OCOPOMO
Open Collaboration in Policy Modelling

D1.1 STAKEHOLDER IDENTIFICATION AND REQUIREMENTS FOR TOOLBOX, SCENARIO PROCESS AND POLICY MODELLING

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EXECUTIVE SUMMARY

As stated in the technical annex of the OCOPOMO grant agreement, the overall goal of the first work package - *Requirement Analysis for IT Solution, Narrative Scenario Development and Policy Process* Design – has to ensure that the development of the ICT toolbox and the policy modelling base on solid user-driven requirement analysis incorporating the needs in two pilot policy areas (see p. 38). The goals of work package 1, outlined in the technical annex, were to identify key stakeholders for policy modelling and to elicit their needs in solving specific socioeconomic policy problems. Therewith, requirements for policy modelling, scenario building and the ICT toolbox facilitating wide collaboration among stakeholders in policy analysis, formulation and evaluation should be analyzed and specified.

The following objectives have driven the tasks of work package 1 (cf. technical annex):

- to characterize the problem scope and identify the stakeholders (policy makers, policy analysts, interest groups, citizens, politicians) of it;
- to elicit needs and expectations of specific stakeholders dealing with diverse policy challenges in the different contexts of the pilots;
- to investigate of stakeholders' requirements for collaborative generation of scenario narratives, design of respective policy models;
- to specify requirements for the integrated ICT toolbox supporting wider consultations, scenario building, policy modelling and simulation;
- to outline the pilot application.

The results of the tasks in work package 1 are documented in this deliverable D 1.1. The report describes the stakeholders identified in each of the pilot cases (Kosice Self-governing Region and Campania Region), their requirements for the policy modelling, scenario processes and the integrated ICT toolbox supporting policy modelling and collaborative scenario development. Moreover it outlines the way in which the OCOPOMO approach will be applied in these two pilot cases.

The first pilot case applies to Kosice Self-governing Region (KSR) in respect to utilisation of renewable energy sources. Basic focus is set on issues of heating and possibilities of energy savings in this area. The second pilot case applies to Campania Region and structural funds enforcing competitiveness and cohesion. Knowledge transfer and its impact on SME's development will be put in the spotlight. For KSR two groups of stakeholders were defined: internal stakeholders (KSR authorities along with the related entities) and external stakeholders at different levels, i.e., international (European Union), national (Slovak government) and regional (energy producers, energy consumers, NGOs etc.). For Campania Region, the following stakeholders were identified: policy makers, authorities managing structural funds, funding beneficiaries and end users (NGOs, citizens, companies etc.). Furthermore the compound analysis of the decision making process has been set, supporting the application outlines and showing, which processes of decision making can be supported by the ICT toolbox.

Based on stakeholder analysis as well as demands related to the methods of policy modelling and scenario generation, a set of functional and non-functional requirements has been defined. The requirements have been divided, first, into four categories: cooperation, collaborative scenario generation, policy modelling, integration of ICT toolbox; and then regarding the prioritization in terms of must-have, should-have and nice-to-have, which will drive the subsequent implementation. The requirements are the basis for the subsequent activities in policy modelling and the OCOPOMO platform design. They shall guarantee the quality and usefulness of the tools to be designed to fulfill the OCOPOMO objectives.

1. INTRODUCTION

1.1. AIMS AND SCOPE OF THE OCOPOMO PROJECT

OCOPOMO (Open Collaboration in Policy Modelling) is a project co-funded by the European Commission under the 7th Framework Programme, Objective 7.3 (ICT for governance and policy modelling). It aims at defining and demonstrating a new approach to policy formation that resolves crucial issues involved with prevailing approaches, such as (cf. technical annex)

1. Inappropriate ICT support in foresights, especially in long-term policy planning;
2. Lack/inability of managing complexity in strategic planning and policy making in complex socioeconomic environments;
3. Lack of open collaboration and lack of transparency in identifying the crucial features of complex social and macroeconomic models to simulate potential alternative policies;
4. Ignorance of the scope for e-participation and other forms of ICT-enabled efficient collaboration of communities of stakeholders relevant to the given policy area;
5. Lack of focus on developing, visualizing and simulating appropriate policy models to enable better management of socio-economic developments and identification of interdependencies that result in complex social and economic relations likely to affect future developments; and/or
6. Lack of comprehensive IT solutions to support policy modelling and simulation, collaboration among, policy analysts and policy operators, wider interest groups and the general public.

To cope with these challenges of existing approaches to policy generation and foresights, OCOPOMO provides an innovative "off the mainstream" bottom-up approach to social policy modelling, combined with e-governance tools and techniques, and advanced ICT technologies. The project aims at creating an ICT-based environment integrating lessons and practical techniques from complexity science, agent based social simulation, foresight scenario analysis and stakeholder participation in order to formulate and monitor social policies to be adopted at several levels of government. Policy issues which are high on the European political agenda will serve as test-beds to evaluate and test the OCOPOMO approach. The policy cases selected for this purpose are (1) renewable energy, which will form the use case from Kosice Self-governing Region, and (2) management of structural funds shaping the use case from Campania Region.

In more detail, OCOPOMO will provide an integrated ICT toolbox with proper mechanisms for open collaboration in policy modelling, including collaborative support for scenario based futures development. It will enable actors of all target groups at different levels of government across Europe “to master and shape future developments so that the demands of its society and economy are met”. Finally, with the two test cases, OCOPOMO will demonstrate that, with appropriate ICT, the integration of formal policy modelling, scenario generation and open and widespread collaboration is not only possible but can come to be seen as essential at all levels of policy formation - whether local, regional, national or global. The overall concept for this approach is shown in Figure 1. Through an open collaboration platform (e-participation features), the stakeholders develop a set of scenarios for the policy cases (1). Based on the understanding of each policy case and the most wanted scenario elements, policy experts generate a common macroeconomic model (2) as well as targeted individual agent-based policy models for the pilot cases (3). These formal policy models are simulated (4) and visualised to enable stakeholders (5a) and policy modelling experts (5b) to validate and evaluate the simulated policy models. In several iterations of scenario and model development, the policy models are refined.

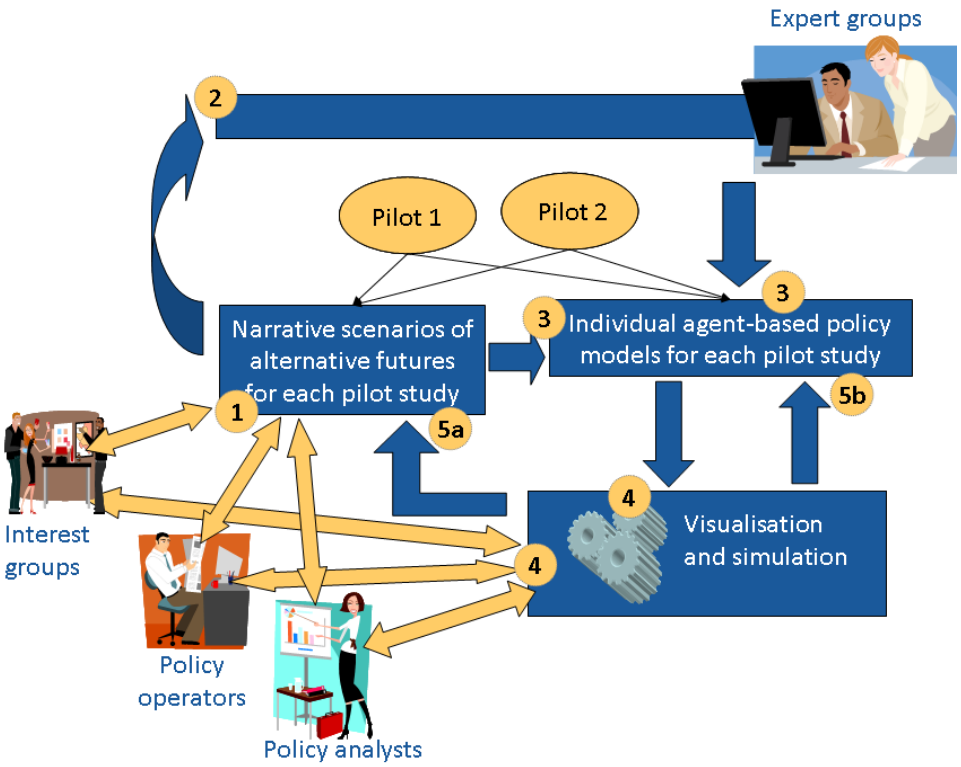

Figure 1: Overall concept for open collaboration in policy modelling in the OCOPOMO project

Through open and widespread collaboration via the ICT toolbox, scenario generation and formal policy modelling, the policy experts as well as wider stakeholder groups are supported in strategic decision making and policy formation. The OCOPOMO approach thereby provides a more suitable policy approach and engages the stakeholder in different stages of the policy formulation.

1.2. PURPOSE AND STRUCTURE OF THE REPORT

OCOPOMO started on January 1, 2010. This first deliverable targets the identification of the stakeholders and the investigation of their specific needs and requirements as well as process requirements for an e-participation platform to enable open collaboration in the policy processes.

The central methodological and theoretical challenge of the OCOPOMO project is to integrate formal policy modelling, scenario generation, open collaboration supporting stakeholders' engagement in social and economic policy with ICT solutions. Having this aim, deep analysis of users' requirements is essential to provide recommendations for development of the integrated ICT toolbox. This will ensure that the further work is based on carefully extracted relevant information of what the users expect from the tool and how the e-participation platform can facilitate their decisions and tasks to best meet their requests. Within the OCOPOMO project, the stakeholder elicitation and requirements specification lay the ground for the subsequent work packages (WP2, WP5 and further).

The requirements are examined by gaining insight into two different but current and significant practical pilot cases of policy issues: renewable energy (Kosice case) and management of structural funds (Campania Region case). The report discusses the requirements for the scenario process, the policy modelling and the toolbox as the state-of-the-art methodology and technology related to the project's scope.

How the requirements analysis fits into the overall OCOPOMO project plan is depicted in Figure 2.

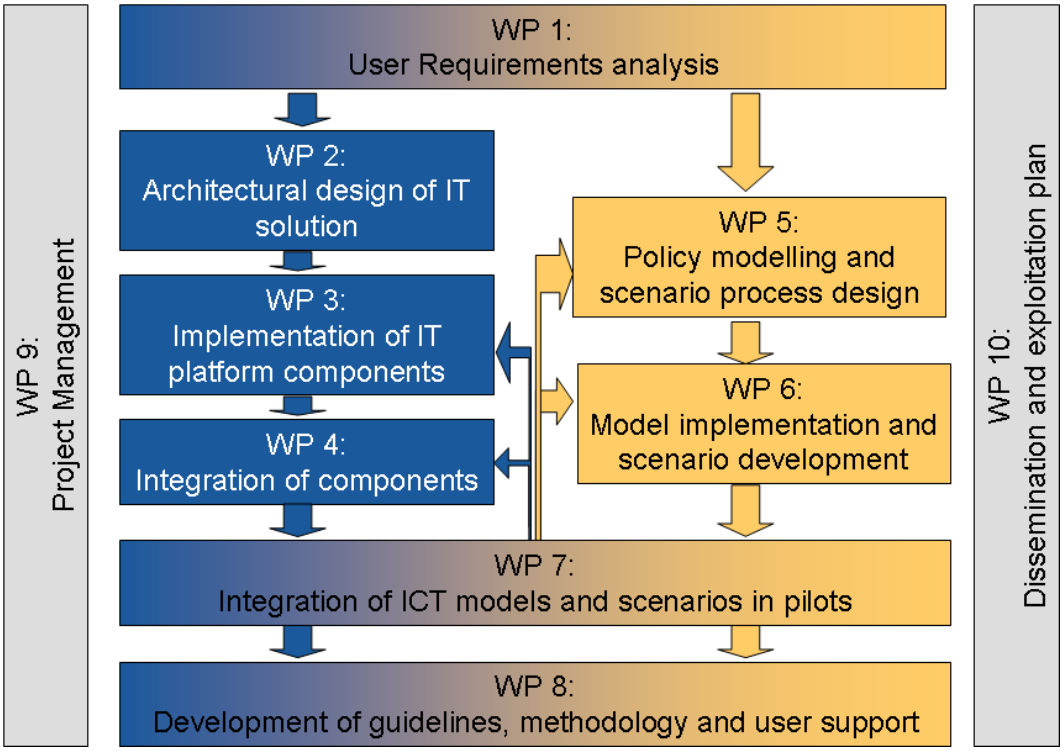

Figure 2: OCOPOMO's approach to implement the project

The remainder of the report is as follows:

Chapter 2 introduces to the methodologies used to perform stakeholder analysis, to analyse the pilot cases and to specify the user requirements. The first subsection focuses on description of the methods employed to investigate the user requirements. In the second section, the methods to examine the specific requirements and needs in scenario generation and policy modelling are presented as well as needs in ICT tool support.

In **chapter 3,** pilot cases from Kosice and Campania Region are investigated. The report presents the pilots' analysis results, i.e. the as-is situation and background information needed to understand the policy cases, the stakeholders and the decision making processes. This chapter herewith illustrates the overall context, procedures and conditions for the policy cases.

Chapter 4 presents an initial outline of the scenario-building and policy modelling processes planned within OCOPOMO. The approach will be further refined in work package 5 in an iterative step.

Chapter 5 elaborates and specifies the requirements for scenario-building, policy modelling and the ICT toolbox, both, general and for selected policy cases (Kosice and Campania Region).

Chapter 6 gives an outline of each of the pilot applications. It settles the specific policy case for the subsequent work in packages 5 and 6, and it outlines the to-be process for the OCOPOMO piloting. The chapter details the policy process for the OCOPOMO application.

The report concludes with an illustration about how the analysed user requirements will contribute to the subsequent work packages of the OCOPOMO project (**Chapter 7**).

2. METHODOLOGY FOR INVESTIGATING USER REQUIREMENTS

The OCOPOMO approach will be adopted and evaluated in two different pilot cases: the Kosice Self-governing Region of Slovakia and the Campania Region of Italy. It is crucial to analyse each pilot case as well as the general environment in which the OCOPOMO approach will be employed. The detection and elicitation of requirements can be seen as the first step in the requirement analysis. Therefore, this chapter subsequently

(1) presents the approach to identify the stakeholders in policy cases and

(2) illustrates the methodology for investigation of the specific requirements and needs in scenario generation, policy modelling and ICT tool support.

2.1. APPROACH TO STAKEHOLDER ANALYSIS IN POLICY CASES

Stakeholder analysis aims at identifying the problems, which will be explored with the support of the integrated ICT toolbox taking into account social, economic, organisational and legal conditionings of both use cases as well as identifying the different users/stakeholders and their special needs and expectations. The necessary information was gathered by means of desk research, group meetings and individual meeting of partners with the local authorities participating in the project as user partners.

Specifically, two study visits were performed, which aimed at consulting and elaborating the policy scopes with both user partners. First meeting was held in Kosice (March 2-3, 2010), second in Naples (April 15-16, 2010).

During both meetings, the preliminary pilot policy scopes were agreed upon (see sections 0 and 0). Simultaneously the initial identification of stakeholders was executed (see sections 3.1.2.1 and 3.2.2.1). An important goal of the meetings was to understand local conditions, especially the decision making responsibilities and procedures. User partners elaborated on this issue describing competences of the regional government and different levels of decision process along with units involved in it (see section 0 and 3.2.3). As one of the objectives of the meetings was to deepen among the user partners the understanding of methods and tools that will constitute the ICT toolbox, introduction to scenario building and policy modelling was held. Additionally, scenario building session took place during the meeting in Campania.

Subsequently, during the serious of individual meetings, user partners specified existing demands concerning policy scope, parties participating in it as well as stakeholders' roles. Basing on that the detailed list of stakeholders and their expectations regarding policy problem were developed. Only after that the methods of involving main stakeholders into the policy building process were elicited for every region (see sections 0 and 3.2.3.3). Moreover, during the individual meetings the application outlines has been sketched showing which processes of decision making can be supported by the OCOPOMO approach (see sections 6.1 and 6.2).

The employed methods helped to uncover the expectations of the pilot users for the OCOPOMO project as well as the most important issues related to the existing decision making processes, legislative framework in the pilot cases. Used tools provided explanations and clarified inconsistencies as well as important background information.

2.2. ANALYSIS OF USER REQUIREMENTS FOR COLLABORATIVE ICT TOOLBOX TO SUPPORT SCENARIO GENERATION AND POLICY MODELLING

The methodological approach to analyse the user requirements for the ICT toolbox is based upon the design phases of the guideline for e-participation initiatives presented in (Scherer et al., 2010). This guideline envisages a separate phase to design the participation processes before planning specific electronic features. This requires, first, to design the scenario building, policy modelling and participation processes and to analyse the requirements identified before designing supporting ICT-based processes. Figure 3 visualises the methodology with stakeholders involved, methods applied and results for each phase of the overall process. The methodology consists of four phases, which are briefly described subsequently.

Phase 1: Initialisation

In Phase 1, key literature and related work in the field of application is reviewed. The desk research helps to get a basic understanding in the following respects:

1. Stakeholder participation and engagement: Basic understanding of stakeholder participation and engagement is needed in phases 2, 3 and 4. This is gathered through literature study by investigating how stakeholders can be engaged in participation processes especially for policy modelling and scenario building.
2. Policy processes: Basic understanding about policy lifecycle and decision making processes are needed in phase 3. Desk research elicits possibilities of stakeholder participation, which are subsequently assessed in respect to how suitable such concepts form literature are in the two pilot areas.
3. E-participation tools and methods: Tools are investigated in respect to their general use in e-participation, and how suitable these are for engaging stakeholders in scenario building and policy modelling.
4. User requirements analysis: General understanding and different requirements engineering methods are investigated to be prepared for the subsequent phases 2, 3 and 4.
5. Scenario building: Shared understanding of scenario building concepts has to be built up for phase 3. In specific, a common framework to the scenario technique needs to be established with the following features:
    a. Different types of scenarios: Scenario analysis is an inherently flexible approach that can be customised for application to different problems. Existing reports of applications to different policy issues and environment will form the basis of an evaluation of existing classification schemes and types of scenarios to formulate a set of alternative possible scenario applications. In phase 2, these findings will be used to identify appropriate scenario applications and to support policy lifecycle and decision making processes in phase 3.
    b. Phases of the scenario building process: A thorough investigation is made to understand and agree upon a scenario building process, which is detailed in phases 3 and 4 to perform stakeholder analysis and policy processes analysis in respect to the scenario building.
    c. Characteristics of scenarios: The characteristics of scenarios need to be extracted in particular in phase 3 and 4, as well as in view of facilitating policy modelling and developing the ICT toolbox. Several characteristics of scenarios are analysed and assigned to the different types of scenarios and the scenario building process.
    d. Scenario application fields: Scenario building has been applied in different context. Desk research will investigate lessons from these cases to prepare a well defined scenario process targeted to the two policy pilot cases. This includes considerations of: which type of scenario is most appropriate to apply in which contexts, and how to design the process, as well as what contribution is necessary from stakeholders and moderators and how to organise interaction and joint scenario development. Scenario building procedures are analysed regarding the activities to be performed.

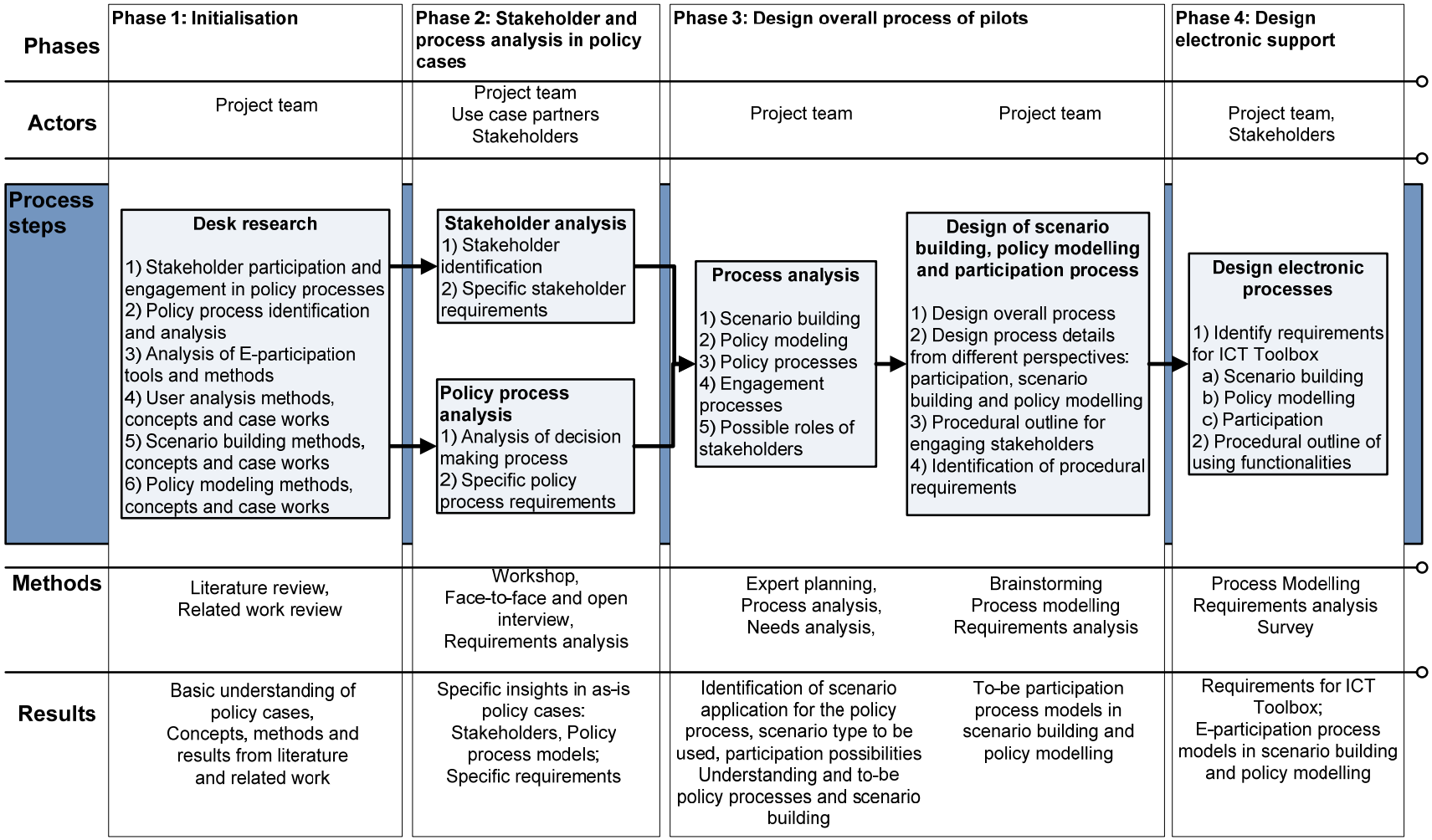

Figure 3: Methodology to analyse user requirements for the ICT Toolbox

6. Policy Modelling: Bottom-up, evidence-driven, agent-based policy modelling has shown considerable promise in previous applications but does not have the same widespread record of application as narrative scenario analysis. Consequently, there is not a body of previously defined categories, phases and characteristics analogous to those described above for scenario building. In these circumstances, it is consistent with the whole approach of the project to build up requirements analysis as develop the early prototype models are being developed. The basis of own past experience and common sense evidence that stakeholders cannot be asked to contribute directly to the implementation or event the designs of the models. Certainly they cannot write the rules that drive agent behaviour and social interaction. Therefore, an initial approach to stakeholder engagement in policy modelling is to be drawn up, whereby the models are presented as gaming simulations in which users can play the roles of any or all of the modelled stakeholders. The other stakeholders will be represented by software agents. It will be essential to be able to capture the reasoning of the human players in order for expert modellers to formulate that reasoning as logic-like, if-then rules.

Phase 2: Stakeholder analysis in policy cases.

The aim of this phase is to analyse the policy cases – the as-is situation as well as background information needed to understand the policy cases and the peculiarities, the processes, the stakeholders etc. With the description of the policy cases along these aspects, a number of requirements will emerge, which will be explicated and described. The process itself is detailed in chapter 4.

Phase 3: Design overall process of the pilots

In this step, results from phase 1 and 2 are brought together in order to identify all possible application alternatives for scenario technique along the policy processes investigated including respective stakeholder involvement. A key factor in the success of scenario technique is the extent to which it is linked to the requirements of the policy processes, the stakeholders of the process and the policy modelling aimed at in the end. The result is the overall to-be process to be applied in the pilots. The process details are designed from different perspectives:

1. Scenario building: Scenarios are an important technique that may be used at various stages of the policy process, principally used to derive the characteristics of the wanted to-be situation. Hence, possible application fields along the policy processes have to be identified at first. Then, the possible objectives to use the scenario technique in the context of the various possible stages of the policy process have to be identified. This lays the foundation for identifying possible roles of stakeholders and the tasks they can fulfil in the scenario building process, as well as assessing which roles the stakeholders may like most (i.e. role with which most stakeholder contribution can be achieve) and which roles are most important to support the achievement of its objectives (i.e. role which delivers the most valuable input). As a result from this step, a portfolio follows that depicts the different possible scenario application alternatives, from which one specific scenario application alternative is chosen.
2. Policy modelling: After deciding on a specific scenario application, a prototype policy model can help to reveal the means by which the identified goals might be reached. It facilitates the development of insight and deeper understanding of the impact and importance of any proposed policy actions, and might further inform the scenario building process by suggesting to stakeholders new aspects or by altering previously specified assumptions. The objective of policy modelling at this point is to describe the stages and stakeholders of a policy process for a restricted application area by a formal model. In subsequent simulations, the model is then inspected and analysed under the influence of various conditions, in order to assess the scenario design and raise topics for discussion. Furthermore, the (potential) users of the later pilot case policy models are enabled to get an impression of the potentialities and restrictions of policy modelling, while for the project team the specific requirements for modelling and simulation methods to be applied (that go beyond the requirements for user participation, e.g. adequate modelling technique for the expected complexity of models) can be raised.

3. Participation: In order to fit the participation processes to the decision making, scenario building and policy modelling processes to have the best possible impact of participation, a detailed analysis of processes and possible points of participation needs to be conducted in advance. As a result of this step, the project team decides which of the e-participation areas[1] will be supported to achieve the project objectives. Besides that, decisions will be made on how these areas can be implemented i.e. which activities are performed.

Requirements analysis focusing on the processes needs to be conducted thoroughly in phase 3. Finally, the goals of each activity have to be agreed with measurable values, e.g. the impact to be achieved.

Phase 4: Design electronic support

Based on the particular processes and user needs analysed in phase 2 and 3, next step is to decide which media and channels need to be supported and (if applicable) which tools are to be integrated into the platform to support the participation processes (cf. also (Phang and Kankanhalli, 2008)). The use of particular tools for e-participation cannot be recommended on a general level, because

a) the usage should depend on the aims of the project and the processes established (see step 2, step 3 and (Phang and Kankanhalli, 2008)) and

b) investigations did not unveil any preferred tools (Scherer et al., 2009).

In terms of usability, the use of different participation features must be well-considered to not overload the users. Beyond that, participation features should only be provided in the case where the voice of participants is really heard by responsible authorities: An e-participation feature can only be used if the integration of the processes and results into the overall political process is ensured. It must be ensured that the users can see that their engagement will be recognized.

The design of the electronic means (i.e. ICT) should involve the real users in order to analyse requirements and design user-friendly services (Scherer et al., 2009). It is especially substantial for e-participation that communication by electronic means is not more complicated than necessary. Hence, usability of the platform is of significant importance for the success of the project. Easy-to-use is a key requirement for participation tools in order to avoid usability flaws that could discourage people from participation in the project. Widely established tools and user paradigms ease the participation for users.

The aim of this phase is to elicit technical requirements on a prospective ICT tools supporting actors participating in the targeted process of collaborative policy formation. In this process, three types of actors such as analysts, developers, and users are expected to be involved and supported by the ICT solution on different levels in respect to their overall involvement. The analysts include modelling experts (scenario analysts and process modellers); the developers are “technical” persons that support the analysts by particular software solutions, and finally the users include prospective users of the ICT toolbox which will be developed within the project. The elicited requirements will form a solid base for the subsequent development of the ICT toolbox within Work package WP2.

Within this phase two types of requirements are considered: functional and non-functional. These are defined as follows:

- **Functional requirements** define those features of the platform or ICT toolbox that will specifically serve a user with specific interaction and such features that describe what the system is capable of computing. Functional requirements describe what the “system” (the ICT toolbox or OCOPOMO platform) should do.
- **Non-functional requirements** describe system quality in terms of usability, user-friendliness, performance, reliability, security, etc.

Formally, each requirement will be described using a set of characteristics as shown in Table 1. The following six main characteristics are used to provide sufficient description of requirements:

[1] E-participation areas proposed by the network of excellence for e-participation DEMO-net are introduced e.g. in [5].

- **ID** – a unique string enabling to identify the requirement. It can be used to reference the requirement within all project materials.
- **Type** – nature of the requirement (functional or non-functional)
- **Priority** – importance of the requirement (must-have / should-have / nice-to-have)
- **Name** - a short (mostly one line) characterisation of the requirement
- **Description** – a more elaborated description of the requirement presenting details of the requirement
- **Measurement indicators** – an indicator (or a list of indicators) enabling to check (measure) throughout evaluation of the system in the piloting phase (work package 7) whether the requirement has been met or not.
- **References and further comments** – e.g. references to supportive material.

Table 1: Table used to describe requirements

Requirement ID: classid-###, **Requirement Type:** Functional / non-functional, **Priority:** Must-have / Should-have / Nice-to-have
Name:
Description:
Measurement indicators:
References and further comments:

The requirement priority enables to link requirements with the importance to be incorporated into the final ICT project solution. The priorities are as follows:

Must have – essential requirements, their presence is required to ensure overall system functioning. The absence of a requirement from this category implies that the ICT toolbox is not able to fulfil its mission.

Should have – important requirements. Although the ICT toolbox can be used despite the absence of a requirement from this category (basic functionality is not hampered), the toolbox's usage could be cumbersome without such requirements being fulfilled.

Nice to have – requirements influencing mostly user comfort, their absence has no implication on the ability and functioning of the toolbox to support users in their tasks, but such requirements improve the user satisfaction and quality.

According to this value, it is possible to group all requirements into these three categories – see Figure 4. All requirements from the first category are expected to be implemented. Requirements from the second category have better chances to be implemented than requirements from the third category, but actual decision on selecting/rejecting will be based on required effort and available resources.

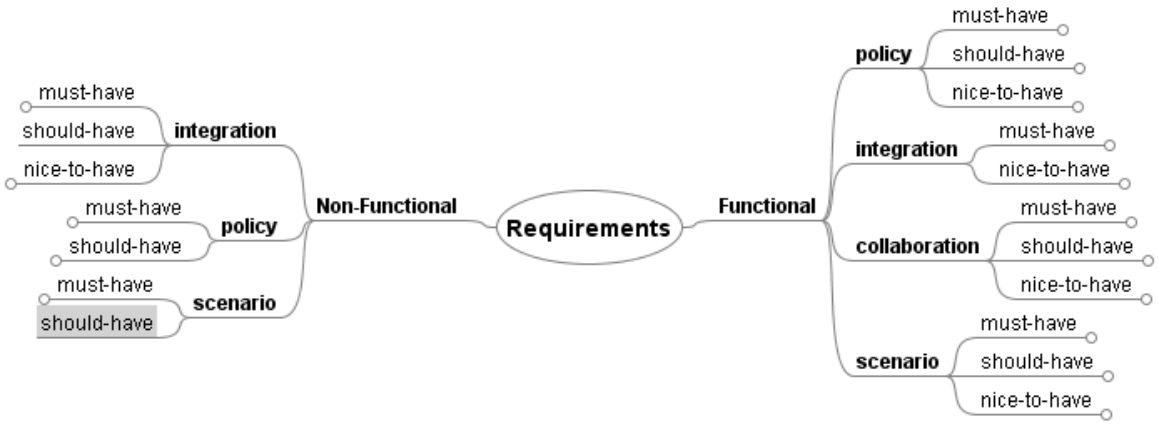

Figure 4: Requirements framework: group requirements along characteristics such as functional / non-functional requirements, groups of requirements for key components and prioritisation

The process of eliciting requirements can be decomposed into two basic parts depicted in Figure 5 and Figure 6. The first part focuses on establishing an environment for gathering requirements (see Figure 5). The process heavily depends on achievements of the previous phases. Descriptions of scenario building and policy formal modelling processes are of special importance since they form a stage for this phase. Those processes can be broken down into individual activities. First, those activities must be analysed from the point of possible ICT support – which activities can potentially benefit from the support by ICT tools (in what way and what will be the added value) needs to be identified. Based on this analysis, it can be decided, which activities will be supported electronically and which (if any) not. This decision will be based on the opinion of scenario generation and formal modelling experts supporting the whole process of policy development.

Having selected a subset of activities to be supported electronically, it is possible in this first part of the requirement gathering process to carry out interviews and discussion with user partners and scenario generation and policy formal modelling specialists in order to identify IT tools which have a potential to support the selected activities. The discussed IT tools can involve but are not limited to Discussion forums, Mailing list, Chat, Wiki, Polling, Teleconference, Multi agent modellers, etc. Although maybe (some of) those tools will not be incorporated into the final ICT toolbox, they can serve as a valuable source of inspiration what IT can offer for policy modelling.

After making the decision on supported activities and collecting information on prospective tools to be integrated, the requirement formation starts. Based on the previous analysis, experience of project team members as well communication with a sample of external stakeholder representatives, initial requirements on the ICT tools are generated. The requirements are generated except the priority field, which is not considered at this stage.

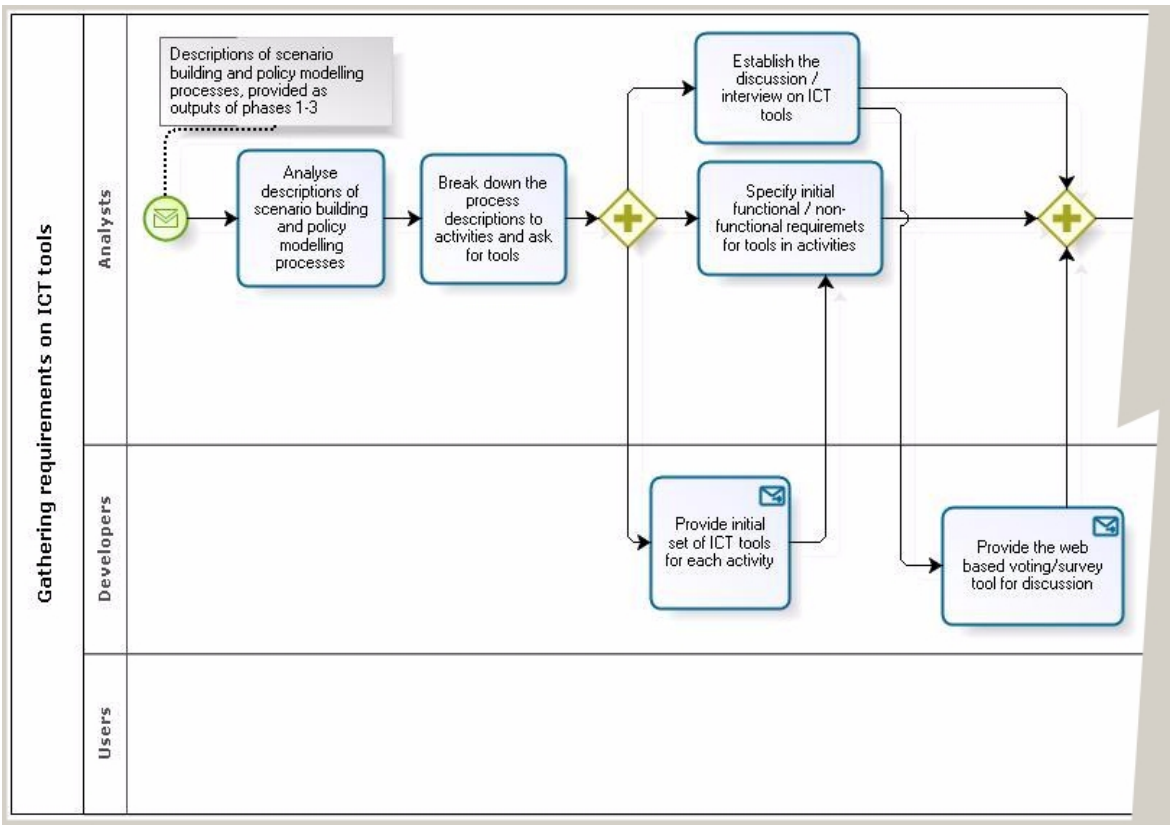

Figure 5: Requirement elicitation process, part1 – establishing an environment for discussing and gathering requirements

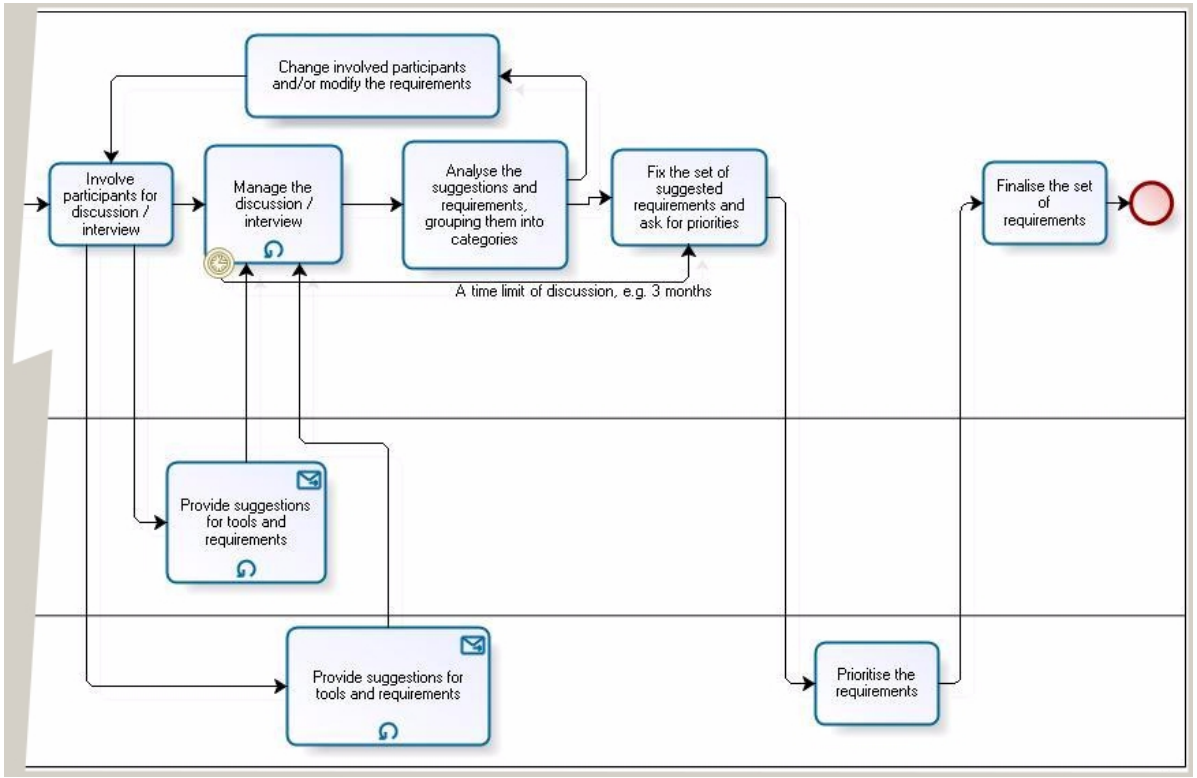

Figure 6: Requirement elicitation process, part 2 – managing the discussion on the ICT tools and requirements

The initial set of requirements forms a seed for the subsequent second part of the process of eliciting requirements. This part focuses mainly on requirement elicitation and evaluation (see Figure 6).

The requirement formation is carried out iteratively – requirements are formulated by individuals, discussed in teams, modified, enhanced, split, merged, and discussed again, etc. The number of iterations is limited by time constraints as well as responsiveness by the engaged experts. One iterative cycle consists of analysing current requirements and suggestions/comments, modifying current requirements to produce an updated set of requirements, discussing the updated requirements and providing comments and/or suggestions on the requirements.

Having created and stabilised a set of possible requirements, it is possible to involve broader audience into the requirement forming process. The last step is to prioritize the defined requirements – to assign priority values to them. Relevant prospective users are provided with a list of requirements to select a proper priority and to comment the requirements. The collected information is subsequently processed, final priorities are assigned and optional comments are attached.

Based on assigned priorities, the set of requirements will be finalised. The priority of the requirements will be a main criterion for a later decision on requirement grouping - all requirements will be divided into three groups:

- Requirements to be implemented for the first trial of pilot applications
- Requirements to be implemented for the second trial of the pilot applications
- Requirements to be postponed after the end of the project (they can be done, but not within the OCOPOMO project, e.g. in subsequent R&D projects, spin-off activities, etc).

The project follows an iterative approach to collect requirements. In the intersection of such rapidly evolving areas, as e-governance, knowledge management and policy modelling, no other approach is more feasible, in a three year project. Therefore, this deliverable provides an initial (more or less) stable set of requirements, leaving open the possibility of updating or enhancing them, based on the results and evaluation of the trials carried out during the project.

3. STAKEHOLDER ANALYSIS IN POLICY CASES

3.1. KOSICE REGION

3.1.1. Description of the Kosice pilot case

3.1.1.1. Description of the socioeconomic and political situation in Kosice

General information

The NUTS III[2] Kosice Self-Governing Region (KSR) is located in the south east of the Slovak Republic (SR). With the population of 774 728 (in 2008), it is the second most populous region in Slovakia and with an area of 6 753 km^2, it covers almost 14% of the Slovak Republic. In the east it borders with the Ukraine, in the south with Hungary, in the west with the region of Banská Bystrica and in the north with the region of Prešov.

