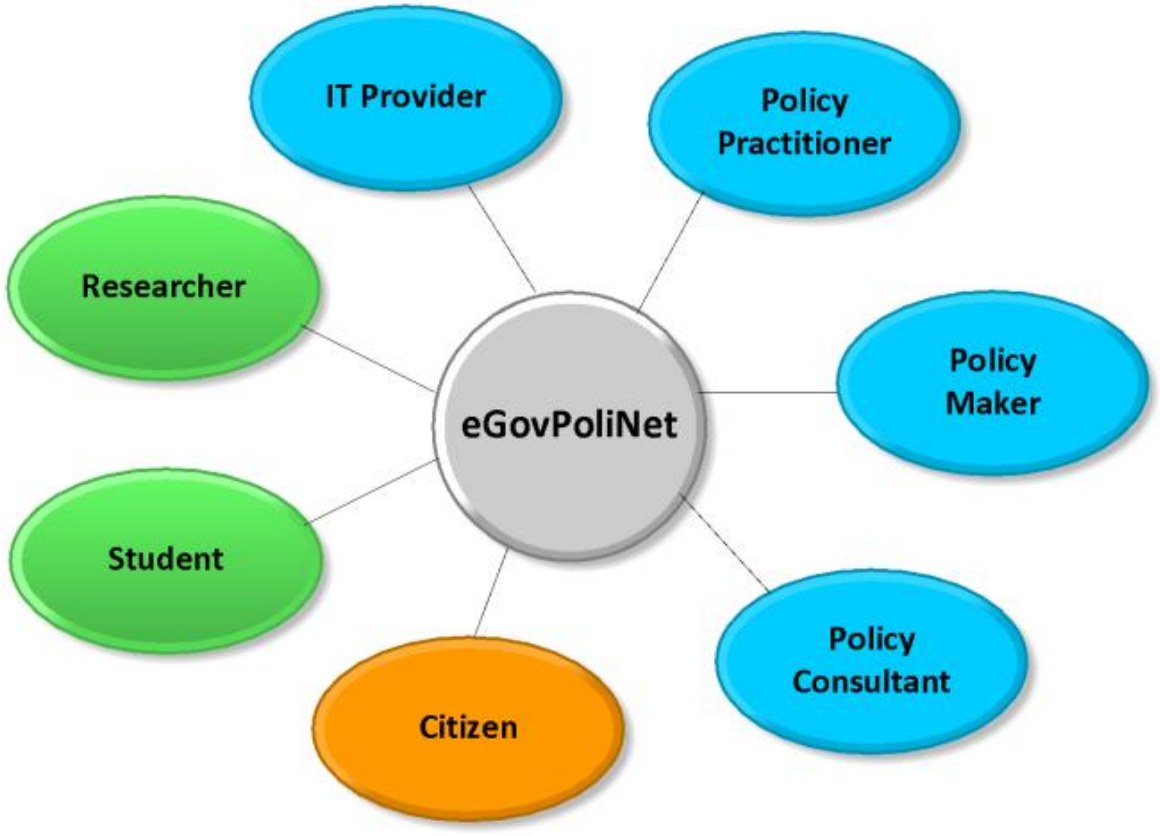


Figure 6 - eGovPoliNet stakeholders

background like researchers and students, as these people contribute most to the community. These sub-groups include different types of researchers from different disciplines like social science, public administration research, computer science and

many more which may contribute to the community. The same applies to students, who might be regular students, research assistants or PhD students interested in and working on governance and policy modelling.

The second group (marked blue) is the practitioner group. These are people with political background who bring in their expert knowledge about policy consulting and policy performing and who depict demand for research and solutions. The other part of the group are people with technical background, like IT experts, who bring in their knowhow about technical solutions for the project. eGovPoliNet targets this stakeholder group, as these people are expected to serve important contributions to the development of the community building, due to their expert knowledge. In this context, academia and industry are expected to provide ICT solutions for governance and policy modelling, while stakeholders from the policy domain are seen as potential users of these solutions (c.f. internal document, 2011).

As the community is generally open to everyone, the third group (marked orange) are citizens with none of the above named backgrounds. Everyone who is interested in political matters, who wants to participate and follow governance and policy modelling is welcome and may benefit from the experts work and even become part of the community. Thus, the community is open to everyone, which certainly implies that eGovPoliNet is set up in English language, as it is the universal language. Citizens can seek for participation in web-based policy making and stakeholders with policy background can submit concepts which support web-based governance and policy making and participation. People from the wide field of IT can support this interaction by developing technical solutions which improve the possibilities of online participation. Stakeholders with research background can monitor this development and explore alternative solutions and name other areas where research is needed.

Besides this classification of stakeholders, different roles of eGovPoliNet website users are distinguished, as Table 4 shows .

Role	**Description**
Partner	Registered member, with full rights (reading and writing in all areas except administration). All Consortium members are partners.
Member	Registered member with limited rights (reading and writing only in selected areas). Can take part in online meetings and be upgraded to partner status, when considered qualified.

Guest	Unregistered member with only reading rights for selected areas. Can register (filling registration form with minimum set of information) and thereby get member rights.

Table 4 - User roles

This classification ensures transparency respecting the website users and assures a reasonable contact with the website, the knowledge base and the resources it provides.

Members and guests can only access public sections of the website, while partners also have access to internal documents, that are part of the project build-up. The different user claims and rights are part of the requirements made on the knowledge base which are presented in chapter six.

6 Requirements for eGovPoliNet's Knowledge Base

6.1 Context eGovPoliNet / Thesis

The eGovPoliNet website provides several approaches for participation in governance and policy modelling for its partners, members and guests. It announces upcoming events dealing with topics of the named domain, it provides a repository with past events and their results and it informs about general news concerning the field. The website also contains a glossary which supports the establishment of a common understanding of subject-specific terms.

Users can subscribe to a mailing list providing regular news feeds and updates concerning the field of electronic governance and policy modelling. To support the desired international, open dialogue, a knowledge base is needed which on the one hand provides topics and impulsions for discussions and on the other hand stores added and new generated knowledge. The knowledge base contains knowledge assets and hence is an important instrument which supports eGovPoliNet in overcoming the fragmentation of knowledge across disciplines. The knowledge base offers expert knowledge at any time for everyone around the world and may serve as point of contact for problem solving. As the knowledge base is an important part of the project, this thesis aims to provide a concept for its establishment. Previous to all design considerations, the requirements have to be identified, which the knowledge base is expected to meet. Chapter 6.2 shows this analysis.

6.2 Requirements Analysis

For the development of a requirements set, information is needed which is gained by analysing the description of work of the eGovPoliNet project in the first step. Subsequently related work, respectively related portals are analysed and usage scenarios are developed. In this context only the requirements for the knowledge base are considered, as the specification of the entire system would go beyond the scope of the thesis. Moreover, at this point, only the functional requirements of the knowledge base are considered, as the knowledge base is embedded in the eGovPoliNet portal which already meets the non-functional requirements like security, reliability, performance and many more.

Subsequently two use case diagrams display the necessary functionalities which the knowledge base should provide. These use cases support requirements engineering, as each of them makes a statement about the system which can be formulated as requirement. Assumed that a partner has logged in, he/she could perform the following activities.

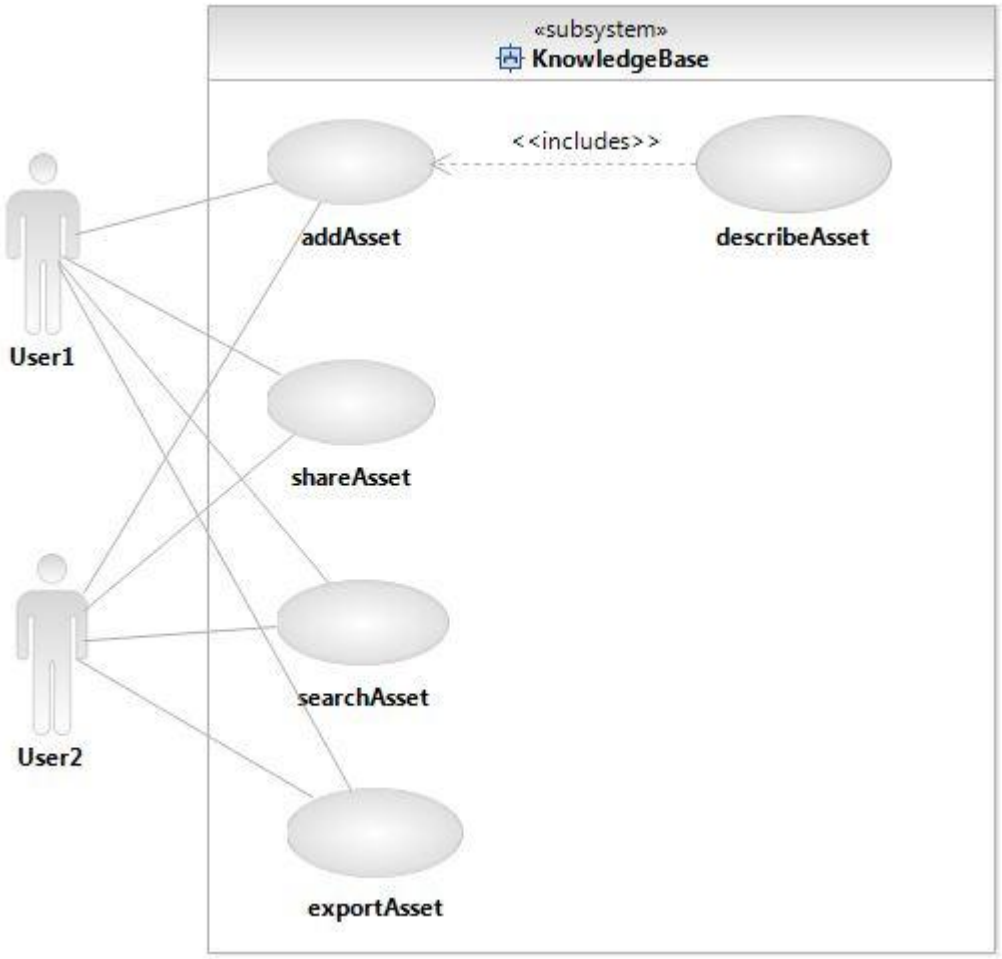


Figure 7 - Use cases 1

The requirements are then collected, numbered and indicated with a weightage.

