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Handbook of efficient recommandations: Public Deliverable D6.4, PRIMA collaborative project, EU 7th Framework Programme, contract no. 212345

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Prototypical Policy Impacts on Multifunctional Activities in rural municipalities

A collaborative project under the
EU Seventh Framework Programme



HANDBOOK OF EFFICIENT RECOMMENDATIONS

Deliverable no. D6.4

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Partners: TUDO, CEMAGREF, UNEW, IAMO, UNWE

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PRIMA aims to develop a method for scaling down the analysis of policy impacts on multifunctional land uses and on the economic activities. The scoped policies will include the cohesion policy (ERDF, ESF, CF), the enlargement process (IPA) & the rural development policy (EAFRD) of the European Commission, with a special focus on agriculture, forestry, tourism, and ecosystem services. The approach will: rely on micro-simulation and multi-agents models, designed and validated at municipality level, using input from stakeholders; address the structural evolution of the populations (appearance, disappearance and change of agents) depending on the local conditions for applying the structural policies on a set of municipality case studies. Involving eleven partners, the project is coordinated by *Cemagref*.

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EXECUTIVE SUMMARY

The Deliverable 6.4 “Handbook of efficient recommendations” deals with the main methodological developments in the context of screening, scoping and Sustainability Impact Assessment (SIA) developed and discussed in PRIMA. The main topics of this handbook deal with key aspects of the methodological enhancement of Impact Assessment within the context of experiences in Environmental Impact Assessment and Strategic Environmental Assessment.

Key research is linked to the questions about (a) the better linkage of rural development policy scenario analysis to screening, scoping and impact assessment; (b) the enhancement of stakeholders’ engagement techniques to the screening of impacts and impact assessment; (c) the scoping of Agent Based Modelling of peoples’ behaviours and land use changes to impact assessment; (d) the linkage of population modelling to the scoping in impact assessment and (e) the methodological problem of scaling when combining local and regional scale levels of investigation.

The organisation of this handbook of recommendations about methodological developments in screening, scoping and Impact Assessment is based on major definitions of terms and follows the main topics of (a) general improvements in impact assessment, (b) the clarification of the screening analysis from policies to objectives and scenario design, (c) the stakeholder perspectives and participatory approaches in the context of screening and scoping of policy impacts, (d) the role of Agent Based modelling and Microsimulation for scoping and (e) the aggregated econometric modelling and scaling to in order to model policy impacts of rural development policies.

The SIA of policies is based on the analysis of policy documents using matrices methods to link policies and impacts. Such structured analysis about the coherence between strategic planning documents and funding procedures should be linked to stakeholders’ perspectives and activities at the local scale. A clustering of municipalities is the basis for selection of representative case studies (regions) and because of the inherent complexity of policy impacts, also for interpretation of further monitoring of assessment activities. By comparing case study investigations, the variety and diversity of problems linked to policies, plans and programmes including driving forces and data issue, is explored. The integration of feedbacks, obtained from ex-ante evaluation and the formulation of potential future scenarios, can orientate further the formulation of policy formulation.

Recommendations about stakeholder perspectives and participatory approaches in PRIMA, highlight that specification of the purpose of any stakeholder interaction is the first step to take. In relation to the identified information needs, a toolbox of methods is available to elicit information from stakeholders including interviews, surveys, focus groups, expert panels (think tanks), Delphi technique and others. Guidelines for choosing the most appropriate instrument to achieve successful engagement with stakeholders are essential. The problem to identify the appropriate stakeholders is linked



first to the definition of the term ‘stakeholder’, over which confusion may arise, and second to the question of how to select the appropriate participants. PRIMA gives examples for useful inclusion of participatory approaches and about the used techniques to obtain information from stakeholders for the linkage of stakeholder knowledge to Impact Assessment. Generally a careful technique is required to ensure that stakeholder engagement activities yield credible results. A set of universal guidelines is developed.

In PRIMA, integrated ABM and micro-simulation modelling confront population modelling and people’s behaviour dynamics as the basis to better comprehend agents’ behaviour resulting from policy effects. A structured integration of both the properties/activities of the main sectors and the stakeholders that drive or influence rural development is essential for the ABM/micro-simulation. Suitable modelling here should include the dynamics from household level up to the regional level on the basis of public statistics. The inclusion of land use/ land cover changes and of the environmental perspective into SIA investigation needs a further methodological development of site specific bio-physical modelling, combined with social and economic modelling, to integrate more aspects of sustainability. In this context, simulation experiments have been employed to test a large number of variables. This was done to determine uncertainty and sensitivity as a basis also for the improved regionalization by micro-simulation with stakeholder’s feedbacks. For the scoping in SIA of Rural Development policies it should be applicable for all sectors (not only for agriculture, tourism and forestry) on the basis of selected modelling tools, storylines and data.

In contrast to ABM-micro-simulation, aggregated econometric and equilibrium modelling were employed in PRIMA for top town policy assessment, and scaling down of policy impact was done by employing econometrics. The possibilities for the re-use of SEAMLESS_IP software and model have been analysed with the goal of making it applicable to IA of rural development policies. Recommendations have also been made to clarify the linkage of population model outcomes which are useful for policy research. The modelling outcomes of ABM/micro-simulation and the aggregated model should be compared by means of assessments obtained by using the CMEF indicators framework.

Impact assessment is seen as a tool for the screening and scoping of impacts of policy, plans, programmes and projects. The methodological development, including modelling for screening and scoping, should be intensified on the basis of statistics to explore the interlinkages between social, economic and environmental characteristics. In this context population change, the ageing of the society, impacts of economic activities, and other major social and economic driving factors are included in the content of a Sustainability Impact Assessment (SIA) when widening the impacts definition from the environmental to social and economic indications. A formal of SIA methods development using official guidelines of the EU seems to be a suitable way to apply the SIA in future. Stakeholder’s integration can enhance the quality of SIA at all scales. The selection of methods for impact indicators assessment includes the formulation of criteria related to problems of data availability, threshold levels and the orientation of change on the basis of policy goals.



The CMEF is a suitable basis for the indication of policy changes on the regional scale level (Nuts 2), but further investigation is needed to break these indicators down to the local scale level. For Impact assessment it seems to be suitable to confront selected CMEF indicators with the project/ economic measures perspectives of agents' behaviour on the local scale level. Finally a SIAT (Sustainability impact assessment tool) should include methods, data description lists, projects lists of potential SIA impacts and guidelines for the usage.