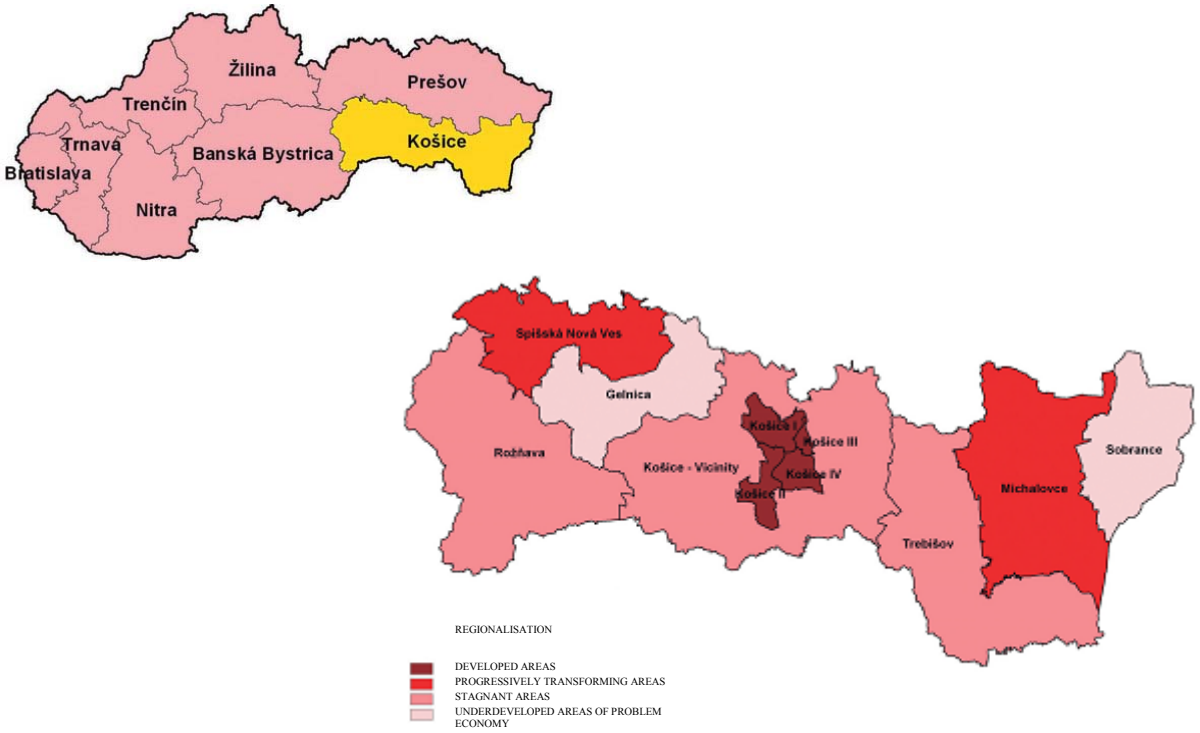

Figure 7: Administrative division of Slovakia and Kosice Self-governing Region

Source: Kosice Self-governing Region

KSR consists of eleven districts: Kosice I to IV, Kosice-surroundings, Gelnica, Michalovce, Rožňava, Sobrance, Spišská Nová Ves, and Trebišov. Residential structure of the Kosice region is based on 440 municipalities; 17 of those are represented by towns. The capital of the region is the city of Kosice with 236 thousand inhabitants, which figures as the administrative, industrial, business, economic, educational, cultural and historical centre of the Eastern Slovakia territory. By its population Kosice is the second largest city in Slovakia after the national capital Bratislava.

[2] Nomenclature of Units for Territorial Statistics (NUTS) is a legal framework for the geographical division of the territory of the European Union in order to harmonize the collection, transmission and publication of national and Community statistics. There are three levels of NUTS defined which base on the existing national administrative subdivisions and the size of population of the administrative unit.

Geography – superficies, rivers and climate

The region is located in the north, mild zone with average annual temperature of 8-10 °C, but the south east reaches temperatures which are inland sub-tropic temperatures. The largest river in the region is Hornád. The region of Kosice has very good traffic connections. International road routes and railways are all across the area and Kosice has an international airport. The region has the following areas of tourism: Kosice and surroundings, Dolný Zemplín, part of Spiš and part of Gemer.

The Kosice region has a great number of national natural monuments, natural monuments, protected areas, national natural reservations and natural reservations. There are four large protected areas located in the Kosice region (the Slovak Paradise, Slovak Carst, Vihorlat and Latorica). The first two are popular destinations for the tourists.

Demography

The region of Kosice is the second most populous district of Slovakia. Most people (56%) live in urban areas. Demographic trend in the region is influenced by relatively high natality, which reaches its highest values in Slovakia. Even though the aging process is apparent, however, it is not so dramatic in this region. Children represent one fifth of the population within the age structure, people in productive age represent 63.2 % of total number and those in post-productive age represent 19.3%[3].

National composition

The national composition of the population is very diverse. The minorities of the neighboring countries live along the state borders. The largest minorities are Hungarian and Roma minority with their administrative centre in Kosice. The Ukrainians and Ruthenians live in the north-eastern part of East Slovakia with their administrative centre in Prešov. The Polish minority plays only marginal role. Hungarian, Ruthenian and Ukrainian pupils attend basic and secondary schools with their official language. The Roma minority is socially excluded and economically handicapped. The unemployment rate and poverty rate in this community exceeds the overall average rates computed for the whole region. According to KSR, there are no national or racist tensions between the Roma and other minorities, but the population expansion and neglecting of the Roma problem may bring a lot of problems in the future.

Education

Education system is particularly important for development of East Slovakia. The number of population in region with upper secondary and post-secondary education is increasing. In 2008 it was about 66%. The number of population in 2008 with tertiary level of education attained about 10 percent and it has an increasing tendency.

The number of students in the Kosice region is about 155 000. Approximately 50% of students attend primary schools. The number of students on secondary school level is about 51 000. The total number of students studying at all universities in the region is over 26 000[4].

In the Slovak Republic the network of secondary schools consists of:

- Secondary Grammar Schools;
- Specialized Secondary Schools (SOŠ);
- Joint Secondary Schools (ZSŠ);
- Secondary Apprentice Schools and Vocational Schools (SOU a UŠ).

[3] http://portal.statistics.sk/showdoc.do?docid=716

[4] http://www.sario.sk/userfiles/file/sario/pzi/regiony/kosice/kosicky_kraj.pdf

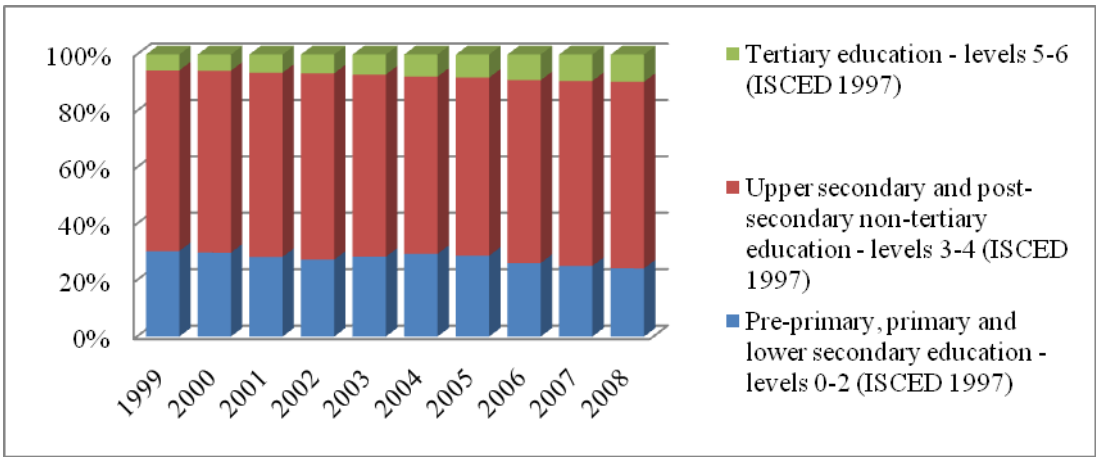

Figure 8: Population in Kosice region aged 15 and over with highest level of education attained

Source: Eurostat

Three universities are located directly in the city of Kosice (Technical University of Kosice, University of P.J. Šafárik, and the University of Veterinary Medicine), as well as three detached offices of other universities (the University of Žilina, Slovak University of Agriculture in Nitra, and the University of Economics of Bratislava). The universities prepare specialists in technical, social, human, and natural sciences. The Technical University does a research and provides an education in the field of technical disciplines as electrical engineering and informatics, machine building, metallurgy, mining and building industry.

Economy growth

The Kosice region is the second most important region in Slovakia in terms of export capacity and GDP per capita. In 2007 it generated 11.73% of the total Slovak GDP[5], while its share on total Slovak population was about 14.3%.

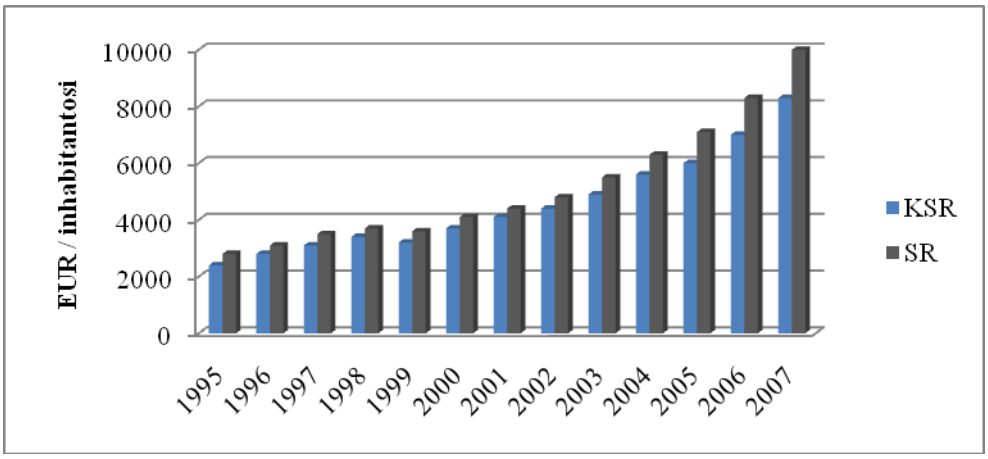

Figure 9: Gross Domestic Product (GDP) at current prices of the Kosice Self-governing Region and Slovak Republic

Source: Eurostat

[5] http://portal.statistics.sk/files/Sekcie/sek_300/330/rev_hdp/Reg_rev_hdp_1995-2007.pdf

Foreign trade

After 2002 the volume of the Slovak foreign trade has gradually increased. In 2009 the total volume of the foreign trade turnover was 78 244.3 mil EUR[6]. While the EU 25 states generally have a relatively stable volume of import and export, in Slovakia the total value of export and import increases. A significant increase can be seen in the area of export, which results from a gradual increase in competitiveness of the Slovak economy. The foreign trade was totally re-oriented and the main business partner became Germany and other EU member states. The main factors of economic growth in Slovakia are foreign direct investments (FDI). The total volume of FDI was significant in the last 5 years. Unfortunately, FDIs are located mainly in the western and the north part of Slovakia.

Import to the Slovak Republic is also increasing. A significant change occurred in import from the EU countries – after Slovakia joined the EU in 2004, the import increased significantly. In 2010 (January-March) the share of import from EU countries represented 65.7% of the total import. The most significant change in the export from the Slovak Republic, when compared to 2009, occurred in the export to the EU countries – it has increased by 8.9%. The EU countries with more significant increase of import from the Slovak Republic in 2010 were Ireland, Portugal, Poland, Germany, Sweden, Belgium, Poland, Hungary, France, the Czech Republic and Austria[7].

From the viewpoint of export, the most important business partners are Germany, Czech Republic, Poland, France, Poland, but also countries like Italy, Austria, Hungary. In 2008 the total export was 39 715.6 mil EUR (decrease by 19.8% in comparison with the year 2008).

Unemployment

The unemployment rate in Kosice had been steadily decreasing until 2008 reaching its minimum of 13.5% in 2008. In 2009 it increased to 15.5%. Besides the unemployed, there is a possibility of employing the economically active population in the region commuting to other regions or to neighboring countries. The unemployment rate within the total Slovak population reached 12.1%[8] in 2009.

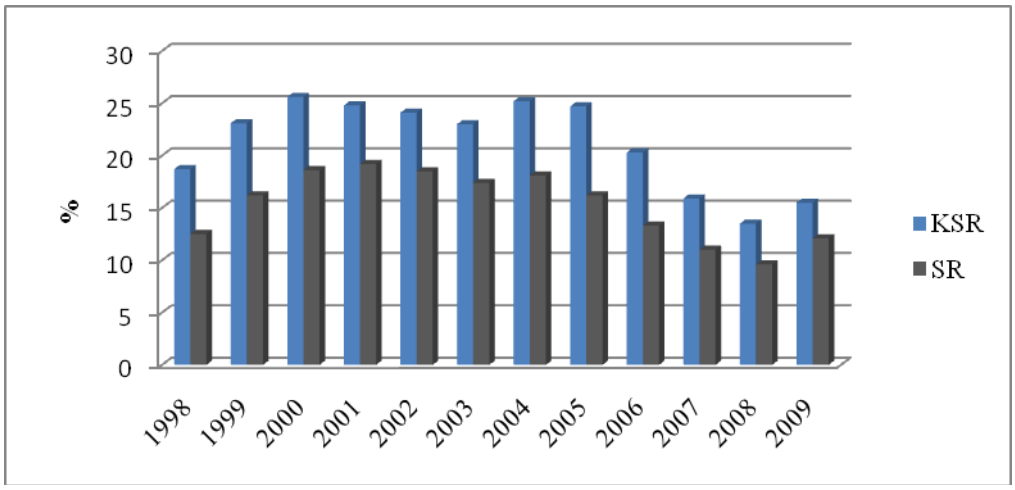

Figure 10: Unemployment rate in Kosice region in comparison with total unemployment in Slovakia

Source: Statistical Office of the Slovak Republic. http://portal.statistics.sk/showdoc.do?docid=1801

[6] http://portal.statistics.sk/showdoc.do?docid=16555
[7] http://portal.statistics.sk/showdoc.do?docid=21403
[8] http://portal.statistics.sk/showdoc.do?docid=6598

Energy and raw material deposits

There are some energy and raw materials deposits in East Slovakia but most of them have no economical importance nowadays. The biggest geothermal energy sources are near Ďurkov with the expected installed potential of 100-110 MW[9].

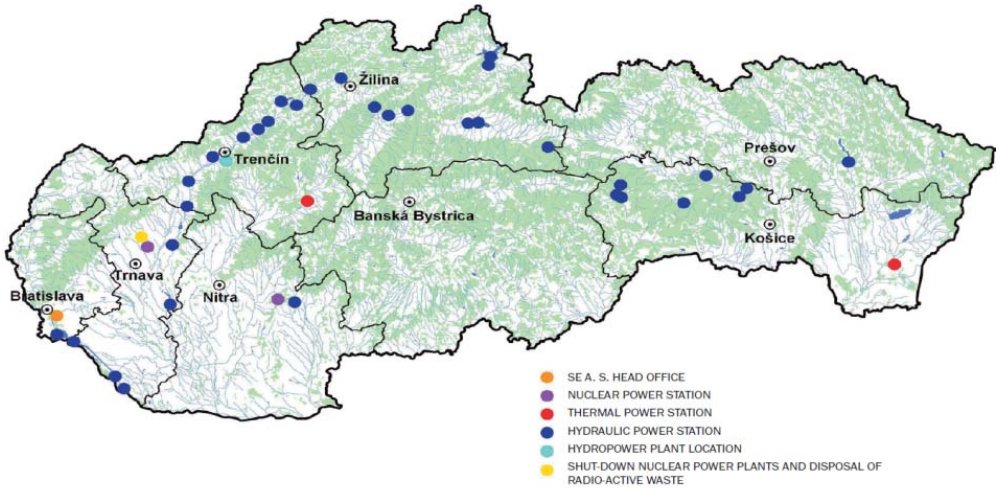

Figure 11: Location of power plants throughout Slovak Republic (2004)

Source: Analysis on Current Investment Environment in Košice Self-governing Region

Geothermal structure of the Košice region is given by 18 geothermal energy sources with temperature about 26-150 C (Košice district) and Trebišov districts (Beša, Čičarovce). There are uranium deposits near Jahodná (Kosice district) that have not been used, yet. There are deposits of iron and silver in Rožňava and Spišská Nová Ves districts, but the traditional mining industry is closed. A profitable magnesium mine near Kosice was closed due to the environmental problems. There are numerous firms processing different kinds of building materials as *East Slovakian building materials*. Different kinds of raw materials such as wall stone, brick clay, calcite, kaolin, gravel sand and others are located in the region.

Economy structure

The structure of the economy has been gradually changing. Employment in the agriculture decade has been decreasing lately but on the other hand, the employment in the service industry has an increasing tendency (see Table 1).

In 2009 the number of economically active subjects in the region was 63 319. Companies with the number of employees below 50 represented the highest share of the total number of companies. The share of medium sized companies was 2.3% and the share of large companies in the region was 0.5%.

The most important employer in East Slovakia is the U.S. Steel Kosice. It is the largest company in region and also the most important employer in region. In recent years the companies with high value added are settled in region. The machine industry, which is located in the region, is often based on processing of the U.S. Steel products. The chemical factories are owned mainly by foreign investors. The electro-engineering industry is rapidly growing. Besides the traditional producers the new foreign firms started their activities. Siemens belongs to the most important producers in this branch and is developing its activities in more plants and in higher variety of kinds of production involving IT, automotive systems, energy sector and so on. Matsushita Panasonic located in Krompachy and

[9] According to Halás, O.: VYUŽITIE GEOTERMÁLNEJ ENERGIE NA VYKUROVANIE MESTA KOŠICE, Slovgeoterm, a.s., accessible at http://www.enef.eu/history/2004/programme/2_session_part1/08_Halas.pdf

Embraco Slovakia located in Spišská Nová Ves develops their activities in white goods/consumer goods. In Michalovce, Yazaki extends its activity as a supplier for automobile industry.

The most important industrial park with area of 320 ha in the region is in Kechnec industrial park (18 km from Kosice).

The main industries in the region are metallurgy, machinery industry and construction industry, which create the majority of production and employ most of citizens. Food processing industry seems to lose its dominant role in East Slovakia (a significant number of breweries and creamery was closed down).

Table 2: Number of employees in different industry sectors

NACE / REGION		KSR	SR
Agriculture, hunting and forestry	A	8 537	79 634
Fishing and operation of fish hatcheries and fish farms	B	15	139
Mining and quarrying of energy prod. Materials	C	1 102	8 913
Manufacturing	D	59 660	524 602
Electricity, gas and water supply	E	5 791	35 487
Construction	F	17 447	168 655
Wholesale and retail trade, repair of motor vehicles, motorcycles and personal and household goods	G	42 201	405 603
Hotels and restaurants	H	6 658	59 489
Transport, storage, post and telecommunications	I	22 682	141 517
Financial intermediation	J	3 048	34 604
Real estate, renting and business activities	K	24 430	206 945
Public administration and defense, Compulsory social security	L	18 945	146 959
Education	M	23 397	162 508
Health and social work	N	19 035	126 070
Other community, social and personal service activities	O	9 771	75 844
Total		**262 719**	**2 176 969**

* data are preliminary, updated by EUROSTAT

* Branch codes according to NACE classification can be found in additional text

Source: Eurostat.http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database

Agriculture area covers about 46 % of the East Slovakia region and is located mainly in its south-eastern part. There are forests in the north-western part of East Slovakia. The south-western part is covered by forests and the south-eastern part is predominantly agricultural. The agriculture production is focused on cereals, potatoes and oil plaints growing. Breeding of cattle prevails in animal husbandry.

Besides the traditional industries, there is also a promising potential of the ICT, as for instance T-Systems, employing about 2000 employees in the field of the software services.

Trade and services are expanding as well as financial institution and education system.

3.1.1.2. Scope of the policy problem

The energy policy becomes a key factor of the development also on the regional level. On one hand, this structure deepens the dependency on the traditional Russian primary energy resources and, on the other hand, it enables the functioning of the monopoly producers and distributors. There is also considerable environmental problem based on the electricity production in the Vojany thermal power plant and the energy being consumed by US-Steel production. Despite of the above mentioned facts, SME‘s entered the energy sector in the last period. Supported by the law modifications and grant schemes on international, national and regional level, SME’s bring new technologies complying with the environmental standards, increase the regional employment and utilize the local energy sources. The balance of all interests of the stakeholders supplying and consuming the energy is the subject of the energy policy on the national and on the regional level.

One of the project´s aim is to support the facility of energy sources in Kosice region to decrease a high dependency on primary energy resources and distribution from other countries. This aim has to be achieved by renewable energy sources utilization, which belongs to the main priorities of both the Renewable Energy Policy of the Slovak Republic and the Renewable Energy policy of the KSR. Mandatory target of a 14% share of energy from renewable sources in overall energy consumption has to be fulfilled by Slovak Republic until 2020[10].

Restructuring the energy industry requirements of the KSR stakeholders are incorporated into the Energy policy of the KSR (2007)[11] and the Strategy of the Renewable Energy Sources Utilization in the KSR[12] (2006). These documents take into account the following facts:

1. ***The need of the increase of the domestic energy sources utilization.***
   There is a considerable amount of the energy, but also labor force in the KSR. The biomass has the highest potential, which does not require so skilled labor force in comparison to the other highly sophisticated technologies.
2. ***Weakening the dependence on the import of energy sources.***

   The import of the primary energy covers about 20% of the total import of the Slovak Republic. It makes the domestic economy highly vulnerable and sensitive to all outside economic and political effects. The best example of this dependency was the Slovak gas crises caused by the interruption of the gas supply from the Ukrainian territory in winter 2009.
3. ***To improve the current account balance.***

   Decreasing the energy import means improvement of the current account balance what means saved financial sources, which are thus at disposal for another purposes.
4. ***Decrease of the greenhouse effect; positive impact on the environment.***

   The traditional production of the energy means production of the emissions deteriorating the environment. On the other hand, under the European Union Emission Trading Scheme rules, the economic effect of the decreased pollution is also expected.
5. ***Restructuring of the economy, creation of the new jobs.***

   The implementation of the renewable energy technologies promises a lot of new opportunities. It includes the research and development units acting mainly in the structure of the Technical University of Kosice as well as small and medium size enterprises supplying and maintaining the technologies. On the other hand, in Kosice region there is a high unemployment mainly among the unskilled and vulnerable groups. There is a chance to involve them into the utilization of the biomass energy sources (for example the previous experiences from

[10] *Directive 2009/28/EC on the promotion of the use of energy from renewable sources*

[11] http://www.vucke.sk/APIR/sk/Pre_Podnikatelov/Investicne_prostredie/energetika/Stranky/default.aspx

[12] http://www.vucke.sk/APIR/sk/Pre_Podnikatelov/Investicne_prostredie/energetika/obnovitelnezdroje/Stranky/default.aspx

Denmark confirm, that for each TWh of energy from straw there are 350 new working places required[13]).

Heat[14]

In 2005 the total heat consumption in the region was approximately 51 500 TJ, of which the industrial consumption is 24 700 TJ/year. The housing units in block of flats have total heat consumption 4 900 TJ/year. The number of family houses is 101 154 (103 232 housing units), what at the consumption of 80-100 GJ/year/family house, means in total the heat consumption: 8 260 - 10 320 TJ/year.

The heating plant in Kosice (TEKO) is the dominant heat producer in the category of central heat producers to the communal sector – it produces 64% of the heat produced by all central sources of heat in the KSR and 80% of the heat demand in Kosice (4 210 670 GJ in 2005).

System of Central Heat Supply (SCZT) provides 64% of total heat supply in whole Slovak Republic. In Kosice city, the Tepelné hospodárstvo (Heat Economy) Košice and the U.S. Steel Kosice play an important role in heat supply and production for housing and municipality sector. KOSIT is another heat supplier in Kosice city, which produces steam by live burning. 20% - 48% of the heat is unused in the combustion process and is released into the atmosphere[15].

Structure of fuel supply for heating technologies

Structure of the fuel used for the communal sector in KSR is divided into natural gas (67.65%), black coal (31.66%) and biomass (0.69%). Table 3 contains parameters of individual energy media relevant (i.e. used) in the KSR and thus also for the development of the energy policy of the KSR.

Table 3: Technical parameters of the energy media – heat

Heat medium	Unit	Heat value (GJ/unit)	Heat (MWh)	Efficiency of heat production (%)	Coefficient of CO_2 emissions (kg/kWh)	Factor of primary energy
Gas	1 000 m3	34.25	85 848	83-93	0.230	1.1
Black coal	ton	26.00	462 528	72	0.330	1.1
Wood chips	ton	11.50	58 300	76	0.062	0.2
Heat pump	MWh	3.60	1 402	–	0.640	–

Source: Ordinance of the Ministry of Building and Regional development, 22-nd November 2006, Act No 555/2005 On the Buildings Energy Efficiency

Potential of heat savings[16]

In 2005 the total heat consumption in Kosice region was approximately 51 500 TJ/year. Potential of heat savings is defined as difference between current consumption and case, which is possible to reach with actual available technical action and Technologies. The total potential of saving in heat is 12 900 TJ/year (see Table 4).

[13] http://www.seps.sk/zp/fond/2001/biomasa.txt
[14] *Energy policy of the KSR, Chapter 3*
[15] *Energy policy of the KSR, Chapter 2*
[16] *Energy policy of KSR, Chapter 3*

Table 4: Heat consumption and potential of saving (TJ/year) in KRS (2005)

	Consumption (TJ/year)	**Potential of saving (TJ/year)**
Industry (indicative)	24 700	2 470
Individual family houses	8 260 - 10 320	
Housing units in block/flats	4 900	4 300
Public buildings	9 500	3 170
Sector of central heat supply (production and supply)	——	2 960
Total	**51 500**	**12 900**

Source: Energy policy of the KSR, 2007, Chapter 3

Note: Consumption in total is not given as a sum of the consumptions given by considered sectors

Following sectors were considered to determine the saving potential of heat in region:

- ***Industry Sector*** **–** the heat consumption of industry is 24 700 TJ/year. The estimated saving potential of heat by industry sector in Kosice region is 10% (2 470 TJ/year);
- ***Individual family houses and flats*** **–** this sector includes houses, flats and corresponding non-living spaces. It consists of the final consumption of energy for heat and preparing of hot household water. The family houses have the highest potential of energy saving (77%). The heat savings in this sector per year could reach at least 4 300 TJ/year.
- ***Public buildings*** **–** this sector includes the final consumption of heat by buildings of public services – schools, administrative buildings, accommodation, cultural facilities, health care institutions and other. The total consumption of heat in these buildings is 9 500 TJ/year. The potential savings of heat in public buildings form 33% of current heat consumption.
- ***Sector of Central Heat Supply and distribution System (CZT)*** **–** CZT comprises heat production and supply for apartment blocks, buildings of public and commercial services and small manufacturing plants. The technical potential of heat saving in this sector is at least 2 960 TJ/year.

The policy scope will not consider and include the industry sector (at least for the time being) is that KSR cannot influence the industry in any direct way. The second reason is a lack of the data on the industry.

Figure 12 illustrates the fact that there exists a potential to reduce the heat consumption in the KSR. The highest potential has the housing sector and public buildings. Together with CZT the project will cover over 80% of total potential in heat in KSR. In Kosice city, there are 589 public buildings, mainly comprised from schools (46%), health institutions, administrative buildings etc.

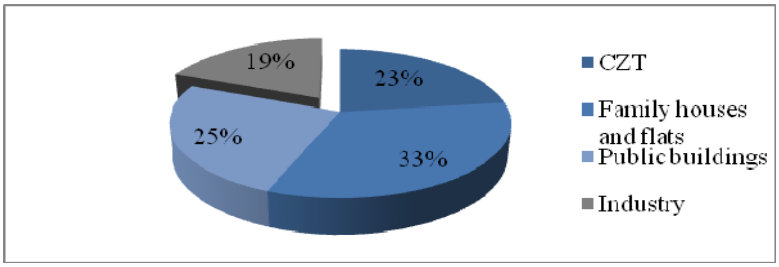

Figure 12: An estimated potential of heat savings: 12 900 TJ/year

Source: Energy policy of the KSR

Potential and barriers of using renewable energy sources in the Kosice region

1. The *solar energy* has the largest potential in the Kosice Region. Considering the financial and technological characteristics, there is an assumption to use this kind of the energy to the water heat, and heat production in general. Photovoltaic enables implementation of the electricity production covering a little percentage share of the total electricity needs in the Kosice Region. On the other hand, the investment requirements in this kind of production are high.
2. *Geothermal energy* has the second largest potential. According to the technical specification and conditions, the utilization is expected in the field of heat. The technical potential (potential, which can be technically utilized) is considerably lower because of the water chemical composition.
3. The largest technical potential in the Kosice Region is the *biomass*. The considerable increase of the biomass utilization is expected in the central heat systems. The economy of the biomass utilization depends mainly on the logistic conditions.
4. The traditional source of the renewable energy is the *hydro energy* (covering 98% of the whole electricity production from the renewable energy sources). The utilization of the whole hydro energy potential is about 57 %.
5. The technical potential of the *wind energy* is estimated above level of 600 GWh.

Table 5: Potential of the alternative energy sources

Renewable energy	Total potential		Technological potential	
	Penta Joul	**TWh**	**Penta Joul**	**TWh**
Water energy	**2.9**	**0.8**	**1.6**	**0.45**
Large hydro power plants	2.4	0.7	1.4	0.40
Small hydro power plants	0.5	0.1	0.2	0.05
Biomass	**18.7**	**5.2**	**18.7**	**5.20**
Forest biomass	2.1	0.6	2.1	0.60
Agricultural biomass	0.8	0.2	0.8	0.20
Bio fuels	2.1	0.6	2.1	0.60
Biogas	1.1	0.3	1.1	0.30
Other biomass	12.6	3.5	12.6	3.50
Wind energy	*	*	**0.4**	**0.10**
Geothermal energy	**131.0**	**36.0**	**66.0**	**18.00**
Solar energy	**32 000.0**	**8 900.0**	**5 600.0**	**1 650.00**
TOTAL	**32152.6**	**8 942.0**	**5686.7**	**1 673.75**

Source: Energy policy of the KSR

The highest potential of renewable energy sources in Kosice region has (on the basis of previous experiences from other regions in Slovak Republic):

1. Burning of timber for heat purposes;
2. Burning of agricultural biomass for heat purposes;
3. Geothermal well drilling and heat supply;
4. Heat solar collectors.

Using these energy sources is efficient also without any financial aid. Other perspective technologies, which are potential to Kosice Region but they require private investors, are:

5. Wind turbine;
6. Small hydro power stations;
7. Bio fuel.

These technologies can be supported by municipalities by agreement with investors.

The Ministry of Finance regards the biggest problem of renewable energy sources in their high prices and high degree of supply instability. Therefore they consider the highest potential for heat in biomass. The main attribute of current use of renewable energy sources (hydro-energy and timber) is their low price in comparison with other fuels (gas). The rest of renewable energy sources are more expensive than conventional energy sources. Therefore the utilization of these sources is supported by Regulatory Office for Network Industries.

On the other hand, this financial support leads to increase of prices of total energy. The energy prices have an increasing tendency (Figure 7). For that reason using the renewable energy sources does not have to be supported by final consumers.

The energy policy of KSR incorporates the financial support of regional energy system development in their facilities, i.e., schools, senior houses, social facilities, hospitals. The public sources in Slovak Republic are divided into following programs:

1. Program for higher utilizing of biomass and solar energy in households;
2. Support of repurchased prices of electricity, produced by renewable energy sources;
3. Co-financing of energy projects for Structural Funds of EU;
4. Co-financing of project by funds of KSR (mainly to 5% of eligible cost).

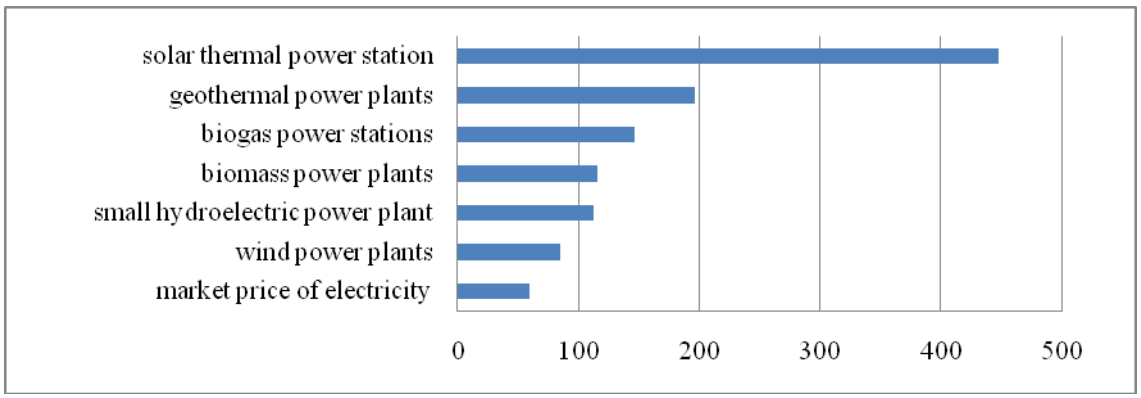

Figure 13: Guaranteed purchase prices of energy power (EUR/MWh)

Source: Regulatory Office for Network Industries

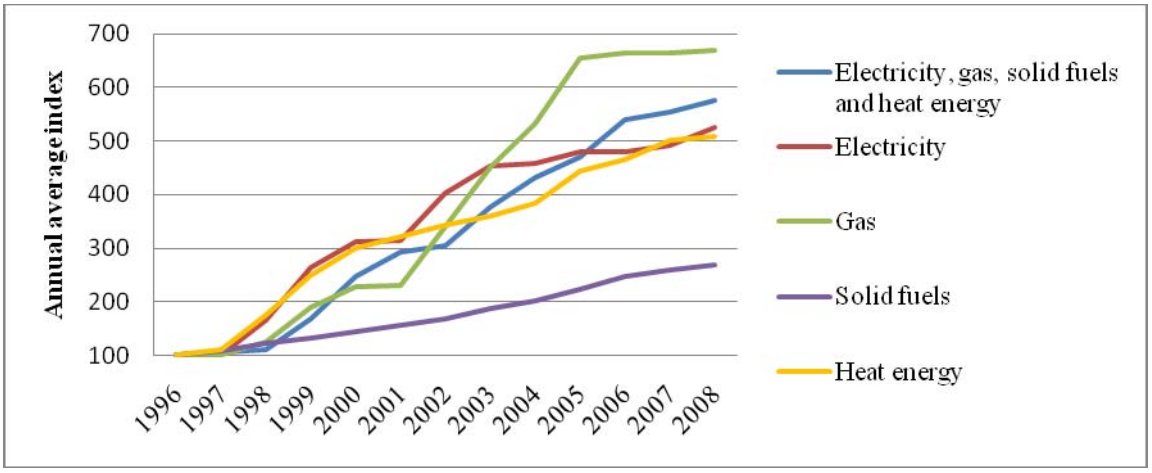

Figure 14: Harmonized Index of Consumer Prices[17] electricity, gas and other fuels (1996=100)

Source: Eurostat

Summary

The policy scope (production and consumption of energy) is focused on renewable energy and its potential in KSR. Goals and Policy Issues are oriented on mandatory target of 14% share of the final energy consumption from renewable energy sources (in 2005 it was 6.7%). From all types of the energy consumption the model will cover only heating (not electricity consumption, not transport). Geographical coverage of the model is the Kosice Self-governing Region (KSR) - however, it is considered that the first version would cover only one larger city in the region - probably Kosice city. One reason for that is that it is easier to get data for the city than for the whole region.

There are two main types of agents in the model – heat consumers, heat producers and/or bio energy fuel suppliers. An agent may have more than one role (municipalities will be both heat producers and consumers). Proposed scenarios to be modeled are: to increase the share if renewable energy sources on the total energy consumption and to decrease dependency of the Slovak Republic in the energy sector on other states.

3.1.2. Stakeholder analysis

3.1.2.1. Identification of Involved Stakeholders

The following categories of stakeholders have been distinguished for the KSR pilot application (for the full list of stakeholders see Annex Ia).:

A. Internal stakeholders – Kosice Self-Governing Region (KSR)

- President of KSR
- KSR Parliament
- KSR Office, Department for the Cross-border Cooperation
- Schools and social institutions directly controlled by the KSR

[17] The HICPs are economic indicators constructed to measure the changes over time in the prices of consumer goods and services acquired by households.

B. External stakeholders

Regional Level:

B.1 SMEs

- Providers of the ~~(~~alternative~~)~~ energy technologies and services
- Energy consumers
- Energy producers

B.2 Large companies

- Energy producers
- Energy consumers
- Energy distributors providers /operators
- Providers of (alternative) energy technologies

B.3 R&D institutions in RES sector within TUKE

B.4 Local municipalities

B.5 NGOs

B.6 Regional Development Agencies

B.7 Regional Advisory and Information Centers

B.8 Consumers associations and housing associations

B.9 Other regional organizations

B.10 Affiliated branch of the Slovak energy and innovation agency

National Level:

- Slovak Parliament
- Ministry of Economy, Slovak Innovation and Energy Agency
- Ministry of Environment, Environmental fund
- Ministry of Agriculture, National Forest Centre
- Statistical Office
- Regulatory Office for Network Industries
- Slovak Environmental Agency
- Slovak energy and innovation agency
- Slovak Electricity Transmission System

3.1.2.2. Stakeholders' roles, needs and expectations

Based on the role in the process of the development and outperforming the regional renewable sources policy, we distinguish the following groups of the stakeholders:

Internal stakeholders

KSR President – Head of the KSR Parliament responsible for the overall functioning of the KSR Parliament and KSR Office. Regarding the policy development, he

a. Takes the final decision on the new Renewable Energy Policy creation,

b. Nominates the reviewers group reviewing the draft directive,
c. Submits the new Regional Renewable Energy Policy proposal to the parliamentary session,
d. Signs the approved Regional Renewable Energy Policy.

KSR Parliament – consisting of the elected parliament members taking part in parliamentary sessions and working in the specialized commissions. There are several commissions in the KSR Parliament organized according to their subject of interest and responsibility. There are 2 commissions dealing with the energy policy:

a. Commission of the Regional Development
b. Commission of the Land Planning and Environment

In addition, several committees can also influence some aspects of the Renewable Energy Policy (Financial Commission, Commission of the Tourism and Cross-border Cooperation, etc.).

The parliament members (especially the above mentioned two commissions responsible for the regional renewable energy policy proposal and implementation) collect information and opinion of all involved stakeholders regarding the renewable energy policy. Then, they discuss the needs of the creation of the new energy policy. Members of **the parliamentary commissions** prepare comments to the new regional renewable energy policy proposal and interpret them in the parliamentary session. parliament members approve the new regional renewable energy policy. On the other hand, the commissions in the consideration are informed on the implementation and functioning of the new renewable energy proposal.

Executive board – includes President, Vice-presidents and Director of the KSR office. It supports the decision making of the President.

Department of the Regional Development and Land Planning – is an executive department, which is responsible for different phases of the proposal and administering of the renewable energy policy. The Head of the department:

a. Nominates the members of the expert group proposing the draft directive,
b. Makes the comments to the review of the draft directive,
c. Submits his comments + draft directive to the Executive board,
d. Submits frame issue, new regional renewable energy policy proposal to the parliamentary commissions,
e. Head of DRDLP submits the new regional renewable energy policy proposal + parliamentary commissions comments to the Executive board (before parliamentary session approval process).

Schools and social institutions directly controlled by the KSR.

KSR directly controls the secondary school net and social institutions like hospitals, different medical care institutions, senior houses, etc. All of these institutions are functioning according to the Energy Policy of the KSR and their buildings must have energy audits and certificates enabling identification of the improvement and investment possibilities on this level.

External stakeholders

Regional stakeholders

This group of stakeholders involves different stakeholders of the renewable energy policy important on the regional level:

1. **SMEs** – providers of the (alternative) energy technologies, energy consumers, energy producers.

2. **Large firms** – energy producers, energy consumers, energy distributors substantially influencing the energy market.
3. **R&D institutions** - performing the technical and/or economy-social-impact research in the field of alternative energies.
4. **Local municipalities** - solving the energy resources problems regarding the social impact of the new technologies.
5. **Non-government organizations, Non-profit organizations and Civic associations** - defending the environmental aspects, providing the alternative views on the energy problems.
6. **Regional Development Agencies, Regional Advisory and Information Centers and other regional organizations** – infrastructural organizations organized on the national/regional level providing the necessary information and advisory support to the investors.
7. **Consumers/producers associations and organizations** - professional organizations organized within the homogenous groups of the stakeholders.
8. **Affiliated branch of the Slovak Energy and Innovation Agency** - provide the economy measurement in the heat-producing machines, develop the energy concepts of the cities and evaluate the energy efficiency projects.

National

1. **National Parliament** - providing the legal framework for alternative energies utilization
2. **Ministry of Economy of the SR** – direct share control of some energy producers or consumers, providing grants, methodological control. The Ministry formulates the *Energy policy of SR*[18], which is an official document defining the basic framework and issues within the *Economy strategy of SR*. The Ministry of Economy directly leads the Slovak Innovation and Energy Agency.
3. **Ministry of the Environment of the SR** – controls the environmental aspects of the Energy policy, provides grants, methodological framework. Ministry of the Environment of the SR leads the Environmental Fund and Slovak Innovation and Energy Agency.
4. **Ministry of Agriculture with the National Forest Centre** – deal with forest research, forest management, detection and monitoring of the forests status, forest information technology, special forest surveys, preparation of national thematic map series with a forestry training and guidance for the forest, propose strategic forests goals within the sustainable development principles.
5. **Statistical Office of the SR –** processing and providing the data regarding the renewable energies.
6. **Regulatory Office for Network Industries, Anti monopoly Office of the SR -** regulate the prices and run the antimonopoly policy in the field of the energy sector.
7. **Slovak Electricity Transmission System** - providing services and meeting the needs of customers – electricity market participants in the area of electricity transmission, optimum use of the existing grid capacity.

3.1.3. Policy processes

Policy creation is a crucial part of the management on the strategic level. It contains the framework analysis, aims definition, determination of the stakeholder roles and specification of basic management tools and financial possibilities. According to the subject, a few kinds of policies can be distinguished

[18] http://www.vucke.sk/APIR/sk/Pre_Podnikatelov/Investicne_prostredie/energetika/Stranky/default.aspx

(Economy policy, Energy policy, etc.). The Renewable Energy Policy development process is described in this section.