The requirements shown in Table 5 describe the main functionalities expected of the knowledge base. Prerequisite for the use of the knowledge base is that it provides knowledge assets. This means users can search for assets, add and retrieve knowledge assets. Adding an asset implies that it needs to be described in order to make it searchable for the search function of the portal. Moreover, users can view assets, bookmark and edit them if applicable. These are essential functionalities to start working with the knowledge base.

Furthermore, it should be possible to share assets and comment them. This might be a contribution to the desired dialogue which would then be initialised by discussions within the knowledge base about specific topics.

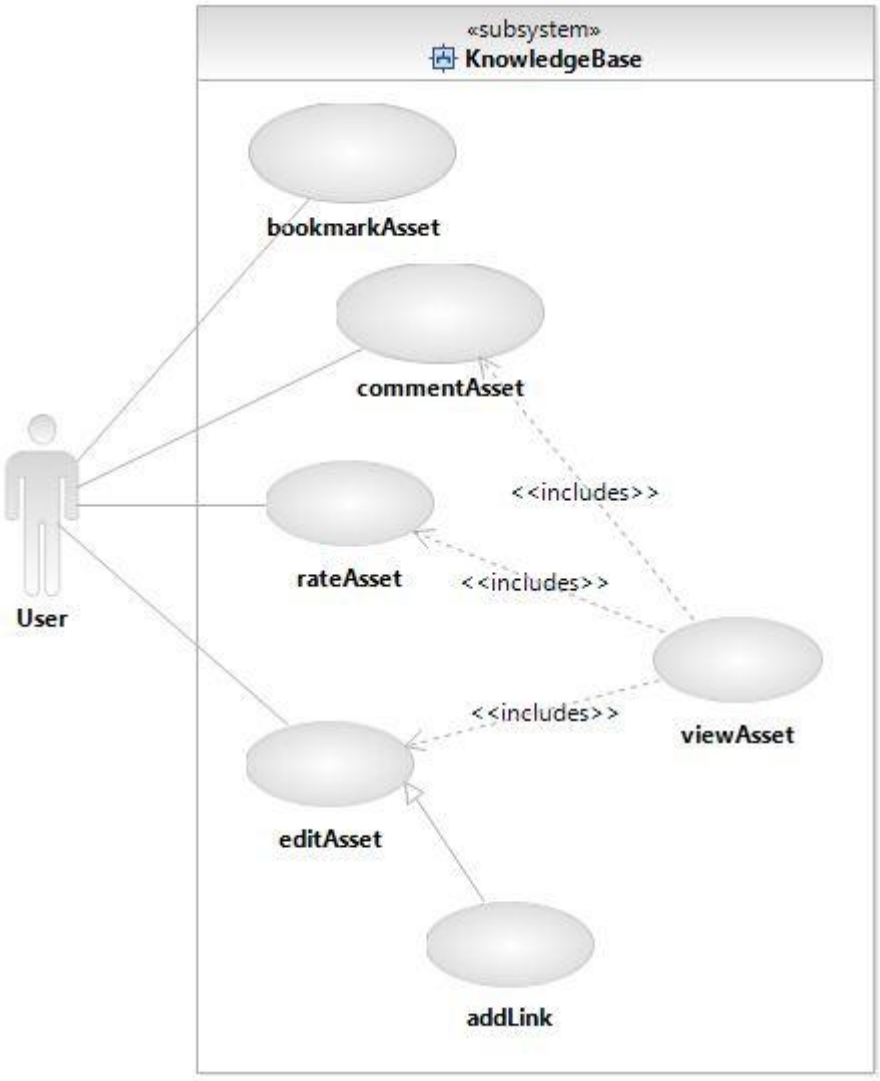


Figure 8 - Use cases 2

Users should also have the possibility to export content to have it available locally. In order to further link up content, it should be possible to add links which lead to further information. This might be other knowledge base content or external information sources. When viewing an asset, the user may edit, comment or rate the asset subsequently. Users might initiate discussions or indicate substantive disagreements by commenting content. Rating assets might be useful to express the quality and usefulness of content.

The role classification of users (see chapter 5.3) also has validity here in the requirement context, so it should be noted that users with limited rights are not able to perform all of the above named activities.

The formulated requirements can be used to design the system structure and functionalities. The structure can then be used as implementation basis for the programmers who can create the necessary classes and methods in order to implement the above named functionalities. The structure presented in chapter 7.1 inter alia depicts the different types of assets and the given requirements describe how these should be used in the system context.

No.	Requirement	Must have	Should have	Nice-to-have
1.	The knowledge base (KB) provides scientific knowledge assets (publications, cases, projects, tools, methods, models, programs, policies, frameworks)	X		
2.	Assets can be viewed	X		
3.	Assets can be added	X		
4.	Assets can be edited / updated	X		
5.	Assets can be searched	X		
6.	Assets can be bookmarked	X		
7.	Assets can be commentated		X	
8.	Assets can be shared / recommended		X	
9.	Assets can be exported		X	
10.	Assets can be linked to further information		X	
11.	Assets can be rated			X

Table 5 - Knowledge base requirements

More information about the functionalities can be seen in chapter 7.3.

7 eGovPoliNet Knowledge Base Concept

The theoretical basics presented in chapters two to four and the findings from the stakeholder analysis and requirements analysis are now combined in chapter seven which finally presents the actual concept for eGovPoliNet's knowledge base.

7.1 Knowledge Structuring

In the first step the knowledge structuring is described to clarify the basic structure of the knowledge base. The relevant knowledge assets are identified with respect to the work package leaders of the project and subsequently categorised and specified. In order to handle the collected knowledge assets properly, it is necessary to establish a sensible structuring which enables users to assign assets to certain categories. This implies working with meta-data in order to gain a clear understanding of hierarchy-based correlations of the system. As mentioned in chapter 4.3 meta-data means that certain artefacts are described on a higher level. The use of meta-data can be performed over several levels, so that one speaks of meta-meta-data and so on. Thus, each level describes its sub-level(s) and each sub-level is described by every level above. So the sub-classes inherit attributes and operations from their parent class.

Using this approach, it is possible to describe and categorize knowledge assets precisely and to create a rational and comprehensible structure for the knowledge base. The contained hierarchies define where certain knowledge assets have to be inserted and which attributes they inherit from their parent class. This approach also shows connections and dependencies between different knowledge assets. To capture this diversity of assets and information, a UML-class diagram was developed which comprises all classes and relations that are necessary to display the whole knowledge base structure. In the following steps this diagram was refined by merging and specifying associated classes and their relations. Figure 9 shows the main diagram which describes the syntactic structure of the knowledge base.

The subsequently following class diagrams have been developed in cooperation with the leading partners of work package 4 of the eGovPoliNet project.