1 INTRODUCTION



Burghard Meyer

Impact assessment is a process of providing policy or decision makers with information about the effects that an activity/project could have on the environment. In the project cycle, and for identifying whether or not a specific assessment procedure is required, European Union directives require the implementation of two processes: (1) an initial environmental evaluation called the screening process and (2) an identification of key environmental issues called the scoping process. The methodological development in PRIMA can be interpreted as valuable outputs to widen these approaches to Sustainable Impact Assessment.

The Deliverable 6.4 “Handbook of efficient recommendations” deals about the main methodological developments in the context of screening, scoping and Sustainability Impact Assessment developed and discussed in PRIMA. The main topics of this handbook deal with key aspects of the methodological enhancement of Impact Assessment within the background of experience in Environmental Impact Assessment and Strategic Environmental Assessment.

Key research is linked to the questions about (a) the better linkage of the policy scenario analysis of Rural Development Policies to screening, scoping and impact assessment; (b) the enhancement of stakeholders’ engagement techniques to the screening of impacts and impact assessment; (c) the scoping of Agent Based Modelling on peoples behaviours and land use changes to impact assessment; (d) the linkage of population modelling to the scoping in impact assessment and (e) the methodological problem of scaling when combining local and regional scale levels of investigation.

The organisation of this handbook of recommendations concerning methodological developments in screening, scoping and Impact Assessment, is based on major definitions of terms and follows the main topics of (a) general improvements in impact assessment, (b) the clarification of the screening analysis from policies to objectives and scenario design, (c) the stakeholder perspectives and participatory approaches in the context of screening and scoping of policy impacts, (d) the role of Agent Based modelling and Micro-simulation for the scoping and (e) the aggregated econometric modelling and scaling to model policy impacts of rural development policies.

The recommendations sections is organised in subchapters which first outline the main research-leading scientific questions, followed by the actual recommendation including (a) a short problem statement, (b) a short summary of the actual problem solving situation and (c) the necessary change, including further research work.



2 RECOMMENDATIONS

2.1 The PRIMA Framework

PRIMA expected outcomes are the following: (from DoW)

- “Increased awareness among stakeholders on the potential gains of model based approaches, and on the need to interpret model results in light of assumptions used in the analyses. In turn, this fosters better communication between model developers and end users.
- Agent-based models of municipality case studies for scenario-analysis/identification and policy/management experiments, implementing structural changes as well as potential impacts of policies.
- Sets of virtual municipality prototypes representing contrasted situations and potential evolutions, selected for their robustness and relevance for the stake-holders.
- Maps of structural evolutions at municipality level in a set of regional case studies, related to a choice of policy scenarios and a set of impact assessment indicators.
- Evaluation of robust differences between the evolutions provided by the aggregation of municipality level micro-simulations and agent models and available models at regional scale.
- A better understanding of the regional rural response to global and national trends. How can regional policy be effectively used for realising future opportunities and decreasing future threats?
- New principles for the enhancement of the screening and the scope of strategic environmental assessment (SEA), sustainability impact assessment (SIA) and environmental impact assessments (EIA).
- A database structured, formatted and documented in accordance with the standardization efforts in the field of geospatial analysis of human-environment relationships: the *Global Earth Observation System of Systems* and the *INfrastructure for SPatial Information in Europe*.”



2.2 Policies objectives and scenario design



Diana Kopeva
Ramon Laplana
Baptiste Hautdidier

Specific research leading questions have been identified to analyse the methods development about:

- How to formulate SIA or policy assessment methods to realise the community priorities? Related to 2.2.1
- How to identify representative municipalities for further monitoring and assessment activities? Related to 2.2.2
- How to enhance the scenario design for SIA investigation? Related to 2.2.3
- How case studies investigation can help to understand the variety and diversity of problems linked to policies, programmes and plans? Related to 2.2.4
- How Member States should ensure complementarity and coherence between actions to be financed by the ERDF, Cohesion Fund, ESF, EFF and EAFRD? Related to 2.2.5
- How to tackle the lack of completely reliable databases? Related to 2.2.6

Recommendation issue 2.2.1

Time constraints and lack of information require that the screening and scoping steps of impact assessment procedures must often rely exclusively on expert opinion.

Short problem statement: Screening and scoping methods for policy assessment range from simple to complex and require specific data at different spatial and time scales. The complexity is increased by the diversity of the disciplines involved from natural to social specialities.

Short summary of the actual problem solving situation: To help to formulate SIA or policy assessment methods to realise the community priorities, we demonstrate the advantage to study, at different scale levels, the environmental, economic and social contexts within which the policy is supposed to be applied. PRIMA shows how to deal with multi-sectoral considerations (environmental, social, and economic), multi-sectoral activities and multi-sectoral impacts. The applied methodology is based on development of a screening impact matrix. The proposed “Matrix method” (Cf. Deliverable D1.1) identifies interactions between various project actions and environmental, economic and social parameters and components. The matrix ranges the policy measures according to their importance (potential to affect; study of all the impacts of a specific project, the impact on different domain) and could be used as an ex ante approach to some community priorities. The evaluation is based on existing policy and strategic documents on national and regional level. The applied methodology involves experts from different bodies at regional level (NUTS 3 and LAU1) in the assessment process. PRIMA demonstrates how an expert group (panel) provides a synthetic judgement on the relevance of priorities/ programmes/actions of public intervention and their potential impact. Moreover, PRIMA methodology



reveals the importance of the examination, of the design and the development steps of the policies at EU, National and local levels, to understand the implementation processes and their relationships with projects outcomes.

Recommendation: Scientific expertise is appropriate for conducting screening and scoping procedures. However, we suggest that screening and scoping procedures should not be restricted to scientific opinions alone, and should also involve stakeholder, that are potentially affected, to participate in the decision-making process (populations, development agencies, project proponents...).

Recommendation issue 2.2.2

Importance of identification of representative municipalities for scenarios design, further monitoring and assessment activities

Short problem statement: From EU to regional scale, clustering of representative municipalities is the basis for impact interpretation (identification and characterization) and further monitoring of assessment activities.

Short summary of the actual problem solving situation: EU regions differ significantly in terms of administrative units at LAU1 and LAU2 level. Actually, PRIMA demonstrates that study sites differ in terms of geographical conditions, demographic structure and economic activities. Thus, the key question is: Which LAU1 and LAU2 to choose when assessing impacts at local level?

Recommendation: PRIMA proposes that identification of relevant units will be based on cluster analysis using the following criteria for clustering: Population density; Population growth in the last 15 years; Remoteness; Share of GDP/GVA by sector; Areas in NATURA 2000; Share of unemployed people; Dependency ratio (Retired/economically active). From each cluster, the screening and scoping in-depth analysis can be achieved by choosing those LAU units the most typical for the group; in fact those that are closer to the cluster centre area.