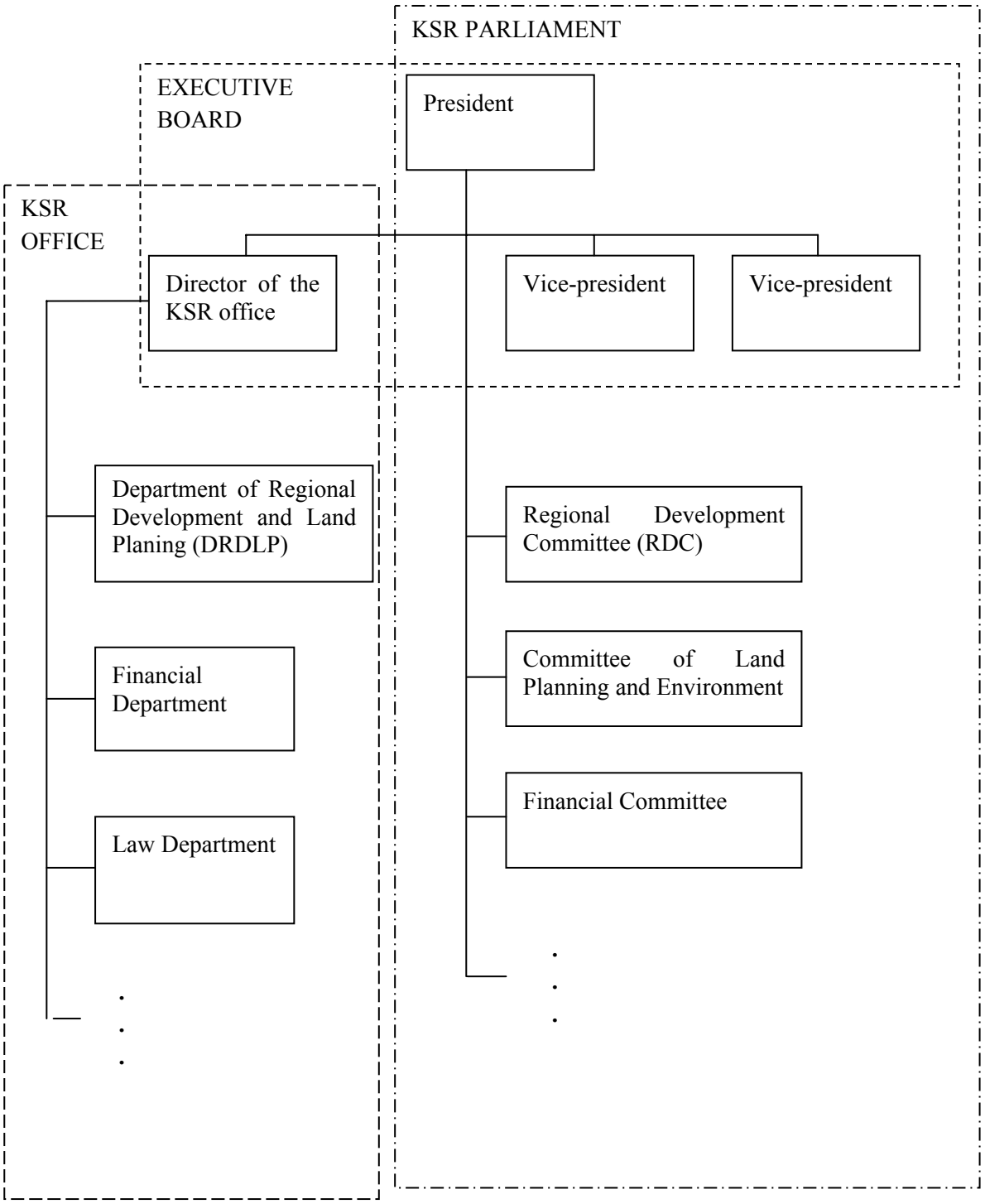

Figure 15: Organisation structure of KSR – internal stakeholders involved into the new policy creation process (given departments and commissions are under the ongoing restructuring)

3.1.3.1. Decision making process

The process of the new policy creation consists of the decision steps that respect parliament democracy rules and involve different stakeholder categories. Its aim is to formulate new policy involving the interests of all participating stakeholders.

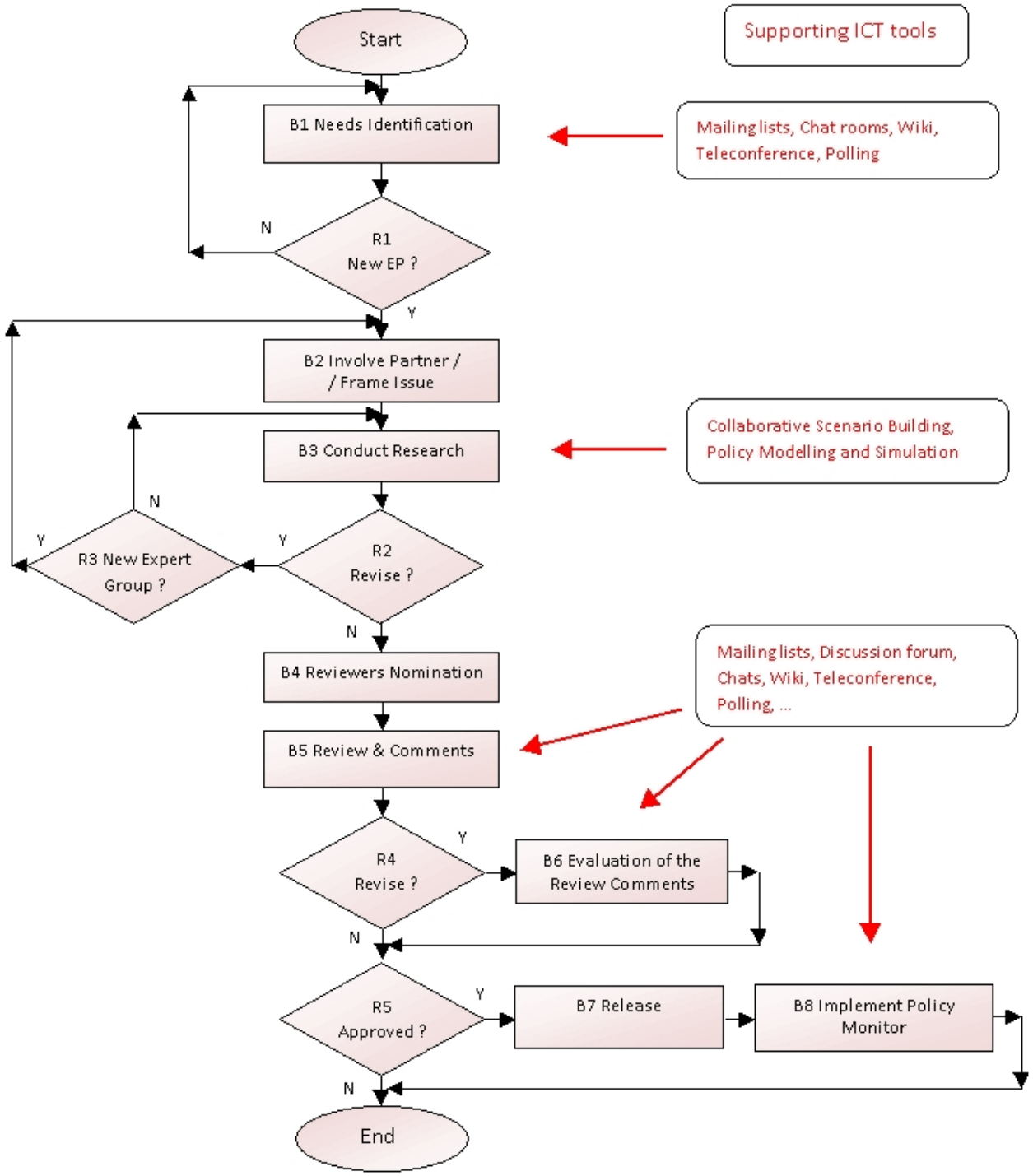

Figure 16: Flow chart of the KSR decision process (OCOPOMO project innovations proposals are in red)

Regulation:

- Act on self-government of higher territorial units
- Official document of the corresponding policy on the national level

Inputs: Proposal of any stakeholder to build a new policy. The proposal is submitted via any member of KSR Parliament to the President.

Outputs: Approved new policy documents. Documents are published and new policy is implemented. The parliament is informed about the implementation process.

Stakeholders: Stakeholders participating in the decision making process include internal and external actors. The list of external stakeholders identified for the KSR use case can be found in ANNEX Ia. Internal actors participating on the decision making process are based on organisational structure of KSR, depicted in Figure 15.

List of internal bodies of KSR, which participate on the decision making process is given in previous chapter.

The flow chart of the decision process in KSR is depicted in Figure 9. The chart consists of process blocks B1-8 and decision blocks R1-5. Expected enhancements of the process by collaborative ICT tools are presented on the right side of the chart. Meaning of particular chart blocks, including the properties such as inputs, outputs, involved stakeholders, responsible bodies, estimated duration, etc., is described in the following outline.

B1 Needs Identification

Inputs: Informal discussion, any form of proposal

Outputs: Information for the Executive Board

Duration: 1 – 4 weeks

Stakeholders: Internal and external stakeholders, RDC KSR

Responsibility: Head of DRDLP

Description: Any stakeholder identifies needs regarding energy policy, formulates and submits them (via RDC KSR) to the president to final decision on new policy creation.

OCOPOMO enhancements: Before decision on creation a new energy policy, different scenario are generated to identify exact needs/threats.

eParticipation ICT tools: The tools supporting an open discussion, namely mailing lists, chat rooms, Wiki, teleconference, and polling.

R1 Create New Energy Policy?

Inputs: Information for the Executive Board

Outputs: Executive Board Report

Duration: 1 week (once a week one day meeting)

Stakeholders: President, Vice-presidents, and Director of the KSR Office (Executive Board)

Responsibility: President, Director

Description: Executive Board takes the decision on the New Energy policy creation.

OCOPOMO enhancements: -

B2 Involve Partner / Frame Issue

Inputs: Executive board Report

Outputs: Frame Issue, Involved Partners List

Duration: 1 – 4 weeks

Stakeholders: DRDLP, Expert Group consisting of internal and external experts

Responsibility: Head of DRDLP

Description: Creation of the Expert Group made by Head of DRDLP. Frame Issue: determination of the duties and responsibilities of any team member.

OCOPOMO enhancements: -

B3 Conduct Research

Inputs: Frame Issue

Outputs: Draft Directive

Duration: from 6 months to 2 years

Stakeholders: Expert Group

Responsibility: Head of DRDLP

Description: Legal and economic environment analysis, analysis of the technical solutions, proposal of the most appropriate measures to conduct the policy.

OCOPOMO enhancements: Provide methodological and/or ICT support for the econometric policy modelling, for updating the narrative scenarios (including the means for open discussion), and for simulations of policy proposals.

Modelling and eParticipation ICT tools: The tools for collaborative scenario building, policy modelling, and agent-based simulation.

R2 Revise (the research outcomes)?

Inputs: Frame Issue, Draft Directive

Outputs: Executive Board Report

Duration: 1 week (once a week one day meeting)

Stakeholders: Executive Board

Responsibility: President

Description: Executive Board takes the decision regarding the Draft Directive quality. If the quality is not on the desired level, the revision is required.

OCOPOMO enhancements: -

R3 New Expert Group?

Inputs: Frame Issue, Draft Directive

Outputs: Executive Board Report

Duration: 1 week (once a week one day meeting)

Stakeholders: Executive Board

Responsibility: President

Description: Executive Board takes the decision regarding the Expert Group re-nomination.

OCOPOMO enhancements: -

B4 Reviewers Nomination

Inputs: Reviewers List Proposal (prepared by Head of DRDLP)

Outputs: List of Reviewers, Executive Board Report

Duration: 1 week (once a week one day meeting)

Stakeholders: Executive Board

Responsibility: Head of DRDLP, President, and Executive Board

Description: Nomination of the Reviewers.

OCOPOMO enhancements: -

B5 Review & Comments

Inputs: Frame Issue, Draft Directive

Outputs: Commented Review Report

Duration: 2 – 6 weeks

Stakeholders: Reviewers - internal and external experts

Responsibility: Team of reviewers, President (responsible for decision on the Draft Directive)

Description: Reviewing process. Comments to Review Report are prepared by Head of DRDLP and are submitted to the Board of Executives. Board of Executives takes the decision regarding the revision of the Draft Directive.

OCOPOMO enhancements: Support for collaborative review process, exchange of information and opinions.

eParticipation ICT tools: The tools supporting an open discussion, namely mailing lists, discussion forum, chat, Wiki, teleconference, polling, etc.

R4 Revise the Policy Proposal?

Inputs: Commented Review Report

Outputs: Decision on the revision, provided as Executive Board Report. If no revisions are required, then the Final Version of the Energy Policy Proposal is provided.

Duration: 1 week (once a week one day meeting)

Stakeholders: Executive Board

Responsibility: President

Description: The President evaluates the comments in the Review Report and decides on a necessity of revisions. If no revisions are required, then the last version of the Draft Directive is considered to be a New Energy Policy Proposal.

OCOPOMO enhancements: -

B6 Evaluation of the Review Comments

Inputs: Frame Issue, Draft Directive, Commented Review Report, and Executive Board Report

Outputs: New Energy Policy Proposal

Duration: 2 weeks

Stakeholders: Expert Group, Head of DRDLP

Responsibility: Expert Group, Head of DRDLP

Description: Comments to the Review Report are included into the New Energy Policy Proposal.

OCOPOMO enhancements: Support for collaborative evaluation of comments in the Review Report, exchange of information and opinions.

Modelling and eParticipation ICT tools: The tools supporting an open discussion, namely mailing lists, discussion forum, chat, Wiki, teleconference, polling, etc. The tools for agent-based simulation can be used for the evaluation of comments in the Review Report.

R5 Approved?

Inputs: Frame Issue, Energy Policy Proposal, and Review Report

Outputs: Decision on the revision, provided as Executive Board Report. If no revisions are required, then the Final Version of the Energy Policy Proposal is provided.

Duration: Once every two months - one day meeting (dates are fixed twice a year and are approved in the parliamentary session; minor changes are available but they need to be approved in the parliamentary session, too).

Stakeholders: Parliamentary session

Responsibility: Head of DRDLP, Parliament commissions, President

Description: Head of DRDLP submits the new Energy Policy Proposal to the parliament. The parliamentary commissions provide their comments to the Executive board. The Executive Board includes the approval of the new Energy Policy to the programme of the parliamentary session. The Frame Issue and the Energy Policy Proposal are published on the web site at least ten days before the parliamentary session to obtain the public opinion.

OCOPOMO enhancements: -

B7 Release

Inputs: Frame Issue, Final Version of the Energy Policy Proposal, and Review Report

Outputs: New Energy Policy, Action Energy Plan

Duration: 3-5 years

Stakeholders: DRDLP, regional stakeholders involved into the particular actions

Responsibility: DRDLP, local stakeholders

Description: After approval of the New Energy Policy Proposal on the parliamentary session, the energy policy is released in the form of Action Energy Plan, which includes (a) direct measures in institutions controlled by KSR, and (b) indirect measures as projects grants, stakeholders networking, etc.

OCOPOMO enhancements: -

B8 Implement Policy Monitor

Inputs: Action Energy Plan

Outputs: Implementation report

Duration: 1 week (will be presented to the parliament members in the parliamentary session)

Stakeholders: DRDLP, local stakeholders, general public

Responsibility: DRDLP

Description: Head of DRDLP collects the experience from policy users (i.e. local stakeholders, general public) and regularly informs the regional parliament about the implementation of the Action Energy Plan.

OCOPOMO enhancements: Support for exchange of information and opinions.

eParticipation ICT tools: The tools supporting an open discussion on the results of the newly implemented policy, namely mailing lists, discussion forum, chat, Wiki, polling, etc.

3.1.3.2. Involvement of stakeholders at different stages of decision making process

The process of decision-making, schematically depicted in Figure 16 and described in previous section can be more formally modeled in standardized BPMN notation. Following the descriptions of flow chart block elements, namely the Stakeholders and Responsibility specifications, the following roles are expected to participate on the process:

- *External stakeholders* (including general public), actors that can require changes in the policy and can verify the policy implementation.
- *Internal stakeholders*, executive and decision making bodies of KSR, including:
  - *President*, the main decision-making body of KSR.
  - *Regional Development Committee*, collective decision-making body of KSR.
  - *DRDLP*, executive body of KSR, which is responsible for preparation and implementation of policy changes.
  - *Executive Board*, the advisory board supporting decisions of the President
  - Exp*ert Group,* collaborative group of internal and external specialist in the field of renewable energies.
- *Experts*, external advisers that can be nominated by external stakeholders or by DRDLP; can be involved into the Expert Group.
- *Reviewers*, internal or external participants those are responsible for reviewing the new policy proposal.

The overall decision-making process presented in Figure 16 can be fragmented into three sub-processes that are sequentially chained. These sub-processes were analyzed and corresponding abstract BPMN models were created on both high and detailed levels of abstraction

The high-level BPMN models are presented in Figure 17, Figure 18 and Figure 19, while the detailed models can be found at <http://www.intersoft.sk/ocopomo/ksr_proc/index.html. In all these models, the tasks representing the current status (i.e. the "AS IS" status) are marked by blue background, while the tasks with enhancement of OCOPOMO tools (i.e. the "TO BE" status) are marked by orange background.>

The high-level BPMN model of the sub-process covering the identification of needs for creating a new energy policy and initial research, which corresponds to the block elements of B1, R1, B2, B3, R2, and R3, is depicted in Figure 17.

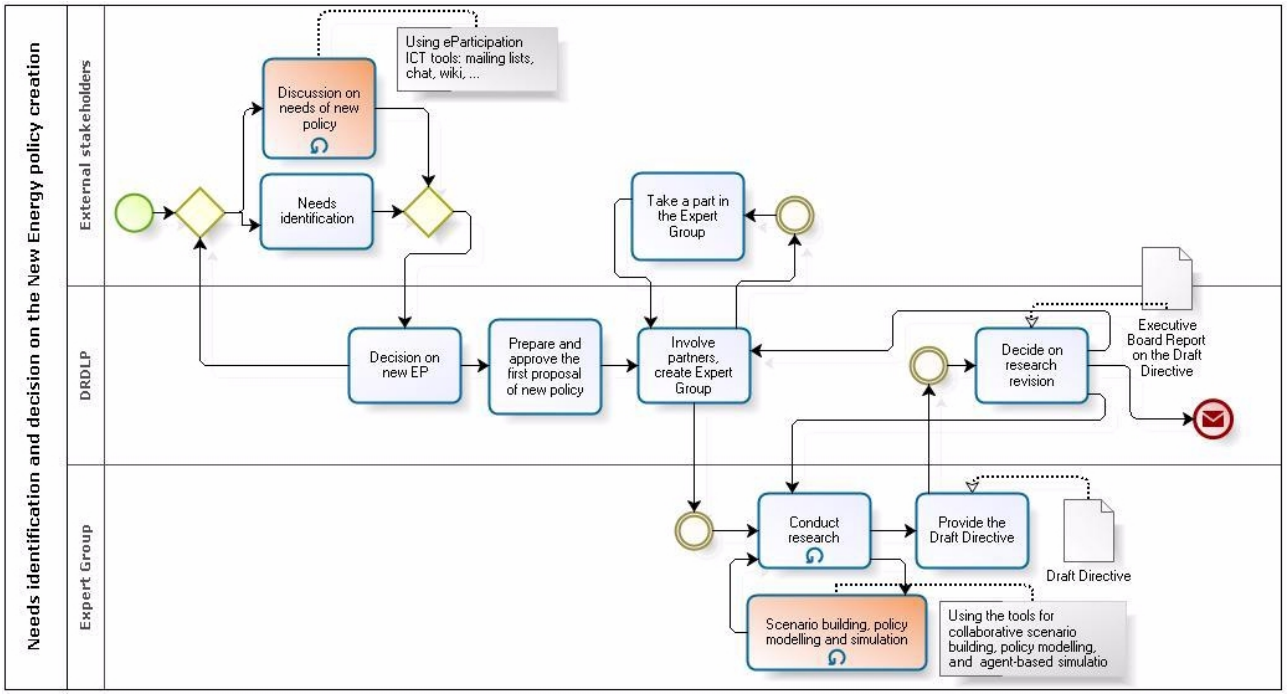

Figure 17: BPMN model of the process of identifying needs on the new energy policy creation

The high-level BPMN model of the sub-process of reviewing the Draft Directive of a new energy policy, which corresponds to the block elements of B4, B5, R4, and B6, is depicted in Figure 18.

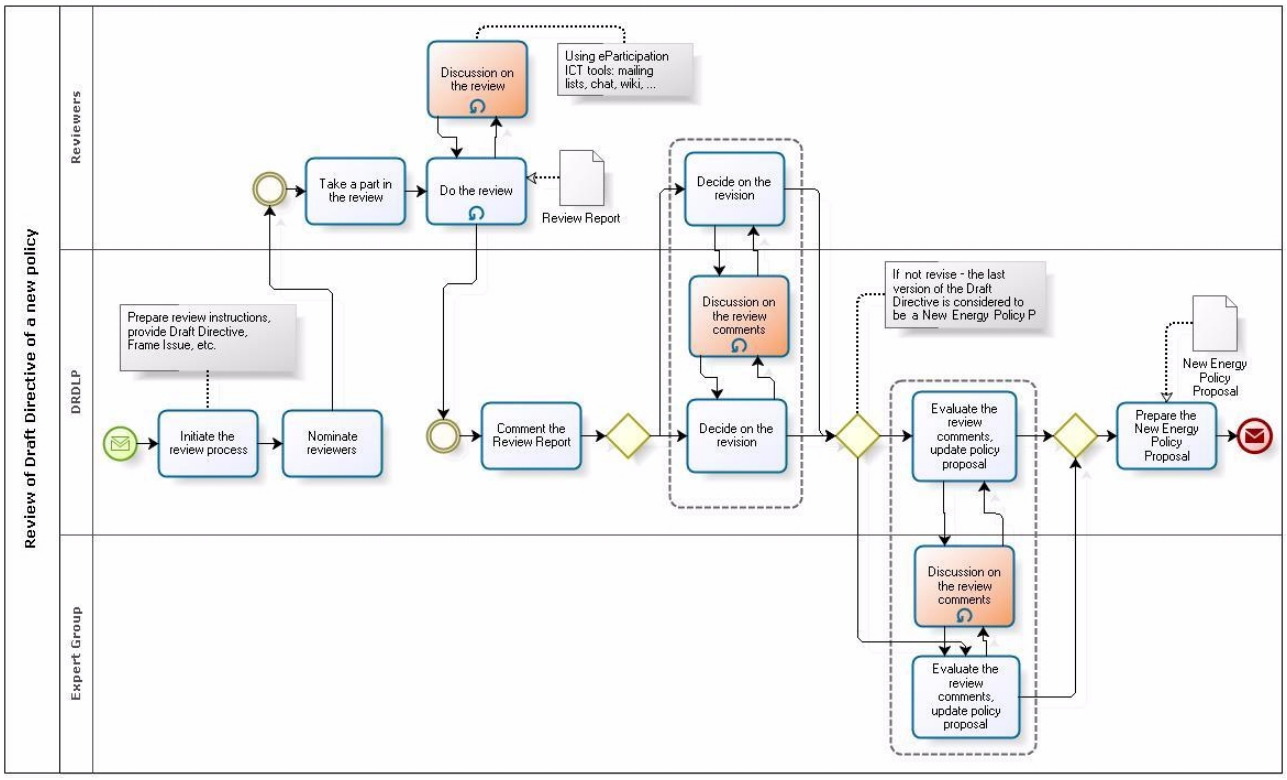

Figure 18: BPMN model of the process of reviewing the Draft Directive of a new energy policy

The high-level BPMN model of the sub-process of approving the new energy policy in RDC, its release and monitoring, which corresponds to the block elements of R5, B7, and B8, is depicted in Figure 19.

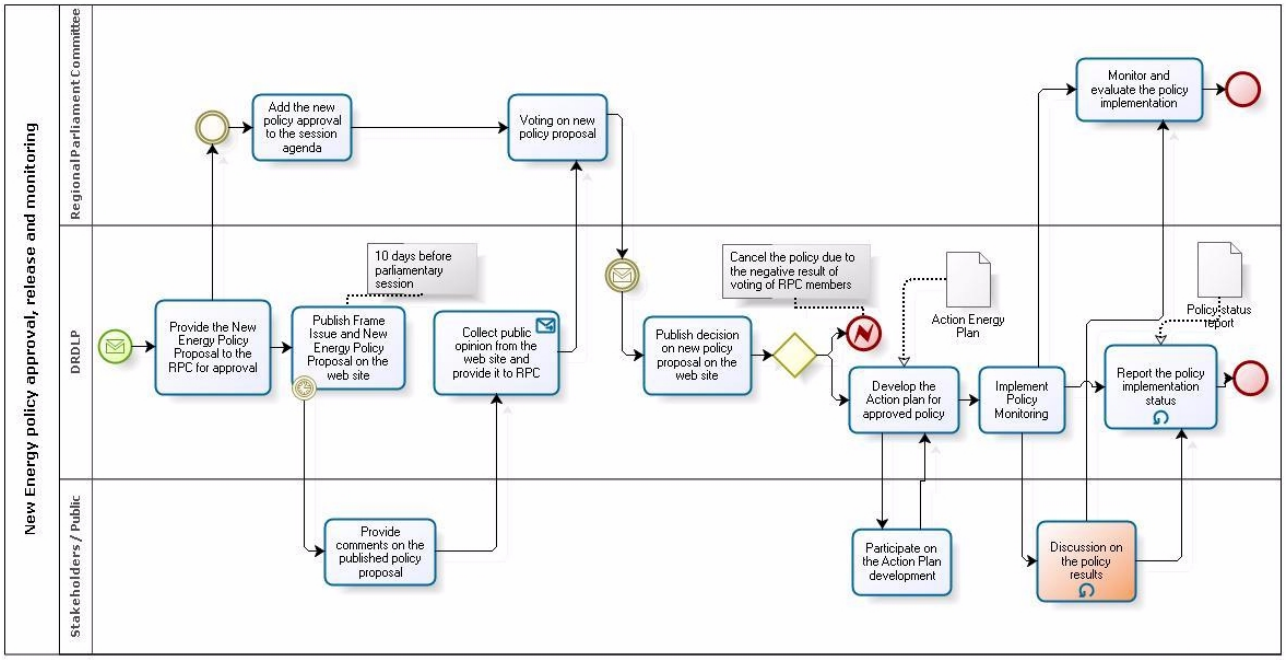

Figure 19: BPMN model of the process of new energy policy approval, release and monitoring

3.1.3.3. Procedural outline for engaging stakeholders

The OCOPOMO project is aimed to support the involvement of different stakeholders categories as to extend the public involvement into the decision making process in the upper tier territorial units areas. Here, the above given stakeholders categories list contains the external categories of the stakeholders that are familiar with the ICT tools and Internet supporting mechanisms. That is why we expect the ability of the external stakeholders to express their attitudes, interests via the OCOPOMO project platform.

As the involvement of the external stakeholders into the Renewable Energy Policy building process is crucial, we are to attract them via:

- OCOPOMO project results dissemination
- use of existing personal contacts
- organising the expert panels to inform about the main outcomes allowing invited stakeholders to take part in discussion

3.2. CAMPANIA REGION

3.2.1. Description of the Campania pilot case

3.2.1.1. Description of the socioeconomic and political situation in Campania

Campania is one of the Italian 20 regions. It is the most densely populated region in the country with some 5.8 million inhabitants[19].

The Regional territory (13.590 Km²) can be divided into low-lying land (25%), hilly (40%) and mountains areas (30%). Hills are located in the inner and coastal parts of the region. Rural areas cover 67% of the territory and are inhabited by 25% of the population. The remaining 75% of population is living in urban-rural areas which are characterized by an extremely high population density (for example on the coast). The average population density of 425.81 inhabitants/Km². Elderly people (over 65 years) are about 16% of the total population with a higher proportion of women. Out migration combined with fewer births makes the ageing problem more acute in the inner disadvantaged areas.

The economy is dominated by agriculture and the food processing industry. The unemployment rate in the region (IV quarter 2009: 13,9% with a female rate of 16% and a male rate of 12,8%) is significantly higher than the country's average rate (IV quarter 2009: 8,6% with a female rate of 10,2% and a male rate of 7,4%). In fact, the unemployment rate of the Southern regions (IV quarter 2009: 13,2%, with a female rate of 15,6% and a male rate of 11,9%) is nearly two times higher than the unemployment rate in the Northern regions of the country (IV quarter 2009: 6,1%, with a female rate of 7,4% and a male rate of 5,1%)[20].

Naples is the capital city of the region of Campania and the province of Naples. With nearly a million inhabitants in the city centre and further three million in the province, it is one of the largest cities in the country. Naples has been the industrial hub of the South but has been rapidly reindustrialising over the past 15 years[21]. In fact, the region lost over a third of heavy industry during the eighties and over a quarter of its industrial employment. Significant growth in employment has been witnessed in the service sector and the tourism industry but the growth has not been sufficient to compensate for the job losses in heavy industry. The region has struggled to make the transition toward a service economy and the service sector employment growth is concentrated on less advanced services. Unemployment is a considerable problem for the city and the problem is further fuelled by the existence of informal economy. Unemployment is particularly high among young people and women with over half of both unemployed. Many of those take part in the informal economy, which however provides unreliable and poorly paid work. On the other hand, Campania can count on a unique cultural capital as Naples, the most visited archeological site in the world – Pompei, formidable touristic attractors like Capri, Sorrento and Amalfi, a consistent manufacturing tradition in the field of automotive – Fiat – and aerospace (Alenia), the best transport network in Italy's south area. A number of strengths and weaknesses makes the development policies implementation in this area particularly demanding.

[19] The region has 350 inhabitants per square kilometre against the Italian average of 196 inhabitants per km^2

[20] Italian regions can be divided into three groups. **Northern regions**: Piemonte, Valle d'Aosta, Liguria, Lombardia, Trentino-Alto Adige, Friuli-Venezia Giulia, Veneto, Emilia-Romagna. **Central regions:** Toscana, Lazio, Umbria, Marche and **Southern regions (with Islands)**: Abruzzo, Molise, Campania, Basilicata, Puglia, Calabria, Sicilia, Sardegna. This division is important because is aged by the Istat, the National Statistical Institute.

[21] Scaramella, M. (2003). The Case of Naples, Italy

Table 6: Labour force indicators, IV quarter 2009 (Source: Istituto Nazionale di Statistica, Istat)

	Italy	South
Unemployment	8,6%	13,2%
Employment	57,1%	44,2%
Activity	62,5%	51,0%

3.2.1.2. The scope of the policy problem

The policy problem that will be dealt with in relation to Campania region will be the management of EU structural funds for local development policies with specific regard to such issues as competitiveness of the region's productive economy. This issue is a transversal policy area, at the cross-road of several developmental policy priorities (e.g. R&D, infrastructures, energy, training…).

In particular, the specific theme of the pilot application involving Campania region will be the use of structural funds in order to foster knowledge transfer between academia and SMEs, and particularly networks between universities, research centres and companies, thus addressing the needs of the knowledge economy. This issue is becoming urgent with specific regards to SMEs in Campania region, which need to strengthen their innovation capacity in order to compete in the global market.

The policy aims of the Campania region in this and other areas are to improve the quality of programmes and relevance to policy priorities by better targeting and allocation of the structural funds, fostering transparency and accountability of public decision-making in the region, meeting the expectations of programme recipients and other parties and raising a sense of responsibility for the programme among all parties interested in its performance and effects.

The Structural Funds are the financial instruments of with which European Union contributes to the harmonious, balanced and sustainable development of economic activity, to a high degree of competitiveness, to high levels of employment and protection of the environment, and to equality between women and men.

There are three levels of action programme:

- the European Commission will fix strategic objectives of socio-economic and territorial cohesion within a framework of interventions of structural funds.
- Each Member State will translate the European strategic objectives in a National Strategic Reference Framework (NSRF)
- each Region will construct, on the basis of the previous lines (European and National) the Operational Programme

Campania is one of the Italian regions eligible under Objective 1 “convergence”.

3.2.2. Stakeholder analysis

3.2.2.1. Identification of Involved Stakeholders

Figure 20 illustrate the main categories of actors and stakeholders in relation to structural funds.

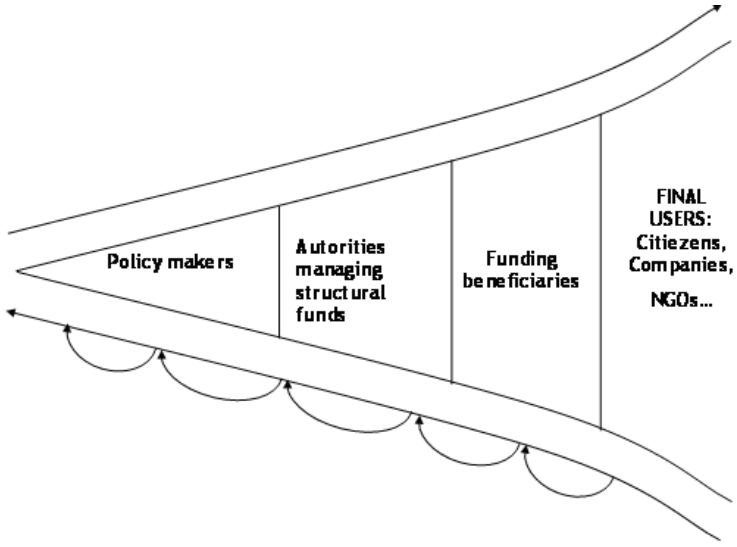

Figure 20: Main actors and stakeholders related to structural funds

Policy makers

The overall priorities of expenditure for structural fund are defined at EU and national level. And yet policy makers at regional levels define the detailed priorities for expenditure and allocation of specific funds in relation to regional specificities. Figure 21 illustrate the allocation of responsibilities to each level.

The Regions in Italy

There are 20 regions in Italy. Each Region has a statute governing its organs, their relations and means of functioning within the Region itself, while the general electoral system remains under State law. The matters entrusted to the care of the Regions are constitutionally defined in Article 117 of the Constitution.

The Region's legislative competence are however restricted by the need of the State to maintain overall unity. There are several levels of competence sharing between the central state and the region. Very generally it can be said that: there are several subjects where regional competence is only subject to constitutional restrictions; subjects of shared competence where the state set the fundamental principles and regional laws need to abide to such principles; and state competence where the Region is required to apply, organize and integrate at a local level specific State laws.

The Regional Organs

The regional entities have three necessary organs: Consiglio Regionale, Giunta Regionale and its President.

The Consiglio is a collective organ, elected by proportional representation of the citizens every five years. Its function is to legislate, control and plan, as well as to elect the executive organs. In essence, the Consiglio decides on everything concerning the regional political direction.

The Giunta Regionale is the collective organ, composed of Assessori and Presidente, to which is entrusted, on an agreed basis, policy initiatives, financial proposals, principal acts of planning and ordinary administrative activity. It is the governing body of the region. The President directs the work of the Giunta, puts into effect its political programme and represents the Region externally. The Regions' administrative activities are implemented by way of decisions made in the Consiglio Regionale and Giunta Regionale or through presidential decrees.

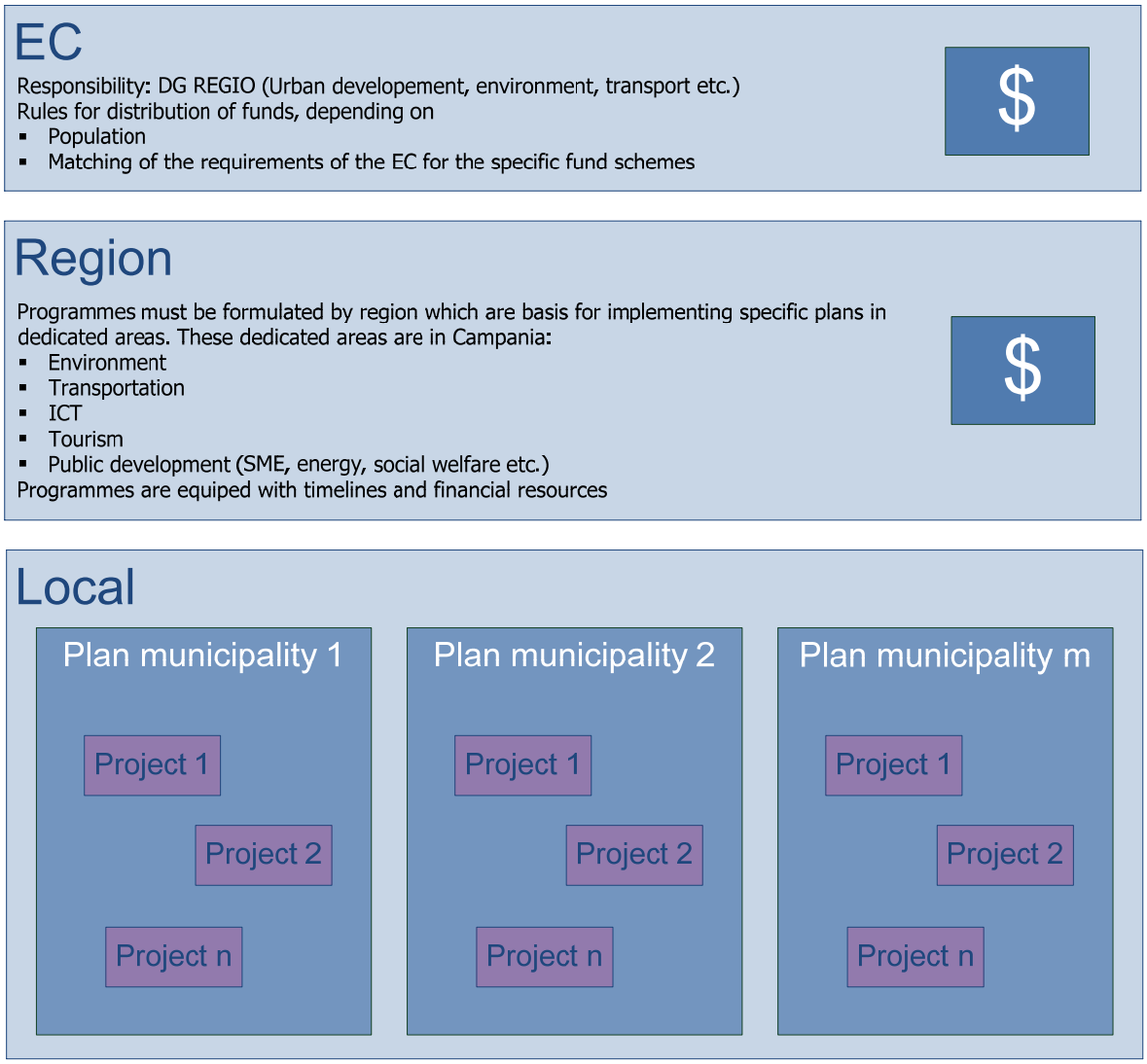

Figure 21: Relevant policy levels of structural funds

The Local Entities

Alongside the Regions, the Constitution provides other administrative entities equipped with independent political direction. These are essentially the Comuni and Province but other local entities may exist. The administrative responsibilities of the local entities may cover a wide area and there is an increasing tendency to maintain at a local level all matters concerning the citizen that are not of national importance. The Regions are contributing, through delegation and devolution, to this growth in local power.

The power of the Provinces are few and objectively of no great importance. Their compulsory obligations cover essentially provincial road maintenance and construction, provision of buildings and non-teaching staff for the institutes of higher education, hunting, fishing in internal waters, agricultural incentives, civil protection planning and some forms of social assistance etc.

By contrast communal powers are expanding to cover almost all matters of immediate civic importance between the citizen and the public administration. The Communes' obligatory duties concern urban planning, construction, municipal public works, preparation of industrial zones, provision of buildings and non-teaching staff for nursery and compulsory education, social assistance, health and public hygiene, right to education, communal road maintenance and construction, urban

transport, control of public commerce, placards, street furniture, refuse collection, supply of water and gas, cemeteries, traffic control, urban police, communal housing, sewerage, public slaughter-houses, fairs and markets etc. To these are then added the optional undertakings that permit, within the limits of local finance, support for activities such as the theatre, music etc. In addition, there are the tasks delegated by the Regions and the decentralized State functions (e.g. register of births, marriages and deaths, civil status and military conscription).

It is clear therefore that the greater part of public functions relating to the ordering of the territory, social services and economic development is concentrated on the Communes. Due to historical reasons, Italy is divided into more than 8,000 Communes. These vary greatly both in character and size, going from metropolitan centres (Milan, Rome, Turin, Naples), to cities (Florence, Bologna, Palermo, Bari, Genoa), to towns (Siena, Pisa, Trieste, Pavia, Catania, Ancona), to small centres (the majority) with a few hundred inhabitants. It is therefore obvious that the system cannot function uniformly and gives rise to some irregularities. The Consigli, Assembly organs of the Commune and of the Province, are elective.

The respective executive organs of the Communes and Provinces are the Giunte Municipali and Sindaci, and the Giunte Provinciali and Presidenti. All these officers are elected for a five year period by their fellow Councillors on the basis of their proposed programmes and can be voted out of office. While the Consigli deal mainly with administration (budgets, plans, programmes, large contracts, regulations, staffing levels and general policies), the Giunte have powers of proposal and execution and the Mayors and provincial Presidents represent the entities legally, supervise overall action and maintain unity of direction.

The actors involved in the management and evaluation of structural funds

Figure 22 illustrates the main stakeholders involved in the management and evaluation of structural fund.

The organisation chart denoting key people in the relevant policy process follows the Regulation ex. Art. 71 CE n°1083/06.

This structure is as follows:

- the **Managing Authority,** under the supervision of the president of Campania region, is responsible for managing and implementing the Regional Operational Program ERDF[22] in accordance with the principle of sound administration and financial management;
- **Certifying Authority** (responsible for the proper certification of funding for the implementation of the program);
- **Audit Authority** (responsible for verifying the effective functioning of the management system and control).
- **Management system and coordination unit** coordinates the management and control systems
- **Financial unit** is in charge of the financial management of structural funds.
- **Monitoring unit** provides technical support in the programming, evaluation, implementation and verification plans, programs and intervention policies
- **Communication unit** is in charge of communication about structural funds.

Other supporting bodies are the Environmental Authority (ensuring environmental integration in the stages of preparation and implementation of the Regional Operational Program, ensuring efficiency and continuity in the evaluation process of the environmental strategy for the sustainable development

[22] European Regional Development Fund

of the territory); the Authority for the gender policy (ensures widespread integration of the principles of equality between men and women and non-discrimination in all interventions implemented, with a view to improvement of Living and equitable development of the territory); the expert in legal issues (transversality of interventions to ensure the legality in every line of program implementation).