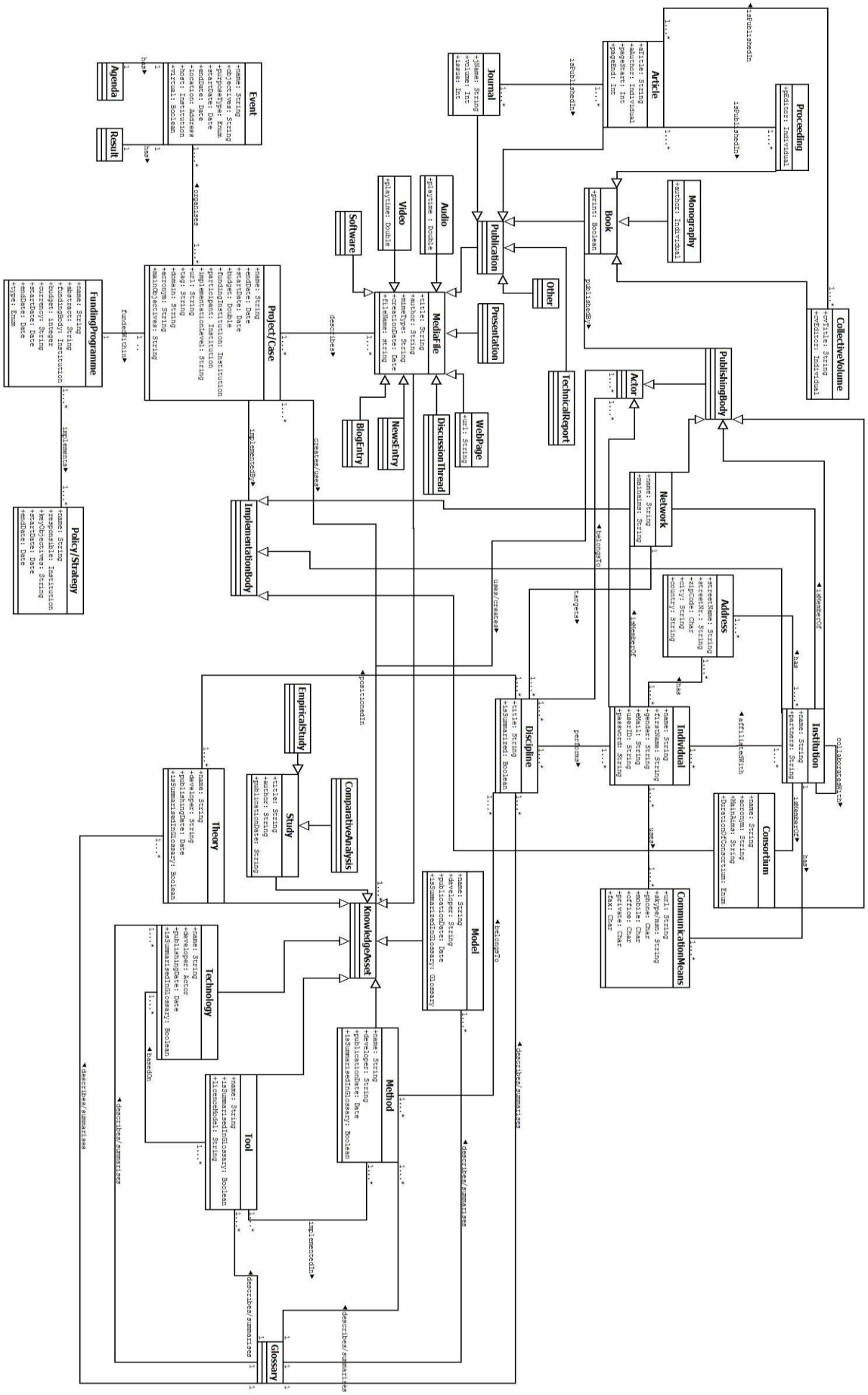


Figure 9 - Knowledge Structuring

Looking closer at Figure 9, it can be seen, that for example "Monography" descends from "Book", which descends from "Publication", which in turn descends from "MediaFile". So the hierarchy-depth here includes four levels. Besides the classes which are part of the knowledge assets, there are many more classes which have to be considered. These classes are primarily actors, creating or using knowledge assets, like individuals, institutions, networks or publishing bodies. Thus, the diagram entities can coarsely be divided into actors and knowledge assets. By analysing the different classes and their connections to other classes, one gets a clearer overview of the actors, knowledge assets and the whole knowledge base structure. At this point it is possible to identify nine main entities which provide most connections and inheritances.

These are:

- Actor
- Discipline
- FundingProgramme
- Glossary
- KnowledgeAsset
- MediaFile
- Policy/Strategy
- Project/Case
- Publication

By only considering the nine classes named above and fading out the other classes, one gets a clearer overview of the main components of the knowledge base, their relations and possible interactions (see Figure 10). These are considered the main elements in this context because they either contain or connect many sub-classes and thereby abstract the relations and behaviour of those. This approach offers a coarse-granular view on the system in order to establish a basic comprehension of the knowledge base structure. Six of them (Actor, Glossary, KnowledgeAsset, MediaFile, Project/Case and Publication) are main classes because of their crucial relevance for the system structure. The three other classes left (Discipline, FundingProgramme and Policy/Strategy) are the major artefacts linking the other classes and supporting their interaction.

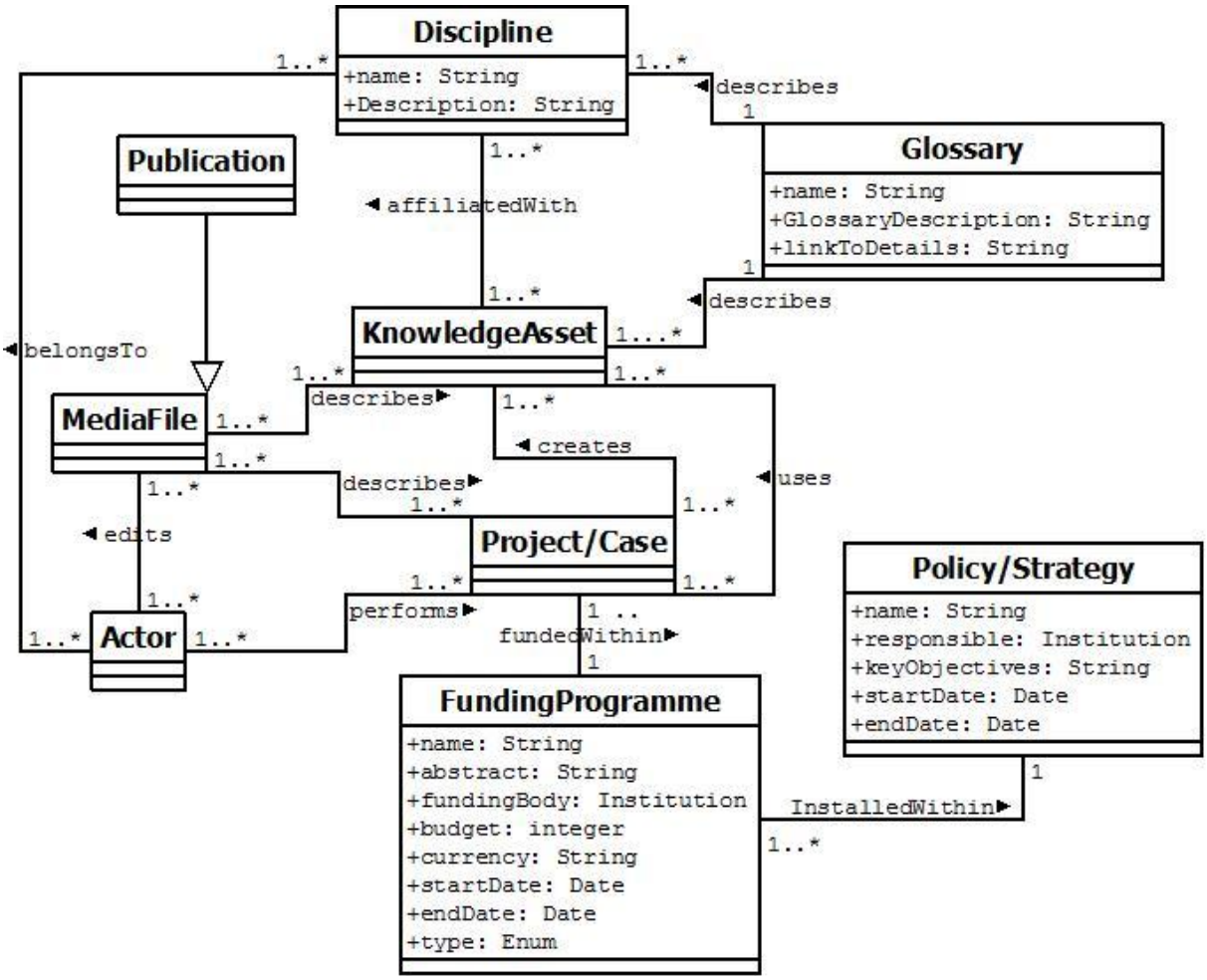


Figure 10 – Abstract model of the knowledge base (coarse-granular view)

Following below, the components of this abstract knowledge base model (Figure 10) are described.

- **Actor**: The actor is the main class here by virtue of the biggest influence on the other classes. By performing projects and cases, the actor creates and uses knowledge assets like theories, methods, tools and so on. These in turn are described in media files, which are edited by actors. The actor is described in more detail in Figure 11.
- **Discipline**: Disciplines are performed by actors who thereby create knowledge assets. It is important to name the different disciplines in this context, in order to establish interdisciplinary cooperation and to understand the fragmentation of the field. A brief description in the glossary serves the common understanding of a discipline.

- **Project/Case**: Actors perform projects and cases which are usually funded within a funding programme. During the performance of a project or case, knowledge assets are used and new assets are developed. These undertakings and their outcomes are described in media files. Projects and cases also serve the knowledge transfer among participants and institutions. More information is shown in Figure 15.
- **FundingProgramme**: Projects and cases are usually funded within funding programmes. These are approved by a funding body within the scope of policies and strategies. A funding programme has a name and is described in an abstract and clearly determined respective the funding budget, currency, duration and type of funding programme.
- **Policy/Strategy**: One or more responsible institution(s) design(s) a strategy or policy which formulates appointed objectives and the planned procedure which aims to achieve those. Policies and strategies serve the advancement of developments in certain areas. Like the funding programme, a policy and/or strategy has a name and is of limited duration. Moreover, the key objectives are described.
- **KnowledgeAsset**: As already mentioned, knowledge assets are created and used during the performance of projects and cases. They are affiliated with disciplines, briefly defined in the glossary and described in detail in media files. More details are shown in Figure 13.
- **MediaFile**: The description of most knowledge assets is done in media files which are edited by actors. This concept is abstract and described in more detail in Figure 14.
- **Publication**: Publication is the main type of media file because it provides most occurrences of publication types. These describe knowledge assets precisely and in detail and thereby are an important source for the comparative analysis. The different sub-classes of publication are shown in Figure 16.
- **Glossary**: The glossary serves the establishment of a common understanding of abstract terms and entities in the knowledge base context by describing those in a simple and understandable way. It is a point of reference for stakeholders and described in more detail in Figure 12.

The subsequent figures provide a detailed view on the components of the abstract model in Figure 10. Only FundingProgramme, Glossary and Policy/Strategy are omitted here, since these classes need no further detailing.