Recommendation issue 2.2.3

Enhancement of scenario design for SIA investigation.

Short problem statement: *Ex-ante* evaluation and potential future scenario formulation should orientate the policies formulation.

Short summary of the actual problem solving situation: A well-designed *ex-ante* evaluation based on well-designed scenarios and developed in close collaboration with local stakeholders improves the performance of policy implementation. PRIMA elaborates four scenarios based on desk study of policy and strategic documents. In a first step these scenarios have been designed broad and general. At that level of definition, SIA can provide general assessment of the policies and strategic documents with a few indicators.

Recommendation: Confrontation of scenarios with local stakeholders' points of view generates more detailed futures at a lower level. In this, SIA must be applied at different levels. A well-designed *ex-ante* evaluation based on well-designed scenarios in close collaboration with local stakeholders improves the performance of policies implementation.

Recommendation issue 2.2.4

Role of case studies investigation in improving understanding the variety and diversity of problems linked to policies, programmes and plans

Short problem statement: Case study investigation explores the wide range of problems linked to policies, plans, programmes and projects including driving forces at stake and comparing.

Short summary of the actual problem solving situation: PRIMA developments show that case studies differ significantly. They have different background/development path, economic development, ongoing demographic changes, relief, land use changes, time period for implementation of EU policies. Concerning the use of driving forces, PRIMA methodology reveals how to increase the influence of positive forces and to diminish the impact of negative ones. The case study sites are an expression of regional differences within the EU. Assessment of the impact of EU policies at local level, having all this variety and diversity, will give an answer to the question – how the strategic and planning documents, and financial instruments deal and solve the problems at regional and local level.

Recommendation: The in-depth case studies approach is a relevant tool for the *ex-ante* analysis of regional/local interventions and particularly in terms of screening and scoping. Case study analysis provides results which can be used in a comparative way and where data are absent or incomplete.



Recommendation 2.2.5

Role of capacity building to develop and to strengthen SIA and the enhancement of the funds absorption.

Short problem statement: Capacity building, defined as the process of development of skills, competencies and abilities of people and communities, appears as one of the main constraint for an efficient policy implementation. The member states' experiences show that structural fund absorption requires solid preparation of the stakeholders including local individuals, local authorities, non-governmental organizations, professionals...

Short summary of the actual problem solving situation: After careful consideration of the specific socio-economic contexts in each of the case study areas of PRIMA project, on average it was judged that there was a positive relationship with the implementation system. It was demonstrated that Capacity building appears as major constraint when developing the local visions of the future, in terms of development priorities, perceived impacts, and feasible response strategies having in mind uncertainties. For impact assessment processes, increase capacity building of stakeholders makes easier an effective identification of areas viewed as the most vulnerable, key driving forces contributing to vulnerability and local specific adaptation practices use to reach policy goals and targets.

Recommendation: To learn and to adapt to change and to improve screening and scoping steps of policy implementation, need the development of conditions (training, courses, seminars, information sessions...) that increase knowledge and skills of individual people and local communities and institutions.

Recommendation issue 2.2.6

Data issue in the context of policy's screening and scoping

Short problem statement: One of the largest single obstacles is a lack of relevant data at local scale. Prima revealed a lack of statistical information at LAU 1 level, which might guarantee the relevance and efficiency of the decision making and strategic planning processes. Moreover, data gaps introduce uncertainties in the scoping and screening procedures.

Short summary of the actual problem solving situation: For evidence-based *ex ante* analysis, basic data on the existing situation is necessary. Scenario simulations to predict the impact of policy actions require databases, which may not be completely reliable. In many cases, the lack of reliable data hinders the assessment of impacts arising from local changes.

Recommendation: Generalize and facilitate public participation and at local scale case studies analysis can provide results which can be used in a comparative way and related to data issue supply lacking information.



2.3 Stakeholder perspectives and participatory approaches



Marian Raley

Specific research leading questions have been identified to analyse the methods development about:

- How to enhance the quality of stakeholder's participation for SIA in the context of pre-, on- and post-modelling developments? Related to 2.3.1
- How to come to universal guidelines for the stakeholder's participation by the help of ABM? Related to 2.3.2
- How to identify appropriate stakeholders for the participative process? Related to 2.3.3
- What techniques are the most appropriate to obtain information from stakeholders? Related to 2.3.4
- How to help to formulate and to prioritise the content of development programmes and of measures funded and applied? Related to 2.3.5
- How to link scenario design and stakeholders? Related to 2.3.5

Recommendation 2.3.1

Specifying the purpose of any stakeholder interaction as the first step.

Short problem statement: Interactions with stakeholders provide a means of overcoming the deficit in social information which is available to the developers of decision support tools. However, before conducting any stakeholder interaction, key decisions must be made concerning the type of interaction (instrument), the location and timing of the interaction(s), the selection of stakeholders, and the designing of the chosen instrument. These decisions are all determined by the information which needs to be elicited from stakeholders, the definition of which is a necessary first step.

Short summary of the actual problem solving situation: In the context of developing micro-simulation and agent-based models (ABMs), and of improving impact assessment, several types of information elicited from stakeholders might be useful including: (1) Interpolation of missing data where datasets are incomplete; (2) Feedback on the usefulness and acceptability of the model (finished or prototype) from a user-perspective; (3) Information concerning behavioural drivers, decision-making and between-actor influences to inform agent-based models; (4) Development and comparison of policy scenarios and policy measures; (5) Identifying relevant indicators; (6) Assisting the model validation. In planning these interactions, a strong degree of inter-dependence between different disciplines is evident. Moreover the time-frame required to organise and conduct these stakeholder interactions can extend to several months.

Recommendation: Substantive management input is required to ensure that the necessary flows of information occur between different disciplinary groups in a timely fashion.



Recommendation issue 2.3.2

Guidelines for choosing the most appropriate instrument to achieve successful engagement with stakeholders.

Short problem statement: In relation to the identified information needs, a toolbox of methods is available to elicit information from stakeholders including interviews, surveys, focus groups, expert panels, Delphi technique and others.