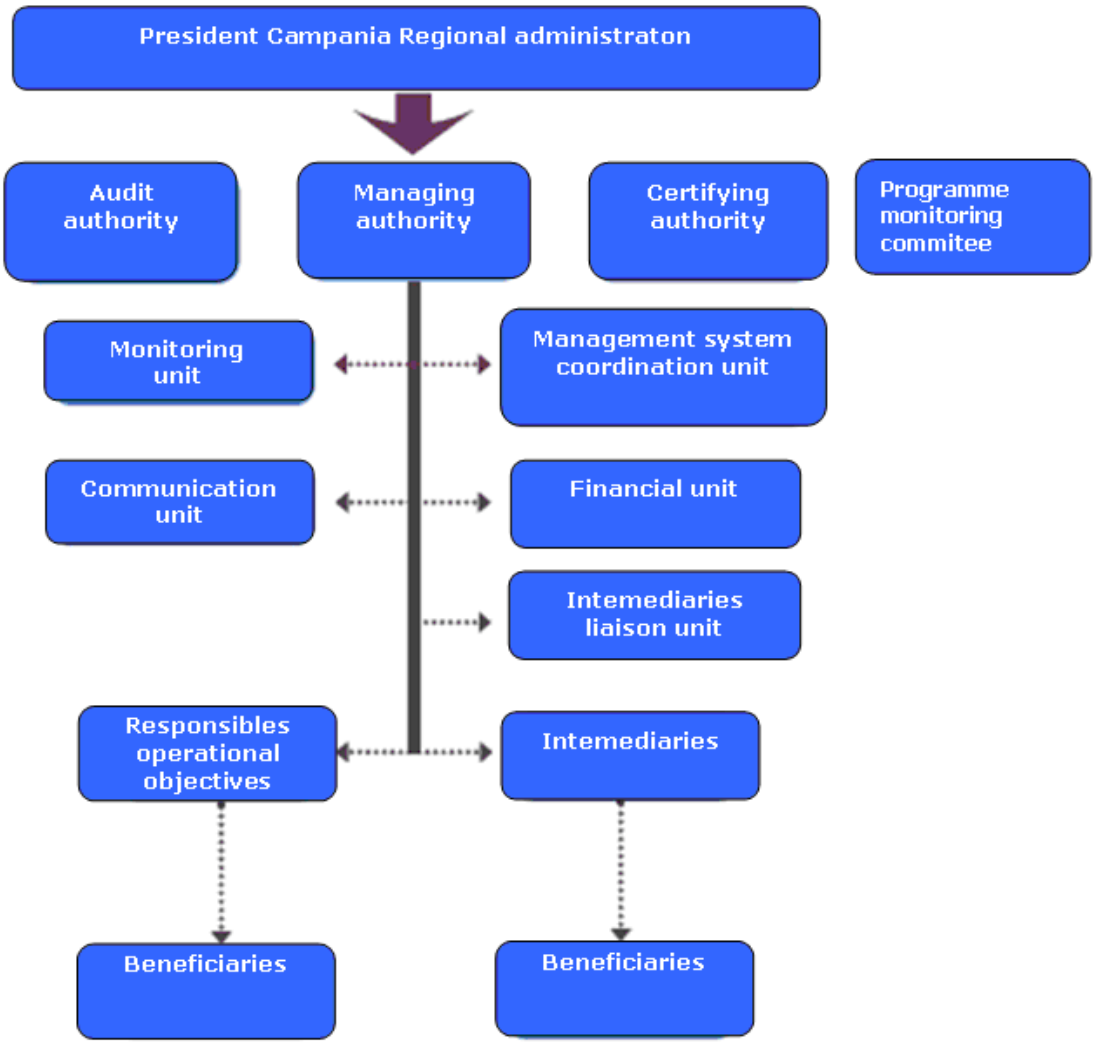

Figure 22: Regional units dealing with structural funds. Source: Communication plan for Regional operational Plan FESR 2007-2013[23]

Funding beneficiaries

Funding beneficiaries are recipient of structural funds. They can be public bodies, private organizations or third-sector organizations.

As for public bodies, these are in the first place public administrations, i.e. provinces (*province*), and municipalities (*comuni*, the smallest local government unit) and mountain communities administration.

[23] http://porfesr.regione.campania.it/opencms/export/sites/default/FESR/download/piano_cominicazione_def.pdf

Regione Campania itself manages directly part of structural funds and can issue call for proposals in relation to certain strands of expenditure (called operational objectives).

Other public bodies beneficiaries of funding are publicly owned companies, Universities, other public authorities.

Private organisations which are beneficiaries of structural funds are mainly large companies dealing with infrastructures (e.g. the Italian Railway companies, airport, national road company, urban transport companies) but also SMEs.

Third sector organisations are NGOs or Professional associations and trade union.

Final users

Every citizen can be considered as user of results of projects financed by the structural funds. However there are organizations that, due to their mission and institutional activities, have an overview of structural funds policies and can influence the allocation of funds. Such organizations are, for instance, political parties, professional associations and trade unions, NGOS based in Campania whose mission is urban development and environment protection, Universities, Research Centres. Some of these association are funding beneficiaries, some other are intermediaries, some other carry out research on structural fund expenditures or influence regional policies.

3.2.2.2. Stakeholders' roles, needs and expectations

Expectations of the region as key stakeholder in managing structural funds are:

- improving quality of programmes and relevance to policy priorities, by better targeting and allocating EU Structural funds
- fostering transparency and accountability of public decision-making in the region
- meet expectations (both the existing ones and the ones which are most likely to appear in the future) of programme recipients and other parties
- foster professional development of programmes/institutions' managers,
- raising a sense of responsibility for the programme among all parties interested in its performance and effects
- need to concentrate funding on large projects vs. the request coming from local administrations to use structural funds for interventions of a smaller entity but considered crucial by local communities
- need to focus investment in deprived areas vs. Need to balance spending in all the region
- need to comply with all the formal duties vs. Need to speed up the process of spending
- autonomy in defining policy priorities vs. Need to comply with national and European framework and previous decisions of expenditure
- define political priorities at top down level vs. involvement of relevant stakehodelrs

Expectation of the outer layer of stakeholders

Every citizen can be considered as user of results of projects financed by the structural funds. However there are organizations that, due to their mission and institutional activities, have an overview of structural funds policies and can influence the allocation of funds.

Such organizations are, for instance, professional associations and trade unions, NGOS based in Campania whose mission is consistent with the objectives of structural funds, Universities, Research

Centres, Science parks. Some of these association are funding beneficiaries, some other are intermediaries, some other carry out research on structural fund expenditures or influence regional policies.

Their **expectations** vary according to their role. End users such as citizens and companies expect relevance to their needs, effectiveness, efficiency, speed and careful planning of structural funds. Organisations acting as intermediaries and/or funding beneficiaries such as professional associations and trade unions, NGOS based in Campania, Universities, Research Centres, Science parks might also want to influence the priorities of structural funds expenditure.

3.2.3. Policy processes

3.2.3.1. Decision making process

The organizational chart of the region is presented below. The responsibility of defining the priorities of structural funds lies in the presidency together with the executive body (Giunta). Their decisions must also be ratified by the regional council (which can be defined the regional parliament). The president and the giunta are supported in the priority definition by several general coordination units (particularly the unit which play the role of managing authority for the structural fund).

General coordination Units, sectors and services are in charge of the operational management of the structural funds. They might be in charge of specific priorities or fulfil horizontal functions (e.g. the certifying authority which is the general coordination unit 09).

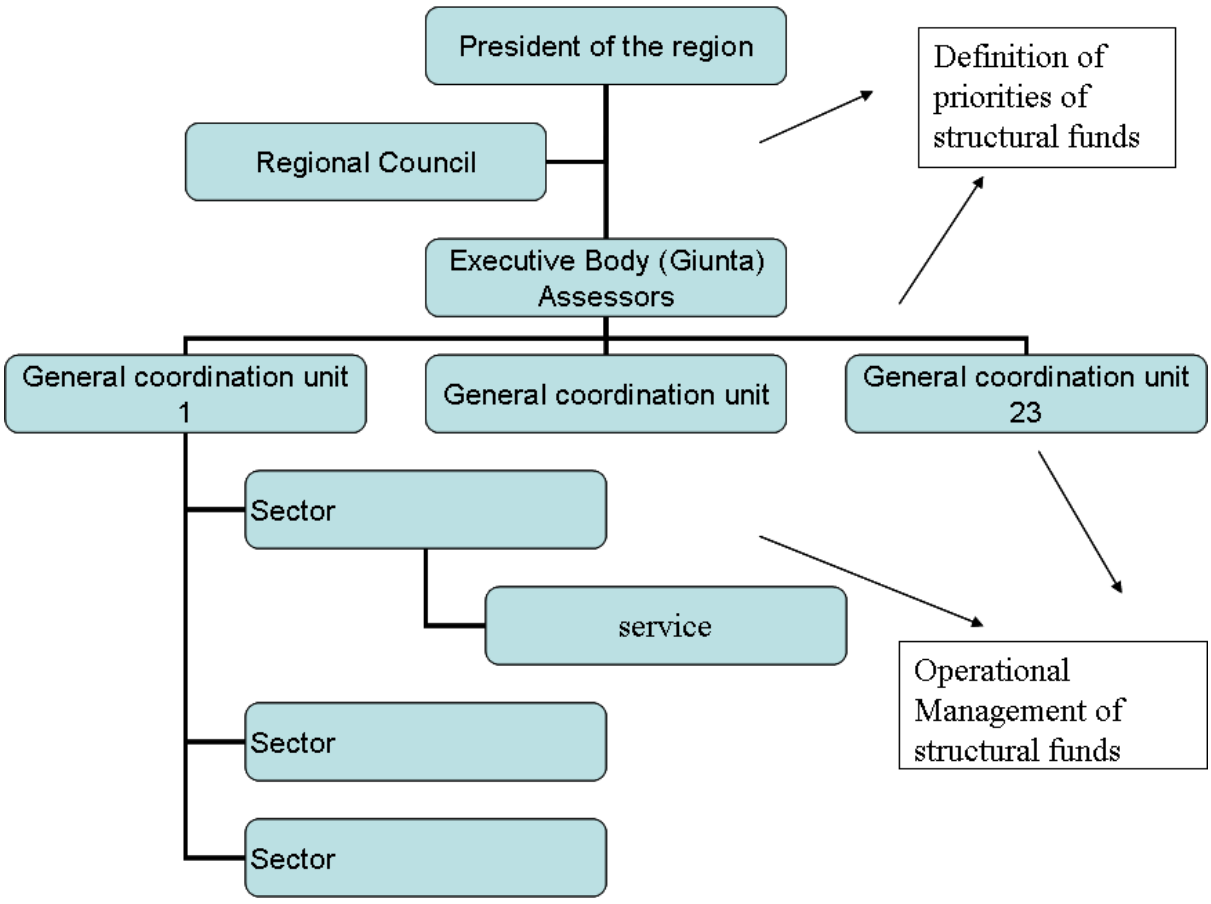

Figure 23: Decision making related to structural funds in the Region organisational chart

Decision making related to the evaluation of the structural funds

When granting financial means for a given country, the European Commission requires to evaluate the efficiency of the use of the assistance granted. To this end, in accordance with Council Regulation (EC) No 1260/1999 of 21 June 1999 laying down general provisions on the Structural Funds, three types of evaluation are conducted:

- ex-ante evaluation - before the beginning of the implementation of a Programme,
- mid-term evaluation - in the middle of the implementation process,
- ex-post evaluation - after the end of the implementation period.

There are several levels of evaluation:

- The expenditure capacity at intermediate deadlines
- Impact evaluation against predefined indicators (e.g. decrease in unemployment, increase in gdp)
- The capacity of vertical and horizontal integration inside different level of governance

There are several bodies participating to this process. A non exhaustive list includes:

- Several administrative units according to priorities
- Programme monitoring committee
- Managing authority
- Unit for evaluation and assessment of public investment (which seems to play an important role)

Decision making related to be individual project funded under the Structural funds

Different kinds of projects are funded under the ERDF or the European Social fund in Campania. They can be classified as follows:

- Projects managed by the region, either directly or with the support of local authorities
- Strategic Projects managed by the region, but involving a concertation of actors (public agencies, associations, social partner, etc.)
- Projects managed through calls for proposals

Figure 24 presents the process leading to a funded project following a call for proposals. In this case, only if the funding beneficiary meets the criteria of the call and its project is positively evaluated, the phase of negotiation can start. Otherwise the next funding beneficiary in the ranking is chosen.

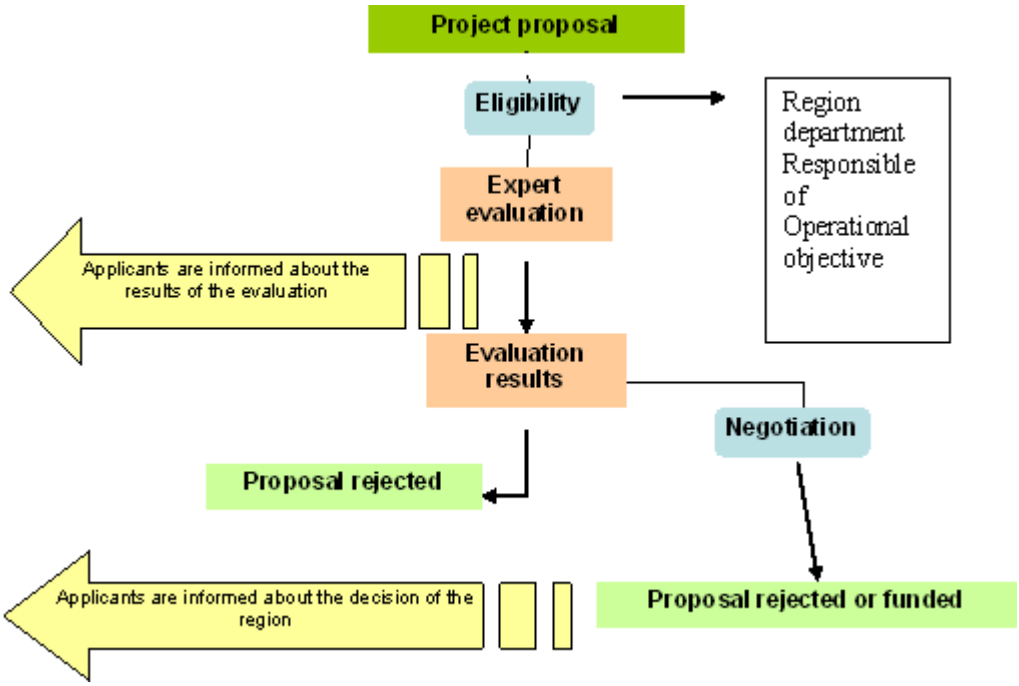

Figure 24: Process leading to a funded project following a call for proposals

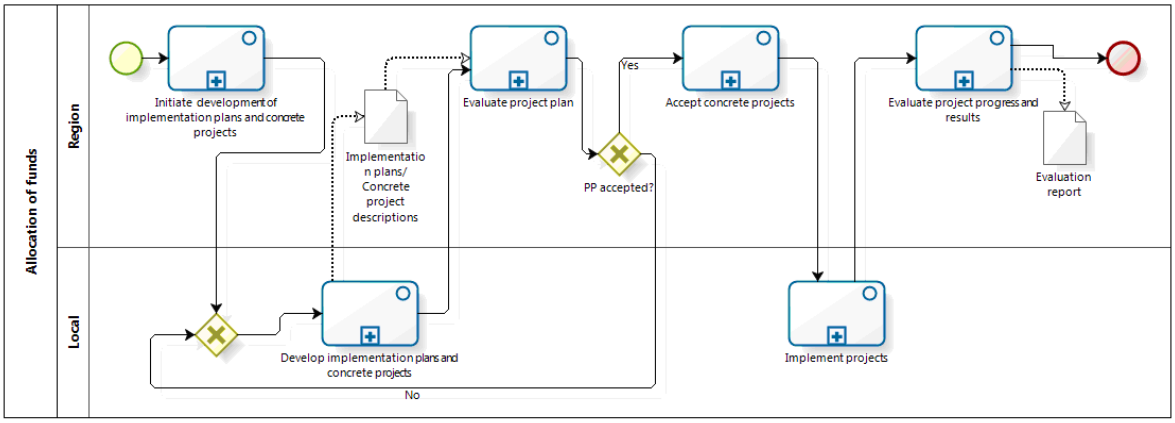

Figure 25: Process model of joint management of structural funds through partnership

3.2.3.2. Involvement of stakeholders at different stages of decision making process

Involvement of stakeholders is highly recommended at all stage of structural funds lifecycles, i.e. socio-economic analysis, planning, implementation, evaluation. As far as evaluation is concerned, the European Commission Working Document No.1 The New Programming Period 2007-2013 INDICATIVE GUIDELINES ON EVALUATION METHODS : EX ANTE EVALUATION[24] at Page 18 argue that "Stakeholders in the programme have valuable insights which the evaluators should draw upon in assessing the relevance and quality of the programme."

[24] http://ec.europa.eu/regional_policy/sources/docoffic/working/sf2000_en.htm and also http://ec.europa.eu/regional_policy/sources/docoffic/working/doc/sea_handbook_final_foreword.pdf

Along these lines, a consultation with stakeholders took place, for instance, in relation to the environmental strategic evaluation[25] which is included in the regional operational programme 2007-2013 of Campania region for the European Regional Development fund.

3.2.3.3. Procedural outline for engaging stakeholders

In order to understand the procedure for engaging stakeholders undertaken by Campania region in relation to structural funds the above-mentioned example about the environmental strategic evaluation[26] can be mentioned. First the relevant agencies which might have a stake in relation to environmental policy of Campania region have been identified.

The regional unit in charge of environmental policy has prepared a scoping document in which he outlined, drawing on lesson learnt from the past, content, themes and issues to be addressed.

The consultation was open both to the authorities with specific environmental responsibilities and to the general public. It took place online, by phone and the possibility to transmit a paper based feedback was provided at the regional information desks. Moreover, a meeting with the authorities with specific environmental responsibilities has been organised by the region. The region received 22 feedback (13 from the authorities with specific environmental responsibilities and 9 from other stakeholders organisation or citizens)

All feedback were analyzed in order to assess the nature of the observation (environmental-related or not), and the possibility to integrate it in the operational programme, not only on the basis of its content but also in light of the Community regulations, National Strategic Framework, Regional Strategic Documents). Nevertheless, several feedbacks have been incorporated in the final version of the regional operational programme 2007-2013 of Campania region for the European Regional Development fund as far as the environmental policy is concerned. An appendix displaying which feedback has been incorporated is annexed to the regional programme.

[25] Page 299 and 303 of regional operational programme 2007-2013 of Campania region for the European Regional Development fund. http://www.porfesr.regione.campania.it/opencms/opencms/FESR/

[26] see above

4. PROCESS MODEL FOR COLLABORATIVE SCENARIO-BUILDING AND POLICY MODELLING

4.1. OVERALL PROCESS MODEL

Modern approaches to policy modelling entail different disciplines and integrate both global problems and policy issues by using qualitative and quantitative methodologies, processes and tools in a framework that take into consideration physical as well as social (including economic) trends and conditions. Policy modelling serves to express possible strategies and to investigate their potential consequences and their impact. By doing so, existing policy analysis, modelling and simulation, as well as visualization approaches are developed to contribute to policy formation with particular focus on computer-assisted approaches. Figure 26 presents the overall framework on how to approach the OCOPOMO policy modelling by linking collaborative scenario building and policy modelling.

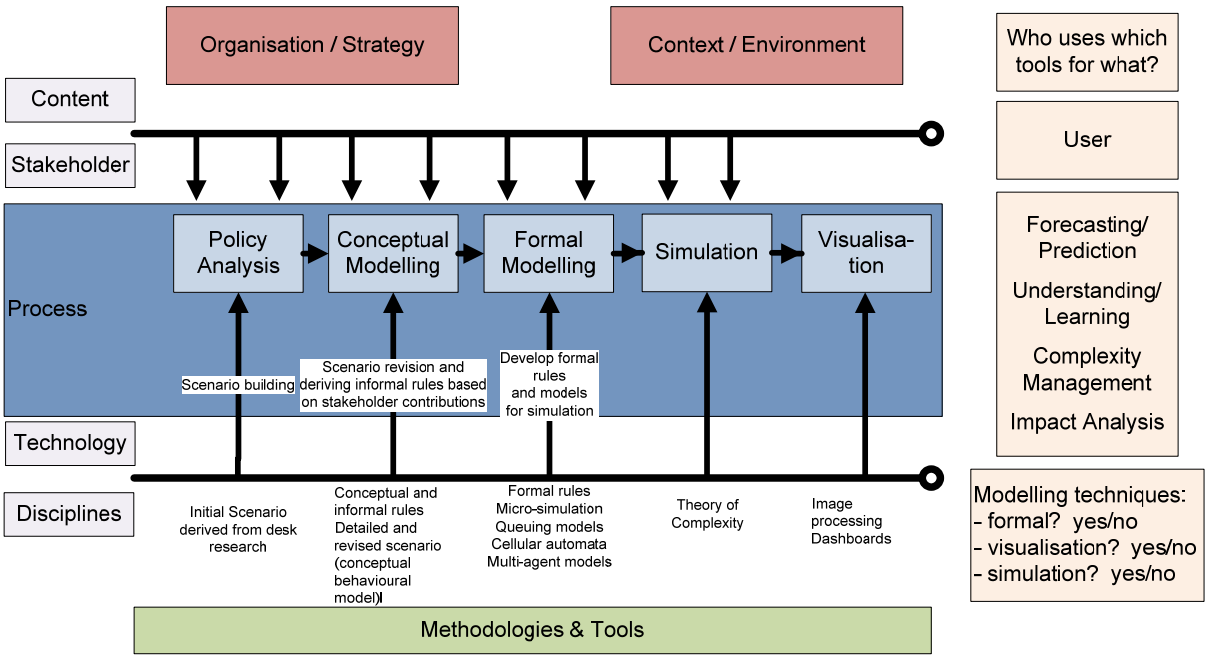

Figure 26: Framework on how to approach policy modelling by linking collaborative scenario building and policy modelling

Policy modelling is a process of abstraction that turns narrative descriptions of policy measures and their impacts into precise, formal statements that are isomorphic with logical theorems. The models are agent-based so that each software agent represents an individual or an organisational or collective stakeholder as may be deemed appropriate in the specific social context. In this project as in several before it, the behaviour of the agents' is driven by rules (or production systems) that capture as far as possible relationships described by stakeholders in the linguistic terms used by them. The virtues of this approach include:

- The models and the behaviour of the agents can then be validated at micro level by seeking evaluations from the stakeholders who know the persons or collectives represented by the agents.
- Numerical outputs from the model can be produced for comparison with analogous, real social data.
- The agent rules can produce text explaining the reasons for actions taken by the agents where such explanations are drawn from the conditions of the rules that produce the actions. The result is a running narrative about and by the agents in the models and the consequences of their actions. This output amounts to a formally generated scenario.

- The agent-based model structure offers scope for software agents to be replaced in the simulation runs by human users.

At the end of each simulation run, human understanding of the results is likely to be enhanced by computer animation and information visualisation. At each step throughout the policy modelling process different stakeholders and domain experts can be involved as long as the process has reached a point of interest for them, thereby to introduce great and new challenges and opportunities for visualisation. The whole process is influenced by the organisation and strategy behind the policy modelling, as well as the context and environment in which the modelling takes place.

It is crucial to underline that the presented process model has been developed jointly with the Work Package 5 "Policy modelling and scenario process design" and it will be elaborated and refined in Task 5.1.

4.2. ASPECTS OF THE PROCESS MODEL

4.2.1. Scenario building process

The transition from scenario inputs to policy modelling and simulation can be separated conceptually into five steps though, in practice, they merge with one another in an integrated and iterative process.

The first step in the scenario building process is the identification and analysis of a policy area (Figure 27) by means of traditional desk research and organized workshops with stakeholders. This phase includes the inspection of relevant material as well as the systematic development of problematic scenarios concerning the potential policy areas. Having agreed on outstanding policy areas the last internal step in this phase is the assignment of scenarios and material to them. A virtual common workspace and participation area for either single groups or for all involved stakeholders supports this step. Participating experts will most probably use a scenario generation tool that is able to handle different policy areas.

The second step of this procedure basically results in an agreement on a policy area that should be inspected, modelled and simulated. Basically this is done by opinion polling using a system that itself could easily be provided using the common workspace.

Once having decided on a single policy area, the third step is the detailing of the objectives and the formulation of scenarios. This is achieved by prioritizing desired aspects of scenarios to inform the generation of one or more target scenarios. This step is supported by the use of the common workspace as well as by an adequate scenario generation tool. This scenario generation produces a narrative that provides the fundamental basis for policy model design.

Step 4 in the overall process, and the first in policy modelling, is the extraction of design features of the policy model from the narrative. These features need to be completed by ad-hoc assumptions on the content where necessary.

Step 4 is performed by modelling experts by the help of a special tool that supports this operation. The parameters belong either to the class of environmental aspects of the modelled world, to goals, stakeholders, or they build alternatives between which stakeholders may choose in order to achieve the desired goals.

Once having extracted those aspects, in step 5 the elements of the policy model are ready to be defined in two steps which (a) describe the simulation world itself and (b) define agent types. The modellers need to represent exogenous factors as well as initial world facts, which either are considered to be constant or variable values. The agent types represent stakeholders of different classes and their initialisations establish sets of carry facts and rule bases driving the behaviour and social interaction appropriate to the classes of stakeholders they represent.

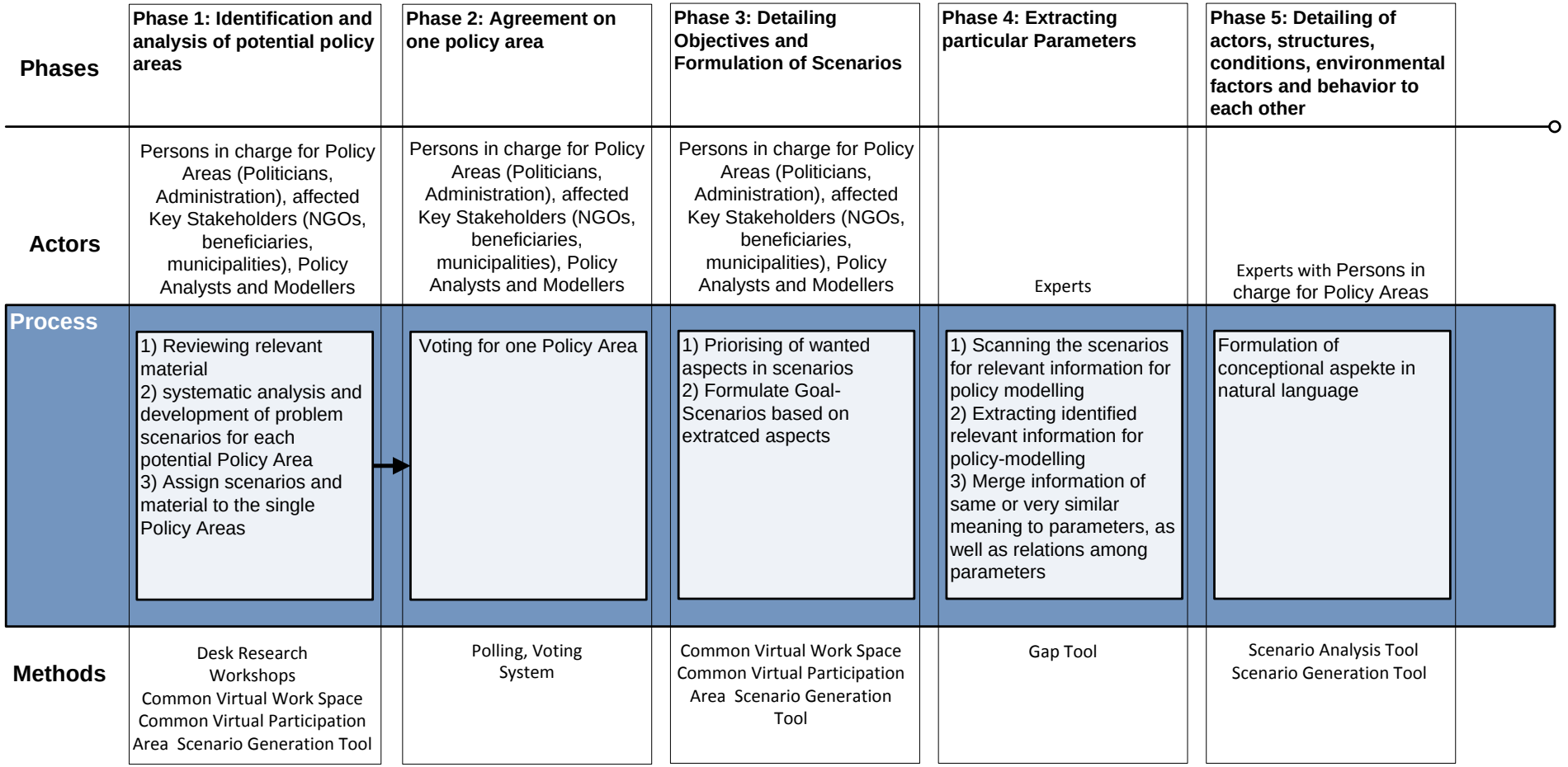

Figure 27: Overview of the scenario method – the phases 1 and 2 are part of tasks in work package 1

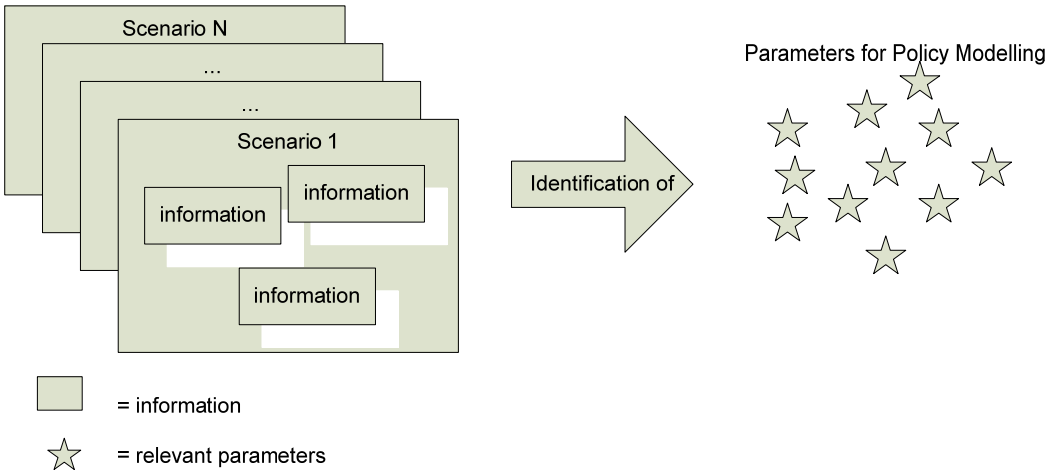

Figure 28: Analysis of scenarios to identify and extract relevant information and parameters for policy modelling

Figure 29 shows the derivation paths from unstructured narratives to a structured scenario model, where aspects of the environment, the involved stakeholders, goals and decision alternatives are arranged. These aspects constitute the foundation for the components of the policy model. While the environmental and stakeholder aspects directly impinge on the model structure (environment and agent types, respectively), the alternatives and goals have to be translated into world facts, agent knowledge and, finally, rules for agent dynamics.

This draft concept might be elaborated into a reference process model during the course of the OCOPOMO project.

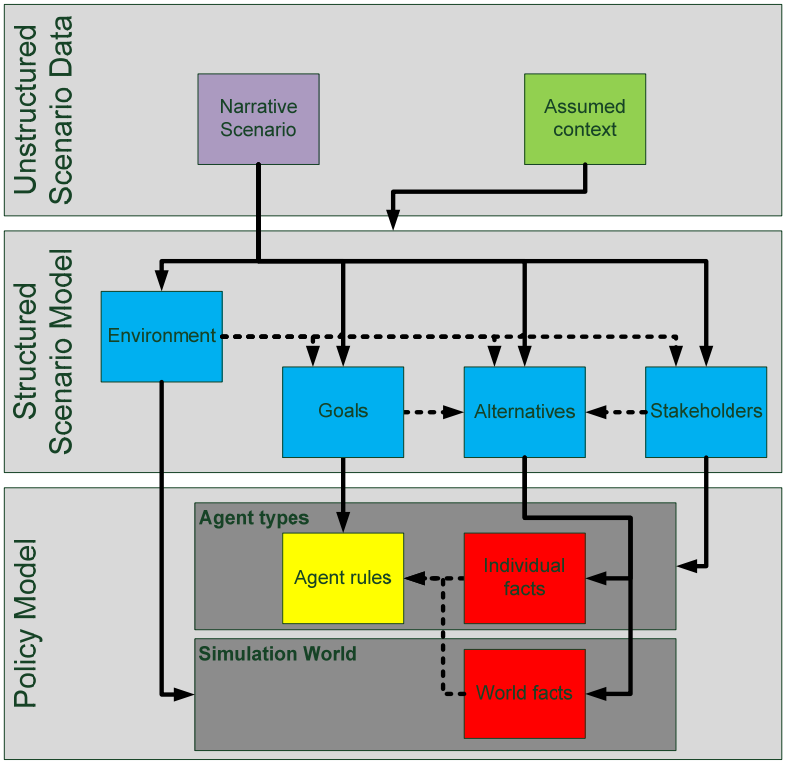

Figure 29: Policy modelling process. Links between aspects and components of different model stages are indicated by solid arcs, while dashed arcs show the interdependencies within a stage.

Table 7: Process of identifying model elements from a scenario description

Level of description	Scenario description	Issue	Category	Characteristic of issue	Default value	Fixed/ variable	Related model structure	Related model component
Comments	A scenario is composed of a number of phrases	One or more issues are extracted from each phrase, representing the key aspects of phrase	For each issue, a category (as specified in the structured scenario model) is assigned in order to allow an issue classification.	A characteristic, defined for each issue, indicates the domain of the issue (the types of values that might be assigned to the issue)	A default value can be specified for an issue, if applicable. This information can be drawn either from the phrase, or an assumption has to be used.	"Variable" indicates an issue that can be transformed into a simulation parameter	It has to be indicated which static model element is affected (environment or a certain agent type)	A concrete component or part of the affected model structure has to be identified.
Examples	*Solar energy should be facilitated by Campania Region.*	*Energy source*	*State* *EITHER Alternative* *OR* *multivariate*	*EITHER nominally scaled,* *e.g. "solar, "nuclear", "hydro", "wind", "fossile"…* *OR: multivariate, e.g. {solar 10 per cent, nuclear 15 per cent, fossile 70 per cent, wind 5 per cent, hydro 0 per cent}*	*EITHER* *"fossile" (if this is the current major source)* *OR* *List of current percentages*	*Variable*	*Environmental state*	*Fact*
		Campania	*Agent*	*[Structure]*		*Static*	*Campania agent*	*Class*
		facilitate	*State change (ways and means, measures to be taken)*	*nominal scaled, e.g. measures for facilitating such as closing a fossile plant after having installed a solar power plant or having built a power line from Libya to Campania, both with funding*	*Approve funding (assumed), start the process of closing the fossile power plant*	*Variable*	*Campania agent*	*Rule in the agent's rule base*
		should be	*Goal (a goal is the description of a desired future state, but "facilitate" is a means to reach the goal!)*	*EITHER nominally scaled,* *e.g. "solar, "nuclear", "hydro", "wind", "fossile"…* *OR: multivariate, e.g. {solar 10 per cent, nuclear 15 per cent, fossile 70 per cent, wind 5 per cent, hydro 0 per cent}*	*EITHER* *"solar" (as this is the desired state)* *OR* *List of desired percentages, e.g.(solar 25 per cent, nuclear 15 per cent, fossile 55 per cent, wind 5 per cent, hydro 0 per cent)*	*Variable*	*Environmental state*	*Environment "..."*
	...							

Table 8: Process of composing formal model descriptions from model elements

Level of description	Model Structure	Model Component	Name	Natural language description	Example for formal language description
Comments	This refers to the "related model structure" as defined in Table 7.	This refers to the "related model component" as defined in **Table 8**.	The name of the model element.	A textual description of the model element.	A formal description of the model element. This is modelling approach specific content and could e.g. be code fragments, imperative or declarative rules.
Examples	*Agent "Campania"*	*Structure*	*Campania*	*Agent class*	*class Campania {...}*
		Facts	*Current state*	*The current distribution of energy sources*	*Class EnvironmentState {*
				The current CO_2 dissipation	*double sourcePercentages[];*
					double CO2Dissipation;
					…}
			Desired state	*The current distribution of energy sources*	*PlanningGoal*
					[objective solar]
					[priority high]
				The current CO_2 dissipation	*...*
			...		
			Danger	*Fossile power plants dissipate CO_2*	
		Rules	*Reduce CO_2*	*If it is true that fossile power plants dissipate CO_2 then reduce percentage of this energy source*	*If (Danger){*
					Close(fossile);
					Install(solar);
					}
			...		
		Actions	*Delete*	*Close power plants of a certain type*	*Method close(powerPlantType)*
			Install	*Install power plants of a certain type*	*Method install(powerPlantType)*
	...				

The policy model itself can be described in various types of languages. The range of suitable languages includes natural language, graphical description languages and various types of descriptive or imperative programming and rule definition languages. Obviously, the specification of a policy model involves several different types of languages: while all aspect of the model should be identified (and documented) in natural language, other (formal) types of languages have to be applied for the formal model (as the ”goal” of the modelling process). An example for a structured way to specify the policy model components is sketched in Table 7 and

Table 8.

The modelling steps mentioned above are to be taken by modelling experts together with stakeholders. An adequate scenario analysis and generation tool may support them in this whole process. Once having generated a model this way, the next step is the preparation and execution of simulation experiments with the model.

4.2.2. Integrating stakeholder-generated scenarios and formal policy models

Most scenario building sessions have the aim to have stakeholders to tell a story of a process will achieve a given end-point configuration. From such a narrative scenario, the modeller extracts the various steps as decisions taken in specified conditions and captures each step with if-then rules. Running the model indicates whether the overarching scenario produced by the stakeholders is also produced by the rules representing the individual decisions.

Essentially, the scenarios are intended to get the stakeholders to start from the conclusion and imagine a sequence of actions that would bring about the conclusion in a sort of backward-chaining approach. The modelling is forward-chaining because it starts by specifying the possible steps that might be taken and the conditions in which they would be taken and is then used to identify the path of events without being constrained by the desired end-point or goal. Both approaches need to be consolidated to one applicable methodology. For this purpose the overall process to formulate an environment for policy analysis, modelling and simulation is divided into several steps as shown in Figure 30.

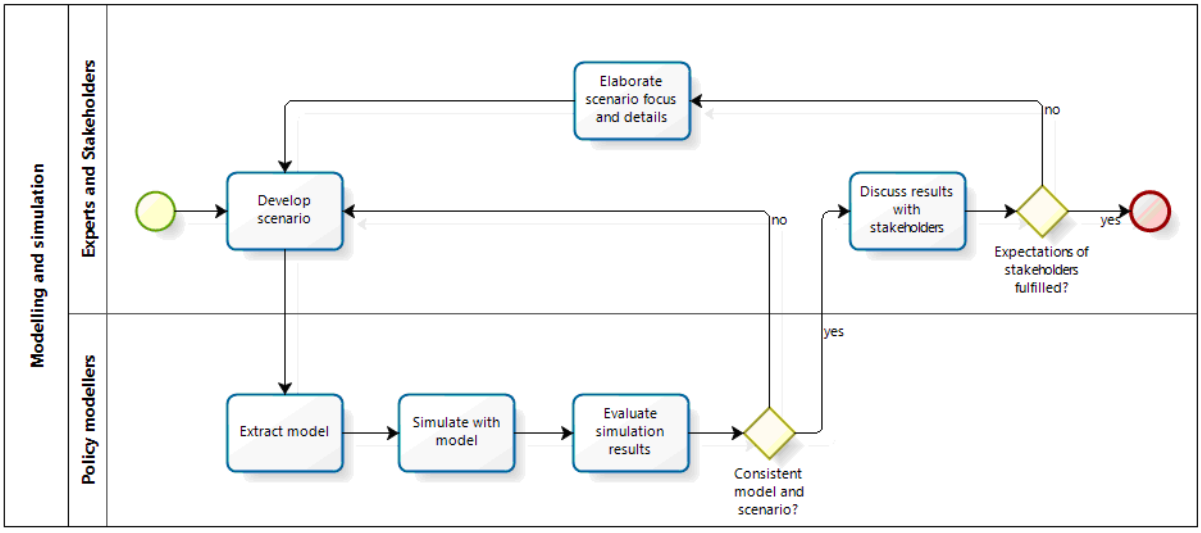

Figure 30: Modelling and simulation process

The initial task of developing a scenario deals with the generation of a set of state-of-play information, extracted from several informal descriptions. This first step needs to be performed thoroughly in order to generate a robust underlying foundation and comprehensive frame the policy model can be based on.

In the following steps the policy model is extracted and put into simulation. If the simulation results are not consistent with the scenario prescriptions, then the scenario developing, model extraction, simulation and evaluation tasks are iterated until a satisfying conformity is achieved. Afterwards the simulation results are discussed among experts and stakeholders in order to investigate whether the stakeholders' requirements and expectations are fulfilled. Having achieved consistent scenarios and models (or investigated and understood reasons for inconsistencies), but stakeholder are not fully satisfied with the results, then the next step is to elaborate the scenario by producing alternative possible futures or to explore outcomes and events (problems and opportunities) that were suggested by previous iterations. Then another iterative process follows, trying to bring model and scenario into a consistent relationship so that the model-generated outcomes capture and possibly inform the stakeholder-generated scenarios.

In general, simulations produced with declarative models yield processes in a way that imperative models do not. This is because the actions taken by agents at any time step depend on the current state of the model and all actions by all agents taken together produce the next state of the model. Consequently, the sequence of actions emerges from the simulation. An imperative model specifies the sequence of actions in advance. Since both scenario generating sessions and the simulation models yield accounts of a process, we have a natural basis for comparing the two. These comparisons are central to the OCOPOMO method. Where there are differences between the two, the exploration of the reasons necessarily entails an analysis of the effects of specific actions in specific conditions (process "Analysis of specifications in specific conditions"). This analysis should inform subsequent scenario developments and also the model rulebases. A key software requirement is that this process of comparison and development should be represented clearly both to modellers and to participating stakeholders.