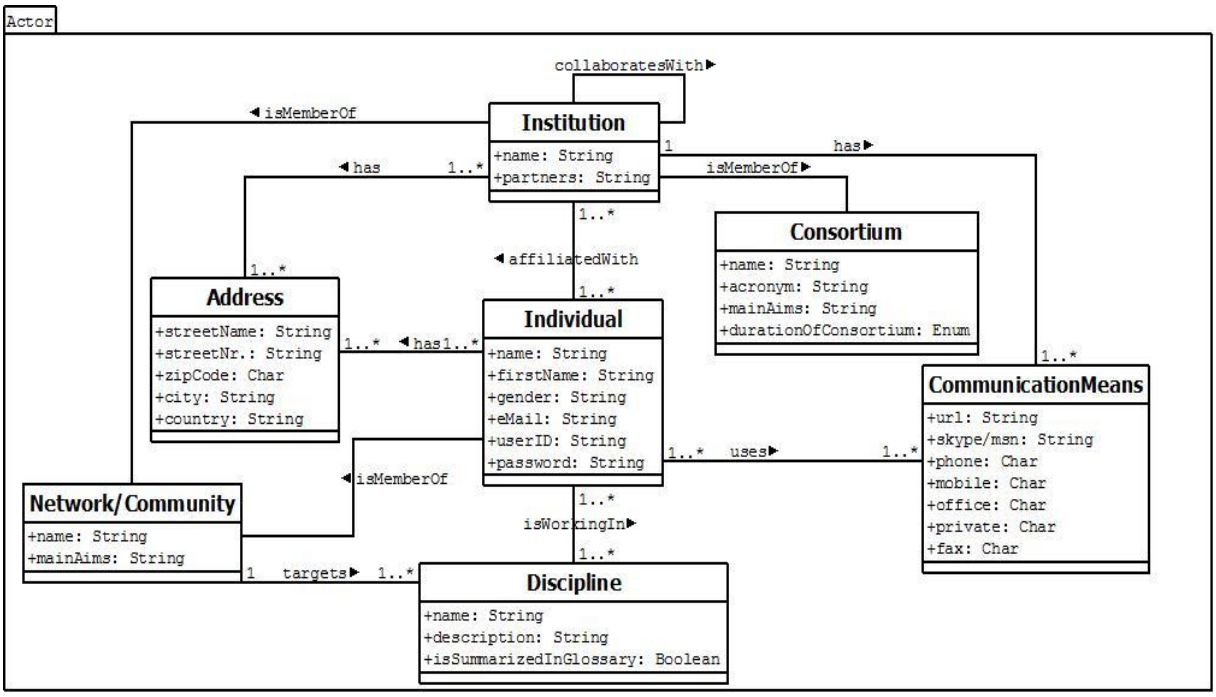


Figure 11 - Actor sub-domain

Figure 11 shows the actor class in more detail. The main class in this context is the individual, as it has most influence on other classes and is by nature the core protagonist in this knowledge base context. The individual introduces disciplines and may include further individuals, networks and consortia. Thereby the individual is the main protagonist in building the community.

- **Individual**: The individual has a name, a first name and a gender. In the system context, it is identified by its user id with which it logs in into the system by using its password. An individual is usually affiliated with an institution, performs in one or more disciplines and can be contacted via e-mail. The individual can also be member of networks and communicate with other individuals, using online and offline communication means.
- **Address**: An address is used for the local indication of an individual or an institution. It is clearly characterized by a street name, street number and zip code. It should be noted that an individual or institution can have several addresses.

- **CommunicationMeans**: This class describes technical communication possibilities for individuals. It represents classic communication means like phone and fax but also modern, web-based communication media like websites (URL), MSN or Skype. Institutions offer these technologies and individuals use them. They play a central role in establishing the desired open dialogue among community members.
- **Consortium**: A joining together of institutions in order to pursue common goals is called consortium. A consortium has a name for which an acronym is usually used, it is of limited duration (e.g. in a project context) and clearly points out the main aims that are to be achieved.
- **Discipline**: An individual performs in a discipline. In this context the indication of the performed discipline is important in order to address experts from other disciplines to cooperate and solve problems.
- **Institution**: An institution can collaborate with other institutions (which may be partners) and be member of networks and consortia. It is localised by its address and can be contacted by using different communication means.
- **Network/Community**: A network or community is another type of joining together. The duration is not limited and the members (individuals and institutions) can participate from time to time, working on a common topic or discipline.

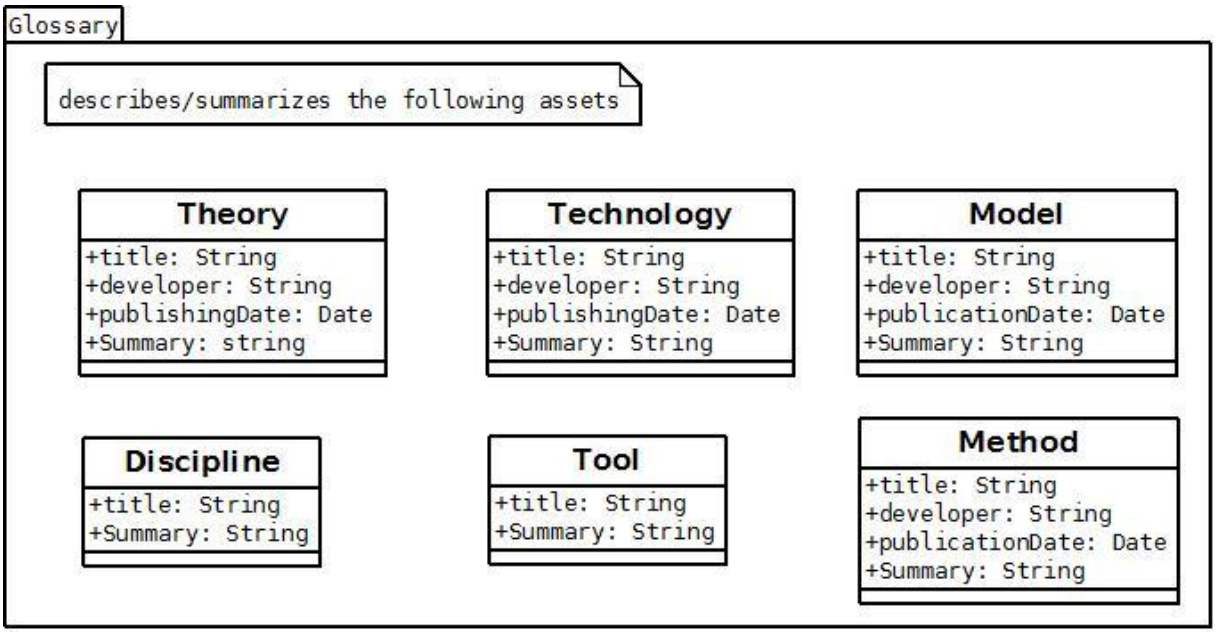


Figure 12 - Glossary sub-domain

The glossary is more of an outside class which meets the purpose of describing several assets and terms, as can be seen above. The glossary contains entries with descriptions and explanations which contribute to the establishment of a common understanding of terms among the community. Besides the description there are embedded links leading to further information about the terms like literature or other information sources. Figure 12 shows the basic idea of the glossary with some examples of terms that are described precisely because community members may have different understandings of them.

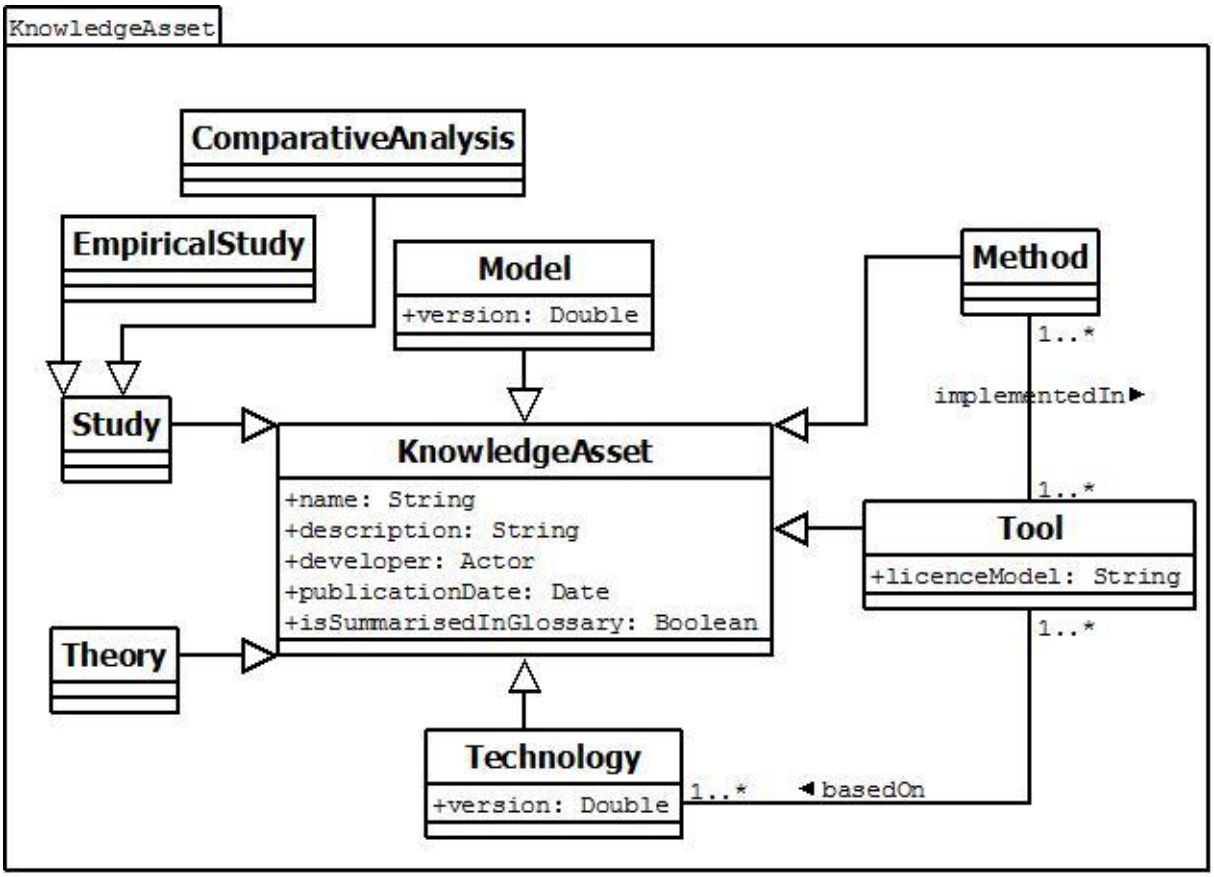


Figure 13 - KnowledgeAsset sub-domain

Another central asset, besides the actor, is the knowledge asset (Figure 13). It is the parent class for most assets to be collected in the knowledge base and can be described as assets that advance governance and policy modelling. These assets are described in publications and media files. Most sub-classes like methods, tools, technologies, theories and models are developed or used during the performance of projects and/or cases. One or more actors develop, name, describe and publish a knowledge asset, which can also be summarised in the glossary. Besides paperwork,

an asset can also be a piece of software including a license model. Studies are a further form of knowledge assets. Moreover, studies are another part of the collection. These are empirical studies concerning topics of the field and comparative analysis which is performed within eGovPoliNet activities to clearly describe assets and delimit them from each other. As the knowledge asset concept is the main source for comparative analysis, it is of crucial importance for the community and knowledge base building.