Short summary of the actual problem solving situation: The issue is of choosing appropriate methods to elicit information to assist model development and impact scoping and assessment. Stakeholder engagement is concerned with flows of information between stakeholders and the research teams in both directions. The interviews instrument provides stakeholders' perceptions about the relevance of specific policies to case study areas. However, a degree of stakeholder learning may be necessary, illustrated as flows between researchers and stakeholders' point of view. We demonstrated that participative techniques permit dialogue between researchers and stakeholders, for example for exploring the assumptions of both parties, and the workshop setting allows information which may not be apparent to participants (tacit knowledge) to be drawn from them. Common understandings or conceptualisation of a system can also be developed. These information needs can be linked to the available research instruments. Workshops provide a longer time frame than other methods, and an opportunity to use advanced techniques such as story-telling and role-playing games. By these means both explicit and tacit information can be elucidated, such as underlying assumptions, beliefs and uncertainties. Thus they can provide information and insights into a locality and local actor behaviour which are not obtainable by other means.

Recommendation: To elicit information from stakeholders' pragmatism is necessary and the final choice will be influenced by considerations such as resources (time, money, and staff), the precision and complexity of information sought, and the accessibility of stakeholders.



Recommendation issue 2.3.3

Identify appropriate stakeholders.

Short problem statement: There are two elements to this issue. First is the definition of the term ‘stakeholder’, over which confusion may arise, and second is the question of how to select appropriate participants.

Short summary of the actual problem solving situation: Widespread confusion over the definition of the term ‘stakeholder’ exists. Most simply, a stakeholder is defined as someone having a stake or interest in the matter under consideration. Commonly the term is used to describe people outside the research community who are invited to take part in deliberative participative activities.

Classically stakeholder analysis is used to support stakeholder selection. First the specific issue which is to be the focus of any project, and its boundaries are defined. Then a stakeholder map is produced, whereby a policy is dissected into its component elements and processes, and relevant actors are mapped onto it. To prioritise among these actors, an interest-influence matrix can be employed, showing each stakeholder’s degree of interest in the policy (or activity) and their degree of power to act (also referred to as their influence). We envisaged that four types of stakeholders might be recruited depending on the knowledge sought from them: (1) Directly affected by a policy (providing the modelling with insights into individual behaviour, the system being studied, and the design of policy/measures); (2) Indirectly affected by a policy (Providing insights into the system being studied, Design of policy/measures); (3). Informants (possess relevant knowledge about the geographic or policy area, Providing insights into the system and an overview of actor behaviour, Generate and compare policy scenarios.), and (4) Policy-makers (representational role, generating and comparing policy scenarios, viewpoint as a model user).

Recommendation: A very rigorous process is essential in selecting stakeholders to ensure they are truly representative of the wider population or knowledgeable about the issues under discussion. By careful design of both stakeholder selection procedures and research instruments, bias (in outputs) should be minimised. Nevertheless any qualitative technique is only based on a sample so cannot be regarded as definitive, and responses should be subjected to a critical analysis to assess their unbiassedness.



Recommendation issue 2.3.4

Inclusion of stakeholders inputs into Impact Assessments.

Short problem statement: Identification of domains and points at which stakeholder inputs may be useful.

Short summary of the actual problem solving situation: The analysis of scenarios provides the link between the computer model and Impact Assessment/scoping. Stakeholders are asked to consider the alternative outcomes of different policy scenarios in terms of their qualitative and/or quantitative impact on key variables. Usually a range of scenarios – capturing different assumptions or different policies – are produced. Scenario analysis leads to formulating and prioritising the content of development programmes, and formulating and prioritising the content of measures. The generation of scenarios – which is enhanced by the insights which stakeholders can provide - involves framing stories within model parameters. This can be done using traces, whereby individual actors or events are related to parameters and tracked from parameter to parameter as events unfold. This makes apparent the causal links which exist, including those driving multiplier effects.

Recommendation: Decision-support tools must be credible, and stakeholders can also give a subjective assessment of whether the model's representation of the real world system and its outputs are plausible. This will be complementary to statistical testing of outputs.

2.4 Agent-based models, micro-simulation and scaling

Specific research leading questions have been identified to analyse the developed methods:

- How to develop a model of rural areas capable of capturing the particularities at the local scale? Related to 2.4.1
- How to better link the rural development policy with terms of jobs and growth, small-scale local and infrastructure development supported within rural development programmes by ex ante assessment tools? Related to 2.4.2
- How to use agent-based/micro-simulation models as a tool to promote discussion with regional stakeholders? Related to 2.4.3, 2.4.4, 2.4.5 and 2.4.8
- How to improve the model representation of a region by micro-simulation by integrating stakeholder's feedbacks? Related to 2.4.6
- How to adapt a generic ABM/ Microsimulation model to the different regions when confronted to the heterogeneity of data among these regions? Related to 2.4.7



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Recommendation issue 2.4.1

The challenge of modelling rural areas from dissimilar regions.

Short Problem statement: The success of assessment of policy impacts in rural areas at local levels can be improved by the use of models representing the local dynamics of the regions. For this task, the use of aggregated models has been superseded by the use of modelling tools capable of representing the dynamics of local area. The challenge is then to develop a model of rural areas which is applicable to different regions, but yet capable of providing key indicators which are important for the analysis of policy impacts. To achieve this, there is a need to identify important aspects common to the different regions, and to use innovative modelling tools capable of capturing the particularity in the local areas.

Short summary of the actual problem solving situation: PRIMA developed generic micro-simulation and agent-based models of rural areas. The models considered some of the main stakeholders, dynamics and interactions that are universal for these rural areas. The successful analysis of dissimilar regions depends on the full lifecycle of the modelling effort. From the definition of the conceptual model (which should consider the most important elements of the process being modelled), to the adaptation of such a conceptual model into the different regions to be analyzed (which should take into account particularities happening in the region, which would be undetected at a more aggregated level).

Recommendation: Analysing one region with such detail is an arduous task. For this reason, the analysis of several regions must be approached with conscience of the required resources (both human and economic). Special care must be taken when adapting what can be seen as an idealized conceptual model (i.e. capable of representing, in theory, the most important dynamics of a region) into a concrete region, as data limitations may make the adaptation effort impossible for some aspects of the model.

Recommendation issue 2.4.2

Choice of models to simulate population dynamics, land use and land cover changes.

Short Problem statement: Four modelling approaches are more or less suitable according to the specific screening and scoping objectives, the level of precision required and the considered scale.