The software must support the interaction between scenario generation by participating stakeholders and model development. The interaction is at two levels. At a structural level, the relationships among rules within each rulebase reflect and describe the structure of the decision-making procedures or an implicit (though not necessarily accurate or unique) structure of cognition ascribed to decision-makers and implemented in the software agents representing them. At the detailed level, each rule contains clauses that are either taken from testimony of participating stakeholders and the literature or have had to be assumed by the modeller to complete the model. These invented clauses must either be shown to have little effect on the scenarios produced by the models or they have to be validated by domain experts.

The structure of a rulebase is defined by a dependency digraph in which each rule is represented by a node. One rule (the child) is dependent on another rule (the parent) when at least one clause on the LHS of the child can be unified with the same clauses on the RHS of the parent. This means that every firing of the parent rule places one or more clauses on a database that are necessary for the child rule to fire. Cycles in these dependency graphs imply that two or more rules are dependent on one another. In a now defunct declarative modelling language called SDML (Moss et al., 1998). SDML: A Multi-agent Language for Organizational Modelling. Computational and Mathematical Organization Theory, 4 (1), 43-69, there was an assumptions mechanism that essentially made a tentative assumption for each such rule that the others would be fired and then tested whether other clauses would be satisfied. If at least one clause in any of the interdependent rules was not satisfied, then none of the rules would fire. Otherwise, they would all fire. Whilst effective, this mechanism was excruciatingly slow and the better alternative was to structure time steps so that clauses causing the mutual dependency were required to have fired in the previous time step. Alternatively, the interdependent rules could be combined into a single rule. The latter resolution meant that some rules would be extremely long and difficult to understand by inspection -- a consequence that defeats one of the reasons for adopting a

declarative agent modelling approach in the first place. It is far better to ensure the dependency graphs are acyclic or, in other words to write rules so that, within any time step, they are not mutually dependent.

Calculating the dependency graph for each time step avoids the need for conflict resolution. First, all of the root nodes are fired if they can be, then all of the rules dependent only on the root nodes, then all of the rules dependent only on previously fired rules until there are none left with all conditions satisfied. However, to understand the structure of the process captured by the rulebase, it is necessary to include in the dependency graph all dependencies involving lags as well. Although the dependency graph used for determining which rules to fire within a time step should be acyclic, the dependency graph used to capture the structure of the decision-making process (including lagged clauses) can contain cycles which represent the considerations that cannot meaningfully be considered in isolation.

The requirements for the software used to relate models and human-generated scenarios are based on the complete, possibly cyclic, dependency graphs. There needs to be a facility to inspect the content of each rule and the reasons for dependencies among rules. The reasons for the dependencies will be recorded in labels on the links. There will need to be something like a pop-up menu for each node with items for inspecting the conditions-side of the rule and the actions-side of the rule. There should also be some means of identifying the source or justification for each clause in a rule. For this purpose, we are proposing the use of a correspondence table relating passages in textual descriptions of stakeholder-generated scenarios to specific rule clauses. Each row of the correspondence table will have a natural language phrase drawn from the reference text and the formal predicate clause intended to capture that phrase. An example of the format for a correspondence table is Table 9.

Table 9: Process of composing formal model descriptions from model elements

DOCUMENT	AGENT	PHRASE	CLAUSE
Scenario report ZZZ.yyy	Campania	The planning goal alternative "solar energy" has high priority	PlanningGoal [objective solar] [priority high]

Validation or criticism of the model will be facilitated by enabling participating stakeholders and other domain experts to call up the rows of the table that are relevant to any rule or clause and also to be able to see the relevant phrases in their textual context.

Existing software does not meet the needs of this approach. The qualitative data analysis software such as ATLAS.ti[27] provides a user interface for to support identifying and then relating concepts and relationships in a semantic web. Ontology editors such as Protégé[28] using the web ontology language OWL and reasoning software Racer[29] also provide a means of generating relationships amongst objects and concepts. The problem with these software approaches is that they do not lend themselves readily to the analysis of process although they are very sophisticated aids to the identification and analysis of structure. One difficulty that arises is the lack of a software tool that is suitable for identifying and analysing processes over time especially where the processes are not highly constrained and leave scope for uncertainty and volatility.

[27] http://www.atlasti.com
[28] http://protege.stanford.edu/
[29] http://www.sts.tu-harburg.de/~r.f.moeller/racer/

4.2.3. Policy modelling process

Agent-based social simulation, and with it the branch of simulation of policy models we are focussing on in OCOPOMO, is probably the most important paradigm for simulations in the social sciences. However, it is a rather new discipline (widely applied since the late nineties of last century), which still reflects in the fact that most of the work done in this field is focussed on research and has in many cases the character of prototypical development. In particular, this has – in association with the high complexity of modelling and simulation in general – major impact for the availability of standardized process models and software tool support for this purpose.

An important facet of this afore-mentioned complexity is – apart from modelling issues as described in the previous sections – the selection of adequate methods for formally specifying the simulations model as a first step, followed by employing the appropriate means for running and evaluating the simulation model. For each of the two stages, a number of relevant criteria (and consequential requirements) can be identified.

For the generation of simulation models two kinds of aspects have to be considered:

- static model aspects and structures, including the
  - involvement of different **agent types**;
  - possibilities to structure the **internal agent data**;
  - **organization of agents** (in grid, network or topography) and dependencies between agents (communication links or hierarchy)
  - structure of the **environment** (representation of environmental data and "behaviour")
  - specification **languages for static aspects** (textual, graphical, interactive)
- dynamic aspects, with the focus on specification of model behaviour and simulation processes, including the
  - **deliberation** capabilities of agents;
  - dynamic **creation and deletion** of agents (birth and death processes);
  - specification **languages for dynamic aspects**;
  - capabilities for interactively **exploring model dynamics**.

The simulating of models involves another set of aspects, regarding:

- **experimentation** with simulation models, including the
  - initialization of simulation runs, i.e. setting the initial parameter configuration;
  - user interaction during simulation runs, covering simulation control (start/stop/pause, external events) and model changes;
  - termination of simulation run by defined stop conditions (time-based, threshold-based) and error handling;
- support for **automated simulation experiments** (e.g. for sensitivity analyses);
- support for **gaming simulation**, i.e. provide functionality to take over decision of one or more agent(s) by a human player;
- simulation **output, visualization and analysis**:
  - plotting qualitative data (logs, stories) and quantitative data (time lines);
  - statistical analysis of quantitative data;
- facilities for preparing **animations**.

When creating the link from these conceptual aspects to practical realization, different ways of implementation can be taken into consideration. To achieve a classification of these ways, which can serve as an evaluation criteria for simulation tools, it seems reasonable to draw on a concept Kreutzer (1986) used for classifying modelling languages, and which was adapted later on by Möhring (1990): the correlation between the power of a specification language and the conceptual distance with respect to the object to be modelled. Usually it can be observed that modelling languages with a short conceptual distance allow content experts with low experience in modelling and programming to retain at language levels they are familiar with in their particular subject area, while abstracting from technical details. Obviously, such languages have to be limited to specific modelling approaches (Gilbert and Troitzsch, 2005) (e.g. describing system dynamics models by using stock-flow-diagrams or modelling parts of reality by cellular automata). On the other hand, with more "powerful" modelling languages (and in particular general purpose programming languages) any types of models can be specified by programmers respective skills.

One of the challenging tasks to be treated in OCOPOMO is to find a compromise between the two extremes that allows to get along with a broader range of model characteristics (which will definitely be necessary to cover the different policy models in this context), but which also enables (trained) policy experts to handle the models.

If this concept is applied to simulation tools, a distinction into five discrete modes for incorporating/handling the abovementioned aspects seems to be an applicable way for a tool discrimination:

- **P (programming language)**: aspects can be implemented by using a general programming language (possibly together with an integrated development environment).
- **L (library)**: the tool provides libraries for simulation-specific functionalities (e.g. simulation scheduler, libraries for rendering diagrams).
- **S (simulation)**: the tool offers integrated support for certain modelling and simulation aspects by introducing limited model specific abstractions (e.g. providing an environment for agents in the form of a grid of patches, endowed with operations for placing and moving of agents, and for calculating the distance between them). Furthermore, it dispenses the modeller from certain technical details (e.g. graphical user interface for simulation control and visualization).
- **D (domain)**: Modelling approach specific or domain specific tool with comprehensive support for the specific purpose (e.g. traffic jam forecast).
- **– (not available)**: an aspect is not supported by the tool.

Table 10 gives an overview on a selection of tools applied for agent-based simulation (with the focus on social sciences). The aspects from the summary above (printed in bold) are basis for evaluation of the tools, while the five modes of support are used for classification of the aspects. The selection covers only a small fraction of available tools, but all were more or less successfully used or tested by the authors. This experience is basis for the classification; there is no further claim for completeness and correctness. Other tool evaluations (incorporating different discrimination aspects) have been conducted and published e.g. by

- Brassel et al. (1997): comparison of several simulation approaches (Systems Dynamics, Microanalytical Simulation Models, Discrete Event Models, Multilevel Models, Cellular Automata) with respect to several characteristics (levels [e.g. micro, macro], attributes [continous, discrete], structure of time, topography, evaluation, state change [deterministic, stochastic], available tools, purpose);

Table 10: Tools applied for agent-based simulation

Tool	Simulation model aspects									Simulation aspects					Comments
	Static aspects					Dynamic aspects									
	Agent types	Internal agent data	Organization of agents	Environment	Languages	Deliberation	Creation and deletion	Languages	Exploring model dynamics	Experimentation	Automated experiments	Gaming simulation	Output, visualization, analysis	Animation	
Netlogo	S	P	D	D	P	L	S	P		S		L	S	S	Netlogo (Wilensky, 1999) is a ” multi-agent programmable modeling environment”, aimed to support the user to rapidly create and execute models and experiment with them. It has easy to handle, but shows certain restrictions (grid-based environment, description of agent behaviour by means of a procedural language, no further means for structuring code, restricted extensibility due to closed source policy).
Repast 3.1	P	L	L	L	P	L	P	P	P	S	L	P	L	L	Repast (North et al., 2006) is a Java-based toolkit which provides the modeller with a framework for discrete-time agent-based simulations, along with a large variety of (mostly external) libraries for e.g. agent AI functionality (ANN, GA etc.), representation of environments (grid, network, topography), mathematical operations (statistical analysis, random number generation etc.), visualisations (diagrams, animations etc.) and many others. It can be extended easily with any functionality available for Java-based applications, but, in any case, modelling is tied to Java programming. A recent version (Repast Simphony, North et al., 2007) is intended to provide an alternative in form of graphical control flow design in conjunction with an alternative modelling language (Groovy), but more complex or “beyond standard” models still require the usage of general-purpose programming languages.
TRASS	P	L	S	L	P	L	P	L	P	S	L	P	L	D	TRASS (Lotzmann, 2009) is a framework for discrete-time, continuous space agent-based simulations. While the focus lies on topography oriented traffic models, a large variety of other applications are imaginable. There are several extensions available, mainly regarding the description of agent behaviour [robotics layer]. Furthermore, interfaces to e.g. EMIL-S (for strategic, normative decisions of agents) and MEME (for automatically conducting simulations experiments) are already integrated.
EMIL-S	S	D	S	D	S	S	L	S	S	–	–	P	L	–	EMIL-S is a component that provides functionality to enrich agents modelled with Java-based simulation tools (Repast, TRASS) with normative capabilities. I relies on a approach where rules are represented by a decision-tree like structure (event-action trees), where the root represents a event (usually triggered by environmental perception), and the leaves define the possible action alternatives. The edges of the tree are annotated with probabilities, which are essential for action selection and (normative) learning. EMIL-S brings along a GUI for creation and managing the event-action trees. Detailed information about the software and the theoretical foundation of the applied normative approach (two-way dynamics) can be found in (EMIL, 2009).

JEOPS	P	D	P	D	S	D	P	S	–	–	–	–	P	–	JEOPS (Santos da Figueira Filho and Ramalho, G., 2000) is a declarative rule engine, implementing the RETE algorithm and, thus, is optimized for application in expert systems. With restrictions, it can be (and also has been) used for simulation purposes.
MEME	–	–	–	–	–	–	–	–	–	S	S	–	S	–	MEME (Iványi et al., 2007) is a tool which allows automated experimentation with simulation models. It is equipped with interfaces for Repast-, Netlogo- and (general) Java-based models, and supports the user with configuration, running and analysis of multiple simulation runs (executed on distributed hardware, if desired).
REP1/ DRAMS	S	S	S	S	S	S	?	S	S	L	?	L	S	?	A declarative rule engine (Rule Engine Prototype 1, REP1; planned to be extended to a Declarative Rulebased Agent Modeling System, DRAMS in order to replace systems like JEOPS) is currently developed with the aim to provide a production rule system optimized for simulation purposes. The proposed system includes agent-individual and shared fact bases, a distributed rule engine, as well as facilities for supporting the modeling and simulation process (interactive generation and management of rule and fact bases, calculating and visualization of dependency graphs). A number of OCOPOMO project partners (SMA, UKL, MMU) are involved in development of this software within the scope of WP5.

- Tobias and Hofmann (2004): thorough evaluation of four "free Java-libraries for social-scientific agent based simulation" (RePast 3.1, Swarm, Quicksilver, VSEit);
- Nikolai and Madey (2009): a survey of more than 50 agent-based modelling platforms concerning five characteristics for comparison (programming language, operating system, type of license, primary intended domain, degree of user support).

Due to the lack of integrated software for the proposed policy modelling approach which would be capable to cope with the anticipated complexity, models developed in the context of the OCOPOMO use cases certainly will involve more extensive functionality than any of the single tools mentioned in the table above could provide. As a consequence, the OCOPOMO policy modelling tool will be composed of several frameworks and components, each covering a specific set of functionality. In fact, it can be expected that DRAMS would be suitable to cover all aspects of agent cognition and deliberation, and, furthermore, could provide a sophisticated modelling user interface. But at least for experimentation with simulation models other (already available) tools have to be incorporated.

The component diagram in Figure 31 shows a first sketch of a possible architecture of the policy modelling tool, consisting of simulation tool (e.g. Repast) and a rule engine (e.g. DRAMS). Only the main components of these systems are depicted, together with the relationships between them.

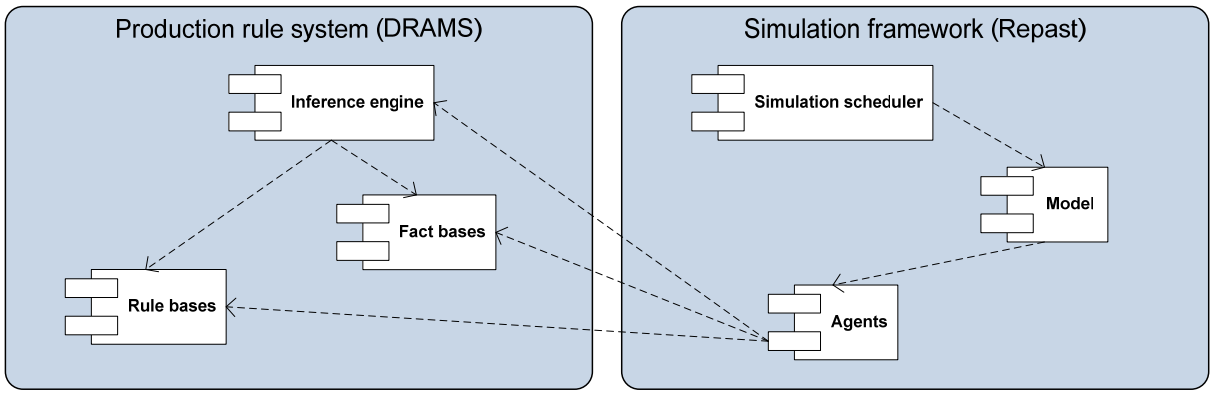

Figure 31: Component diagram of a possible architecture for the OCOPOMO policy modelling tool

The necessary interfaces for integrating the policy modelling tool into the OCPOMO ICT toolbox are shown in Figure 32. There are three front-ends for modelling, experimentation and gaming included, and the dependencies between the front-ends and the components of the simulation system can be extracted from Figure 32.

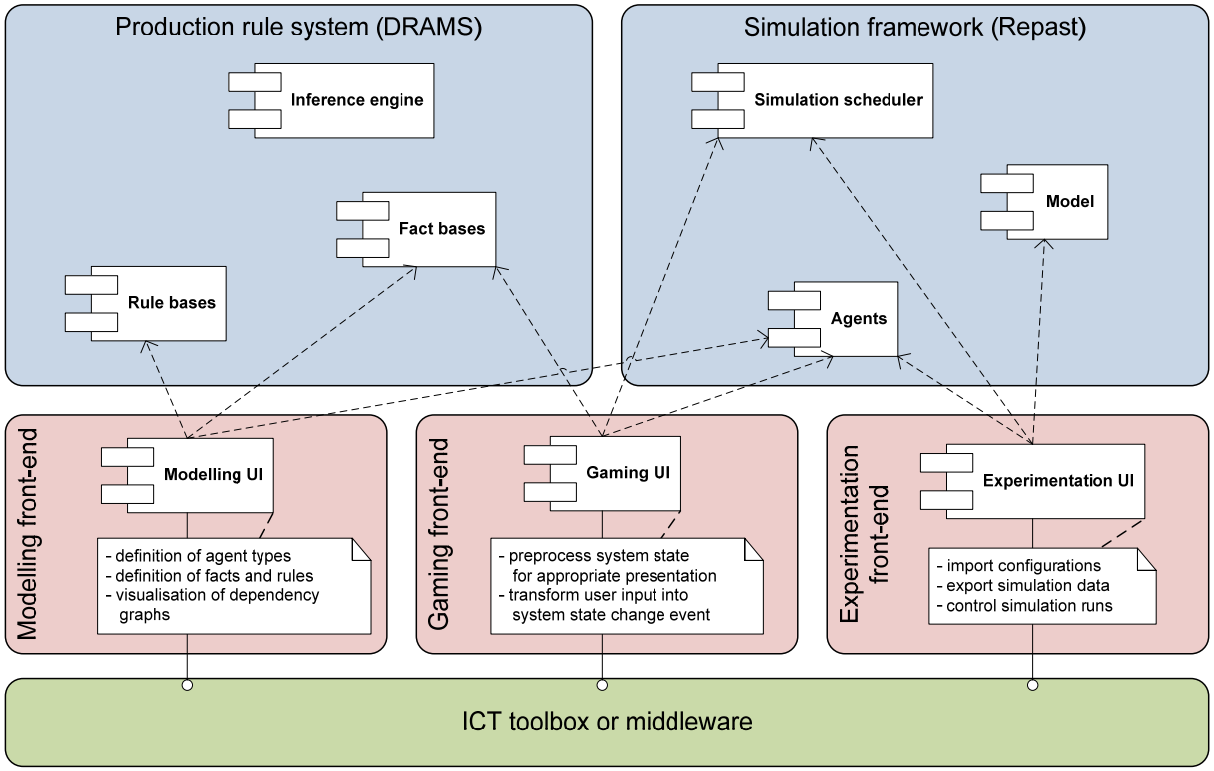

Figure 32: Integration of the policy modelling tool into the OCOPOMO integrated toolkit

4.2.4. Participation process

The scenario building and policy modelling process does not only have the aim to develop and test the policy models. Rather, it aims to help the stakeholders to understand the effects of applying the policy model and thereof to change it. Therefore stakeholders should be increasingly involved in the different stages of the process. This has several advantages (Gilbert and Troitzsch, 2005; Ramanath and Gilbert, 2004):

- It can be made sure that the policy areas tackled are relevant for the stakeholders.
- Stakeholders, who have been involved, feel obligate to give feedback to the policy models.
- Stakeholders have the knowledge about the modelled world.
- To be involved in the process, raises stakeholders' interest in the topic.

But the same time, continues involvement of stakeholders is challenging. Motivation of stakeholders is a time consuming process which needs a good time management, 'right mix' of stakeholders, effective communication channels (Ramanath and Gilbert, 2004). Therefore the participation processes are designed in detail.

A participation process means the process of involving stakeholders in the overall process of collaborative scenario building and policy modelling. Therefore it highlights what needs to be considered to have a successful participation (so that the participation has an effect on the decision making process) and details stakeholder engagement methods for the specific scenario building and policy modelling processes. It details which participation activities are envisaged (e.g. consultations) and which accompanying activities are needed in which order. The participation process is a result from the application of the methodology described in section 2.2. It is modelled in BPMN, which turned out to be useful to present and agree to-be participation processes (Scherer et al., 2009b).

The most important thing to be considered for participation in OCOPOMO is that the overall scenario building and policy modelling process fits into the decision making process. It needs to be sure that the

results of the overall process are recognised and used in the next steps of the decision making process. Therefore the extensive analysis of decision making processes in both regions has been undertaken (cf. sections 3.1.3.1 and 3.2.3.1). The step "evaluation of a new project or programme" seems reasonable to integrate the OCOPOMO approach. It needs to be further detailed how the overall process fits into this decision making step in both cases. An example for detailing this for the pilot in Campania Region is shown in Figure 33. This process model does not detail the participation process itself. Rather it shows how an overall process of collaborative scenario building and policy modelling could fit into the overall decision making process.

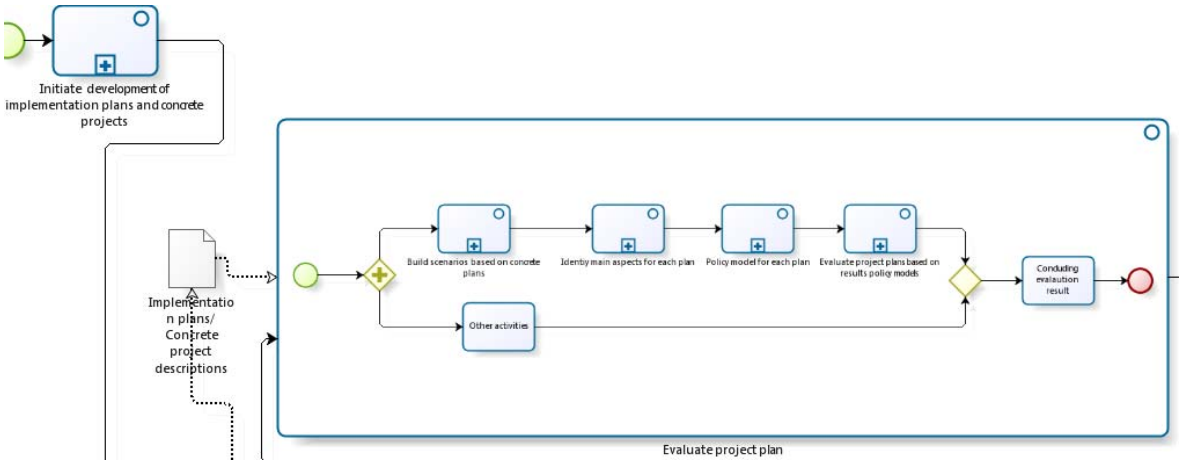

Figure 33: Example for detailing the evaluative project plan step for the OCOPOMO case in the Campania Region

Out from such a perception, it is the next step to formulise the objectives and expected results. This is of particular importance for making the participation process transparent for the potential participants. It needs to be resolved how the participation process will fit into the decision making process and how the outcome of the overall process will be further used in the decision making process. If the participation processes are designed it is also important to provide information about how the participation process will go on and how the outcome of one participation step will be used in the next one. Beyond it is necessary to provide the following information for stakeholders:

1. Easy understandable description of the decision making process
2. What are the aims and expectations of stakeholders' participation
3. Background knowledge about the policy area.

Figure 34 shows the main interaction and tasks to be undertaken around the scenario building and policy modelling process. It is necessary to prepare necessary information and marketing activities in advance (see above). All kind of regional media (TV, newspapers, regional internet portals, etc.) should be contacted and informed about the starting and ongoing initiative. Publishing recent news about the policy area, decision making process, etc. should be an ongoing process during the whole initiative. News in the portal should be rather short and up-to-date, sometimes linked with the other contents in the portal and provide important background information about the topics. Discussions can be started together with news published. The functionality to comment news (similar to a blog-functionality) supports the interactivity of the news section. No extra blog functionality is needed because external as well as project internal news can be presented with this kind of news functionality. Other information services as newsletter (because users are rather used to them) and RSS feeds (no additional effort) should be integrated. In the BPMN model, planned stakeholders' activities are modelled with ad-hoc processes.

The need to present news and discussions results in order to interest and attract stakeholders with links to the discussions, requires having one overall web portal, which provides all needed functionalities. The people of the project team, which are responsible to publish news and start discussions, are not familiar with technical features. Therefore an easy-to-use content management system should be favoured to support the project team in these tasks.

The BPMN model also shows the interactivity between the tasks "scenario building and policy modelling" and "inform and participate". Detailed descriptions can be found in the subsequent sections.

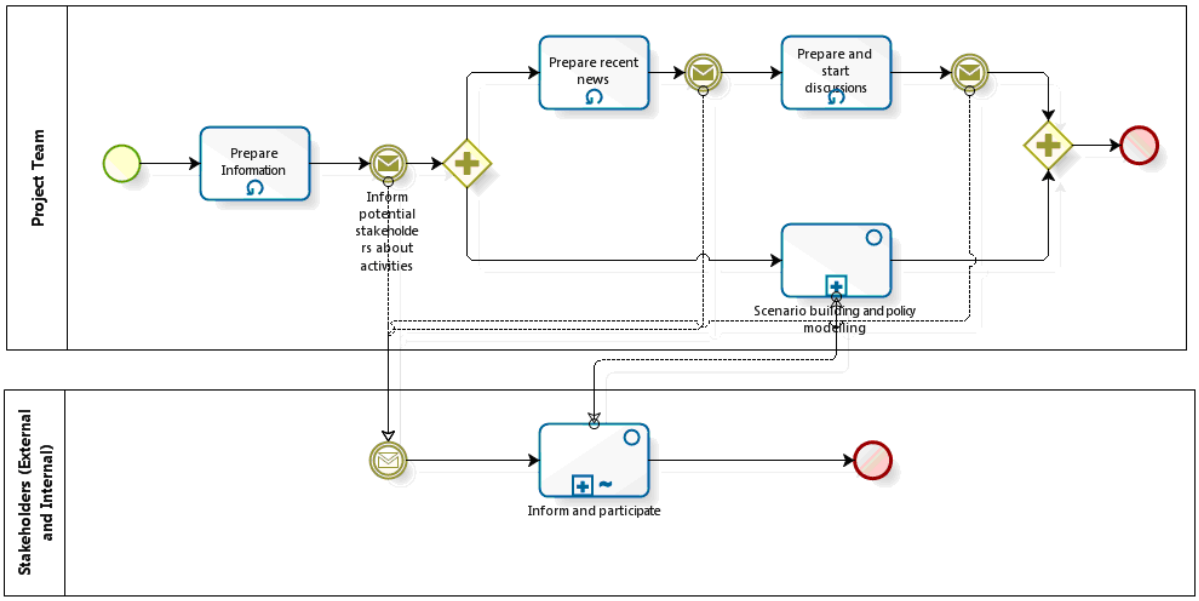

Figure 34: Interaction between parties around the scenario building and policy modelling process

4.2.4.1. Participation in scenario building

Subsequently integration of stakeholders' opinions during the scenario building process (as described in section 4.2.1) is detailed with participation and engagement process descriptions.

Therefore the different scenario building steps were analysed for their aim, stakeholders involved and methods in order to design resulting participation steps. The result is shown in Table 11. The process of engaging stakeholders in scenario building is planned based upon these steps.

Step 1 and 2 are detailed in the BPMN model in Figure 41, step 3 is described in Figure 42 (see Annex VI). To consult stakeholders about potential policy areas to model, a forum can be used. Regarding discussions need to be initiated, moderated and evaluated by the project team. For each consultation and polling process, an explicit time frame needs to be planned in advance. To give the stakeholders the opportunity to write their "own" scenarios a simple text editor needs to be integrated in the platform. Some of the users could be discouraged by a wiki because of the specific syntax. Therefore a specific "scenario" template which can be edited and revised by different users is needed.

Table 11: Stakeholder involvement in scenario building process

	Aim	Stakeholders involved	Participation steps	(electronic) Support Tools
1	Identification and analysis of potential policy areas	Responsible parties for policy areas (politics, government), concerned key stakeholders (NGOs, municipalities, positively or negatively concerned stakeholders), policy analysts, modelers	Inform about the aim of the project and this step.	News section, newsletter, RSS feed, email to interested stakeholders, Press, Other electronic media, regional TV
			Consult internal and external stakeholders about possible. policy areas	Forum, Chat with specific stakeholders (published in the platform)
			Inform about the policy areas.	See 1)
			Discuss possible policy areas among stakeholders.	Forum, Comments on the platform
2	Agreement on policy area	As before	Inform about the aim of the project and this step.	See 1)
			Poll on policy areas	Polling functionality
			Inform about the decision on policy area	See 1)
3	Detail objectives and formulate scenarios	As before	Inform about start/example scenario (to give stake-holders an idea) and the objectives of this step.	See 1)
			Write and discuss a common scenario with a group of stakeholders (each group one scenario)	Specific implemented functionality to support collaborative scenario building
			Discuss scenarios and aspects with other groups.	Forum, Comment functionality of scenario
			Poll on scenarios	Polling functionality
4	Extraction of issues	Experts	1) Inform about aim of the project and this step.	See 1)
			2) Collaborative extraction of issues (includes discussions in different forms)	Specific implemented functionality to support collaborative issue extraction
			3) Agreement on issues	Comment functionality of issue tool

5	Detailing stakeholders, structures, conditions, environment factors, behaviour and interact.	Experts with responsible parties for policy areas	1) Inform about aim of the project and this step.	See 1)
			2) Collaborative work on these factors (includes to regard discussions in different forms)	Specific implemented functionality to support this step, summary of forum discussions on specific topics
			3) Inform about the result	See 1)

Table 12: Stakeholder involvement in policy model simulation

	Aim	Stakeholders involved	Participation steps	(electronic) Support Tools
1	Performing simulation experiments;	Responsible parties for policy areas (politics, government), concerned key stakeholders (NGOs, municipalities, positively or negatively concerned stakeholders), policy analysts, modelers	Inform about the aim of the project and this step.	News section, newsletter, RSS feed, E-mail to interested stakeholders, Press, Other electronic media (regional tv, etc.)
			1) Inform about the policy model	Simple understandable visualization of the policy model and simulation results
			2) Stakeholders play with the model	Support users to change different parameters and compare simulation results, users can save parameters and results
2	Analysing, interpreting and conditioning outcomes from simulation experiments	Experts, Internal stakeholders	3) Consult internal and external stakeholders about possible changes of the policy model	Forum, Chat with specific stakeholders (published in the platform)
3	Discussing simulation outcomes	Responsible parties for policy areas (politics, government), concerned key stakeholders (NGOs, municipalities, positively or negatively concerned stakeholders), policy analysts, modelers	4) Inform about results for the policy model	See 1)
			5) Discuss possible changes among stakeholders.	Forum, Comments on the platform
4	Revising configuration/ parameter settings of the simulation model	Experts, Internal stakeholders	6) Inform about final results	

4.2.4.2. Participation in policy modelling

Stakeholder participation in policy modelling aims to collect feedback on results and generating inputs/parameters for new simulation runs according to revealed discrepancies to scenario expectations. This type of participation is essential for policy evaluation and, in turn, for model verification and validation.

Policy evaluation is done in an iterative process, comprising a number of steps:

- performing simulation experiments;
- analysing, interpreting and conditioning outcomes from simulation experiments in order to make this data understandable for policy experts/use case partners;
- discussing simulation outcomes (together with possible reasons for unexpected results) with policy experts/use case partner in order to gather information about reasonableness of the outcomes and correctness of the model;
- revising configuration/parameter settings of the simulation model (and, if necessary, the model itself) for the next iteration, where required.

Evidently, stakeholder participation is applicable (and necessary) in the experimentation and discussion steps. Hence, the stakeholders should get the opportunity to “play” with the policy models by changing possible parameters for the simulation. By comparing the simulation results with different parameters, the stakeholders can propose different solutions or comment the correctness of the policy model. The process of stakeholder engagement is detailed in Table 12.

5. REQUIREMENTS FOR COLLABORATIVE SCENARIO-BUILDING AND POLICY MODELLING

This chapter gives an overview of the requirements specified within work package 1 for the integrated ICT toolbox and following the method introduced in section 2.2.

The identified requirements were categorized in regards to the specific components they will support within the OCOPOMO platform: integration, policy modelling, scenario generation and collaboration – see Figure 35. To every individual requirement within the categories the priority levels were assigned as presented already in section 2.2. This prioritization was done during a project meeting with all partners.

The requirements as presented here (and in detail through the requirements tables in annexes II– V) will be refined and revised along with the realization of the OCOPOMO project. Mostly it will be conducted in work packages 2, 5 and 6. This means that some of the requirement features, which are listed below may be revised in subsequent iterations.

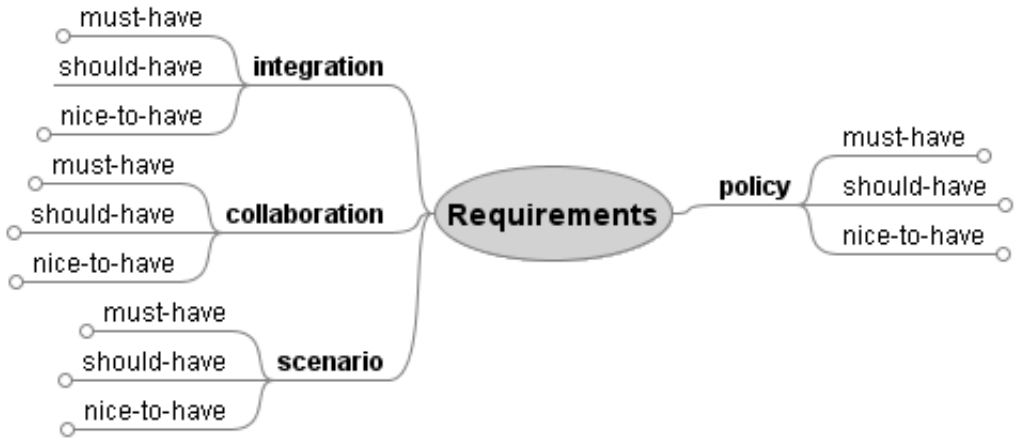

Figure 35: General categorisation of requirements

5.1. REQUIREMENTS RELATED TO SCENARIO GENERATION

Requirements related to scenario generation support the processes which have to be carried out by the authorised user (i.e. facilitator) who begins, maintains and terminates the process of scenario generation (e.g. start of the scenario generation process, control of process phases, log of activities, workflow support, creation of stakeholders' group) as well as organises and analysis the data gathered during the process of scenario generation (e.g., Data Analysis Software Tool). Moreover, the requirements regarding the integration of components with the e-participation tools (e.g., data exchange/annotation, support for direct export/import of information between these processes) and transformation of information between different processes can be found in this category.

Figure 36 presents the detailed content of the category with diversification into different priorities: "must-have", "should-have" and "nice-to-have". A more detailed description of requirements is provided in Table 13 and in Annexes II - V.

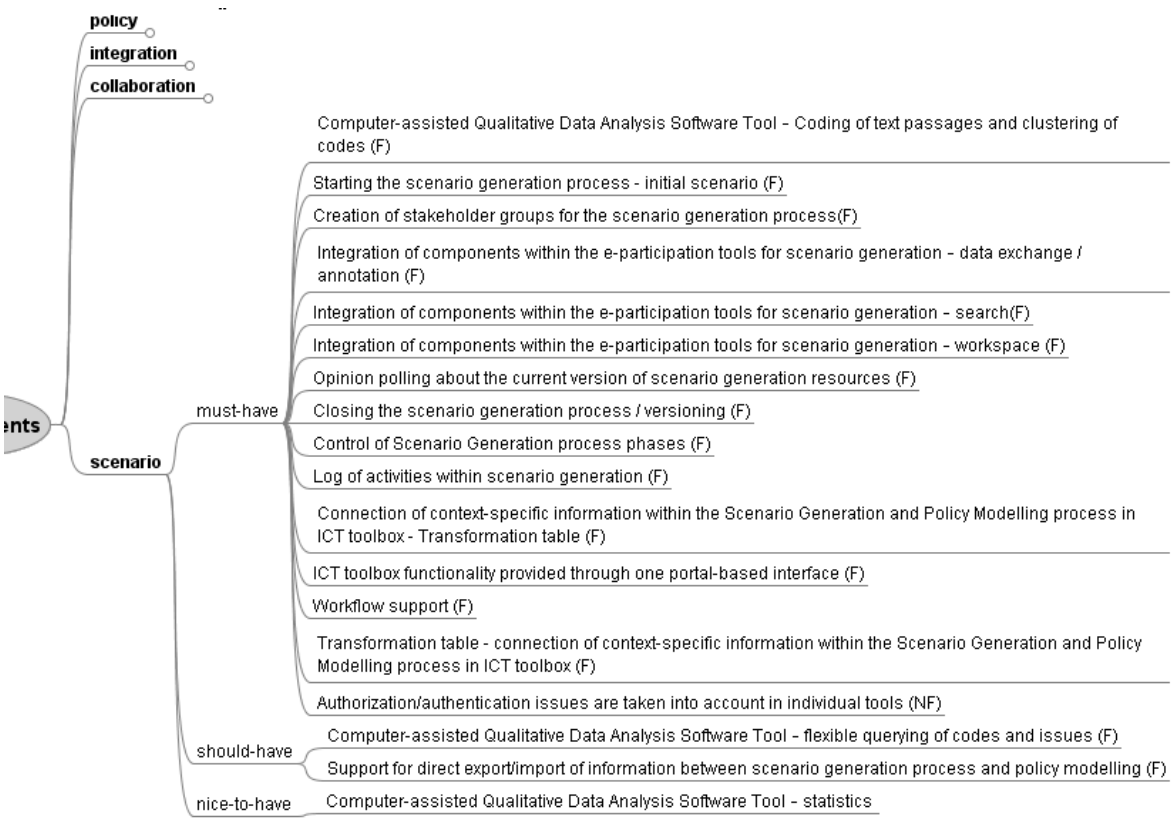

Figure 36: Mindmap of requirements related to scenario generation (functional requirements have been indicated with letter F, non-functional with letter NF)

Table 13: Requirements related to scenario building with more detailed description

Name of requirement	Description
Computer-assisted Qualitative Data Analysis Software Tool – Coding of text passages and clustering of codes	Open documents stored in the DMS, and any other written text (i.e. wiki text, discussion forum text, chats, blogs, transcripts of audio and video records). Analysts should be able to work in the back-office and analyse the written text received. Analysts should be able to work on the texts and highlight phrases (i.e. text passages) in the text. If the analyst right clicks the highlighted text passage, a context menu opens with one entry called “extract phrase”. If the analyst selects “extract phrase”, thereby creating automatically a unique identifier for phrase with relevant attributes or meta-data (i.e. the position of the phrase in the text and the original document is fixed including paragraph, line as well as its start and end position in line). After the creation of codes (i.e. coded phrases), analysts should be able to cluster existing similar codes into an issue. The analyst can choose to either link the coded phrase to an existing issue (i.e. cluster of codes according to similarity of their meaning) selected from the list of issues shown on the right side or to create a new issue on the base of this coded phrase. If a new issue has to be set up, create data record of issues in the database with the corresponding attributes or meta-data.

	Visualize the coded text passages by highlighting them within the text document. Give each data record for text documents, codes and issues a unique identifier to ensure traceability. Allow the integration of comment(s) to codes and issues.
Starting the scenario generation process - initial scenario	Responsible for scenario generation user (facilitator) can publish an initial scenario using the publishing tool of the ICT toolbox, where specific context information for the current case is created in the initial moment. From this moment onward, everything related to this scenario has this context information.
Creation of stakeholder groups for the scenario generation process	Responsible user (facilitator) can create group(s) of stakeholders for a revision of the current scenario. The integrated system should have context-specific information about their membership and activities (log).
Integration of components within the e-participation tools for scenario generation – data exchange / annotation	Different e-participation tools should be easily and mutually referenced (annotated). For example, there should be a possibility to reference some part of a scenario (e.g. a highlighted part of a text) and to use an action, which automatically creates discussion thread within a discussion forum related to this scenario, when user wants to do such an action (together with a copy of information to an introductory message in the discussion). Exchange of information should be defined as some format. Other possibilities of annotation / data exchange between particular tools should be identified before the design of the architecture and the implementation phase starts.
Integration of components within the e-participation tools for scenario generation – search	Users can search for resources within the e-participation tools using several metadata descriptions and attributes.
Integration of components within the e-participation tools for scenario generation – workspace	Information provided by group members is shown in an integrated form as one workspace, where individual tools are available for use within the group. Scenario is published / updated within this workspace with all its aspects and derived rules.
Opinion polling about the current version of scenario generation resources	Facilitator and/or other members of the scenario generation process can set up an opinion polling about the content. All granted users can express their opinion in the created poll.
Closing the scenario generation process / versioning	Facilitator can close consultation about the current scenario generation process. All information about the case is automatically locked and archived within the context. The current status of all data is versioned in the integrated system under the defined context.
Control of scenario generation process phases	Facilitator can switch using the ICT toolbox between basic modes of the scenario generation process – discussion and stakeholder comments on scenario, and evaluating and survey of the current status. The facilitator is granted with the right to change mode of the current work within the

	scenario generation process, and to finish the consultation, publish updated version, etc. The switched modes are disjunctive (there is no possibility to change data in the other mode; user has to wait for changing the mode).
Log of activities within scenario generation	All activities of users within the process of scenario generation and policy modelling are saved as metadata log with its context. Then this information can be used for metadata search and analyses (e.g. for presentation of results).
ICT toolbox functionality provided through one portal-based interface	The ICT toolbox should be provided as a portal-based web application. It means that particular tools will be fully available under this portal (where applicable). Integration of elements within portal should be similar to Google docs or Alfresco Share, both from the side of presentation and space of collaboration (workspace).
Workflow support	The whole process of policy modelling and scenario generation (or its part) is supported by selected workflow process engine. Facilitator can publish an evaluation of created resources from the both processes. All information is (semi-)automatically copied and integrated to all relevant tools, together with creation of some starting discussion threads, etc.
Transformation table - connection of context-specific information within the Scenario Generation and Policy Modelling process in ICT toolbox	All information related to one scenario generation is connected through one context. It means that everything created within development of one scenario is identified using a unique context in order to support context-specific search, information presentation, workspace/group management and users access to the resources. At the same time, when policy modelling is connected to a context-specific scenario, user is informed where the scenario comes from. It means that specific policy modelling has the same context information related to some concrete scenario and its rules.
Authorization/authentication issues are taken into account in individual tools	For all the tools and relevant functionality authorization/authentication issues will be taken into account.
Computer-assisted Qualitative Data Analysis Software Tool – flexible querying of codes and issues	Provide area where all data collected so far, can be viewed divided by classification. Show the set of attribute(s) or meta-data and included codes that correspond to the issue(s) selected/listed in an extra area below the issue. Querying and visualisation of either one issue or a set of issues based on single or combined attribute(s) or meta-data. Show the list of issue(s) that fulfil the criterion/criteria. Provide facilities to direct queries and visualise statistics. Allow as many as possible queries derived from the different combinations of parameters thereby using statistical techniques to sort and list the aggregated results. Formulation of queries considering usability. Extra area to specify filter criteria for querying. Consideration of not only of ready-made importable queries but also of flexible-generated new

	queries to the system is significant. Provide ready-made importable queries. Provide flexible generation of new queries.
Support for direct export/import of information between scenario generation process and policy modelling	ICT toolbox supports responsible users to automatically export information resources from scenario generation process to policy modelling, while supporting also backward interaction (from policy modelling to scenario generation).
Computer-assisted Qualitative Data Analysis Software Tool – statistics	Visualise each possible statistic therefore provide different kinds of diagrams. Example: visualising the results of the statistical calculations (e.g. the occurrences of words, the weighting of likeliness, the relevance of issues, etc.). In particular the visualisation of rankings enables the analyst to interpret the data accurately and come to clear conclusions. Thus, rankings ought to be either coloured highlighted or graphical reprocessed. In doing so, the option to include additional information, such as comments, notes, would be also helpful for scenario analysis.