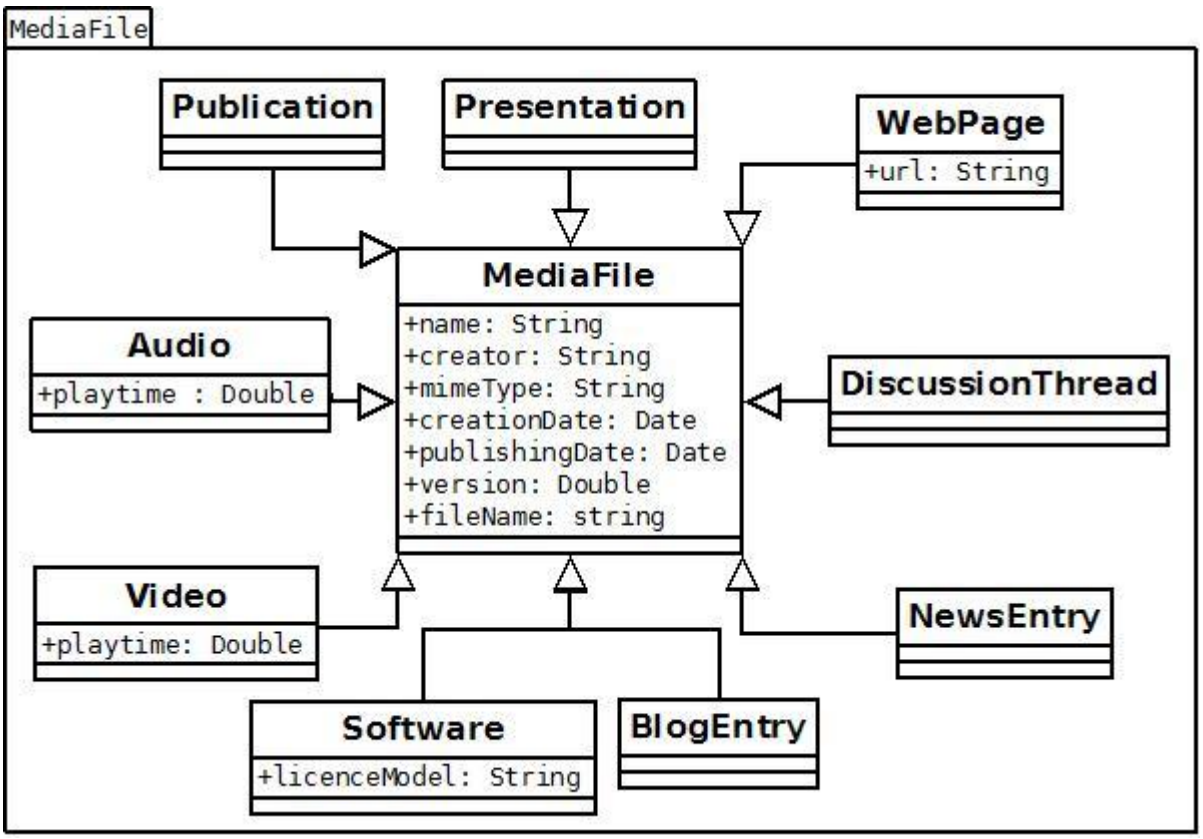


Figure 14 - Media file sub-domain

The media file (Figure 14) is the parent description for mainly electronic information carriers, which form the knowledge base content. Media files are edited by actors and describe knowledge assets, projects and cases (Figure 10). They can appear in textual, audio, and visual form. A media file can also contain all three of the forms, for example a video, showing a presentation which is commented by a speaker. Blog entries or interactive discussion threads in internet forums also represent media files. In general, a media file is developed by an actor and in a certain mime type. The file has a filename and can also have a name for its content. Moreover, it has a creation date, a publishing date and a version number which differs it from former or later

versions. Media files offer a wide variety of information provision that is used to fill the knowledge base with content.

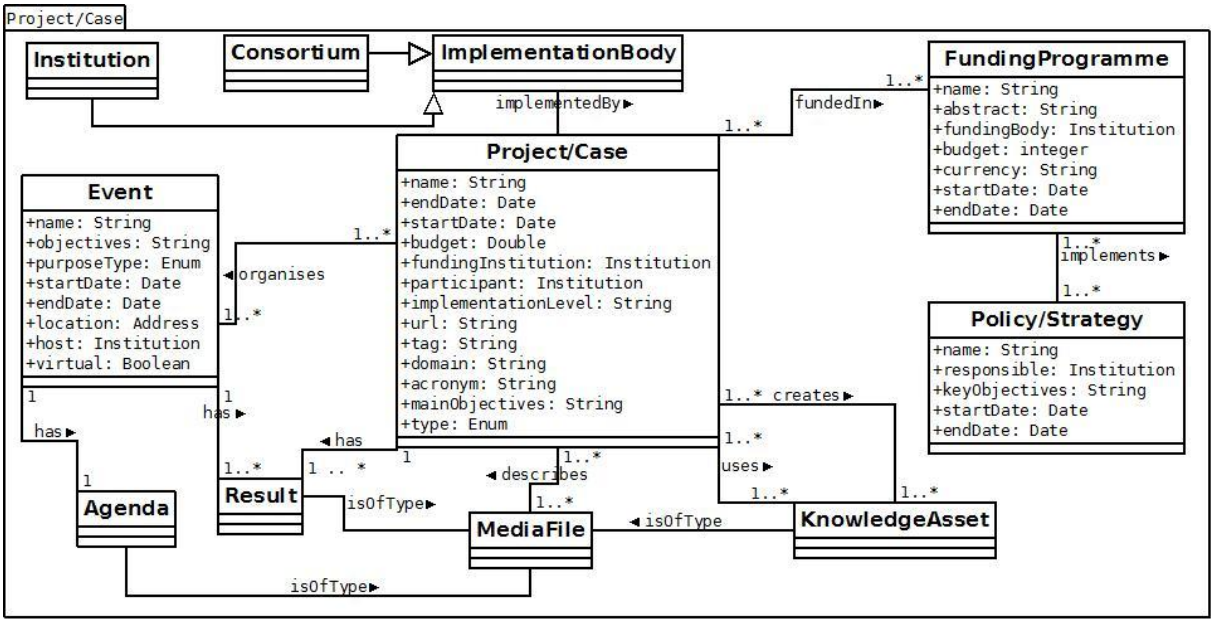


Figure 15 - Project/case sub-domain

Figure 15 shows the Project/Case sub-domain. Besides its name and acronym, a project is characterised by a limited time period and a fixed budget. URLs and tags provide information about a project or case, where the main objectives are pointed out, as well as the participating and funding institutions. The implementation level indicates the stage of project progress. Projects and cases are implemented by an implementation body like an institution or a consortium. A policy defines where research is to be performed and to what extent. Therefore, a strategy is formulated which pursues defined goals. In this context a funding programme is set up to make the implementation of projects possible. To advance a project or case, events are organised which follow an agenda and create results, which are both described in media files. During the performance of projects and cases, existing knowledge assets (see Figure 13) are used, new knowledge assets are created and finally described in media files, like projects and cases themselves. Projects and cases are driving forces which contribute considerably to the knowledge base advancement and thereby to eGovPoliNet's development.

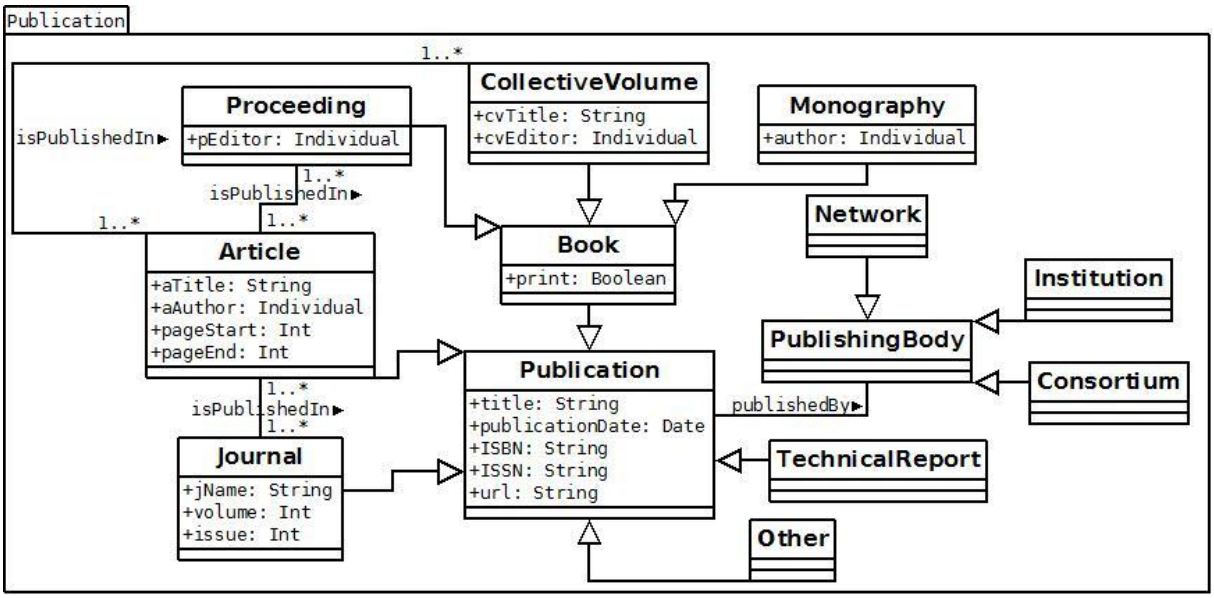


Figure 16 - Publication sub-domain

The publication is the parent description for several forms of publications like books, journals, articles and many more, as can be seen above in Figure 16. A publication is published by a publishing body, which is some kind of actor like a network, an institution or a consortium. The book class generalises the monography, the collective volume and the proceeding. An article can appear in a journal, in a proceeding or in a collective volume. In this context the publication represents the classic forms of publications like print media, although these assets can also appear in electronic form, for which reason "Publication" is also part of the "MediaFile" sub-domain. A publication has an ISBN or ISSN and a URL which provide more information about it. Besides that, journals have a volume number what differs them from books. The publication class is closely connected to the media file class, as these are the main information providers which are to be collected for the knowledge base.