Short summary of the actual problem solving situation: EQUATION BASED models provide a good qualitative description for the dynamics of the system, but this kind of approach limits the level of complexity that can be considered in the model and, above all, it is not easily inefaceable with em-



pirical data, like for example the information on land structure. CELLULAR AUTOMATA are dynamical spatial systems in which the state of each cell, at a determinate time, is determined from the previous states of the cells within a neighbourhood according to a set of transition rules. CA is very efficient computationally and this fact allows the analysis at a very high resolution level; on the other side in CA models it is very difficult to incorporate social factors and human decisions. AGENT BASED models are focused on human actions realized by a set of agents. Agents are autonomous, share an environment through agent communication and interaction and make decisions (like rational optimizers) that connect behaviour to the environment. The behaviour of the whole system depends on the aggregated individual behaviour of each agent. MICROSIMULATION models describe economic and social events by modelling the behaviour of individual agents.

Recommendation: Agent Based and Microsimulation models are suitable tools for screening and scoping complex policies. Moreover creating a spatial micro-simulation model by adding geographical information to micro level data allows studying the impact of policies on everyday life and its consequences at the global level.

Recommendation issue 2.4.3

Achieving appropriate model calibration in individual based rural models with large number of variables.

Short problem statement: Given the complexity of the modelled regions, there are inherent uncertainties which must be identified. Such uncertainties reflect parts of the regional dynamics that are not captured with the model assumptions. At the end of screening and scoping processes, parts of regional dynamics should have not been captured by models and consequently the confidence of stakeholders to these instruments changed. ... In order to avoid this type of problem by minimizing such differences, a calibration phase for each adapted region must be performed to ensure that the model can replicate the dynamics observed in the region.

Short summary of the actual problem solving situation: For the analysis of uncertainty a sensitive analysis has to be performed to detect the impact of the model inputs. In addition, the confidence ranges for the simulation outputs has to be defined. The calibration of the models can be performed using two different approaches: Approximate Bayesian Computation (ABC) and genetic algorithms. Genetic algorithms have been extensively used for the calibration of agent-based models but on the other hand, the advantages of ABC for agent-based and micro-simulation models are just being realized. Both methods provided a good fitness between the real data and the simulation output. The task of model calibration is more important when considering the ambitions of a model. The adaptation of the generic model into different regions calls for the calibration of the model for each of the regions being modelled. Because of this, the issue of data availability comes



into play again. The quality of the calibration can only be as good as the quality of the available real data.

Recommendation: Improving the fidelity of agent-based and micro-simulation models can help to increase the trust that stakeholders give to these tools. To realize this, better data sources are needed to enhance the calibration process.

Recommendation issue 2.4.4

Agent-based/micro-simulation models as tools to promote discussion with regional stakeholders.

Short Problem statement: Within the process of policy formulation, ABMs and MS can be used as tools to promote discussion with local regional stakeholders. Nevertheless, there is no consensus on the correct way to present the outcome from these modelling tools to stakeholder to maximize its utility during the process.

Short summary of the actual problem solving situation: The PRIMA Micro Simulation model proved to be easily understood for stakeholders. It was found to be a transparent and comprehensible approach. In this context, it may be useful to describe a general overview of models to stakeholders; however, trust in the model has to be built as the majority of stakeholders may never understand the model in detail. To achieve this, model outcomes should be presented using indicators or views which are familiar to the stakeholders. Using standard demographic and economic indicators and comparing model results with statistical information that is familiar to the stakeholders can help increase the trust in the outcome. Indeed, any planned discussion with regional experts should be prepared using vocabulary and concepts that are familiar to the stakeholders. Consulted stakeholders could relate their knowledge with the outputs provided by the models (as time series of a variety of municipality or regional indicators). This facilitated the discussion of the regional development in terms of the defined indicators.

Recommendation: Even though in general stakeholders' view of the models remain 'cautiously positive', it may be useful to offer the models as an interactive tool that allows them to test different "what if" scenarios by themselves. Some stakeholders fail to see what the benefit of such tools is for them. While other stakeholders understand the potential and even envisage the use of similar models as "desktop tools" that helps them in day to day decision making. Although these concerns should be addressed, it must be done with caution, as the reach of these tools can be overestimated.



Recommendation issue 2.4.5

Workshops as suitable tools to link ABM and Microsimulation with stakeholders perspectives.

Short problem statement: Part of the analysis of rural areas development at lower regional levels involves understanding the issues that affect these small regions. Although these issues can be classified in more general terms (such as: unemployment, high out-migration, lack of infrastructure, etc.), the precise nature of each issue differs in details from region to region. Full understanding can only be completed by approaching the stakeholders dealing with the region development on a day to day basis. On the other hand, the application of ABM and Microsimulation models to represent rural areas can be augmented by considering aspects that cannot be obtained from the data. Consequently, linking the models with regional stakeholders can improve the accuracy of the modelling task.

Short summary of the actual problem solving situation: Micro Simulation model has been proved to be easily understood for stakeholders. Given that the main features of agent-based and micro-simulation models can be directly mapped to elements familiar to stakeholders, the models proved to be transparent and comprehensible. Regarding the discussion of the model outcomes, consulted stakeholders could relate their knowledge with the outputs provided by the models (as time series of a variety of municipality or regional indicators). Indeed, for a stakeholder it is easy to discuss about the past, present and future issues in the region focusing on familiar indicators. This facilitated the discussion of the regional development in terms of the defined indicators.

Recommendation: Even though in general stakeholders' view of the models remain 'cautiously positive', it may be useful to offer the models as an interactive tool that allows them to test different "what if" scenarios by themselves. Some stakeholders fail to see what the benefit of such tools is for them. While other stakeholders understand the potential and even envisage the use of similar models as "desktop tools" that helps them in day to day decision making. Although these concerns must be addressed, it must be done with caution so that potential users understand the limitations of such types of tools.

Recommendation issue 2.4.6: *Effects of stakeholder's feedbacks in the improvement of model representation of a region by micro-simulation.*

Short problem statement: Conceptual models contain the representation of a region as viewed by the modeller. Even when care has been taken to understand the events that happen in the region during the first development stages of a model, there can be aspects not considered in these models which are important drivers for the modelled regions. Given these two limitations, feedback from regional experts must be used to improve the model assump-



tions. The question lies in whether it is possible to engage in a dialog with regional experts that can serve to improve the model representation of the region.

Short summary of the actual problem solving situation: The link between social agent-based models and regional stakeholders by the way of direct interaction has been termed participatory simulation. Participatory simulation using agent-based models has been used for some time. Such interactions allow improving the understanding of the reality in the modelled region and can facilitate the discussion of regional issues that will otherwise be missed. In-model stakeholder meetings carried out allowed refining the model assumptions from the generic model to consider issues that are particular to each region. Additionally, some stakeholders were presented with data at regional or country level (used as part of the assumptions of the model where LAU2 data was unavailable) and were able to modify it to make it reflect the state of their region. This stakeholder “downscaling” approach was used for some data originally unavailable at local level.