5.2. REQUIREMENTS RELATED TO POLICY MODELLING

In this section, the requirements related to policy modelling are presented, however, there is a set of requirements that refer to the scenario generation and policy modelling at the same time, i.e., ICT toolbox functionality provided through one portal-based interface, Workflow support, Support for direct export/import of information between scenario generation process and policy modelling, Transformation table. They are presented in this section but their description is provided in section 5.1.

Requirements related to policy modelling support the following processes:

- transformation process (e.g. goal definition, rule generation, stakeholder extraction, environment generation, assumption definition),
- modelling processes (e.g. agent type creation, initial model definition, iteration, general model description),
- simulation setup (e.g. initial state definition, level of details, focusing on a part of the used model),
- simulation termination (e.g. end state, adjustable parameters, termination events),
- experimentation and gaming (e.g. user interaction, feedback on simulation, role-playing games),
- collaboration facilities, like creation of stakeholders group for policy modelling.

Moreover, the identified tools can be separated into three groups:

- publishing tools (e.g. publishing of simulation results, version control, integration with ICT toolbox),
- simulation tools (e.g. event handling, parameter presentation, simulation visualization, simulation execution),
- analysis tools (e.g. experiment and rule development browser, qualitative representation of the simulation results, narrative output).

Figure 37 presents the mindmap of sample of requirements related to policy modelling which have been diagnosed as being crucial for the realisation of OCOPOMO approach (the priority “must-have”) while the requirements with lower priority are presented in the Figure 37. The detailed description of requirements is provided in Table 14.

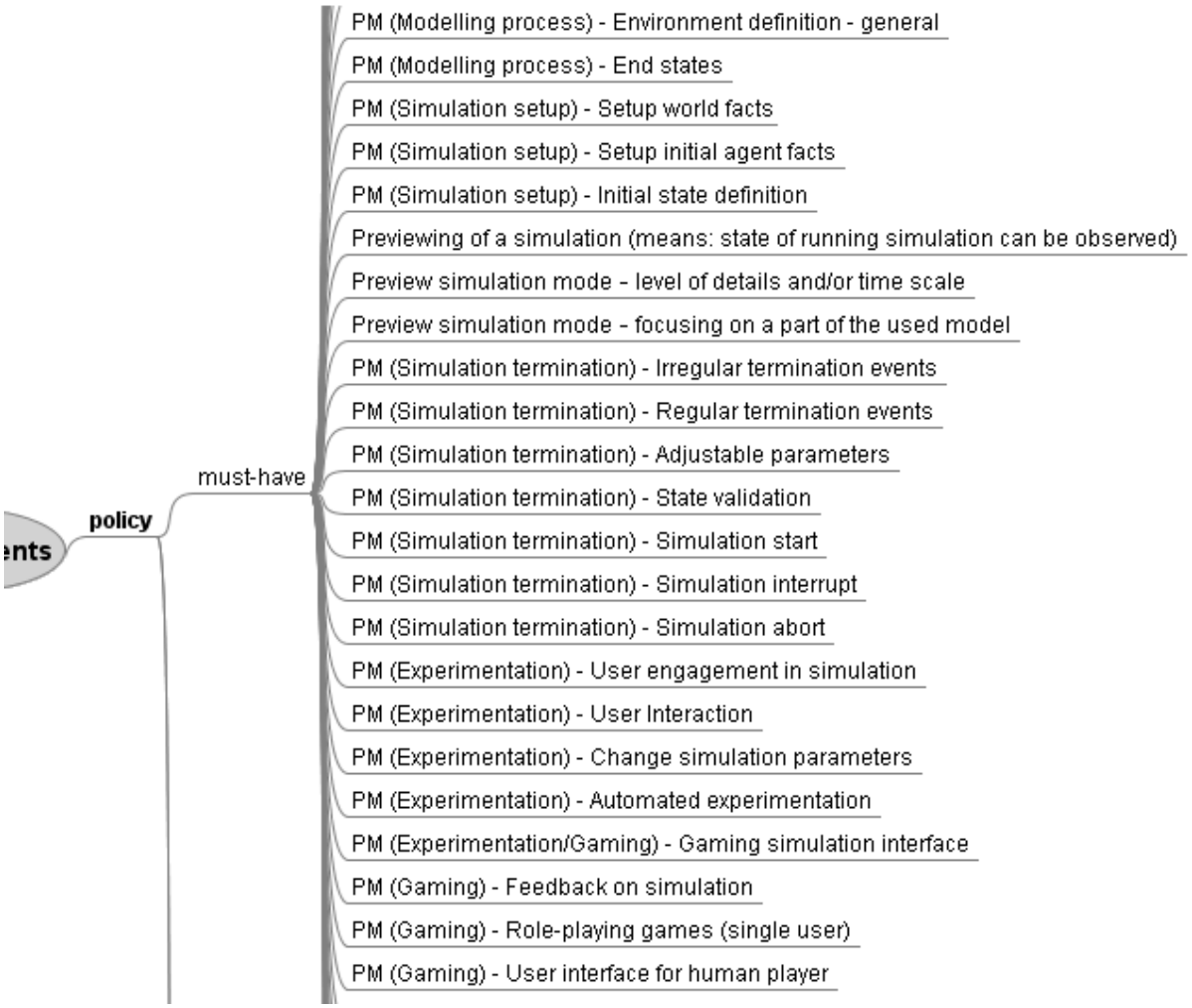

Figure 37: Mindmap presenting the part of requirements related to policy modelling with priority "must-have"

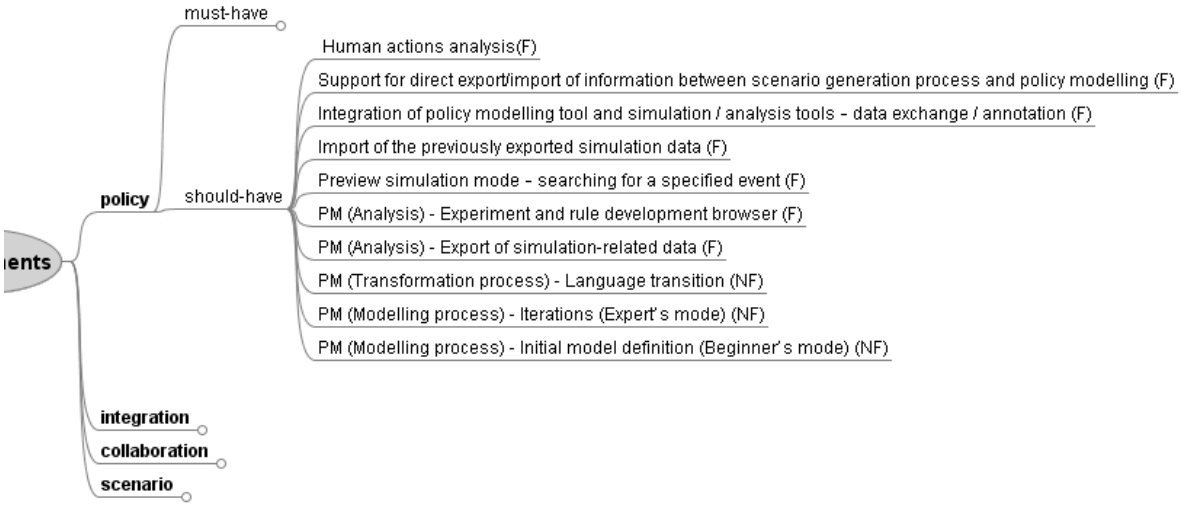

Figure 38: Mindmap presenting requirements related to policy modelling with priority "should-have" (functional requirements have been indicated with letter F, non-functional ones with letter NF)

Table 14: Description of requirements related to policy modelling

Name of requirement	Description
PM (Transformation process) - Define initial policy modelling aspects	The tool should provide the possibility for policy modellers to extract basic information out of narrative scenario descriptions in order to formulate a foundation for policy modelling.
PM (Transformation process) - Stakeholder extraction	The tool should provide the possibility to extract stakeholder descriptions out of the narrative scenario.
PM (Transformation process) - Environment generation	The tool needs to provide the possibility to generate environmental aspects out of the descriptive scenario.
PM (Transformation process) - Goal definition	The tool should provide the functionality for experts to define goals the policy model is going to aim at.
PM (Transformation process) - Rule generation	The tool should provide a method to extract basic rules out of the narrative scenario and SOP to apply them to the modelled agents and environment.
PM (Transformation process) - Assumption definition	The tool should provide the possibility to define a minimum number of assumptions the model should carry.
Agent-based simulation tool	The tool supports simulations of activities/decisions of all stakeholders based on a formal model. Selected stakeholders can be represented by software agents.
PM (Modelling process) - Agent type creation	The tool needs to support and handle different types of agents (not only for participating human individuals).
PM (Modelling process) - Agents at different aggregation levels	Out of the extracted stakeholder and environmental information, the tool should provide the possibility to define agents for different groups of stakeholders.
PM (Modelling process) - Exogenous factors	The tool needs to represent exogenous factors.
PM (Modelling process) - Environment definition - general	The tool needs to provide a possibility for the modeller to define the environment for carrying agents and support inter-agent behaviour.
PM (Simulation setup) - Setup world facts	The tool needs to provide a possibility to setup the initial world facts that are used to start simulating the according model.
PM (Simulation setup) - Setup initial agent facts	The tool needs to provide a possibility to setup the initial facts of the agent types that are used to start simulating the according model.
PM (Simulation setup) - Initial state definition	Before simulating a model the tool needs to provide a possibility to define an initial state that is going to be simulated.
Previewing of a simulation (means: state of running simulation can be observed)	In the simulation tool it is possible to see a preview of particular simulation (in a forward and/or backward mode). State of the running simulation can be observed.

Preview simulation mode – level of details and/or time scale	In the simulation tool it is possible to change the time scale and a level of detail for previewing the current simulation.
Preview simulation mode – focusing on a part of the used model	During the simulation it is possible to focus on some specific part(s) of the model (e.g. agents, rules, their decisions, etc).
PM (Simulation termination) - End state	The tool needs to be able to let the modeller formulate an end state, which is based on rules that should lead to it. This end state is also a user-defined termination event.
PM (Simulation termination) - Irregular termination events	The tool should be able to let the modeller formulate irregular, unpredictable termination events.
PM (Simulation termination) - Regular termination events	The tool should provide a possibility for the modeller/user to formulate regular termination events for a simulation, e.g. time-based events.
PM (Simulation termination) - Adjustable parameters	The tool should provide a possibility to create and associate adjustable parameters with agents and environments on which they are founded to keep simulation adaptable (e.g. time).
PM (Simulation termination) - State validation	Before simulating a model the tool needs to provide a possibility to validate a state that is going to be simulated (e.g. by appropriate participation possibility).
PM (Simulation termination) - Simulation start	The tool should provide a possibility to start simulation runs by user side.
PM (Simulation termination) - Simulation interrupt	The tool should provide a possibility to interrupt simulation runs by user side.
PM (Simulation termination) - Simulation abort	The tool should provide a possibility to abort simulation runs by user side.
PM (Experimentation) - User engagement in simulation	The tool should provide the possibility to take the role of one agent while simulating. The user should be allowed to take the role of one agent but also a fraction of agents belonging to one group (the size of the fraction should be decided by the user). The fraction of agents should behave as the user with little diversity.
PM (Experimentation) - User interaction	The tool needs to interact with the user (waits for decisions) while being in simulation mode the participates in.
PM (Experimentation) - Change simulation parameters	The tool should provide the possibility to switch back to the stating state once having finished the simulation run to change simulation parameters.
PM (Experimentation) - Automated experimentation	The tool should provide the possibility to define batch runs for exploring different configurations by automatically assigning values out of a given range to according parameters (e.g. for sensitivity analysis).
PM (Experimentation/Gaming) - Gaming	The tool must provide an adequate representation of the

simulation interface	current state of the simulation and the possible alternative actions in real-time and on-line in order to enable the "human player" to make decisions.
PM (Gaming) - Feedback on simulation	The tool should provide a possibility to let the participating users leave their feedback on the simulation run in a direct an appropriate way.
PM (Gaming) - Role-playing games (single user)	User is able to play role-playing games within policy modelling tool in order to acquire knowledge about the system and learning how the simulation works. The educative games will base on the simulations in which users will be allowed to change parameters of the simulation and observe how the magnitudes of change influence the development of the future states. The game should be interactive so the user is asked to make the decision every few time steps of the simulation run.
PM (Gaming) - User interface for human player	Users are able to play role-playing games using specifically designed user interface, which will allow them to change all necessary aspects and parameters, together with taking of their decision during the simulation steps.
PM (Analysis) - Within-timestep dependency graph visualisation	A graph showing directed links between nodes where each node represents a declarative rule. Pop-up menus are needed on links to explain the reason for the dependency and on nodes for rule inspection and to call up transition tables. This will mainly be useful for modellers so they can see how new rules relate to previously implemented rules.
PM (Analysis) - Qualitative representation of the simulation results	Qualitative representation of the simulation results is provided, instead of some scale of numbers, e.g. directions of change, indication of volatility, etc. The more qualitative representations, the better. In some cases it is better to have a qualitative indication of direction of change, relative magnitudes than for example time series or cross sections.
PM (Analysis) - Narrative output	During simulation runs, textual output is generated, describing a state or a state change of the simulation model. The single statements/text chunks are generated by dedicated clauses which have to be included in all relevant rules. Special attention must be paid by the modeller at phrasing the text chunks in order to allow human readers to get an idea about the reasons for and the background of a particular simulation result (i.e. the history of the simulation process) from the generated text.
PM (Analysis) - Visualisations of non-numerical outcomes/events	Simulation outcomes are represented by numerical (quantitative) data in many cases, often shown in timelines. This data can be further analysed with statistical methods. On the other hand, there could be qualitative outputs,

	e.g. describing certain events occurring during simulation runs. The narrative output (see above) is an example in this respect, but these events could also be presented in graphical way (e.g. all municipalities who have applied for funding of renewable energy projects are shown in a topographical map; if funding is allocated, then the colour of the shape for this municipality turns to colour green, otherwise to red...).
Maintaining of scenarios and rules within the ICT toolbox	Several versions of scenarios and rules are maintained in the ICT toolbox in order to have grounded inputs for different simulations and work within policy modelling tools.
Support for the policy modelling tool to create a new scenario generation iteration	Responsible user for policy modelling can start a new process of scenario generation iteration with the existing scenario (new version of the scenario) or new one (new scenario, but with respect to previous one, which is referenced). After creation of new iteration and preparing relevant information as a feedback (copied to the scenario generation resources), the facilitator takes over the control again. New policy modelling will be connected to new context of scenario generation iteration; the previous one is only referenced.
Discussion about simulation results and decisions of human agents in simulation	Users (human agents) can see their decisions made within the simulation and explain them, discuss them in the forum etc., all as a narrative text. This functionality also includes possibility to set up discussions around a specific simulation event.
Comparison of simulations	There will be possibility to compare two different simulations. The differences should be extracted from the log of the simulations.
Log of activities within policy modelling / simulation	All activities of users within the process of scenario generation and policy modelling are saved as metadata log with its context. Then this information can be used for metadata search and analyses (e.g. for presentation of results).
Defining scenario for policy modelling	Responsible user for policy modelling/simulation can prepare a scenario, which will be used in policy modelling and simulation (to define scenario, which will be used from the previous steps, define roles and who will play them, etc.)
Creation of stakeholders groups for policy modelling process	Responsible user (facilitator) is able to create group(s) of stakeholders for the current policy modelling and simulation steps. The integrated system should have context-specific information about their membership and activity (log). It is also possible to re-use groups from the scenario generation part of the integrated process.
Publishing of simulation results by the	Users can publish results of simulation using simple

publishing tool (content management tool)	commands / buttons in the publishing tool. Metadata (context information) is saved by the publishing tool (content management tool).
Version control of process models and/or agent models	Policy and agent models are versioned within the system. Versioned models are easy available for modellers.
Simulation preview tool available from different physical locations – remote access	Users can watch / participate in simulations via a web-based interface. This should be provided using remote access to policy modelling tool with integrated tool features.
Action–based and rule-based role playing of stakeholders in simulation	User can participate in two basic modes (which can be combined). In the action-based mode (human agent) they respond to every single step. In the rule-based mode rules are used to make a decision in a step-wise mode. If there is no applicable rule, user is asked explicitly. User is able to change/defines rules in his/her rule set.
Translation of agent rules from a tool neutral syntax into simulation back-end language	This requirement is related to formal description of agents – possibility to translate agent rules from a tool neutral syntax into the language used by a selected simulation back-end.
Transition table browser	Transition tables record the links between clauses comprising rules and narrative text obtained from stakeholders in scenarios or by interview or any other means. The browser will be called up by a menu item in the dependency graph browser. Only the rows (the transitions) relevant to the clauses of the rule will be displayed. If one or more clauses in a rule are selected, then only the corresponding rows of the transition tables will be displayed.
Full dependency graph including dependency of rules on lagged clauses	Rules which depend on clauses declared in previous time-steps are not dependent on the rules that declared those clauses in determining whether those rules can fire in the current time-step. However, these inter-time-step dependencies are part of the description of the processes generated by the rules and it should be possible to understand these lagged dependencies. The same functionality relating to rule inspection and linking to transition tables are required here as in requirement I-38. This will mainly be useful for modellers.
Integration of policy modelling tool and simulation/analysis tools – data exchange / annotation	Different data exchange is supported between the tool for policy modelling and tools for simulation preview and data analysis.
Import of the previously exported simulation data	It is possible to import the previously exported simulation data and to continue working with them in the simulation tool.
Preview simulation mode – searching for a	In the simulation tool it is possible to change the time scale and a level of detail for previewing the current

specified event	simulation.
PM (Analysis) - Experiment and rule development browser	In developing rules or inspecting rules, it is useful to be able to select one or more clauses and then either fetch them (if all clauses are on the database) or retrieve them (if there are some clauses involving calculation such as > or <). Useful if a rule that was expected to fire did not or if a new rule is being implemented at a paused time step during a simulation.
PM (Analysis) - Export of simulation-related data	It is possible to export the data, context, and the simulation details (with possibility to import them to other IT tools, including the simulation tool).
Human actions analysis	Possibility to filter from simulation log activities of a specific agent (e.g. played by a human) together with the relevant context and to develop rules of agent actions in an automatic way.
PM (Modelling process) - Initial model definition (Beginner's mode)	The tool needs to provide the possibility to set up an easy to understand and not too difficult first model.
PM (Modelling process) - Iterations (Expert's mode)	The tool should be able to detail the current model in later iterations. So having simulated an easy model should open a possibility to change the model itself for later iterations.
PM (Transformation process) - Language transition	The tool should assist the user to perform the transition from natural to formal language in a user-friendly way.

5.3. REQUIREMENTS RELATED TO COLLABORATION

Requirements related to collaboration support the exchange of information/arguments between users (e.g., discussion forum, chat, tool for opinion polling) as well as updating the users about new content/activities on the platform (e.g. Newsletter, RSS, e-mail notification system). Moreover, the requirements regarding the content management can be found in this section. Figure 39 presents the detailed content of the category while the description of the listed requirements can be found in Table 15.

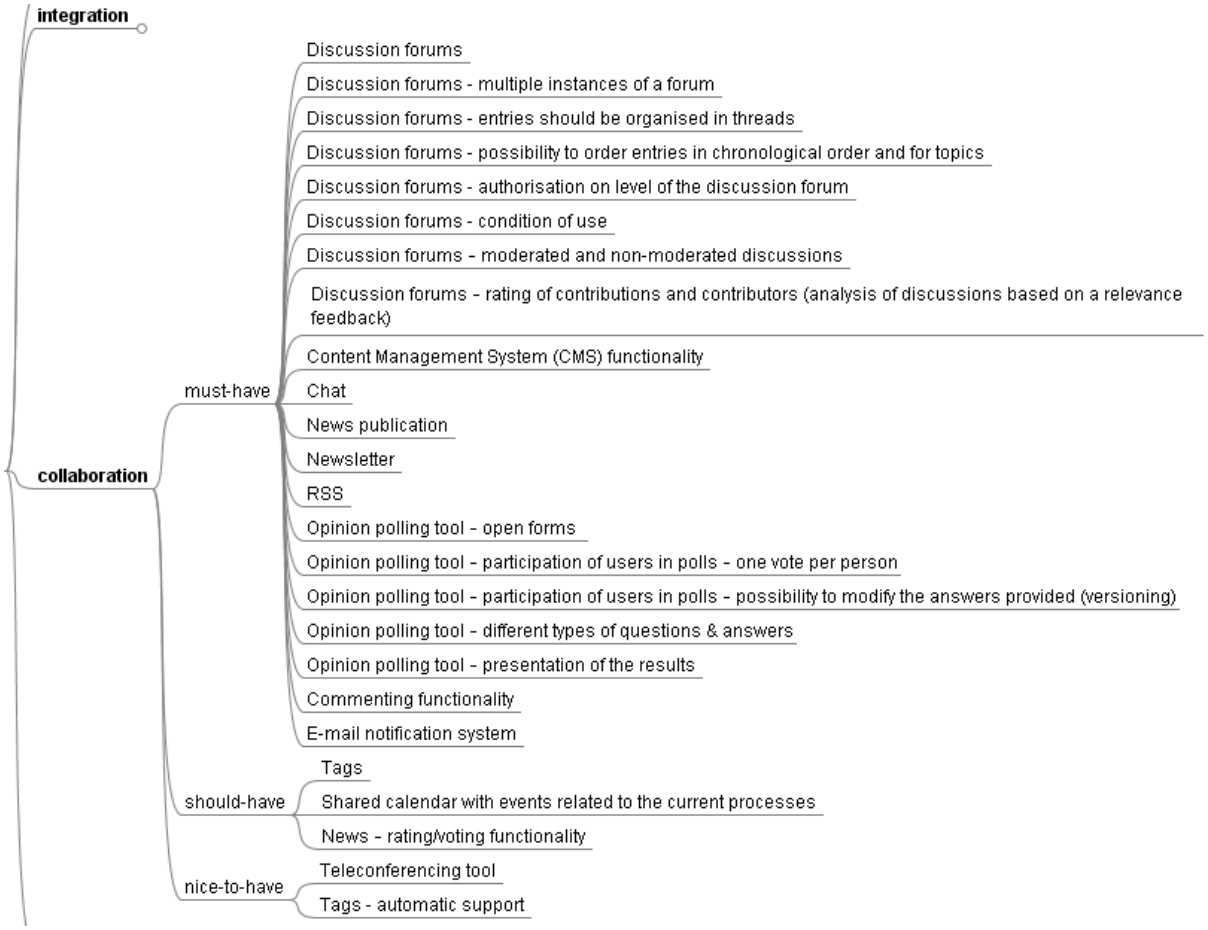

Figure 39: Mindmap presenting requirements related to collaboration (all requirements has been identified as functional)

Table 15: Description of requirements related to collaboration with priority "must-have"

Name of requirements	Description
Discussion forums	Users can discuss on the selected topic using a discussion forum tools. Users can pick a topic of interest from the initial scenario and see a "thread" of messages to this topic of interest. They can choose to reply on messages or to post their own message. Discussion forums provide the opportunity for both consultation and collaboration. In the scope of online consultation and open collaboration, a discussion forum is applied for advancing and validating the desk research results and interim consultation results of the scenario building and analysis. The discussion forum bases on clear 'conditions of use' that provide a guideline for moderators and users likewise. Before starting the discussion forum, the project team informs the stakeholders on the purpose of the discussion forum and on how the results will be further used. The process has to be clearly explained and communicated to the stakeholders in order to be transparent (i.e. to fulfil the Good Governance principle of openness).
Discussion forums - multiple instances of a forum	Organization of discussions will be available using multiple instances of discussion forums within the platform and context.

Discussion forums - entries should be organised in threads	Discussions within forums are organized in 'threads'. All messages become to one specific thread, which has its context.
Discussion forums - possibility to order entries in chronological order and for topics	It is possible to organize discussion threads within forums in different types of order like chronological or topic-based (hierarchical structure of threads, topics, and messages). In more details, scenario building requires that contributions can be depicted and structured through topics (i.e. several discussions are possible at the same time concerning different topics of interested extracted from the scenario) on the one hand and on the other hand chronologically (i.e. discussions to one topic should be in chronological order).
Discussion forums - authorisation on level of the discussion forum	Authorisation of operations (like editing and viewing) with discussion forum should be possible on discussion forums level.
Discussion forums - condition of use	The forum should disclose conditions of use, which state the conditions under which users can state comments. The conditions of use state how the forum is moderated by the moderators (in which case a comment can be withdrawn by the moderator? How long does it take until a comment is published by the moderator? etc.). The conditions of use explain who can see/read the forum (e.g. the general public) and who is allowed to submit comments).
Discussion forums – moderated and non-moderated discussions	Discussion forums support both moderated and non-moderated discussions. In first case authorized users (e.g. facilitator in case of the scenario building) can moderate a discussion within the discussion forum. Contributions to the forum will be automatically published and the moderator is informed of the new contributions. The moderator can decide to withdraw a contribution. The forum will be used as a consultation tool to ask users about their opinions on specific issues. The discussion forum is applied to have a formal discourse on topics of interest extracted from the scenario in order to advance it and to provide specific information on it. Within well-directed moderated discussion forums stakeholders are asked to express their opinions, recommendations and concerns regarding completeness and assessment of desk research results. Discussion forums help to relate and advance descriptions while stakeholders are discussing their opinions with other stakeholders. The system shall publish rules for comments' moderation at the "Rules for engagement" section in order to avoid the accusations of censorship. In case of non-moderated discussions system users shall publish the written comments automatically, although the content administrator will be able to modify them and to erase them at any moment.
Discussion forums – rating of contributions and contributors (analysis of discussions based on a relevance feedback)	Users are able to attach a relevance feedback to contributions in the discussion forum using a rating scale (e.g. 1 – agree, 0 – not relevant in my opinion, -1 – disagree) about the content. Based on this evaluation feedback to the contributions of individual users (a ranking of users) is produced. Contributions of the users with higher ranking score should be taken into account with a priority when summarizing the discussion results. Because in one contribution two or more issues can be mentioned it should be possible for the user to highlight the part of the text and rate it by right clicking the highlighted text and choosing the option "Rating" from the popped up menu. The evaluation of the

	contribution depends on the partial evaluations of content.
Content Management System (CMS) functionality	Content Management System (CMS) functionality available – creating and editing documents, document versioning, publishing, versioning of documents, etc. All users with granted access rights are able to use CMS for writing a text and creation of content according to specific templates, i.e. template-based publishing with versioning (for scenarios). Documents created using this functionality are applicable for developing and validating the scenarios and making them internally consistent (especially if it is linked to discussion forums). Editing functions are provided to allow users work on the text of an article. An article can be a scenario or a specific aspect of the scenarios. Discussions and polls can be attached to the scenarios. The system should also support e-Library functionality, like referencing sources and uploading related files.
Chat	All granted users can use chats, to exchange their ideas with other people involved in the scenario generation and policy modelling. Additional functionality includes creation of more chats, which are context-specific, save history of chats as document in CMS, create related discussion in forums, etc.
News publication	Authorized user (e.g. facilitator in case of the scenario generation) can publish news and link them to other parts of the system. News should be readable by all users (no need to login). The news feature shall provide an overview about recent published news with date and title, last modified elements notification, etc.
Newsletter	Responsible users (with granted access rights) can create (publish) a newsletter and send it to the subscribed users.
RSS	All users can install RSS reader, to be able to check for new information, works, downloads on a regular basis (e.g. during an unsynchronised scenario generation session) using system feed.
Opinion polling tool – open forms	Authorised users (with granted access rights, e.g. facilitator in case of the Scenario generation process) are able to conduct an opinion poll and define the users who are allowed to participate or to organize an open poll. It is possible to support launching/closing the opinion polling according to the defined setting (e.g. time interval, the number of participants, percentage of the filled in forms from the whole group, etc).
Opinion polling tool – participation of users in polls – one vote per person	Users can participate in the opinion polls by filling in a form (questionnaire), however they are not authorized to change their answers once provided (i.e. they cannot produce a new version of the filled in form). For scenario analysis, opinion polling tools are applied to let stakeholders express their preferences, e.g. for a specific scenario, a specific behaviour, certain scenario aspects. This also allows the project team to gather an idea about the intention of stakeholders to show a specific behaviour.
Opinion polling tool – participation of users in polls – possibility to modify the answers provided (versioning)	Users can participate in the opinion polls by filling in a form (questionnaire) and they can change their opinion - answers provided before, i.e. they can produce a new version of the filled in form.

Opinion polling tool – different types of questions & answers	Opinion polling tool should support definition of different types of questions and answers in the form – e.g. multi-choice questions, text-based inputs (answers), selection of a specific part on a map, selection of text parts (fragments) in a text etc.
Opinion polling tool – presentation of the results	The opinion polling tool is able to produce a graphical output from the survey results (using graphs, diagrams etc.).
Commenting functionality	Authorized users (e.g. facilitator in case of the scenario generation) can decide whether the content in the system can be commented upon. Commenting should have always the same style, does not matter what is commented. Users are able to comment most of the sources within the system.
E-mail notification system	This feature should provide an awareness mechanism (daily/weekly/monthly) allowing participants to be informed on newly published or modified content in discussions, CMS, etc.
News – rating/polling functionality	Users are able to rate/vote for interesting news entries. Rating/Polling is an easy to use functionality to initialize first participative behaviour and interest with the topics and to identify certain tendencies.
Shared calendar with events related to the current processes	Responsible users (with granted access rights) can enter an event to the calendar. The calendar should have a function of sending a reminder about the event to all predefined users or groups of users.
Tags	Users of forums, blogs and chats should be allowed to tag their input. By right clicking the highlighted text the menu with option tags should open. If the user chooses to tag the written text the list of available tags should be presented with the option of adding a new tag to the list.
Tags - automatic support	Tags functionality is available together with automatic support for highlighting of specific types of inputs (like names of organizations, locations, units, etc.).
Teleconferencing tool	All users of the system are able to use a teleconferencing tool within the proposed OCOPOMO ICT toolbox.

5.4. REQUIREMENTS RELATED TO INTEGRATION OF ICT TOOLBOX

Requirements related to integration maintain the coordination and consolidation of particular features and components of ICT toolbox. In this category the requirements supporting the security (e.g. privacy, authorisation, authentication, integrity, login, user registration), ongoing actions facilitation (e.g. multilingual interface, personalise overview, look and feel, help and assistance) and efficiency (accessibility, response time, operational etc.) of users direct operations are placed. Figure 40 shows the requirements in a mindmap, while a more detailed description is provided in Table 16.

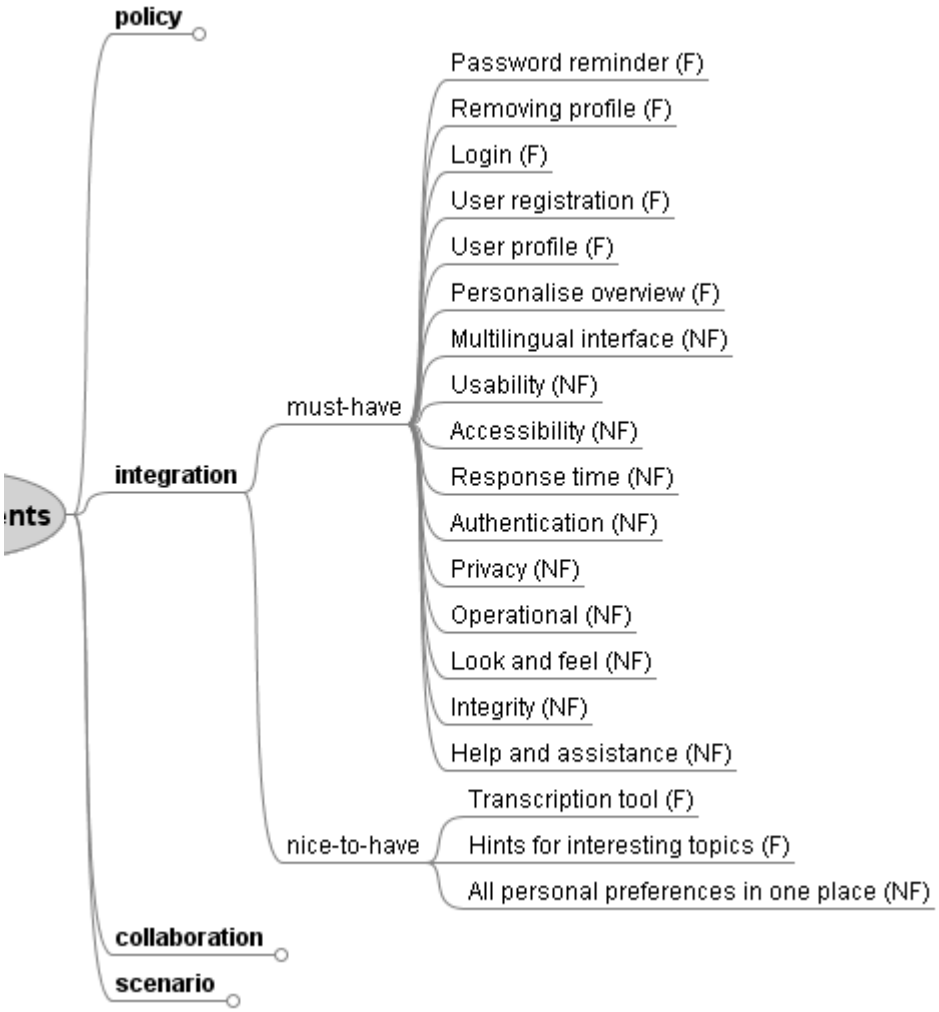

Figure 40: Mindmap of requirements related to integration (functional requirements have been indicated with letter F, non-functional with letter NF)

Table 16: Description of requirements related to integration

Name of requirement	Description
Password reminder	The system shall include a reminder that helps to recover password.
Removing profile	If a registered user wants to delete his/her profile and stop being a registered member, he/she must/can do this in the system. If the user is logged-in he or she needs to press the “remove my account” button and confirm this decision afterwards to remove the profile.
Login	After the initial registration, members can login each time they wish to access the site by providing their user name or email and password.
User registration	The system shall ask for the following data to register a new user: User name, Email, Password, Code to avoid spam bots.

Personalise overview	The system shall provide a personalized webpage for registered and logged in users, which is customized according to the user's preferences. This means that the user 1) can choose which information should be visible (events, news, forums, etc.) at which place on the webpage, and 2) the interesting information are highlighted. The user has to be registered and logged in to see the personalized webpage. The personalized overview does not replace the start page. It is an extra page, which is only visible for registered and logged in users.
Transcription tool	Every communication with stakeholders relevant for scenario building and analysis, as well as for simulation, which is not written down (i.e. every audio and video record and face-to-face workshops and interviews), should be recorded and transcribed automatically.
Hints for interesting topics	The system shall provide links to further interesting readings at the platform for documents, forum entries, etc.
All personal preferences in one place	All possible preferences (language, form of presentations from tools (if applicable), personal profile details, etc.) should be available in one screen / form. It means that all possible preferences (related to ICT toolbox) and will be integrated into one form (instead of separate settings for each tools).

6. PILOT APPLICATION OUTLINE

6.1. PILOT APPLICATION OUTLINE KSR

Scope

The energy policy has become a key development factor on national as well as regional level. On one hand, the existing structure of energy suppliers in Slovakia deepens dependency on the traditional Russian primary energy resources. On the other hand, it supports functioning of the monopoly producers and distributors. In addition to that, electricity production by the thermal power plant Vojany (Eastern Slovakia) has also considerable negative impact on environment.

In accordance to the modern trends, SMEs have been entering the energy sector in the last period. Supported by new/amended legislation and grant schemes on international, national and regional level, SME's bring in new technologies complying with the environmental standards, increase the regional employment and utilize the local energy sources. The balance of interests of all the stakeholders supplying and consuming the energy is the subject of the energy policy on the national and on the regional level.

The Kosice Self-Governing Region offers significant future potentials for several kinds of Renewable Energy (RE) sources, which can be exploited in the period of years to come. Of course, significant barriers to wider deployment of RE is the cost factor (reflected in price) and available technologies. In spite of the existence of the current barriers, it seems viable that both in the heat sector and in electricity generation RE sources can play significant role in the KSR in the near future.

Development of an ICT toolbox supporting the new Renewable Energy Policy development is one of the project aims enabling involvement of different groups of stakeholders, providing them with scenario generation support tools and policy modeling toolkit.

Expected results

Implementation of the pilot application - Renewable energy (RE) policy development is expected to have an impact on several areas of regional economic development.

a. Impact of renewable energy policy on economy

Price and cost effects

Price and/or cost effects are often mentioned as important mechanisms how RE policies influence the economy. Since the costs of producing energy from RE sources are higher than from "conventional" sources, price of this energy is subsidized by the state. This fact generates also demand for new technologies (enabling lower price of energy produced from RE sources), which again will require further investments.

Employment

Exploitation of the domestic renewable energy resources, is expected to create new job opportunities in the region (e.g. growing and processing of biomass, maintenance of energy production facilities etc.). A wide variety of RE technologies for heat and energy production (based on the exploitation of the wind, hydro, solar and biomass energy) provides possibilities to build not only on regional natural resources and opportunities, but also on the available human resources. Since the exploitation of the domestic sources is more labour consuming in comparison to the import of the energy media from abroad, the overall employment in the region is also expected to increase.

Budgetary effects

Due to the higher costs, the renewable energy technologies need some kind of (financial and/or other) support within the existing tax, grant giving, and subsidiary mechanisms. The public budget costs can be partly compensated by savings induced by the decrease of import and unemployment.

Structural effects

In addition to the above mentioned effects, an increase of the RE sources utilisation leads to structural changes in the economy. In fact, both positive and negative effects can be identified as consequences of a renewable energy policy. Implementing a RE sources policy requires additional investments to increase RE sources capacities and, in the case of biomass and bio fuels, an increased demand for forest and agricultural products.

b. Environmental impacts

The environmental aspects of the RE policy are an inherent part of the sustainable economy development. Decrease of the fossil fuels utilisation is motivated by the EU Emission Trading System as well as the official obligation to increase the share of the renewable energy on the whole energy consumption within Slovak national economy.

c. Public participation in government decision making at the regional level

The renewable energy utilisation is a complex phenomenon and thus opinion of all stakeholders is crucial for creation of a new RE policy. The KSR pilot application is expected to provide opportunity for a wider involvement of all types of stakeholders, facilitating their contribution to a policy development trying to identify, discuss and explore options of further development. This approach prevents dominance of some stakeholders groups preferring their interests at the expense of interest of the others.

d. Multiplication effect

It is expected that the approach of a policy development enhanced by an ICT toolbox supporting scenario building and policy modelling to be developed and validated within this project and pilot application, will be transferred to and used also in other application domains (e.g. transport policy, healthcare services etc.).

Actors involved

The regional government of the KSR will be the main actor involved in the pilot application. The active role by the exploitation of the OCOPOMO platform is assigned to planning and decision making actors such as:

- Director of the Department of Regional development and Planning
- Executive board members
- President of the region
- Expert group members
- Commission of Regional Development and Planning

There is an assumption to involve stakeholders from each of the stakeholders' categories provided in section 3.1.2. The IT platform is to enable communication and collaboration of all the involved participants.

Relevant policy process

The OCOPOMO platform offers support in several stages of the policy creation process. The ICT toolbox functionality should support their collaborative involvement in this process. The whole process of policy development is described in section 3.1.

6.2. PILOT APPLICATION OUTLINE CAMPANIA

The specific theme of the pilot application involving Campania Region will be the structural funds dedicated to competitiveness of Campania Region[30], a crucial theme for Campania innovation agenda. This issue is becoming urgent with specific regards to SMEs in Campania region, which need to strengthen their innovation capacity as well as their investment in R&D in order to compete in the global market. It is a transversal policy area, at the cross-road of several developmental policy priorities (e.g. R&D, infrastructures, energy, training etc.).

Campania Region has tackled this policy area by adopting specific measures dedicated to SMEs and knowledge transfer between universities and industries e.g., fostering knowledge transfer between academia and SMEs, and particularly improving and funding networks between universities, research centres and companies, thus addressing the needs of the knowledge economy[31]. In particular in the previous programming period of 2000-2006 Campania Region has supported the birth of the so-called regional centres of competence (centri regionali di competenza)[32], and has already several examples of leading edge centres of excellences and industrial involving universities and industries, for instance in the field of biotechnologies and aerospace. In the current programming period 2007-2013 the priorities for the structural funds in this area, as stated in the regional operational programme for the European Regional Development fund[33] and European social fund[34] are:

- Promoting research at the highest level of excellence, by bridging the integration and fragmentation of critical mass of expertise needed to create leadership;
- Strengthen research cooperation between different operators, by enhancing clusters and knowledge districts, networks of excellences between universities, research centres and companies, thus addressing the needs of the knowledge economy
- Promote investment in R&D of industries (particularly SMEs)
- Strengthen the coordination of research programs within the region in this area
- Promote the dissemination of knowledge and transfer of research results; foster international cooperation;
- Focusing on competences and human capital development particularly in relation to high-tech sectors

Expected results

The result will be social simulations integrating many variables, parameters, qualitative judgements and corresponding scenarios necessary to explore potential outcomes and impacts of the Campania policy objectives relating to the knowledge transfer for SMEs. In this way the effectiveness of investments made by Campania region through structural funds will be analysed in an innovative and enriched manner.