The presented structuring clarifies the basic composition of the knowledge base, its components, their associations and dependencies. This serves as a basis for the technical implementation in the eGovPoliNet portal, as well as for the implementation of an ontology. In order to make this basic concept operable, an ontology is needed which creates correlations among knowledge base content. Chapter 7.2 presents this subject.

7.2 Ontology

Chapter 7.1 describes the static system structure and the classification of content, whereas this chapter describes the dynamic, semantic structure and cross-linking within the knowledge base content. Thus, the ontology supports the knowledge base operability.

The ontology concept originates from philosophy and is understood as the study of existence (Lim, Liu, & Lee, 2011). In computer science, ontologies model and represent knowledge within a system, using classes, attributes and relationships among classes. Thus, they support knowledge sharing, knowledge reuse and thereby advance the development of knowledge-based systems (Lim, Liu, & Lee, 2011). Gargouri and Jaziri (2010) describe an ontology as *"[...] the result of an exhaustive and rigorous formulation of the conceptualization of a domain*" (Gargouri & Jaziri, 2010, p. 3). Under the inclusion of a hierarchical organisation, an ontology defines concepts and relationships between those. These representations are constrained by rules and axioms (Gargouri & Jaziri, 2010). An ontology describes entities and their relations extensively in order to provide multiple characteristics for connecting related content.

This approach aims to describe information in a way that computers can 'understand' the meaning of content and establish meaningful connections between similar content. In this context one speaks of semantic web or web 3.0, where information is not only made available but also semantically connected. This offers the possibility to organise the knowledge base content reasonable and to search it for selected topics and knowledge assets. In this context, Hepp (2008) describes an ontology as the vocabulary to express a knowledge base. Moreover, an initial motivation for the use of ontologies was supporting interoperability among multiple knowledge bases (Hepp, 2008).

7.2.1 Ontology Engineering

The development of theories, methods and software tools which serve the creation and maintenance of ontologies, is called ontology engineering (Lim, Liu, & Lee, 2011). According to Lim, Liu & Lee (2011), ontologies can be created manually, automatically and semi-automatically:

- **Manual approach**: This approach is seen as the simplest way to create an ontology. When the ontology structure is specified, domain experts start implementing the ontology according to the given specification. Creating an entire new ontology may be difficult, as the involved experts may create it from different views with different priorities. Ontology building requires large working efforts in general, which also applies to maintaining and updating the ontology. These processes can be quite ineffective and time consuming, as the responsible individuals have to analyse the ontology over and over in order to make changes and adjustments. So the manual creation of an ontology may be simple at first but not practically.
- **Automatic approach**: In order to reduce the working effort for ontology creation and management, many researchers prefer the automatic approach of creating an ontology. An automatic process extracts information from databases and documents and provides these in a specific format. However, today's automatic procedures are not accurate enough and usually provide low-quality ontologies, especially when used in larger knowledge base systems. This leads to the conclusion that the semi-automatic approach seems to be most practically.
- **Semi-automatic approach**: This approach combines the automatic creation process and the precise human working effort. Individuals construct, refine and validate an ontology engineering framework which is used to develop ontologies. Therefore, it is important to find an optimal combination of human-computer interaction. The semi-automatic approach is proven to be practical and to provide high quality ontologies.

Once the ontology is implemented, the ontology life cycle begins, as Figure 17 shows. At the beginning, the needs for the ontology are formulated and a design is developed, according to the named requirements. When the ontology is installed, the actual use begins and therewith the

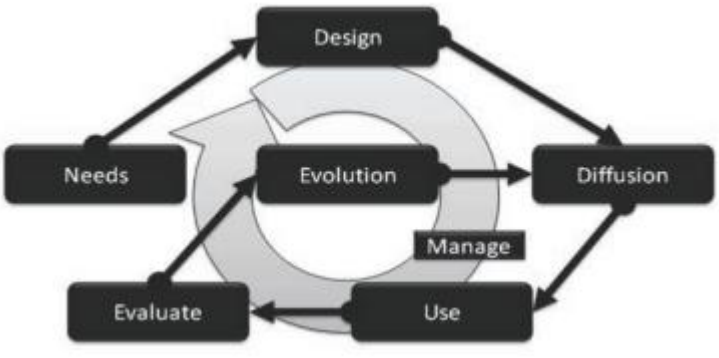


Figure 17 - Ontology life-cycle (Gargouri & Jaziri, 2010)

ontology management. The ontology is evaluated permanently, further developed, adjusted and finally updated for use again. Thus, the actual cycle consists of diffusion, use, evaluation and evolution. In this context Gargouri et al. (2010) refer to ontologies as living objects, as they permanently evolve.

The basic structure to describe an ontology entity is the three tuple structure, shown in Figure 18. A subject and an object are connected by a predicate relation. This structure makes a statement which describes the entity, for example "author writes book". In this case it is quite similar to the UML class diagram structure but the description of ontology entities can be enlarged and specified using more description terms. For example the author is an individual with a name, first name, gender, birth date, address and much more. So this precise description makes it possible to formulate complex search queries and to receive high quality search results. Moreover, relations can be described reciprocally in order to clarify the connection of two subjects. According to the example given above, this might be "book isWrittenBy author".

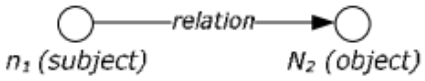


Figure 18 - Three tuple structure (Lim, Liu, & Lee, 2011)

Taxonomy relations form a hierarchical structure within an ontology, similar to UML class diagrams, in order to point out parent-child relations between classes may enlarge the ontology depth and increase its quality (cf. Lim, Liu, & Lee, 2011).

In this thesis, the requirements (chapter 6) and the basic system structure (chapter 7.1) can be used as starting point for the development of an ontology for the knowledge base. In fact it can be constructed quite similar to the UML diagrams shown in chapter 7.1. The presented structure can in principle be adopted and in addition be described in more detail, which means to create and describe more relations among entities, in order to establish a cross-linked, well working ontology. Similarly, new knowledge assets which are added to the knowledge base need to be precisely described, in order to make them operable for the ontology.

7.2.2 Ontology Concept

According to the findings of Lim, Liu & Lee (2011) it would be advisable to choose the semi-automatic approach for the creation of the ontology. Therefore, the structure presented in chapter 7.1 may be used to implement the basic structure of the

ontology. The entities can be implemented according to the UML diagrams. In the next step, the description of entities and their relations can be done in more detail in order to enlarge the concept and precisely describe it.

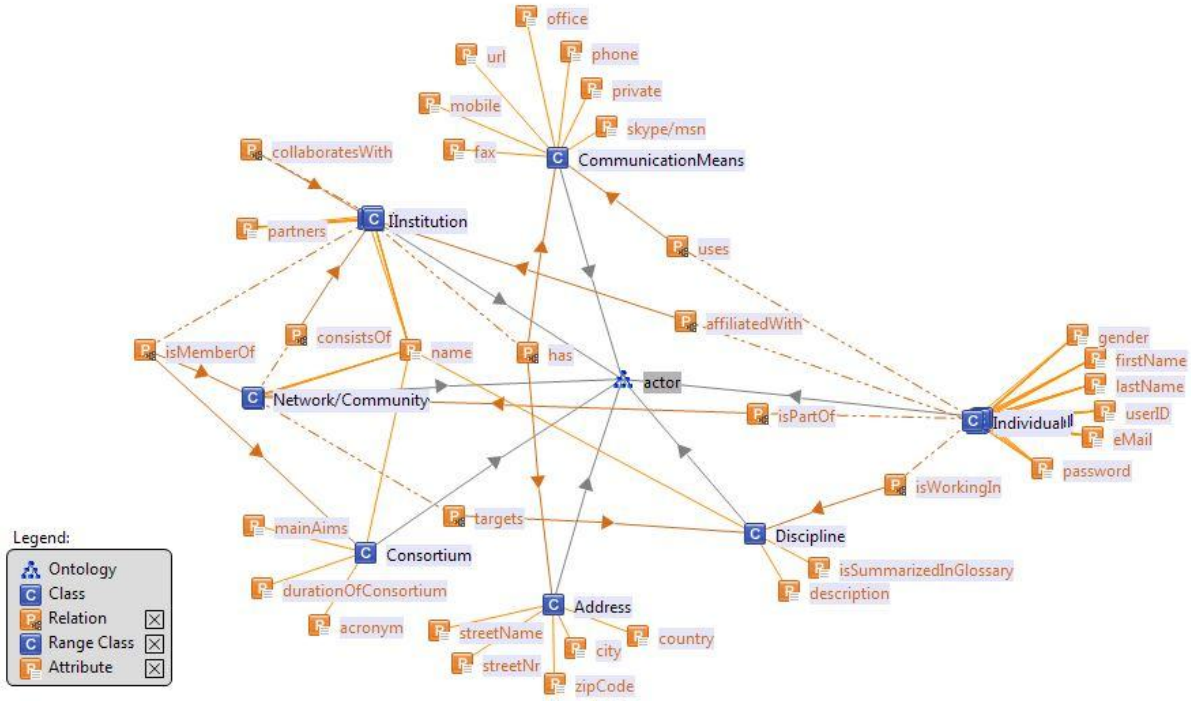


Figure 19 - Actor ontology[13]

Figure 19 shows an example of a basic approach for an ontology for the actor class. This ontology is based on the actor domain (Figure 11). The contained entities, their attributes and relations are pointed out and thereby build an information network. The ontology can be enriched with extensive descriptions of entities and relations in order to provide substantial cross-linked content.