Recommendation: The stakeholder/model interaction must be based on the acknowledgement of mutual benefit. Stakeholder communication can only be useful when stakeholders understand the objective of the interaction. Hence, the description of models and other tools must be done in terms that are familiar to the stakeholders.

Recommendation issue 2.4.7

Issues on data availability and downscaling.

Short Problem statement: A successful adaptation generic ABM/ Microsimulation model to the different local-level regions is limited by the heterogeneity of data (both in quality and availability) among these regions.

Short summary of the actual problem solving situation: An important step in the modelling process was the adaptation of the agent-based and micro-simulation models to the diverse regions specificities.. To perform this adaptation, data for each region is needed. For the models, data at the LAU2 level was required in order to achieve a practical representation of the regions at the desired scale (i.e. at the micro-level). Two types of limitations are present during this process:; First, not all required data is available on each region. In some cases, the data was only partially available (due to privacy concerns) at the LAU2 level; in other cases data was only available at upper levels (NUTS3). To cope with such limitations, data at upper levels can be downscaled by the use of stochastic generation methods and by assuming data homogeneity among different levels.

Recommendation: To improve the utility of AB and Microsimulation models at the municipality levels, better data has to be acquired. In cases where is not accessible due to privacy concerns, it may be possible to apply



the modelling tools at more aggregated levels (such as LAU1 or NUTS3). The comparability among regional adaptations can be improved if using similar classifications on the indicators. Thus, an effort should be made to homogenize the different data sources of different countries to codify the data using standard international nomenclature. For instance, the NACE (European industrial activity classification) and ISCO (International Standard Classification of Occupations) codings can be used in the modeled regions.

Recommendation issue 2.4.8

Clear objectives for stakeholder engagement enhance stakeholder input for model improvement.

Short problem statement: The use of stakeholder input for the improvement of regional models is of particular importance when modelling local areas. Stakeholders can provide information useful to differentiate the local region from the more general trends. This is especially important when the lack of local data decreases the ability of the models to represent local areas. To improve the quality of the outcome from stakeholder engagement, model communicators must have a clear and concrete idea of the outcomes expected from such an engagement.

Short summary of the actual problem solving situation: The type of questions and the detail of description discussed with stakeholders depends on the type of stakeholders which are selected for the discussion. Within the workshops performed in PRIMA, several different types of stakeholders were consulted in different regions. Some stakeholders were happy to discuss quantitative information about the region, others found difficult to commit to such a task. Similarly, some experts had no problem elucidating potential regional scenarios while others were limited to what they saw as imminent reality of the region. In addition, special care must be given while formulating the questions or points for discussion with stakeholders. If such points are not correctly understood by the experts, their answers may have limited use to enhance the model. On the contrary, when stakeholders do understand the issues at stake, they are capable to provide information that greatly complements the models.

Recommendation: Additional resources should be used to define the task of the models within a stakeholder engagement process. It must be clear, before the engagement takes place, how should the expected results from the interaction, be obtained, and if participating stakeholders are able and willing to give such results. This task is not easy as the selection of stakeholder is usually done before any engagement plan has been produced. Nevertheless, at minimum the feasibility of discussing any issue or question should be questioned before defining a final program for the stakeholder engagement.



2.5 Improvement of impact assessment



Burghard Meyer

The recommendations are basing on a summing up of the tasks results about “Theory and methodology on SIA, SEA and EIA” (T 6.1); “SIA impact indicators and agent behaviors” (T. 6.2) and “Impact matrix methods” (T 6.3) for the screening and scoping in general (Task 6.4. = this report). Experiences of all the other tasks in PRIMA are included.

Specific research leading questions have been identified to analyse the methods development about:

- How to better link key Community objectives to impact assessment by using the experience of SEA and EIA for an integrative SIA? (Related to 2.5.1)
- How to enhance the integration of the social and economic indicators into SIA? (Related to 2.5.2)
- How to break down the “common monitoring and evaluation system for RDR”? (Related to 2.5.3)
- How to apply impact assessment indicators content/questions/mapping on the local scale level? (Related to 2.5.4)
- How to enhance the quality of stakeholders’ participation for SIA in general? (Related to 2.5.5)
- How to apply CMEF baseline indicators and their assessment? (Related to 2.5.6)
- How to better link the environmental aspects (e.g. NATURA 2000, environmental and ecosystem functioning and multi-functionality) to social and economic perspectives during formal screening and scoping? (Related to 2.5.7)
- What content should a SIAT include? (Related to 2.5.8)

Recommendation issue 2.5.1

Impact assessment can be used as general tool for the screening of impacts of policy, plans, programmes and projects.

Short problem statement: EIA and SEA methodologies have been successfully further developed for the assessing of environmental impacts of and programmes at the regional scale and on the local scale for major projects in the member states. A comparable structured approach SIA is missing (a) for the break down of the community objectives to a practical (local) scale level; (b) for the environmental assessment of policy impacts; (c) the inclusion of the cascades of impacts from policies stimulating new plans, programmes and projects; (d) the inclusion of the social and economic impacts, introduced by policies, plans, programmes and projects to integrated sustainability impact assessment; (f) the clarification of the sustainability impact of policies in general (e.g. what is an impact in the context of sustainability impact assessment?); (g) the missing knowledge how to assess sustainability on the basis of a core set of indicators.



Short summary of the actual problem solving situation: Methodologically a wide range of knowledge is still missing to confront types of policy introduced impacts to the programmes and plans in the regions and to the potential projects (measures) on the local. First examples e.g. from Trade SIA, when using a set of very general indicators, cannot easily be transferred to a potential of rural development policies. Policy assessment should be further developed by exploring and combining the impacts on local (to better know the potential site specificity of impacts)_and on regional scale level by using prototypes of potential changes and by investigating the wants about potential changes formulated by the stakeholders. PRIMA has chosen a scenario approach on the basis of policy assessment, when formulating main scenario and verifying using stakeholder workshop techniques. Sets of main goals of programmes and plans are based on the experiences of EIA and SIA. Modelling is used to link the CMEF indicators to impact assessment when focussing on population modelling and potential measures influenced by the policies (scenario).