[30] The proposal to focus on competitiveness has been formulated in the framework of a Study visit held in Naples on the 15-16 of April 2010

[31] See priority dedicated to networks of excellences between universities, research centres and companies, thus addressing the needs of the knowledge economy description, referring to axis 4 human capital of the European Social fund regional operational programme for Campania Region 2007-2013, http://www.fse.regione.campania.it/ See also the Regional operational programme for the European Regional development fund, 2007-2013 http://www.fesr.regione.campania.it/

[32] The full list of regional centre of competence is included in Annex Vb

[33] Regional operational programme for Campania Region-European Regional development fund 2007-2013, pages 168-171.

[34] European Social fund regional operational programme for Campania Region 2007-2013, pages 70-74.

The OCOPOMO pilot experience can affect and support mid-term and ex-post evaluation of structural funds in Campania and the related periodic revision of the Regional Operational Programme, with specific regards to those measures aimed at promoting knowledge transfer and competitiveness.

Actors involved

The regional government General Coordination unit 03 "Plans and programme" will be the main actor involved in the pilot as far as Campania Region is concerned since it is the managing authority of the European Social Fund and it is also in charge of the action plan for the achievement of the "Service objectives". Other units of the region will be involved if it is needed.

The outer layer of stakeholders mentioned in section 3.2 is also among the relevant actors of the pilot application. In particular SMEs, but also organisations representing the interests of SMEs, professional associations and trade unions can be involved in the pilot experience.

The possibility to engage science parks, regional centres of competence or other organisations active in the field of scientific and technology transfer institutions (see Annex Ib for more examples) will also be explored.

As for public bodies, these are local authorities, i.e. provinces (*province*), and municipalities (*comuni,* the smallest local government units), in the first place. Other public bodies that are beneficiaries of funding are publicly owned companies, universities, research centres. In particular universities, research centres and NGOs located in Campania whose mission is related to knowledge transfer as well as municipalities and public agencies in charge of development policies (not belonging to the region) have a key stake in relation to knowledge transfer. Some of these actors are funding beneficiaries, some other are intermediaries, some other carry out research or provide policy support on structural fund expenditures and can influence regional policies.

Relevant policy process

One of the key policy processes to be dealt with in the pilot application involving the Campania Region refers to the assessment of projects proposals eligibility for funding under the European structural funds[35]. In this respect the Campania Region administration has defined the general criteria for the evaluation of proposals in a document which was endorsed by the Giunta (executive body). Then according to the theme, each call for proposal has specific eligibility and assessment criteria.

If we take for instance the European Social fund (but a similar process apply to the European Regional Development Funds provisions) at the beginning of the programming period 2007 the Region defines the general criteria. According to the theme, each criteria and sub-criteria is described in more detail, weighted and associated to specific indicators. These are listed below and the meaning of each criterion is explained in a supporting document[36] .

The policy models to be developed in the first instance will render the criteria for funding more precise whilst retaining the linguistic terms used by the Campania region administration and the stakeholders.

At a macro level, the pilot application to be conducted, as mentioned above, will affect the overall management of structural funds, by supporting the overall monitoring and evaluation of structural funds and eventually the whole decision making process related to structural funds.

[35] See the description of such process in section 3.2.1

[36] Vademecum per la valutazione delle operazioni co-finanziate attraverso il FSE http://www.fse.regione.campania.it/

Table 17: Criteria for evaluation of project proposals

Criteria	Sub-criteria	Weight
Applicant	- Efficiency and management capacity measured in previous operations financed with public resources - Synergy with operations financed and potential overlap - Congruence of the proponent profile with the thematic areas of project - Composition of any working group	
Quality and internal consistency	- clarity in defining the project objectives and expected results - Completeness and coherence of the information provided - Adequacy of human logistics and organizational resources to the project objectives - Presence and validity of the monitoring and evaluation instruments - Presence and validity of the dissemination instruments - Consistency with the call for proposal - Consistency of the proposed intervention with other interventions provided for projects already made, under construction or planned	
Sustainability	- Technical sustainability - Socio-economic, financial, organizational and managerial sustainability of the project	
Compliance with the priorities of the axis of the Operational Program and specific priorities of the call for proposals	- Consistency of the project proposal with the priorities of the axis of the Operational Program - Compliance with specific priorities of the call for proposals	
Innovativeness and transferability of the project	- Innovativeness of content and transferability of the project proposal - Innovativeness and transferability of the actors involved - Innovativeness and transferability of methods of intervention	
External Consistency	- Consistency with national and regional planning documents	
Cross-cutting Priorities	- Consistency of the proposed intervention with the transversal priorities defined in European regulations (ex. equal opportunities, sustainable development)	
Outputs, results and impacts	- Capacity of the project have a positive impact directly and indirectly on indicators defined in the Regional operational programme	

7. CONCLUSION

OCOPOMO's goal is to define and demonstrate a new approach to policy formation. The main output of the project will be the integrated ICT toolbox which aims at being tailored to answer the needs of wide range of stakeholders in diverse policy problems. The integrated ICT toolbox will be adopted and evaluated in two pilot cases. Based on the collaboration with local authorities from Campania Region and Kosice Self-governing Region which are user partners of the project, the specific policy problems with detailed description of decision making processes as well as involved stakeholders have been identified.

The report at hand presents the results of efforts undertaken to provide the thorough stakeholder analysis indicating their specific needs and expectations regarding the ICT toolbox. The requirement analysis, which is a crucial phase in the process of toolbox development, has been conducted only after the overall framework on how the OCOPOMO approach linking collaborative scenario building and policy modeling has been designed. The set of functional and non-functional requirements has been listed. They will serve as input in creating an overall outline of the OCOPOMO project. Furthermore, the indicated requirements have been divided into four categories depending on the process which they should cover: cooperation, collaborative scenario generation, policy modelling and integration of ICT toolbox. Finally the requirements have been evaluated during the workshop with user partners and then were prioritized and divided into three groups: must-have (most of them will be implemented for the first trial of pilot applications – decision will be made in work package 2), should-have (will be implemented for the second trial of the pilot applications together with some remaining must-haves) and nice-to-haves (will be suggested for implementation after the end of the project).

The systematic categorization of requirements with an additional description gives the basis for the work in the subsequent work packages WP2 and W5.

The objective of work package 2 "Architectural design of IT solution" is to create and validate the software architecture for the integrated ICT toolbox. The aforementioned platform architecture will be derived from the user requirements identified in this deliverable. Specifically, stakeholder analysis and requirements related to policy modelling, scenario development and open collaboration together with technical requirements will serve as the significant input in the process of developing platform architecture and its components. The requirements (functional and non-functional) are expected to be covered by a platform architecture and its well-designed components and guarantee the quality and usefulness of the architecture design of ICT toolbox.

The goal of the work package 5 "Policy modelling and scenario process design" is to define the integrated policy modelling and scenario process. Specific requirements investigated in WP1 will support the integration of both methods. For each policy case (KSR and Campania Region), a description, based on the requirements analysis from this report, will be created indicating the topics to be addressed in the initial scenario building exercises and the initial model specifications. Additionally, the requirements for tools supporting narratives production of scenarios and policy modelling identified in WP1 will be refined and extended in WP5.

Presented analysis of stakeholders and identification of user requirements is not terminated in a sense that new requirements and facts about policy scope can emerge along the run of the project. For instance, new requirements are expected to arise from internal technical testing as well as the iteration of the pilot applications (WP3 "Implementation of IT platform components", WP4 "Integration of components", WP6 "Policy Modelling and Scenario Process Implementation"). If new requirements arise they will be consistently formulated and considered in the subsequent incremental implementation phase. In the end the Collaborative ICT toolbox will be evaluated in terms of satisfying the stakeholder's requirements as well as the modeller and policy analysts' support needs (WP7 „ Integrating ICT models and scenarios in pilots"). Thanks to this approach a high quality software will be ensured.

Assuming that the policy can be efficiently made only if all stakeholders are involved in the process of creating it, our ICT toolbox has to meet real needs of potential users and enable to conduct smooth analysis of gained materials by facilitators and policy makers.

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ANNEX Ia: EXAMPLES OF STAKEHOLDERS INVOLVED IN ENERGY POLICY IN KOSICE REGION

A. Internal stakeholders – Kosice Self-Governing Region (KSR), www.vucke.sk

1. President of KSR www.vucke.sk/APIR/sk/Urad_KSK/Predseda_KSK
2. KSR Parliament http://zastupitelstvo.vucke.sk/Pages/default.aspx
3. KSR Office http://www.vucke.sk/APIR/sk/Urad_KSK/Stranky/Contacts.aspx
4. Department of Regional Development and Planning
5. Department of Finance,
6. Legislative Department,
7. Department for the Cross-border Cooperation
8. Schools and social institutions directly controlled by the KSR, http://www.vucke.sk/APIR/sk/Urad_KSK/Cinnosti_KSK/Skolstvo/Stranky/Default.aspx, http://www.vucke.sk/APIR/sk/Urad_KSK/Cinnosti_KSK/Socialne_Veci/zoznamy_soc_zar/Stranky/default.aspx

B. External stakeholders

Regional Level

B.1 SMEs

a) Providers of the (alternative) energy technologies

- Geoterm Košice www.geoterm-kosice.sk/ (legal seat in Košice)
- Ekoplus s.r.o. http://www.ekoplus.sk/ (legal seat in Košice)
- Energocom s.r.o. http://www.energocom.sk/ (legal seat in Košice)
- Intech Slovakia s.r.o. / http://www.intechenergo.sk/ (legal seat in Košice)
- Ing. Tomáš Mišanko TOMEX http://www.stiepkovanie.sk/ (legal seat near Košice)
- Solárko, s.r.o. http://www.solarkosro.sk/ (legal seat near Košice)

b) Energy consumers

- Slovak Chamber of Commerce and Industry, http://ke.sopk.sk/

c) Energy producers (to be prioritized)

- Bytové hospodárstvo Sečovce, s.r.o., Sečovce
- Bytový podnik Trebišov, s.r.o., Trebišov
- CLEAN ENERGY SOURCES - GAMMA, s.r.o.
- Dalkia Kráľovský Chlmec, spol. s r.o., Kráľovský Chlmec
- Dalkia Východné Slovensko, s.r.o.
- Dalkia Východné Slovensko, s.r.o., Košice, http://www.dalkia.sk/dalkia-vychodne-slovensko-s-r-o
- DOMSPRÁV s.r.o. byty, teplo a iné služby, Michalovce, http://www.domsprav.sk/
- EDOS, s.r.o., Košice, http://www.edos.sk/main.html

- EOLICA Slovensko, a.s.
- EMKOBEL, a.s., Spišská Nová Ves, http://www.emkobel.sk/
- FOLMAR s.r.o.
- ILS energy s.r.o.
- Ing. Juraj Tomčo, Košice
- JSE, spol. s r.o.
- Kosit, a.s. kosit@kosit-as.sk
- MIBYT, s.r.o., Veľké Kapušany EU@MIBYT.SK
- MVE Opátske, s.r.o., Košice,
- MVE Družstevná pri Hornáde s.r.o. mvedph@zoznam.sk
- MVE Prešov, s.r.o. kotras@procom.sk
- PRAKOENERG, s.r.o., Prakovce, prakoenerg@ke.telecom.sk
- PRAVEL spol. s r.o., Prakovce
- TP 2, s.r.o., Strážske, http://www.energetikastrazske.sk/
- Obec Smižany, Smižany, http://www.smizany.sk/
- RAVEN spol. s r.o.
- RWE Transgas, a.s. erik.kolsto@rwe.cz , jakab_radomir@vse.sk
- RWE Gas Slovensko, s.r.o. kulla_miroslav@rwegas.sk , siposova_viktoria@vse.sk
- SG-T, s.r.o.
- SÍRIUS ELECTRIC s.r.o.
- Služby mesta s.r.o., Spišské Podhradie http://spisskepodhradie.sk/
- Správa domov Gelnica, Gelnica, http://sdgl.sk/kontakt.html
- Správa majetku mesta Košice, s.r.o., Košice, http://www.smmk.sk/
- TEKO-R, spol. s r.o., Rožňava, http://www.teplovmeste.sk/menu/teko_r_spol_s_ro_roznava_97/
- Tepelné hospodárstvo s.r.o., teho@teho.sk , weinwurmova@teho.sk
- Tepelné hospodárstvo Moldava, a.s.
- TEKO - R, spol.s r.o., Rožňava, oeh.teko-r@stonline.sk , teko-r@stefe.sk
- Solarklima s.r.o., spes@solarklima.sk
- TERMOKOMPLEX, spol. s r.o.
- NEK Slovakia s.r.o. nekslovakia@mail.t-com.sk
- Východoslovenská distribučná, a. s. hrusc_jaroslav@vse.sk, vozarova@vse.sk
- ZEKON, a.s. Michalovce, Michalovce, http://www.zekonas.sk/zekon/

B.2 Large companies

a) Energy producers

- Slovenské elektrárne, http://www.seas.sk/

- Teko - Tepláreň Košice,www.teko.sk

b) Energy consumers

- US Steel, http://www.usske.sk/

c) Energy distributors

- VSE, www.vse.sk
- Slovenský plynárenský priemysel (SPP), http://www.spp.sk/en/

d) Providers of (alternative) energy technologies

- Dalkia Východné Slovensko, s.r.o

B.3 R&D institutions – doing technology and/or socio-economy research in the area of alternative energies

- Technical University of Kosice, www.tuke.sk, Faculty of Mechanical Engineering, Department of Power Technology, http://www.sjf.tuke.sk/ket/
- Development and Realisation Workplace of Raw Materials Extracting and Treatment, http://web.tuke.sk/vrp/
- Katedra elektroenergetiky, Fakulta elektrotechniky a informatiky / Department of Electric Power Engineering
- Centrum obnoviteľných zdrojov energie / Centre of the Renewable Energy Resources http://www.fberg.tuke.sk/coze/ http://www.kulhavy.co.uk/images/olexa/index.html (no eng. Web site)

B.4 Local municipalities – dealing with the energy resource problems regarding the social impact of the new technologies

- Turňa nad Bodvou, http://www.turnanadbodvou.sk/
- Medzev, http://www.medzev.sk/
- Margecany, http://www.margecany.sk/
- Prakovce, http://www.prakovce.sk/
- Plešivec, http://www.plesivec.ocu.sk

B.5 NGOs

- Asociácia strážcov chránených území Slovenska , Spišská Nová Ves
- DAPHNE, www.daphne.sk (not in the Kosice region)
- Greenpeace, www.greenpeace.org/slovakia/
- People and Water, http://www.ludiaavoda.sk/ (seat in Kosice)
- Sosna, http://www.sosna.sk/ (seat in Kosice)
- Združenie PČOLA, www.zdruzeniepcola.org/ (seat near Košice)
- Združenie Slatinka, http://www.slatinka.sk/
- Občianske združenie Ekoenergia, www.ekoenergiaoz.sk/
- Lesoochranárske zoskupenie Vlk, http://www.wolf.sk/ (seat near Kosice)
- Centre for Sustainable Development ETP Slovakia, http://www.etp.sk/ (seat in Kosice)
- Stredisko environmentálnej osvety BAMBI, http://www.seps.sk/zp/bambi/index.htm (near Kosice)
- Friends of the Earth, http://www.priateliazeme.sk/spz/?q=sk/o-nas (seat in Kosice)

B.6 Regional Development Agencies

- Regional Development Agency Tatry – Spiš, http://www.rozvoj.org/
- Regional Development Agency Zemplin, pavlo_j@stonline.sk
- Regional Development Agency Šírava, www.irra.sk
- Regional Development Agency in Kralovsky Chlmec, www.rakch.sk
- Regional Development Agency in Rožňava, www.regag.sk
- Regional Development Agency in Moldava n. Bodvou, www.rramoldava.sk
- Regional Development Agency Spiš, www.srra.sk
- Regional Development Agency of Zemplín, www.rradz.szm.sk
- Regional Development Agency Borolo, www.borolo.sk

B.7 Regional Advisory and Information Centres

- Regional Advisory and Information Centre Kosice, www.rpicke.sk/
- Regional Advisory and Information Centre Rožňava, www.rpicrv.sk
- Regional Advisory and Information Centre Trebisov, www.rpic.tv
- Business Innovation Centre (BIC) Košice, www.bicke.sk
- Business Innovation Centre (BIC) Spišská Nová Ves, http://www.bicsnv.sk/
- Centrum prvého kontaktu Michalovce, www.cpk.sk/michalovce

B.8 Producers & Consumers associations

- Združenie pre veternú energiu Slovenska, http://www.zves.sk/
- BIOMASA, z.p.o., biomasa@biomasa.sk
- Združenie pre zatepľovanie budov, http://www.zpzb.sk/
- Slovenský zväz výrobcov tepla, http://www.szvt.sk/
- Asociácia zdravých miest Slovenska, gejzalegen@hotmail.com (seat in Košice)
- Slovenská asociácia pre biomasu, www.skbiom.sk
- Slovak Chamber of Commerce and Industry (branch office Košice), sopkrkke@sopk.sk

B.9 Other regional organizations

- Slovenská agentúra životného prostredia
- Slovenská inovačná a energetická agentúra, officeke@siea.gov.sk

National Level

- Slovak Parliament (providing legal framework for utilization of alternative energy), http://www.nrsr.sk/
- Ministry of Economy, Slovak Innovation and Energy Agency (fulfilling the tasks of the Slovak Ministry of Economy in the area of energy policy – grants, methodological control of the energy activities), http://www.sea.gov.sk/
- Ministry of Environment, http://www.enviro.gov.sk/servlets/page, Environmental fund, http://www.envirofond.sk/sk/
- Ministry of Construction and Regional Development, http://www.nsrr.sk/

- Ministry of Agriculture, www.land.gov.sk, National Forest Centre, www.nlcsk.sk
- Statistical Office, www.statistics.sk
- Regulatory Office for Network Industries, http://www.urso.gov.sk/
- Slovak Environmental Agency, http://www.sazp.sk/
- Slovak Electricity Transmission System, www.sepsas.sk

International level

- **European Union**

ANNEX Ib: EXAMPLES OF STAKEHOLDERS RELATED TO STRUCTURAL FUNDS FOR COMPETITIVENESS AND KNOWLEDGE TRANSFER OF CAMPANIA REGION

B.1 Provinces (Department administrations)

- Provincia di Avellino http://www.provincia.avellino.it/
- Provincia di Benevento http://www.provincia.benevento.it/
- Provincia di Caserta http://www.provincia.caserta.it/
- Provincia di Napoli http://www.provincia.napoli.it/
- Provincia di Salerno http://www.provincia.salerno.it/

B.2 Main Municipalities

- Comune di Avellino http://www.comune.avellino.it/
- Comune di Benevento http://www.comune.benevento.it/
- Comune di Caserta http://www.comune.caserta.it/
- Comune di Napoli http://www.comune.napoli.it/
- Comune di Salerno http://www.comune.salerno.it/
- Full list of Municipalities and departments: www.ancitel.it/link/siti/index.cfm

B.3 Universities

- Università degli Studi di Napoli "Federico II" http://www.unina.it/
- Seconda Università degli Studi di Napoli http://www.unina2.it/
- Università degli Studi di Napoli "Parthenope" http://www.uninav.it/
- Università degli Studi di Salerno http://www.unisa.it/
- Università degli Studi del Sannio http://www.unisannio.it/
- Università degli Studi di Napoli l'Orientale http://www.iuo.it/
- Università degli studi Suor Orsola Benincasa http://www.unsob.na.it/

B.4 Cultural, scientific and technology transfer institutions

- CIRA Centro Italiano Ricerche Aerospaziali (aerospace research, www.cira.it)
- Città della Scienza (Science park, www.cittadellascienza.it)
- CNR Napoli (National research centre Naples) http://www.area.na.cnr.it/
- Consorzio Promos Ricerche (research and innovation) http://www.promosricerche.org/
- Enea Portici (National Research Centre for Energy and Environment), http://axpenea.portici.enea.it/
- ISVE Istituto di Studi per lo Sviluppo Economico (Institute for Economic Development studies) http://www.isve.org/
- Parco scientifico e tecnologico di Salerno e delle aree interne della Campania (scientific and technologic park of Salerno and inner Campania) http://www.pstsa.it

- IMAST (technological district on polymeric and composite materials engineering and structures) http://www.imast.biz
- CEMSAC Centre of excellence on methods and systems for competitive enterprises http://www.cemsac.it/
- Centro Regionale di Competenza sull'Information and Communication Technology ICT - Information and Communication Technology Centre of competence -http://www.crdc-ict.unisannio.it/
- Centro Regionale di Competenza Nuove Tecnologie per le attività produttive Centre of competence on ICT for industry http://www.crdctecnologie.it/
- Centro Regionale di Competenza Produzioni Agroalimentari AGRO - Produzioni agroalimentari Centre of competence on agricultural production http://www.crdcpa.unisa.it/
- Centro Regionale di Competenza in Biotecnologie Industriali BIOTEKNET - Biotecnologie Industriali (Centre of competence on industrial Biotech) http://www.bioteknet.com/
- Centro Regionale di Competenza Diagnostica e Farmaceutica Molecolari DFM - Diagnostica e farmaceutica molecolari (Centre of competence on molecular diagnostics and farmaceutics) http://www.crdc-dfm.it/
- Centro Regionale di Competenza in Genomica (GEAR - Genomica strutturale Centre of competence on Genomics) http://www.gear.unina.it/
- Centro Regionale di Competenza - Benecon Centro di Competenza per i Beni Culturali Ecologia Economia (Centre of competence on ecology, economy and cultural heritage) http://www.benecon.it/
- Centro Regionale Competenza - Trasporti (Centre of competence on transport) http://www.crdctest.it/
- Centro Regionale Competenza - Innova CRC per lo Sviluppo ed il Trasferimento dell'Innovazione Applicata ai Beni Culturali e Ambientali (Centre of competence on technology transfer for cultural heritage) http://www.innova.campania.it/
- Centro Regionale Competenza - AMRA CRC sull'Analisi e Monitoraggio del Rischio Ambientale (Centre of competence on environmental risk monitoring) http://www.amracenter.com/
- Campaniaerospace -Industria, ricerca, finaziamenti e network per l'aerospaziale campano (industry, research network on aerospace) http://www.campaniaerospace.it/

B.5 Professional associations, trade unions and other relevant stakeholders

- Associazione Piccole e Medie Industrie Provincia di Benevento (Association of Small and Medium Enterprises Benevento Province) http://www.apibenevento.it/
- Associazione Piccole e Medie Industrie Provincia di Caserta http://www.apicaserta.it/
- Associazione Piccole e Medie Industrie Provincia di Napoli http://www.apinapoli.it/
- Associazione Piccole e Medie Industrie Provincia di Salerno http://www.apisalerno.it/
- Asmez (association of municipalities) www.asmez.it
- Camera di commercio di Avellino (Chamber of Commerce Avellino) http://www.av.camcom.it/
- Camera di commercio di Benevento http://www.bn.camcom.it/
- Camera di commercio di Caserta http://www.ce.camcom.it/

- Camera di commercio di Napoli http://www.na.camcom.it/
- Camera di commercio di Salerno http://www.sa.camcom.it/
- Cesvitec (services for technological innovation in Campania Small and Medium Enterprises) http://www.cesvitec.it/
- CGIL Campania (trade union) http://www.cgilcampania.it/
- CISL Campania (trade union) http://www.cislcampania.it/
- Eurosportello di Napoli (Information for SMEs on structural funds, promoted by the Chamber of Commerce) www.eurosportello.napoli.it
- Confindustria Campania (Main Employers association) www.confindustriacampania.org
- UIL Campania (trade union) http://www.uilcampania.it/
- Unioncamere Campania, (Union of Chambers of Commerce) www.unioncamere.campania.it/
- Confartigianato (Craftsmanship federation Avellino, Benevento, Caserta, Napoli, Salerno) www.confartigianato .it/Sistema.jsp?ID=496
- Confesercenti (shopkeepers association) www.catcampania.it
- Coldiretti (Farmers association) www.campania.coldiretti.it/
- Confcommercio (shopkeepers association) www.confcommercio.na.it
- Confagricoltura (Farmers association) www.confagricoltura.it/default.aspx
- API (Association of SMESs) www.api.napoli.it/Confapi/ApiCampania.html
- CNA (Confederation of Craftsmanship) www.cnacampania.it

B.6 Information about structural funds and Campania Region

- Portal on structural funds in Campania http://programmazioneunitaria.regione.campania.it/
- Website on European Regional development fund http://www.porfesr.regione.campania.it
- Website on European social fund http://www.porfse.regione.campania.it
- Statistics about Campania region http://www.statistica.regione.campania.it/

B.7 Information about structural funds at national level

- Website on the programming period 2007-2013 of the Ministry for economic development http://www.dps.tesoro.it/qcs/qcs_programmazione.asp
- Government brief on structural funds http://www.governo.it/GovernoInforma/Dossier/fondi_strutturali_indagine/
- Guide to structural funds-National research council http://www.cpo.cnr.it/friend/documenti/Cide.pdf
- Portal on Structural funds-FORMEZ-Centre of innovation for public administration http://europa.formez.it/Fondi_strutturali_2007_2013.html

B.8 Information about structural funds at EU level

- European Parliament/Committee on Regional Development (REGI) http://www.europarl.europa.eu/meetdocs/2004_2009/organes/regi/regi_meetinglist.htm
- Committee of the Regions http://www.cor.europa.eu

- European Economic and Social Committee (ECO Section) http://www.eesc.europa.eu/sections/eco/index_en.asp
- European Investment Bank http://www.eib.org
- Eurostat (Regional statistics) http://epp.eurostat.ec.europa.eu/portal/page?_pageid=0,1136162,0_45572073&_dad=portal&_schema=PORTAL
- Eurostat (NUTS-Nomenclature of territorial units for statistics) http://ec.europa.eu/eurostat/ramon/nuts/splash_regions.html
- Assembly of European Regions (AER) http://www.a-e-r.org
- Conference of Peripheral and Maritime Regions (CPMR) http://www.crpm.org
- Council of Europe (Congress of local and regional authorities) http://www.coe.int/t/congress/default_en.asp
- Council of European Municipalities and Regions http://www.ccre.org/
- Eurocities http://www.eurocities.org
- European Metropolitan Regions and Areas (METREX) http://www.eurometrex.org
- Association of Regional Development Agencies (EURADA) http://www.eurada.org
- European Spatial Planning Observation Network (ESPON) http://www.espon.eu
- Regional Studies Association http://www.regional-studies-assoc.ac.uk/

ANNEX II: FUNCTIONAL REQUIREMENTS

Requirement ID: T-1 **Requirement Type:** Functional **Priority:** Must-have
Name: Discussion forums
Description: Users can discuss on the selected topic using a discussion forum tools. Users can pick a topic of interest from the initial scenario and see a "thread" of messages to this topic of interest. They can choose to reply on messages or to post their own message. Discussion forums provide the opportunity for both consultation and collaboration. In the scope of online consultation and open collaboration, a discussion forum is applied for advancing and validating the desk research results and interim consultation results of the scenario building and analysis. The discussion forum bases on clear 'conditions of use' that provide a guideline for moderators and users likewise. Before starting the discussion forum, the project team informs the stakeholders on the purpose of the discussion forum and on how the results will be further used. The process have to be clearly explained and communicated to the stakeholders in order to be transparent (i.e. to fulfil the Good Governance principle of OPENNESS).
Measurement indicators: Available functionality.

Requirement ID: T-1-1 **Requirement Type:** Functional **Priority:** Must-have
Name: Discussion forums - multiple instances of a forum
Description: Organization of discussions will be available using multiple instances of discussion forums within the platform and context.
Measurement indicators: Available functionality.

Requirement ID: T-1-2 **Requirement Type:** Functional **Priority:** Must-have
Name: Discussion forums - entries should be organised in threads
Description: Discussions within forums are organized in threads. All messages becomes to one specific thread, which has its context.
Measurement indicators: Available functionality.

Requirement ID: T-1-3 **Requirement Type:** Functional **Priority:** Must-have

Name: Discussion forums - possibility to order entries in chronological order and for topics
Description: It is possible to organize discussion threads within forums in different types of order like chronological or topic-based (hierarchical structure of threads, topics, and messages). In more details, scenario building requires that contributions can be depicted structured through topics (i.e. several discussions are possible at the same time concerning different topics of interested extracted from the scenario) on the one hand and on the other hand chronologically (i.e. discussions to one topic should be in chronological order).
Measurement indicators: Available functionality.

Requirement ID: T-1-4 **Requirement Type:** Functional **Priority:** Must-have
Name: Discussion forums - Authorisation on level of the discussion forum
Description: Authorisation of operations (like editing and viewing) with discussion forum should be possible on discussion forums level.
Measurement indicators: Available functionality.

Requirement ID: T-1-5 **Requirement Type:** Functional **Priority:** Must-have
Name: Discussion forums - condition of use
Description: The forum should disclose conditions of use, which state the conditions under which users can state comments. The conditions of use state how the forum is moderated by the moderators (in which case is a comment be withdrawn by the moderator? How long does it take until a comment is published by the moderator? etc.). The conditions of use explain who can see/read the forum (e.g. the general public) and who is allowed to submit comments).
Measurement indicators: Conditions of use are described on the platform.

Requirement ID: T-4 **Requirement Type:** Functional **Priority:** Must-have
Name: Chat
Description: All granted users can use chats, to exchange their ideas with other people involved in the scenario generation and policy modelling. Additional functionality includes creation of more chats, which are context-specific, save history of chats as document in CMS, create related discussion in forums, etc.

Measurement indicators: Available functionality.

Requirement ID: T-5 **Requirement Type:** Functional **Priority:** Must-have
Name: Content Management System (CMS) functionality
Description: Content Management System (CMS) functionality available – creating and editing documents, document versioning, publishing, versioning of documents, etc. All users with granted access rights are able to use CMS for writing a text and creation of content according to specific templates, i.e. template-based publishing with versioning (for scenarios). Documents created using these functionality is applicable for developing and validating the scenarios and making them internally consistent (especially if it is linked to discussion forums). Editing functions are provided to allow users work on the text of an article. An article can be a scenario or a specific aspect of an scenarios. Discussions and polls can be attached to the scenarios. The system should also support e-Library functionality, like referencing sources and uploading related files.
Measurement indicators: Available functionality.

Requirement ID: T-6 **Requirement Type:** Functional **Priority:** Nice-to-have
Name: Teleconferencing tool
Description: All users of the system are able to use a teleconferencing tool within the proposed OCOPOMO ICT toolbox.
Measurement indicators: Available functionality.

Requirement ID: T-7 **Requirement Type:** Functional **Priority:** Must-have
Name: Opinion polling tool – open forms
Description: Authorised users (with granted access rights, e.g. facilitator in case of the Scenario generation process) are able to conduct an opinion poll and define the users who are allowed to participate or to organize an open poll. It is possible to support launching/closing the opinion polling according to the defined setting (e.g. time interval, the number of participants, percentage of the filled in forms from the whole group, etc).

Requirement ID: T-8 **Requirement Type:** Functional **Priority:** Must-have
Name: Opinion polling tool – participation of users in polls – one vote per person

Description: Users can participate in the opinion polls by filling in a form (questionnaire), however they are not authorized to change their answers once provided (i.e. they cannot produce a new version of the filled in form). For scenario analysis, opinion polling tools are applied to let stakeholders express their preferences, e.g. for a specific scenario, a specific behaviour, certain scenario aspects. This also allows the project team to gather an idea about the intention of stakeholders to show a specific behaviour.

Requirement ID: T-9 **Requirement Type:** Functional **Priority:** Must-have
Name: Opinion polling tool – participation of users in polls – possibility to modify the answers provided (versioning)
Description: Users can participate in the opinion polls by filling in a form (questionnaire) and they can change their opinion - answers provided before, i.e. they can produce a new version of the filled in form.

Requirement ID: T-10 **Requirement Type:** Functional **Priority:** Must-have
Name: Opinion polling tool – different types of questions & answers
Description: Opinion polling tool should support definition of different types of questions and answers in the form – e.g. multi-choice questions, text-based inputs (answers), selection of a specific part on a map, selection of text parts (fragments) in a text etc.

Requirement ID: T-11 **Requirement Type:** Functional **Priority:** Must-have
Name: Opinion polling tool – presentation of the results
Description: The opinion polling tool is able to produce a graphical output from the survey results (using graphs, diagrams etc.).
Measurement indicators: Available functionality.

Requirement ID: T-12 **Requirement Type:** Functional **Priority:** Must-have
Name: Discussion forums – moderated and non-moderated discussions
Description: Discussion forums support both moderated and non-moderated discussions. In first case authorized users (e.g. facilitator in case of the scenario building) can moderate a discussion within the discussion forum. Contributions to the forum will be automatically published and the moderator is informed of the new contributions. The moderator can decide to withdraw a contribution. The forum will be used as a consultation tool to ask users about their opinions on specific issues. The discussion forum is applied to have a formal discourse on topics of interest extracted from the scenario in order to

advance it and to provide specific information on it. Within well-directed moderated discussion forums stakeholders are consulted to express their opinions, recommendations and concerns regarding completeness and assessment of desk research results. Discussion forums help to relate and advance descriptions while stakeholders are discussing their opinions with other stakeholders. The system shall publish rules for comments' moderation at the "Rules for engagement" section in order to avoid the accusations of censorship. In case of non-moderated discussions system shall publish the written comments automatically, although the content administrator will be able to modify them and to erase them at any moment.
Measurement indicators: Available functionality.

Requirement ID: T-14 **Requirement Type:** Functional **Priority:** Must-have
Name: Discussion forums – rating of contributions and contributors (analysis of discussions based on a relevance feedback)
Description: Users are able to attach a relevance feedback to contributions in the discussion forum using a rating scale (e.g. 1 – agree, 0 – not relevant in my opinion, -1 – disagree) about the content. Based on this evaluation feedback to the contributions of individual users (a ranking of users) is produced. Contributions of the users with higher ranking score should be taken into account with a priority when summarizing the discussion results. Because in one contribution two or more issues can be mentioned it should be possible for the user to highlight the part of the text and rate it by right clicking the highlighted text and choosing the option "Rating" from the popped up menu. The evaluation of the contribution depends on the partial evaluations of content.
Measurement indicators: Available functionality.

Requirement ID: T-16 **Requirement Type:** Functional **Priority:** Must-have
Name: Agent-based simulation tool
Description: The tool supports simulations of activities/decisions of all stakeholders based on a formal model. Selected stakeholders can be represented by software agents.
Measurement indicators: Available functionality.

Requirement ID: T-17 **Requirement Type:** Functional **Priority:** Should-have
Name: PM (Analysis) - Export of simulation-related data
Description: It is possible to export the data, context, and the simulation details (with possibility to import them to other IT tools, including the simulation tool).

Measurement indicators: Available functionality.

Requirement ID: T-18 **Requirement Type:** Functional **Priority:** Should-have
Name: Import of the previously exported simulation data
Description: It is possible to import the previously exported simulation data and to continue working with them in the simulation tool.
Measurement indicators: Available functionality.

Requirement ID: T-19 **Requirement Type:** Functional **Priority:** Must-have
Name: Previewing of a simulation
Description: In the simulation tool it is possible to see a preview of particular simulation (in a forward and/or backward mode). State of the running simulation can be observed.
Measurement indicators: Available functionality.

Requirement ID: T-20 **Requirement Type:** Functional **Priority:** Must-have
Name: Preview simulation mode – level of details and/or time scale
Description: In the simulation tool it is possible to change the time scale and a level of detail for previewing the current simulation.
Measurement indicators: Available functionality.

Requirement ID: T-21 **Requirement Type:** Functional **Priority:** Should-have
Name: Preview simulation mode – searching for a specified event
Description: It is possible to specify an event, which could be of interest for the simulation analysis and to move simulation to this point (or near this point).
Measurement indicators: Available functionality.

Requirement ID: T-22 **Requirement Type:** Functional **Priority:** Must-have
Name: Preview simulation mode – focusing on a part of the used model
Description: During the simulation it is possible to focus on some specific part(s) of the model (e.g. agents, rules, their decisions, etc).
Measurement indicators: Available functionality.

Requirement ID: T-23 **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Analysis) - Qualitative representation of the simulation results
Description: Qualitative representation of the simulation results is provided, instead of some scale of numbers, e.g. directions of change, indication of volatility, etc. The more qualitative representations, the better. In some cases it is better to have a qualitative indication of direction of change, relative magnitudes than for example time series or cross sections.
Measurement indicators: Available functionality.

Requirement ID: T-24 **Requirement Type:** Functional **Priority:** Must-have
Name: News functionality
Description: Authorized users (e.g. facilitator in case of the scenario generation) can publish news and link them to other parts of the system. News are readable by all users (no need to login) The news feature shall provide an overview about recent published news with date and title, last modified elements notification, etc.
Measurement indicators: Available functionality.

Requirement ID: T-25 **Requirement Type:** Functional **Priority:** Must-have
Name: Commenting functionality
Description: Authorized users (e.g. facilitator in case of the scenario generation) can decide whether the content in the system can be commented upon. Commenting should have always the same style, does not matter what is commented. Users are able to comment most of the sources within the system.
Measurement indicators: Available functionality.

Requirement ID: T-28 **Requirement Type:** Functional **Priority:** Should-have
Name: Shared calendar with events related to the current processes
Description: Responsible users (with granted access rights) can enter an event to the calendar. The calendar should have a function of sending a reminder about the event to all predefined users or groups of users.
Measurement indicators: Available functionality.

Requirement ID: T-29 **Requirement Type:** Functional **Priority:** Must-have
Name: Newsletter
Description: Responsible users (with granted access rights) can create (publish) a newsletter and send it to the subscribed users.
Measurement indicators: Available functionality.

Requirement ID: T-30 **Requirement Type:** Functional **Priority:** Must-have
Name: RSS
Description: All users can install RSS reader, to be able to check for new information, works, downloads on a regular basis (e.g. during an unsynchronised scenario generation session) using system feed.
Measurement indicators: Available functionality.

Requirement ID: T-32 **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Gaming) – Role-playing games (single user)
Description: User is able to play role-playing games within policy modelling tool in order to acquire knowledge about the system and learning how the simulation works. The educative games will base on the simulations in which users will be allowed to change parameters of the simulation and observe how the magnitudes of change influence the development of the future states. The game should be interactive so the user is asked to make the decision every few time steps of the simulation run.
Measurement indicators: Available functionality.

Requirement ID: T-33 **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Gaming) – User interface for human player
Description: Users are able to play role-playing games using specifically designed user interface, which will allow them to change all necessary aspects and parameters, together with taking of their decision during the simulation steps.
Measurement indicators: Available functionality.

Requirement ID: T-34 **Requirement Type:** Functional **Priority:** Must-have
Name: E-mail notification system
Description: This feature should provide an awareness mechanism (daily/weekly/monthly) allowing participants to be informed on newly published or modified content in discussions, CMS, etc.
Measurement indicators: Available functionality.

Requirement ID: T-38 **Requirement Type:** Functional **Priority:** Should-have
Name: Transcription tool
Description: Every communication with stakeholders relevant for scenario building and analysis, as well as for simulation, which is not written down (i.e. every audio and video record and face-to-face workshops and interviews), should be recorded and transcribed automated.
Measurement indicators: Available functionality.

Requirement ID: T-39 **Requirement Type:** Functional **Priority:** Must-have
Name: Computer-assisted Qualitative Data Analysis Software Tool – Coding of text passages and clustering of codes
Description: Open documents stored in the DMS, and any other written text (i.e. wiki text, discussion forum text, chats, blogs, transcripts of audio and video records). Analysts should be able to work in the back-office and analyse the written text received. Analysts should be able to work on the texts and highlight phrases (i.e. text passages) in the text. If the analyst right clicks the highlighted text passage, a context menu opens with one entry called “extract phrase”. If the analyst selects “extract phrase”, thereby creating automatically a unique identifier for phrase with relevant attributes or meta-data (i.e. the position of the phrase in the text and the original document is fixed including paragraph, line as well as its start and end position in line). After the creation of codes (i.e. coded phrases), analysts

should be able to cluster existing similar codes into an issue. The analyst can choose to either link the coded phrase to an existing issue (i.e. cluster of codes according to similarity of their meaning) selected from the list of issues shown on the right side or to create a new issue on the base of this coded phrase. If a new issue has to be set up, create data record of issues in the database with the corresponding attributes or meta-data. Visualize the coded text passages by highlighting them within the text document. Give each data record for text documents, codes and issues a unique identifier to ensure traceability. Allow the integration of comment(s) to codes and issues.
Measurement indicators: Available functionality.

Requirement ID: T-40 **Requirement Type:** Functional **Priority:** Should-have
Name: Computer-assisted Qualitative Data Analysis Software Tool – flexible querying of codes and issues
Description: Provide area where all data collected so far, can be viewed divided by classification. Show the set of attribute(s) or meta-data and included codes that correspond to the issue(s) selected/listed in an extra area below the issue. Querying and visualisation of either one issue or a set of issues based on single or combined attribute(s) or meta-data. Show the list of issue(s) that fulfil the criterion/criteria. Provide facilities to direct queries and visualise statistics. Allow as many as possible queries derived from the different combinations of parameters thereby using statistical techniques to sort and list the aggregated results. Formulation of queries considering usability. Extra area to specify filter criteria for querying. Consideration of not only of ready-made importable queries but also of flexible-generated new queries to the system is significant. Provide ready-made importable queries. Provide flexible generation of new queries.
Measurement indicators: Available functionality.

Requirement ID: T-41 **Requirement Type:** Functional **Priority:** Nice-to-have
Name: Computer-assisted Qualitative Data Analysis Software Tool – statistics
Description: Visualise each possible statistic therefore provide different kinds of diagrams Example: Visualising the results of the statistical calculations (e.g. the occurrences of words, the weighting of likeliness, the relevance of issues, etc.). In particular the visualisation of rankings enables the analyst to accurate interpret the data and come to clear conclusions. Thus, rankings ought to be either coloured highlighted or graphical reprocessed. In doing so, the option to include additional information, such as comments, notes, would be also helpful for scenario analysis.
Measurement indicators: Available functionality.