Content can then be searched with the use of the website search functionality. With help of the ontology the search function provides meaningful related search results.

For example the user might search for a specific topic and receive search results including publications, projects or institutions dealing with the searched topic and moreover receive further related information.

A basic structure for the knowledge base and suggestions for an ontology have been presented. Now the knowledge base needs to be filled with content, which requires the participation of the community members. This process should be described and

[13] Image made with OntoStudio

mapped in order to capture possible user interactions and to respond to their demands. Chapter 7.3 presents a possible version of this process.

7.3 Participation Process - Knowledge Collection and Maintenance

This section addresses the participation process, which means adding knowledge to the knowledge base and maintaining it.

As a first step the knowledge base developers might add content to the knowledge base in order to create starting points for other participants. This would provide an idea of how the knowledge base is constructed and how to work with it. In the second stage experts from related projects with common background knowledge might contribute further information, as they are already experienced in knowledge base building and know users' demands (c.f. Bolte et al., Internal Document). End-users could then use, edit and add further content in the third stage.

When this process is working, the knowledge base administrators and experts of the field need to maintain the knowledge base content in order to guarantee a high quality level. Thereby it is important to start with a manageable complexity concerning participants, functionalities and content (c.f. Bolte et al., Internal Document). When the participation process is working properly, the knowledge base may be enlarged with more users, more content and if necessary, with more functionalities.

The collected knowledge then needs to be distributed and the community needs to be informed about new content. This could be achieved with newsletters, which inform about new content in general and can be modified so that users receive information concerning selected topics.

As a community lives on its members, it is of highest importance to keep the members motivated to further contribute to community building and content development. When a community loses its dynamism, so that the activities within it power down, members lose interest and sooner or later leave it.

To prevent the eGovPoliNet community from this, it is necessary to develop a concept which keeps the members motivated and thereby ensures the community dynamism. According to Weidemann and Femers (1993) the involvement of members increases with the level of access to information and the rights in the decision-making process (Weidemann & Femers, 1993). So this is a first step to

motivate the community members, by offering a diversity of information and the opportunity to actively design the community. When a member creates a new entry it should immediately appear on one of the top levels of the website and be mentioned in the newsletter, so that members can see that their contributions are of significance and part of the community evolution. This also offers the possibility to discuss new entries, which appear on the top levels and are visible for every member visiting the website. Moreover, website users may rate content to express their assessment of the asset.

Another approach would be the encouragement of discussion panels by asking questions or propounding discussion themes by the website administrators and experts of the field. Therefore, the moderation of discussions by administrators and experts is of crucial importance in order to guarantee a reasonable, professional progress. Performing this approach in official meetings would certainly have most impact and also demonstrate the community's dynamism and vitality. Offering online lectures could also imply discussion and elaboration of the presented content.

In addition to the general procedure concerning the knowledge base, its content management and functionalities, subsequently different processes are presented in more detail. These processes are described in natural language and visualized in a use case diagram to clarify the process-system context (Figure 20). Later on these processes are also shown from the BPMN view (Figure 21). When the user has logged in to the system, he/she has the possibility to browse the knowledge base for content and read information. Further the user can add a knowledge asset in which he/she can choose the type of knowledge asset he/she wants to add (book, journal, article...) and append a short description to it. Moreover, existing content can be edited. The user may comment or rate content, revise content or report inappropriate content to the website administrators. Rating content could be realized by introducing a points-based assessment system. Users could then rate content regarding its quality and usefulness. When a new knowledge asset is added, the system reports this to the administrator who informs the community about the new entry, using the newsletter functionality. Furthermore the user can join a discussion and also create a new entry, for example to start a new discussion in the community. The administrator manages the knowledge base content. When a new knowledge asset appears, the administrator validates it, if possible (depending on the amount of new assets). In

terms of quality management it is important to review new assets and to check them for suitability.

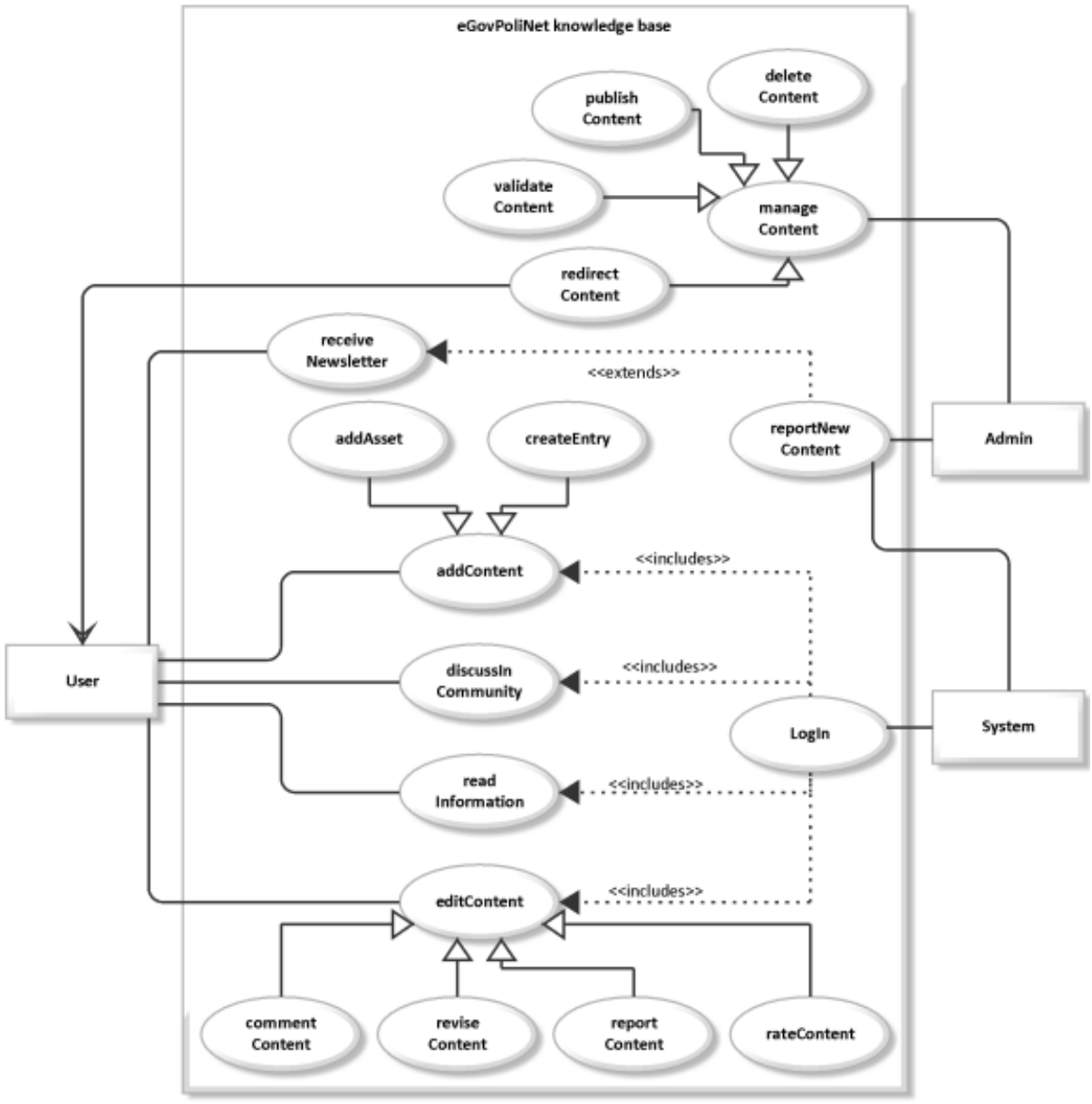


Figure 20 - Interaction of User, System and Admin

In case an asset is inaccurate, the administrator can redirect the asset to its creator in order to revise it. Otherwise it is published. Useless content can be deleted.

Figure 21 shows possible processes which can occur within the knowledge base. In addition to the information Figure 20 shows, the different process branches and proceedings as well as the different participants and message exchanges are pointed out here. This is only a little insight into the processes, whereat the amount of

processes and the processes themselves may be enlarged along the knowledge base enlargement and increase complexity.