Recommendation: On several aspects the screening and scoping of policies impacts should be enhanced by a better and more specific formulation (a) of the focussing on a general application of sustainability impacts; (b) of the identification of list of major commodities (German “Schutzgüter”) of sustainability impact assessment and strongly linked to the CMEF indicators and monitoring approach; (c) of the identification of a list of projects (plans, programmes, policies) with impact; (d) of the identification of significance level (threshold) describing the size of a project in the context of the SIA application needed;(e) of the linkage of the approach to the policy goals, when linking the impact of a policy (plan, programme, project) to thresholds for each major commodity (indicator).

Recommendation issue 2.5.2

Populations change, aging of the society, economic impacts and other major social and economic indicators should be part of SIA by widening the impacts definition.

Short problem statement: EIA and SIA are developed to reduce or to minimise impacts on the environment. A SIA of policies should not replace this directives – it could be applied to screen the policies in a balanced and general approach to types of plans and programmes for the regional scale level and types of projects (measures) with SIA impact at the local scale. Aim should it be to link a small number of major commodities of the social, economic and environmental axis of sustainability to a practical approach. It is essential here to screen the policy impacts in the context of the major changes in population, economic activities and the social welfare by including additionally a set of meaningful environmental commodities.



Short summary of the actual problem solving situation: PRIMA have has chosen the approach to link a prototypical set of commodities to measures, introduced by actors activities, stakeholders' needs demanded and general trends formulated from policy analysis by scenario settings. When the population model links economic actors from the individual person, households, municipalities and networks of municipalities (from Lau 2 to NUTS 3 scale level), the potential impact of a project is differentiated from the general trends of social and economic changes.

Recommendation: Much future work is needed to investigate and explore the interlinkages between each selected commodity and the screening of potential impacts based on the typification of projects. Basic work future is essential to link the different scale levels of investigation (national, regional, local). In this context a new impact definition should be worked out integrating social, economic and environmental impacts.

Recommendation issue 2.5.3

The CMEF is a suitable basis for the screening and indication of policy changes on the regional scale level (Nuts 2) - it should be broken down to the local scale level.

Short problem statement: The CMEF was developed in the last decade in form of yearly reports about the rural development in the EU. It has grown to an essential basis to monitor rural development policies. Several indicators are based on data from EUROSTAT available on the Nuts 2 level (fewer indicators on the Nuts 3 level). For the screening of policy impacts in the context of impact assessment a core set of the CMEF indicators should be further developed for the usage for the screening of policy introduced changes in impact assessment.

Short summary of the actual problem solving situation: PRIMA has chosen a set of CMEF indicators from social, environmental and economic perspective (6 indicators each). Goal is to explore the impacts of measures (plan, programmes) and projects (local activities). The usage of an indication is clearly linked to the level of data actually available. For that the indicators from CMEF are a good basis for the application of econometric modelling (top-down assessment of policy scenario impacts). The PRIMA approach of comparing bottom-up assessments from the local scale and the top-down assessment leads to the question of the availability of comparable data at the Lau 1 and Lau 2 scale level. When social and economic data are partly available on this scale level by national statistics especially environmental indicators are scarce. Differences in the availability of national statistics on rural development indicators in the different PRIMA case study countries are obvious; partly belonging to the status of membership / accession / pre-accession. As long definitions and statistics are not standardised in definition and counting cycles a scaling of indicators will be difficult in general.



Recommendation: For a structured and European wide comparability of indicators for policy assessment (impact assessment) it seems to be suitable to develop an integrative core set of indicators for all the scale levels, used on the related statistics in Europe. This core set of indicators should be broken down from the EUROSTAT level together with the member states and the regions to a comparable application of statistics at the local level.

Recommendation issue 2.5.4

CMEF indicators should be confronted with the projects perspective of agents' behaviour on the local scale level

Short problem statement: As described above policies stimulate the content of plans and programmes at the regional scale, when concretising the projects /the economic activities influenced by measures at the local scale. Aim is to know more about potential policy impacts on the local when formulating or changing a policy. These impacts should be numbered best by using the same indicators as on the Nuts 2 scale level also on the local scale level.

Short summary of the actual problem solving situation: A wide range of potential projects are influenced by policies and the measures linked. It is essential and interesting to analyse the needs of stakeholders and the actors' perspective about the potential application of projects. When EIA is applied by focussing on the impacts of a project and with the need of an environmental impact assessment of selected commodities, the impact on the social and economic perspective are nowadays not clear taken under consideration. PRIMA links scenario about the agents' behaviour and consumer preferences with prototypical projects. This leads to the measurements of typical agents' behaviour against the CMEF indicators on the Lau1 and Lau2 scale. It is essential to better know what type of projects (measures) are the most essential, useful and sustainable ones from the stakeholder and consumers perspective and from the diverse (typical) local perspective.

Recommendation: Much more experiments about potential project types and projects impacts from the agents' local perspective are useful to explore and to screen the sustainability impacts. Modelling techniques should be applied to differentiate the projects impacts. Impacts of projects should be measured by local and regional CMEF indicators.



Recommendation issue 2.5.5

A structured SIA is under methods development. Integration of Stakeholder can enhance scoping and the quality of SIA on all scale levels.

Short problem statement: A general applicable SIA of projects, plans and programmes or policies is under developments and only few methodological studies about a structured SIA are available. It seems to be useful following the experiences in PRIMA to include key stakeholders informed about the main essential commodities of SIA at the different scales. The practice of EIA and SEA can help to structuring the process. It seems to be obvious that the number and the detailness of the SIA investigations on a selected set of commodities will be less detailed when analysing the impacts of general types of projects following on the policy changes. Stakeholders can also be essential to screen the potential impacts when assisting a competent authority (CA).

Short summary of the actual problem solving situation: It is not the mission of PRIMA to develop a structured methodology for SIA. The investigation and the different stakeholder discussions in PRIMA especially generated the problem about the type, the scale and the commodity content a SIA of policies impacts should become included. Comparable to EIA and SIA no general conclusion can be made about potential impacts because of different aspects of scale and commodity content (e.g. for environmental indicators on the local scale). These problems are different when dealing about a policy assessment on the national scale level or on the local level of project application. The stakeholders' response in public lectures in a scientific and practitioners' auditorium varied largely from the discussion about (a) no need of sustainability impact assessment and (b) the intense demand about knowing better potential of sustainability impacts on the local level, regional and national level. No general outcomes can be stated here. The D62-report concluded: "The scoping in the impact assessment context includes definitions and discussion about scoping, indicators and also the scaling problem. If the EU Impact Assessment Guidelines stress the usage of quantitative data and technical indicators to scope the impact of policies, discussions of social evaluation sciences stress the importance of qualitative data and stakeholder involvements".