Requirement ID: T-42 **Requirement Type:** Functional **Priority:** Should-have
Name: Tags
Description: Users of forums, blogs and chats should be allowed to tag their input. By right clicking the highlighted text the menu with option tags should open. If the user chooses to tag the written text the list of available tags should be presented with the option of adding a new tag to the list.
Measurement indicators: Available functionality.

Requirement ID: T-43 **Requirement Type:** Functional **Priority:** Nice-to-have
Name: Tags - automatic support
Description: Tags functionality is available together with automatic support for highlighting of specific types of inputs (like names of organizations, locations, units, etc.).
Measurement indicators: Available functionality.

Requirement ID: FR01_PM **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Transformation process) - Define initial policy modelling aspects
Description: The tool should provide the possibility for policy modellers to extract basic information out of narrative scenario descriptions in order to formulate a foundation for policy modelling.
Measurement indicators: Functionality to extract basic information out of scenarios is provided. The information is provided properly, extractable and understandable.

Requirement ID: FR02_PM **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Transformation process) - Stakeholder extraction
Description: The tool should provide the possibility to extract stakeholder descriptions out of the narrative scenario.
Measurement indicators: Functionality to extract stakeholder descriptions is provided. Narrative scenario describes stakeholders in detail.

Requirement ID: FR03_PM **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Transformation process) - Environment generation
Description: The tool needs to provide the possibility to generate environmental aspects out of the descriptive scenario.
Measurement indicators: Functionality to generate environmental aspects is provided. Descriptive scenario describes environmental aspects detailed.

Requirement ID: FR04_PM **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Transformation process) - Goal definition
Description: The tool should provide the functionality for experts to define goals the policy model is going to aim at.
Measurement indicators: Functionality to define goals is provided.

Requirement ID: FR05_PM **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Transformation process) - Rule generation
Description: The tool should provide a method to extract basic rules out of the narrative scenario and SOP to apply them to the modelled agents and environment.
Measurement indicators: Functionality to extract rules out of scenario and SOP is provided. SOP and Scenario description is covering and well-structured.

Requirement ID: FR06_PM **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Transformation process) - Assumption definition
Description: The tool should provide the possibility to define a minimum number of assumptions the model should carry.
Measurement indicators: The functionality to define assumptions is given and the user accepts the assumptions as a minimal set.

Requirement ID: FR07_PM **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Modelling process) - Agent type creation
Description: The tool needs to support and handle different types of agents (not only for participating human individuals).
Measurement indicators: Functionality to create agent types is provided.

Requirement ID: FR08_PM **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Modelling process) - Agents at different aggregation levels
Description: Out of the extracted stakeholder and environmental information, the tool should provide the possibility to define agents for different groups of stakeholders.
Measurement indicators: Functionality to define agents is provided. Extracted stakeholder and environmental information is covering.

Requirement ID: FR09_PM **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Modelling process) - Exogenous factors
Description: The tool needs to represent exogenous factors.
Measurement indicators: Functionality to represent factors is provided.

Requirement ID: FR10_PM **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Modelling process) - Environment definition - general
Description: The tool needs to provide a possibility for the modeller to define the environment for carrying agents and support inter-agent behaviour.
Measurement indicators: Functionality to define environment is provided.

Requirement ID: FR11_PM **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Simulation setup) - Setup world facts

Description: The tool needs to provide a possibility to setup the initial world facts that are used to start simulating the according model.
Measurement indicators: Functionality to setup initial world facts is provided. Simulation needs to run properly.

Requirement ID: FR12_PM **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Simulation setup) - Setup initial agent facts
Description: The tool needs to provide a possibility to setup the initial facts of the agent types that are used to start simulating the according model.
Measurement indicators: Functionality to setup all agents initial facts. Simulation needs to perform properly.

Requirement ID: FR13_PM **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Simulation setup) - Initial state definition
Description: Before simulating a model the tool needs to provide a possibility to define an initial state that is going to be simulated.
Measurement indicators: Functionality to define an initial state for simulation is provided. Simulation needs to accept configuration.

Requirement ID: FR14_PM **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Simulation termination) - End state
Description: The tool needs to be able to let the modeller formulate an end state, which is based on rules that should lead to it. This end state is also a user-defined termination event.
Measurement indicators: Functionality to define an end state is provided. Simulation needs to realize this state.

Requirement ID: FR15_PM **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Simulation termination) - Irregular termination events

Description: The tool should be able to let the modeller formulate irregular, unpredictable termination events.
Measurement indicators: Functionality to define irregular termination events is provided.

Requirement ID: FR16_PM **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Simulation termination) - Regular termination events
Description: The tool should provide a possibility for the modeller/user to formulate regular termination events for a simulation, e.g. time-based events.
Measurement indicators: Functionality to formulate regular termination events is provided. The simulation needs to realize the defined events.

Requirement ID: FR17_PM **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Simulation termination) - Adjustable parameters
Description: The tool should provide a possibility to create and associate adjustable parameters with agents and environments on which they are founded to keep simulation adaptable (e.g. time).
Measurement indicators: Functionality to handle adjustable parameters is provided. Agents and environment need to accept these values.

Requirement ID: FR18_PM **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Simulation termination) - State validation
Description: Before simulating a model the tool needs to provide a possibility to validate a state that is going to be simulated (e.g. by appropriate participation possibility).
Measurement indicators: Functionality to validate a to-be simulated state is provided.

Requirement ID: FR19_PM **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Simulation termination) - Simulation start
Description: The tool should provide a possibility to start simulation runs by user side.

Measurement indicators: Functionality to start the simulation by the user is provided. The simulation needs to accept the start event.

Requirement ID: FR20_PM **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Simulation termination) - Simulation interrupt
Description: The tool should provide a possibility to interrupt simulation runs by user side.
Measurement indicators: Functionality to interrupt the simulation by the user is provided. The simulation needs to accept the interruption event.

Requirement ID: FR21_PM **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Simulation termination) - Simulation abort
Description: The tool should provide a possibility to abort simulation runs by user side.
Measurement indicators: Functionality to abort the simulation by the user is provided. The simulation needs to accept the abort event.

Requirement ID: FR22_PM **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Experimentation) - User engagement in simulation
Description: The tool should provide the possibility to take the role of one agent while simulating. The user should be allowed to take the role of one agent but also a fraction of agents belonging to one group (the size of the fraction should be decided by the user). The fraction of agents should behave as the user with little diversity.
Measurement indicators: Functionality to take the role of any one agent at runtime as well as pre-simulation is provided. The simulation part needs to realize this participation and needs to interact with the user properly.

Requirement ID: FR23_PM **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Experimentation) - User Interaction
Description: The tool needs to interact with the user (waits for decisions) while being in simulation mode the participates in.

Measurement indicators: Functionality to interact with the simulation part (agents/environment) is provided.

Requirement ID: FR24_PM **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Experimentation) - Gaming simulation interface
Description: The tool must provide an adequate representation of the current state of the simulation and the possible alternative actions in real-time and on-line in order to enable the "human player" to make decisions.
Measurement indicators: The state and the alternatives are present in a direct and understandable way.

Requirement ID: FR25_PM **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Experimentation) - Change simulation parameters
Description: The tool should provide the possibility to switch back to the stating state once having finished the simulation run to change simulation parameters.
Measurement indicators: The functionality to start a new simulation after having performed a simulation with slightly modified parameters is provided. The tool needs to map the known parameters to the start configuration of the new simulation run.

Requirement ID: FR26_PM **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Experimentation) - Automated experimentation
Description: The tool should provide the possibility to define batch runs for exploring different configurations by automatically assigning values out of a given range to according parameters (e.g. for sensitivity analysis).
Measurement indicators: The functionality to use the batch mode is provided.

Requirement ID: FR27_PM **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Gaming) - Feedback on simulation
Description: The tool should provide a possibility to let the participating users leave their feedback on

the simulation run in a direct an appropriate way.
Measurement indicators: Functionality to leave feedback on a performed simulation run is provided.

Requirement ID: T-C1 **Requirement Type:** Functional **Priority:** Nice-to-have
Name: Hints for interesting topics
Description: The system shall provide links to further interesting readings at the platform for documents, forum entries, etc.
Measurement indicators: Available functionality.

Requirement ID: T-C2, **Requirement Type:** Functional, **Priority:** Must-have / Should-have / Nice-to-have/ Not-important
Name: News – rating/polling functionality
Description: Users are able to rate/vote for interesting news entries. Rating/Polling is an easy to use functionality to initialize first participative behavior and interest with the topics.
Measurement indicators: Available functionality.

Requirement ID: TP-1 **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Analysis) – Within-timestep dependency graph visualisation
Description: A graph showing directed links between nodes where each node represents a declarative rule. Pop-up menues are needed on links to explain the reason for the dependency and on nodes for rule inspection and to call up transition tables. This will mainly be useful for modellers so they can see how new rules relate to previously implemented rules.
Measurement indicators: Available functionality.

Requirement ID: TP-2 **Requirement Type:** Functional **Priority:** Should-have
Name: PM (Analysis) – Experiment and rule development browser
Description: In developing rules or inspecting rules, it is useful to be able to select one or more clauses and then either fetch them (if all clauses are on the database) or retrieve them (if there are

some clauses involving calculation such as > or <). Useful if a rule that was expected to fire did not or if a new rule is being implemented at a paused timestep during a simulation.
Measurement indicators: Available functionality.

Requirement ID: TP-3 **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Analysis) - Narrative output
Description: Description: During simulation runs, textual output is generated, describing a state or a state change of the simulation model. The single statements/text chunks are generated by dedicated clauses which have to be included in all relevant rules. Special attention must be paid by the modeller at phrasing the text chunks in order to allow human readers to get an idea about the reasons for and the background of a particular simulation result (i.e. the history of the simulation process) from the generated text.
Measurement indicators: Narrative output is generated during simulation runs in an appropriate (readable) way.

Requirement ID: TP-5 **Requirement Type:** Functional **Priority:** Must-have
Name: PM (Analysis) - Visualisations of non-numerical outcomes/events
Description: During simulation runs, textual output is generated, describing a state or a state change of the simulation model. The single statements/text chunks are generated by dedicated clauses which have to be included in all relevant rules. Special attention must be paid by the modeller at phrasing the text chunks in order to allow human readers to get an idea about the reasons for and the background of an eventual simulation result (i.e. the history of the simulated policy process) from the generated text.
Measurement indicators: Narrative output is generated during simulation runs in an appropriate (readable) way.

ANNEX III: NON-FUNCTIONAL REQUIREMENTS

Requirement ID: T-35 **Requirement Type:** Non-Functional **Priority:** Must-have
Name: Simulation tool – the number of agents
Description: The simulation tool used within the project is able to work with a necessary number of agents (will be defined based on the pilot application outline).
Measurement indicators: To be indicated according to the pilot application outline, e.g. minimum 1000 agents.

Requirement ID: T-36 **Requirement Type:** Non-Functional **Priority:** Must-have
Name: Simulation tool – performance in simulation cycles
Description: The simulation tool used within the project is able to simulate a necessary number of cycles with software agents (will be set up according to the pilot application outline).
Measurement indicators: To be indicated according to the pilot application outline, e.g. 100 cycles during 1 minute.

Requirement ID: T-37 **Requirement Type:** Non-Functional **Priority:** Must-
Name: Authorization/authentication issues are taken into account in individual tools
Description: For all the tools and relevant functionality authorization/authentication issues will be taken into account.
Measurement indicators: All secure functions within individual tools should be reused in a correct (secure) way.

Requirement ID: NFR01_PM **Requirement Type:** Non-Functional **Priority:** Must-have
Name: PM (Transformation process) - Data representation
Description: The tool needs to represent the data extracted out of the scenario description in a clear and understandable way that modellers need to understand.

Measurement indicators: Represented data is clearly understandable.

Requirement ID: NFR02_PM **Requirement Type:** Non-Functional **Priority:** Should-have
Name: PM (Transformation process) - Language transition
Description: The tool should assist the user to perform the transition from natural to formal language in a user-friendly way.
Measurement indicators: The user is able to inspect and follow the process.

Requirement ID: NFR03_PM **Requirement Type:** Non-Functional **Priority:** Must-have
Name: PM (Modelling process) - End states
Description: The tool needs to enable each simulation run to lead to one of the following end states: success, failure, user-aborted.
Measurement indicators: The used software needs to finish simulation execution as soon as having reached an end state. This event needs to be visualized to the user.

Requirement ID: NFR04_PM **Requirement Type:** Non-Functional **Priority:** Should-have
Name: PM (Modelling process) - Initial model definition (Beginner's mode)
Description: The tool needs to provide the possibility to set up an easy to understand and not too difficult first model.
Measurement indicators: Users need to understand generated models. The tool provides a restricted set of functionalities.

Requirement ID: NFR05_PM **Requirement Type:** Non-Functional **Priority:** Should-have
Name: PM (Modelling process) - Iterations (Expert's mode)
Description: The tool should be able to detail the current model in later iterations. So having simulated an easy model should open a possibility to change the model itself for later iterations.

Measurement indicators: The user is able to take the present parameter values at the end of any simulation run to have them build a new configuration for later iterations.

Requirement ID: NFR06_PM **Requirement Type:** Non-Functional **Priority:** Must-have
Name: PM (Modelling process) - Model description
Description: The tool needs to provide the possibility to describe and document the model in adequate types of languages (e.g. formal, graphical, natural).
Measurement indicators: Users and experts need to understand the languages and derivations out of them.

Requirement ID: NFR07_PM **Requirement Type:** Non-Functional **Priority:** Must-have
Name: PM (Modelling process) - General model description
Description: The tool needs to as general as possible in order to provide a common platform for different policy models.
Measurement indicators: Users accept the model as a most general one.

Requirement ID: NFR08_PM **Requirement Type:** Non-Functional **Priority:** Must-have
Name: PM (Simulation) - Event handling
Description: The tool needs to catch events that result in aborting the active simulation run.
Measurement indicators: Stable and reliable event handling needs to catch all events. Users may be alerted.

Requirement ID: NFR09_PM **Requirement Type:** Non-Functional **Priority:** Must-have
Name: PM (Simulation) - Exception handling
Description: The tool needs to be able to catch non-predictive exceptions during simulation runs.
Measurement indicators: Stable and reliable exception handling needs to catch all exceptions. Users may be alerted.

Requirement ID: NFR10_PM **Requirement Type:** Non-Functional **Priority:** Must-have
Name: PM (Simulation) - Simulation visualization
Description: Simulation should be visible to the user. The current simulation process step needs to be observable (e.g. variables).
Measurement indicators: The user needs to be able to inspect simulation runs.

Requirement ID: NFR11_PM **Requirement Type:** Non-Functional **Priority:** Must-have
Name: PM (Simulation) - Parameter presentation
Description: The created formal model's parameters should be represented and accessible in a direct and easy way before simulation starts.
Measurement indicators: The toolbox's graphical user interface needs to display all parameters. Users need to associate them.

Requirement ID: NFR12_PM **Requirement Type:** Non-Functional **Priority:** Must-have
Name: PM (Simulation) - Parameter locking
Description: The created formal model's static parameters should be locked while simulating.
Measurement indicators: The user may not change any static parameters while in simulation state.

Requirement ID: NFR13_PM **Requirement Type:** Non-Functional **Priority:** Must-have
Name: PM (Simulation) - State handling for inspection
Description: The tool should keep the simulation in an explicit and persistent state that can easily be inspected and stored at every time.
Measurement indicators: Users may display a simulation's relevant parameter values at every time.

Requirement ID: NFR14_PM **Requirement Type:** Non-Functional **Priority:** Must-have

Name: PM (Simulation) - Simulation execution
Description: The tool should perform the simulation either autonomous or in steps the user needs to trigger interactively.
Measurement indicators: Users may adjust values on the fly. The software needs to adapt and visualize the changes in the according simulation.

ANNEX IV: INTEGRATED REQUIREMENTS - FUNCTIONAL

Requirement ID: I-1 **Requirement Type:** Functional **Priority:** Must-have
Name: ICT toolbox functionality provided through one portal-based interface
Description: The ICT toolbox should be provided as a portal-based web application. It means that particular tools will be fully available under this portal (where applicable). Integration of elements within portal should be similar to Google docs or Alfresco Share, both from the side of presentation and space of collaboration (workspace).
Measurement indicators: Users can connect to the portal with more than 80% of the functionality of the particular tools.

Requirement ID: I-2 **Requirement Type:** Functional **Priority:** Must-have
Name: Transformation table – connection of context-specific information within the Scenario Generation and Policy Modelling process in ICT toolbox
Description: All information related to one scenario generation is connected through one context. It means that everything created within development of one scenario is identified using a unique context in order to support context-specific search, information presentation, workspace/group management and users access to the resources. At the same time, when policy modelling is connected to a context-specific scenario, user is informed where the scenario comes from. It means that specific policy modelling has the same context information related to some concrete scenario and its rules.
Measurement indicators: All information created within the mentioned processes has specific context information.

Requirement ID: I-3 **Requirement Type:** Functional **Priority:** Must-have
Name: Starting the scenario generation process - initial scenario
Description: Responsible user for scenario generation (facilitator) can publish an initial scenario using the publishing tool of the ICT toolbox, where specific context information for the current case is created in the initial moment. From this moment onward, everything related to this scenario has this context information.
Measurement indicators: Available function, created context information (metadata).

Requirement ID: I-4 **Requirement Type:** Functional **Priority:** Must-have

Name: Creation of stakeholder groups for the scenario generation process
Description: Responsible user (facilitator) can create group(s) of stakeholders for a revision of the current scenario. The integrated system should have context-specific information about their membership and activities (log).
Measurement indicators: Available function, created context information (metadata).

Requirement ID: I-5 **Requirement Type:** Functional **Priority:** Must-have
Name: Integration of components within the e-participation tools for scenario generation – data exchange / annotation
Description: Different e-participation tools should be easily and mutually referenced (annotated). For example, there should be a possibility to reference some part of a scenario (e.g. a highlighted part of a text) and to use an action, which automatically creates discussion thread within a discussion forum related to this scenario, when user wants to do such an action (together with a copy of information to an introductory message in the discussion). Exchange of information should be defined as some format. Other possibilities of annotation / data exchange between particular tools should be identified before the design of the architecture and the implementation phase starts.
Measurement indicators: Available functionality, necessary part of data is copied / referenced; more than 80% of tools have interconnection using a similar annotation / data exchange.

Requirement ID: I-6 **Requirement Type:** Functional **Priority:** Must-have
Name: Integration of components within the e-participation tools for scenario generation – search
Description: Users can search for resources within the e-participation tools using several metadata descriptions and attributes.
Measurement indicators: The integrated portal will have one interface for (context-specific) search within all the tools.

Requirement ID: I-7, **Requirement Type:** Functional, **Priority:** Must-have / Should-have / Nice-to-have/ Not-important
Name: Integration of components within the e-participation tools for scenario generation – workspace
Description: Information provided by group members is shown in an integrated form as one workspace, where individual tools are available for use within the group. Scenario is published / updated within this workspace with all its aspects and derived rules.

Measurement indicators: The integrated portal has workspace presentation of any group within the scenario.

Requirement ID: I-10 **Requirement Type:** Functional **Priority:** Must-have
Name: Opinion polling about the current version of scenario generation resources
Description: Facilitator and/or other members of the scenario generation process can set up an opinion polling about the content. All granted users can express their opinion in the created poll.
Measurement indicators: Integrated portal has a workspace presentation of any group within scenario.

Requirement ID: I-11 **Requirement Type:** Functional **Priority:** Must-have
Name: Closing the scenario generation process / versioning
Description: Facilitator can close consultation about the current scenario generation process. All information about the case is automatically locked and archived within the context. The current status of all data is versioned in the integrated system under the defined context.
Measurement indicators: Available functionality, successful versioning of current status and lock.

Requirement ID: I-12 **Requirement Type:** Functional **Priority:** Should-have
Name: Support for direct export/import of information between scenario generation process and policy modelling
Description: ICT toolbox supports responsible users to automatically export information resources from scenario generation process to policy modelling, while supporting also backward interaction (from policy modelling to scenario generation).
Measurement indicators: Available functionality, automatic creation of an input to policy modelling (and backward).

Requirement ID: I-13 **Requirement Type:** Functional **Priority:** Must-have
Name: Control of Scenario Generation process phases
Description: Facilitator can switch using the ICT toolbox between basic modes of the Scenario

Generation process – discussion and stakeholder comments on scenario, and evaluating and survey of the current status. The facilitator is granted with the right to change mode of the current work within the scenario generation process, and to finish the consultation, publish updated version, etc. The switched modes are disjunctive (there is no possibility to change data in the other mode; user has to wait for changing the mode).
Measurement indicators: Available function.

Requirement ID: I-14 **Requirement Type:** Functional **Priority:** Must-have
Name: Maintaining of scenarios and rules within the ICT toolbox
Description: Several versions of scenarios and rules are maintained in the ICT toolbox in order to have grounded inputs for different simulations and work within policy modelling tools.
Measurement indicators: Available functionality, versioning tool expected.

Requirement ID: I-15 **Requirement Type:** Functional **Priority:** Must-have
Name: Support for the policy modelling tool to create a new scenario generation iteration
Description: Responsible user for policy modelling can start a new process of scenario generation iteration with the existing scenario (new version of the scenario) or new one (new scenario, but with respect to previous one, which is referenced). After creation of new iteration and preparing relevant information as a feedback (copied to the scenario generation resources), the facilitator takes over the control again. New policy modelling will be connected to new context of scenario generation iteration; the previous one is only referenced.
Measurement indicators: Available functionality.

Requirement ID: I-17 **Requirement Type:** Functional **Priority:** Must-have
Name: Discussion about simulation results and decisions of human agents in simulation
Description: Users (human agents) can see their decisions made within the simulation and explain them, discuss them in the forum etc., all as a narrative text. This functionality also includes possibility to set up discussions around a specific simulation event.
Measurement indicators: Available function, possibility to create a discussion thread about their decisions.

Requirement ID: I-18 **Requirement Type:** Functional **Priority:** Must-have
Name: Comparison of simulations
Description: There will be possibility to compare two different simulations. The differences should be extracted from the log of the simulations.
Measurement indicators: Available function.

Requirement ID: I-19 **Requirement Type:** Functional **Priority:** Must-have
Name: Log of activities within scenario generation
Description: All activities of users within the process of scenario generation and policy modelling are saved as metadata log with its context. Then this information can be used for metadata search and analyses (e.g. for presentation of results).
Measurement indicators: Context-based log of all activities within workspace, used for presentation of information and search.

Requirement ID: I-20 **Requirement Type:** Functional **Priority:** Must-have
Name: Log of activities within policy modelling / simulation
Description: All activities of users within processes of policy modelling and simulation are saved as metadata log with its context. This information can be then used for metadata search and analyses (e.g. for presentation of results).
Measurement indicators: Available function.

Requirement ID: I-22 **Requirement Type:** Functional **Priority:** Must-have
Name: Defining scenario for policy modelling
Description: Responsible user for policy modelling/simulation can prepare a scenario, which will be used in policy modelling and simulation (to define scenario, which will be used from the previous steps, define roles and who will play them, etc.)
Measurement indicators: Available function.

Requirement ID: I-23 **Requirement Type:** Functional **Priority:** Must-have
Name: Creation of stakeholders groups for policy modelling process
Description: Responsible user (facilitator) is able to create group(s) of stakeholders for the current policy modelling and simulation steps. The integrated system should have context-specific information about their membership and activity (log). It is also possible to re-use groups from the scenario generation part of the integrated process.
Measurement indicators: Available function, created context information (metadata).

Requirement ID: I-24 **Requirement Type:** Functional **Priority:** Must-have
Name: Publishing of simulation results by the publishing tool (content management tool)
Description: Users can publish results of simulation using simple commands / buttons in the publishing tool. Metadata (context information) is saved by the publishing tool (content management tool).
Measurement indicators: Available function, created context information (metadata).

Requirement ID: I-25 **Requirement Type:** Functional **Priority:** Should-have
Name: Integration of policy modelling tool and simulation / analysis tools – data exchange / annotation
Description: Different data exchange is supported between the tool for policy modelling and tools for simulation preview and data analysis.
Measurement indicators: Available functionality, necessary data is copied / referenced, metadata created.

Requirement ID: I-26 **Requirement Type:** Functional **Priority:** Must-have
Name: Version control of process models and/or agent models
Description: Policy and agent models are versioned within the system. Versioned models are easy available for modellers.
Measurement indicators: Available functionality, versioning tool expected.

Requirement ID: I-27 **Requirement Type:** Functional **Priority:** Must-have
Name: Simulation preview tool available from different physical locations – remote access
Description: Users can watch / participate in simulations via a web-based interface. This should be provided using remote access to policy modelling tool with integrated tool features.
Measurement indicators: Available functionality, portal-based access.

Requirement ID: I-28 **Requirement Type:** Functional **Priority:** Must-have
Name: Action–based and rule-based role playing of stakeholders in simulation
Description: User can participate in two basic modes (which can be combined). In the action-based mode (human agent) they respond to every single step. In the rule-based mode rules are used to make a decision in a step-wise mode. If there is no applicable rule, user is asked explicitly. User is able to change/defines rules in his/her rule set.
Measurement indicators: Available functionality.

Requirement ID: I-29 **Requirement Type:** Functional **Priority:** Should-have
Name: Human actions analysis
Description: Possibility to filter from simulation log activities of a specific agent (e.g. played by a human) together with the relevant context and to develop rules of agent actions in an automatic way.
Measurement indicators: Available functionality.

Requirement ID: I-30 **Requirement Type:** Functional **Priority:** Must-have
Name: Translation of agent rules from a tool neutral syntax into simulation back-end language
Description: This requirement is related to formal description of agents – possibility to translate agent rules from a tool neutral syntax into the language used by a selected simulation back-end.
Measurement indicators: Available functionality.

Requirement ID: I-32, **Requirement Type:** Functional, **Priority:** Must-have / Should-have / Nice-

to-have/ Not-important
Name: Workflow support
Description: The whole process of policy modelling and scenario generation (or its part) is supported by selected workflow process engine. Facilitator can publish an evaluation of created resources from the both processes. All information is (semi-)automatically copied and integrated to all relevant tools, together with creation of some starting discussion threads, etc.
Measurement indicators: Available functionality, workflow process based on the business process analysis, context-specific information saved and used within system.

Requirement ID: I-39 **Requirement Type:** Functional **Priority:** Must-have
Name: Full dependency graph including dependency of rules on lagged clauses
Description: Rules which depend on clauses declared in previous time-steps are not dependent on the rules that declared those clauses in determining whether those rules can fire in the current timestep. However, these inter-timestep dependencies are part of the description of the processes generated by the rules and it should be possible to understand these lagged dependencies. The same functionality relating to rule inspection and linking to transition tables are required here as in requirement I-38. This will mainly be useful for modellers.
Measurement indicators: Available functionality.

Requirement ID: I-40 **Requirement Type:** Functional **Priority:** Must-have
Name: Transition table browser
Description: Transition tables record the links between clauses comprising rules and narrative text obtained from stakeholders in scenarios or by interview or any other means. The browser will be called up by a menue item in the dependency graph browser. Only the rows (the transitions) relevant to the clauses of the rule will be displayed. If one or more clauses in a rule are selected, then only the corresponding rows of the transition tables will be displayed.
Measurement indicators: Available functionality.

Requirement ID: I-F-I1 **Requirement Type:** Functional **Priority:** Must-have
Name: Password reminder
Description: The system shall include a password reminder.

Measurement indicators: Available functionality

Requirement ID: I-F-I2 **Requirement Type:** Functional **Priority:** Must-have
Name: Removing profile
Description: If a registered user wants to delete his/her profile and stop being a registered member, he/she must/can do this in the system. If the user is logged-in he or she needs to press the "remove my account" button and confirm this decision afterwards to remove the profile.
Measurement indicators: Available functionality

Requirement ID: I-F-I3 **Requirement Type:** Functional **Priority:** Must-have
Name: Login
Description: After the initial registration, members can login each time they wish to access the site by providing their user name or email and password.
Measurement indicators: Available functionality

Requirement ID: I-F-I4 **Requirement Type:** Functional **Priority:** Must-have
Name: User registration
Description: The system shall ask for the following data to register a new user: User name, Email, Password, Code to avoid spam bots.
Measurement indicators: Available functionality

Requirement ID: I-F-I5 **Requirement Type:** Functional **Priority:** Must-have
Name: User profile
Description: Once a user registers for the first time, he/she will be invited to provide a personal profile, which includes the following information: his/her personal information and contact details, topics interesting for him/her, in order to be notified about new topics posted on the forum related to that processes, newsletter registration. The user profile information can be modified at any time by the profile owner.

Measurement indicators: Available functionality

Requirement ID: I-F-I6 **Requirement Type:** Functional **Priority:** Must-have
Name: Personalise overview
Description: The system shall provide a personalized webpage for registered and logged in users, which is customized according to the user's preferences. This means that the user 1) can choose which information should be visible (events, news, forums, etc.) at which place on the webpage, and 2) the interesting information are highlighted. The user has to be registered and logged in to see the personalized webpage. The personalized overview does not replace the start page. It is an extra page, which is only visible for registered and logged in users.
Measurement indicators: Available functionality

ANNEX V: INTEGRATED REQUIREMENTS – NON-FUNCTIONAL

Requirement ID: I-33 **Requirement Type:** Non-Functional **Priority:** Must-have
Name: Comprehensive simulation results
Description: Simulation results will be provided to the users in a comprehensive way. Narrative stories should be added from logs (manually).
Measurement indicators: More than 75% of users will find description of simulation results comprehensive and clear.

Requirement ID: I-34 **Requirement Type:** Non-Functional **Priority:** Must-have
Name: Simulation back-end integrated with the ICT toolbox
Description: A well-known agent-based simulation backend will be used in policy modelling process (e.g. Repast, NetLogo, etc.). Particular steps, human agents participation, logging of activities, analyses should be integrated with the ICT toolbox. Also the simulation back-end should be easily interchangeable with another one, not connected to external environments, and not consuming external services (standalone application).
Measurement indicators: Integrated simulation back-end(s) with possibility to enable human participation, logging, etc. Performed simulation in a stand-alone mode.

Requirement ID: I-35 **Requirement Type:** Non-Functional **Priority:** Must-have
Name: Multilingual interface
Description: All interfaces in the integrated toolbox (e-participation tools, scenario generation processes, policy modelling, simulation tool, etc) should be provided in and support different language versions.
Measurement indicators: User interface will be provided at least in English, Italian and Slovak, user can choose a language in his/her preferences.

Requirement ID: I-36 **Requirement Type:** Non-Functional **Priority:** Nice-to-have
Name: All personal preferences in one place
Description: All possible preferences (language, form of presentations from tools (if applicable),

personal profile details, etc.) should be available in one screen / form. It means that all possible preferences (related to ICT toolbox) and will be integrated into one form (instead of separate settings for each tools).
Measurement indicators: More than 90% of settings integrated into one form, correct change of settings within ICT toolbox and particular IT tools.

Requirement ID: I-NF-1 **Requirement Type:** Non-Functional **Priority:** Must-have
Name: Usability
Description: The system should have a good usability.
Measurement indicators: At least 70% of users in test sessions shall be able to complete a test and resolve any difficulties encountered without assistance. Users with basic internet experience (6 months to one year) shall on average give satisfactory, or higher, ratings on an 'ease of use' scale to be given in a questionnaire.

Requirement ID: I-NF-2 **Requirement Type:** Non-Functional **Priority:** Must-have
Name: Accessibility
Description: The platform shall comply with Web Accessibility Initiative´(WAI) Guidelines for the Accessibility of Web Content level 2 checkpoints. Exceptions to this requirement may be agreed with the consortium partners.
Measurement indicators: Defined within description.

Requirement ID: I-NF-3 **Requirement Type:** Non-Functional **Priority:** Must-have
Name: Response Time
Description: Users in test sessions shall not have to wait more than 10 seconds on average for a page to load over a 56 kbps modem connection. Animated graphics, video and audio clips (if provided) may exceptionally take more than 20 seconds but no more than 30 seconds to download at 56kbps.
Measurement indicators: Defined within description.

Requirement ID: I-NF-4 **Requirement Type:** Non-Functional **Priority:** Must-have

Name: Authentication
Description: The authentication method shall identify individuals in a univocal and non-questionable manner. The authentication method shall verify the identity claimed by an individual without collision risks. The system must support unauthenticated access to information.
Measurement indicators: Correct authentication available.

Requirement ID: I-NF-5 **Requirement Type:** Non-Functional **Priority:** Must-have
Name: Authorization
Description: Authorization method shall be based on individuals: the authorization shall support the definition of access control rules based on individual identities. Authorization shall provide a registration system: the authorization system must provide a registration system for receiving enrolment applications from individuals. Multiple authorization fails must block the account access to the service: The system must monitor multiple authorization fails and react by blocking the account and notifying this action to the service administrator.
Measurement indicators: Correct authorization available.

Requirement ID: I-NF-6 **Requirement Type:** Non-Functional **Priority:** Must-have
Name: Privacy
Description: The privacy of the information transmitted across a communication network shall be preserved. No user shall be allowed to or capable of attaching to another user's session. Personal information shall be kept private: Any personal information needed for the authentication, authorization or any other management tasks shall be kept secret. To improve the privacy of users, the passwords should be saved encrypted into the database. The password of a user should not be visible to anyone but the software itself and the user. The user's personal information must be secured against unauthorised disclosure, in accordance with Directive 95/46/EC on the protection of individuals with regard to the processing of personal data and on the free movement of such data.
Measurement indicators: Privacy of information is correctly respected.

Requirement ID: I-NF-7 **Requirement Type:** Non-Functional **Priority:** Must-have
Name: Operational
Description: Solution shall run as a web server application. All user interfaces must be provided via industry-standard web browsers. It will be possible for a user to perform all toolkit functions using MS Internet Explorer or Netscape (version 5 or above). The software should use HTTP to interface with

the user software. Macromedia Shockwave Flash, Adobe PDF or other proprietary technologies requiring the user to download and install client applications shall be used only where essential to the project goals. An OCOPOMO eMail address shall be supported to allow users to communicate in the language of the pilot country with the System Administrator to resolve technical queries. System must be capable of allowing simultaneous access by more than one user.
Measurement indicators: Available.

Requirement ID: I-NFT-8 **Requirement Type:** Non-Functional **Priority:** Must-have
Name: Look and feel
Description: The system shall be capable of displaying content consistently with the styles and languages used by participating institutions from the two regions to display on their sites content intended for use by their stakeholders.
Measurement indicators: Available.

Requirement ID: I-NF-10 **Requirement Type:** Non-Functional **Priority:** Must-have
Name: Integrity
Description: The integrity of the stored information must be preserved: The system must prevent any unauthorized individual from altering any of the contents of the information stored. Periodical integrity checks shall be supported: The system must support the implementation of periodical integrity checks of the stored information. The integrity of the logged information must be preserved: The integrity of the log files and their contents must be preserved.
Measurement indicators: Available and successful integrity checks.

Requirement ID: I-NF-11 **Requirement Type:** Non-Functional **Priority:** Must-have
Name: Help and assistance
Description: User guide is needed to assist users in system navigation and task accomplishment. Platform functionalities (as e.g. RSS feeds, social bookmarks, etc.) need to be explained for not expert users. The general guideline should be available from every place (webpage) of the ICT toolbox, but addition help icon should accompany all options available to the user. When clicking on the help icon the description of the option with an example if appropriate should appear.
Measurement indicators: Defined within description – available help and assistance.

ANNEX VI: PARTICIPATION PRODCESS MODELS

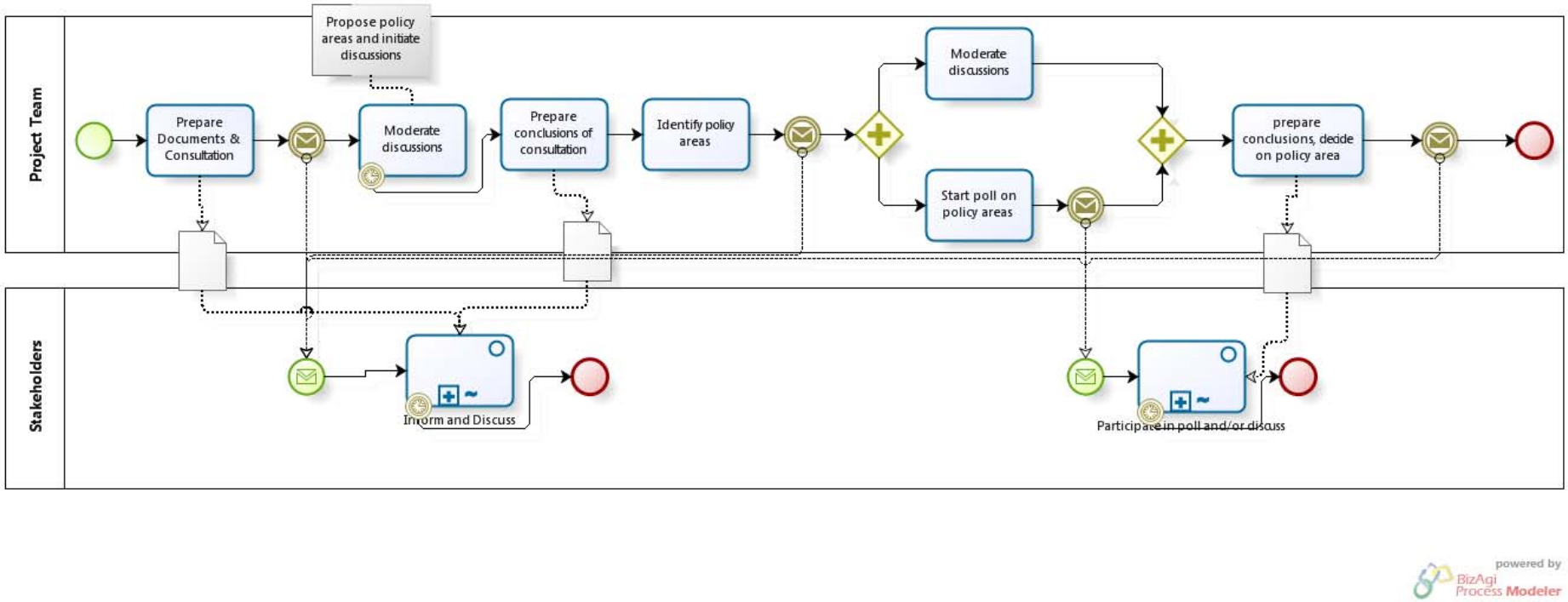

Figure 41: Participation process for step 1 and 2 of scenario building

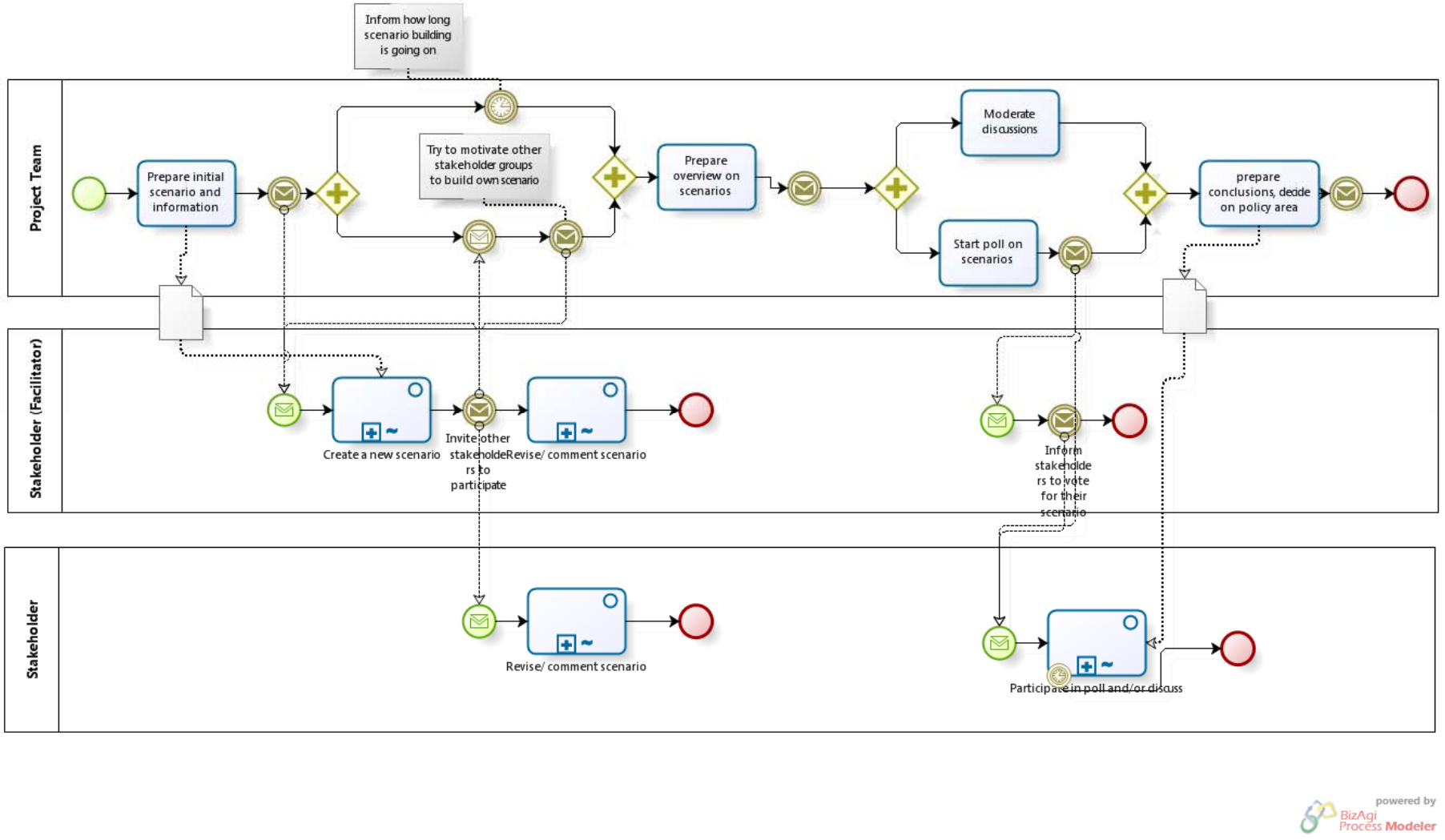

Figure 42: Participation process for step 3 of scenario building