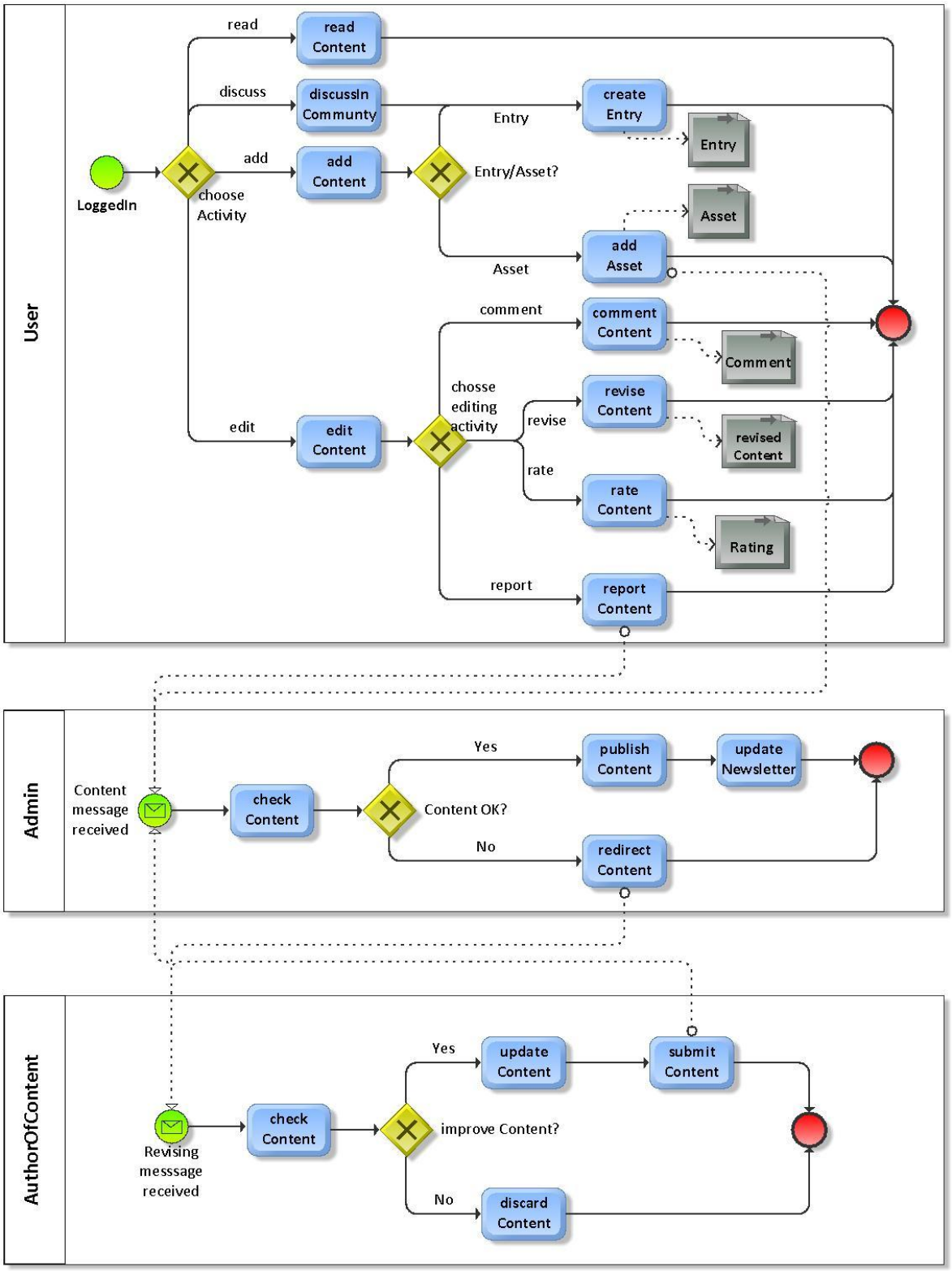


Figure 21 - Processes inside the knowledge base

Chapter 7 has introduced the concept of the knowledge base, with focus on the knowledge base structure, as this is the basis for following activities concerning the implementation. The knowledge assets are described precisely and the ontology proposal may be used to make the knowledge base operable. The processes presented here are only a small section, as the detailed design of all processes is beyond the scope of this work and also dependent on implementation design issues. However, they display the basic interaction of users, administrators and the system. Thereby, possible process branches and their outcome are depicted. Moreover, the processes display the functionalities the knowledge base should provide and the involved actors.

Subsequently, chapter eight reflects the thesis and provides recommendations for the further development of the knowledge base.

8 Reflection & Recommendations

This chapter briefly summarises the thesis and its results. Furthermore some recommendations are provided, concerning the working approach and use of the results.

Chapter one introduced the objective of the thesis, embedded it into a context by explaining the motivation for the bachelor thesis and gave the reader an overview of the approach and structure of the work which were briefly propounded.
Chapter two provided information about knowledge management which is essential for the establishment and maintenance of a knowledge base. Here the eGovPoliNet community was identified as a learning organisation as it creates, acquires and transfers knowledge based on scientific work. Furthermore, approaches for knowledge elicitation and management were presented. It has been found that different types of information providers have to be considered and managed, like academics and practitioners. Moreover, the knowledge life cycle, respectively the knowledge-value chain need to be managed when operating a knowledge base.
Chapter three then introduced stakeholder theory and community building fundamentals. In the analysis of the fundamentals it was found that stakeholders need to be clearly identified and described in order to consider their demands which are directed at the knowledge base. When the stakeholders and their needs are identified it is possible to formulate what type of community is to be built and for what purpose. Moreover, it is essential to include stakeholders into design and development considerations, as thus their motivation to participate significantly grows. In addition, related work was presented and it was determined that eGovPoliNet meets the essential requirements to become a successful online community.
Methods and research design were presented in chapter four. At first a literature review was carried out in order to acquire fundamental knowledge in all relevant areas to draw up this bachelor thesis. Subsequently the methods used for designing the knowledge base concept were described, like requirements engineering, software engineering and business process engineering. The tools used were listed afterwards.

The eGovPoliNet project was presented in more detail in chapter five to clarify the background and the need for a knowledge base. Therefore, the objectives of the project were pointed out and the resulting added value was described. In the following the project's stakeholders were specified in more detail and assigned to user roles in the system context. It was found that people with political background depict research demand in the field of governance and policy modelling and researchers and experts from the IT sector try to develop solutions to satisfy the demands.

In chapter six requirements were formulated which the knowledge base is expected to meet. Based on desk research, related work analysis and use case development, requirements analysis was performed. Results of this analysis were eleven functional requirements which describe the functionalities the knowledge base should provide.

Users can access assets in different ways and interactively comment, share and edit content, which supports the open dialogue, eGovPoliNet tries to establish.

Chapter seven presented the knowledge base structure which can be used as implementation basis. First there is the knowledge structuring visualised in UML class diagrams and described in natural language. It points out the different assets and actors appearing in the knowledge base context, with all their attributes, behaviour and relations. This gives an overview of the assets, their relationships and dependencies they are characterised by. The ontology builds up on this structure, as its fundamental structure can be implemented with the use of the UML class diagrams. The precise description and cross-linking of content, the ontology should provide, is essential to establish meaningful connections among knowledge base content and to make the knowledge base operable for its stakeholders. Unfortunately the ontology has not been worked out in detail due to lack of time. Subsequently, processes were modelled that will appear in the use of the knowledge base. These were modelled as use cases and BPMN diagrams. Thereby, possible executions of knowledge base functionalities and the involved actors were displayed.

Overall, this thesis provides concepts for the technical aspects of the knowledge base in chapters six and seven, as well as organisational management concepts in chapters two, three and five. Eventually it can be stated that the thesis serves as a model for the implementation of the knowledge base. It depicts the involved stakeholders, users and their roles in the system context. Several requirements are

formulated which the implemented knowledge base should meet and processes are shown which should be handled in the final system. Furthermore, the thesis provides an extensive and detailed structure of the knowledge base and its content, which is supported with the given ontology suggestion. In addition, approaches for the knowledge base functionalities are provided. The insights into community building support the interactive idea of eGovPoliNet's philosophy and may be useful to manage the different stakeholders and their demands. Knowledge management approaches are provided as well and give an idea how to organise the knowledge base content.

It is advisable to identify and analyze stakeholders, their demands and the actual purpose of the project at the beginning of developing a concept like this. When the projects' purpose is described clearly and in detail one can start to develop a concept. Thereby, communication among the developers is of highest importance while creating a concept, to ensure the involved people are working into the right direction, pursuing a common goal. For future projects the use of a generic knowledge base framework should be considered which might be adjusted to meet the expected requirements.

As other communities pursue similar goals of knowledge collection and centralisation concerning governance and policy modelling, there is a risk because thereby the communities overcome fragmentation locally but in some respects, keep fragmentation upright, merely on a higher, global level. So it would be important to include further communities and experts into the community, on the one hand to expand the eGovPoliNet community and thereby strengthen its pioneer position and on the other hand, to embank fragmentation. Hence, communication and collaboration among different communities with similar goals is needed as well.

9 Conclusion & Outlook

Web based research on governance and policy modelling is becoming increasingly important in today's society, that is why the European Commission is essentially fostering projects of the field, like eGovPoliNet. As indicated in chapter 3.3, there are numerous approaches and efforts to further advance this field. However, the results of these projects are quite fragmented due to the variety of individual approaches.

eGovPoliNet aims to oppose this development and seeks to collect, process and provide the expertise of professionals in a central location, namely the knowledge base, which's conceptual elaboration has been done in this bachelor thesis.

To achieve eGovPoliNet's goal, it is essential to build a community which advances the development of the project. The members' participation can only be assured when they feel motivated to participate. So members should have the possibility to get insights into project documents and thereby into project advancement. Moreover, they should be given the possibility to actively be part of the community designing process and to bring in their expertise, as this is on what eGovPoliNet builds up.

It can be noted from the author's view that there is no general concept how to build a knowledge base. The design of a knowledge base concept depends on the domain where it is used, the involved stakeholders, the users who use it, the assets which have to be managed and the fundamental purpose the knowledge base is used for.

The knowledge structuring and ontology development require most working effort, as they are the main components of the concept and define the basic shape of the knowledge base.

This thesis provides a concept which points out the basic structure and functionalities, the eGovPoliNet knowledge base should provide. Based on these findings, software engineers and programmers can decide how to implement the knowledge base and choose a suitable software environment for the implementation.

The approach eGovPoliNet pursues is quite promising, as especially the knowledge base with its content is an essential step to overcome fragmentation across disciplines. Using the knowledge base, eGovPoliNet becomes a central point of contact which provides a multiplicity of expert knowledge and thereby essentially advances the development of governance and policy modelling. The thesis provides groundwork for the technical implementation and use of eGovPoliNet's knowledge base as well as approaches for stakeholder engagement which is the key for

successful community building. In case the implementation and the subsequent use of the knowledge base will be successful, it will be to consider expanding the knowledge base in its scope and functionality to attract a broader audience and to become the major driving force in advancing governance and policy modelling.

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