Recommendation: Detailed guidelines comparable to EIA and SEA directive should be formulated for SIA in the context of rural development policies in general by using the experiences of EIA and SEA methodologies and handbooks.



Recommendation issue 2.5.6

For the impact indicators assessment a criteria formulation should be applied by including data availability, thresholds levels and the intended direction of changes on the basis of policy goals.

Short problem statement: Impact indicators for SIA are not available yet. The formulation of a SIA structure includes indicators, available data layer on all the scale levels, thresholds for the assessment in the context of quality objectives for sustainability or policy goals

Short summary of the actual problem solving situation: In PRIMA, the updating of the CMEF indicators is linked to the data availability and to modelling scenario outputs from the agent-based model and the micro-simulation model up-scaling and to the regional equilibrium model down-scaling. The methodology of impact matrices and the content of assessment indicators for Sustainability Impact Assessment (SIA) are discussed. The outputs of ABM/ micro-simulation model to the indicators of the importance of rural areas, socio-economy, sectoral economy and quality of life and environment are compared to the output indicators of the regional equilibrium model used. Conclusions for the following application of impact matrices methods are stated. Matrices on potential impact indicators for ecologic, economic and social impacts of economic activities were prototypically developed. The development of the impact matrices follows the aim to “translate” changes of land uses and agent behaviours to impact assessment. There is an obvious large gap in the knowledge about thresholds and the societal view on the CMEF indicators.

Recommendation: Impact matrices should be developed also to progress the screening, scoping and assessment methodology by the aim to focus policy analysis and stakeholder participation to IA methodology. Basic future work should be done to explore the overlaps between the practical needs of impact assessment and the CMEF monitoring framework. Main aspects of scaling down the indicator framework to the local and regional scale level in the EU–Member-states should be explored in future research projects. Best practises projects, thresholds analysis on the national scale levels, improvements of the policy analysis around the CMEF indicators and the exploration about how to link indicators to different policies (and to the environmental, economic and social perspectives) should be further developed.



Recommendation issue 2.5.7

General methodological development including modelling should be done on the basis of statistics to explore the interlinkages between social, economic and environmental characteristics.

Short problem statement: The complexity of the general SIA approach is overlaid by the inherent general measurement problems about each of the indicator or commodity is used. The research about ecological economy was intensively developed in the last two decades, but research on social ecology and the linkage between social and environment besides the health aspects is still at the beginning of methods development. Large recent research projects like SENSOR, SEAMLESS or EFORWOOD have developed integrated methodologies to model and to give scenario forecasts by focussing on the interlinkages of the economic, social and environmental characteristics. Problems of application of these project results in SIA can be named by their over-complexity; the lack of statistical public available data and the problem to link indicators by a “simple and fast” impact assessment procedure/analysis. Few experiences are available to link the social dimension with land use and the multi-functionality.

Short summary of the actual problem solving situation: In the EU no definition about multi-functionality is available. PRIMA has used the CMEF as proxy for multi-functionality. Land cover change analysis with CORINE data is available but much more investigation should be done about land use changes and their impacts on the social and environmental perspective. Land cover is only a very rough proxy about potential impact and most of the essential land use changes are subject of a change in the same category of land cover. Of course, a land cover change will be normally have a huge impact (e.g. the reforestation of larger areas, the change of arable into build up land); but changes in land use normally will have a high impact on recreation (tourism sector), water and nutrient household (agriculture and forestry sector etc).

Recommendation: A SIAT development research should be taken as the starting point (and not as the result of research) about essential lacks in knowledge and data application between social and economic perspectives and environmental indicators. For scaling purposes the investigation should be planned on local, regional and national scale level. The potential feasibility of the ecosystem services approach for SIA should be explored. A new assessment framework for better understanding the multiple impacts of policy measures on the environment is also needed for a better analysis of impacts.



Recommendation issue 2.5.8

SIAT should include methods, data descriptors lists, projects lists of potential SIA impacts, and guidelines for usage.

Short problem statement: Few examples for SIAT are available in the literature (e.g. developed by the PLUREL project). The SIAT should be developed as simple as possible, based on the best public available data. It should include answers about the methodological problems of scaling and about the screening and scoping of the impacts of the policy on programmes, plans and project at the regional and local level.

Short summary of the actual problem solving situation: A SIAT should include the aspects about types of projects, plans and programmes. PRIMA has chosen the methodological approach to compare model outcomes from the local scale level (and worked out together with local and regional stakeholders) on the basis of selected CMEF indicators with modelling results scaled down from general equilibrium model. A small number of prototypical scenarios have been made on case study regions in the European member states and in the pre-accession country Croatia.

Recommendation: A potential way to link the European level with the applied local and regional scale levels will be the development of a SIAT family (by including for each scale level one SIAT – without neglecting the scale dependent methodological differences and differences between the best scale dependent models and techniques). The scaling linkages between these SIAT` will be the indicators, the data related and typifications of projects (plans, programmes and measures) impacts. For that, more work should be done on the linkage from local actors to policy formulation and assessment.



3 KEY CONCLUSIONS

3.1 Data gaps



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Data gaps introduce uncertainties in the scoping and screening procedures. Prima *revealed* a lack of statistical information at LAU 1 level, which will guarantee relevance and efficiency of the decision making and strategic planning processes. Moreover, for evidence based ex ante analysis, basic data and information on the existing situation is necessary. Scenario simulations to predict the impact of policy actions require database, which can be not completely reliable. In many cases, the lack of reliable data hinders the assessment of impacts due to local changes. We demonstrate that the issue of data availability comes into play again when adapting generic model into different regions calls for the calibration of the model. Actually, the quality of the calibration can only be as good as the quality of the available real data. How to deal with data gap issue?

- Case studies analysis provides results which can be used in a comparative way and related to data issue supply lacking information.
- Interpolation techniques of missing data where datasets are incomplete
- Stakeholder “downscaling” approach can be used for some data originally unavailable at local level.
- Data at upper levels (NUTS3) can be downscaled by the use of stochastic generation methods and by assuming data homogeneity among different levels.
- From the point of view of regional statistics, data availability (at more local levels) could be improved and homogenized with European standards (e.g. NACE classification for industry, ISCO classification for skills, CORINE classification for land cover, etc.

3.2 Scenario design and stakeholders’ involvement

From EU to regional and local scale, clustering of representative municipalities is the basis for scenarios design. The generation of scenarios and their confrontation with local stakeholders’ points of view generates more detailed futures at a lower level. This procedure involves framing stories within model parameters. This can be done using traces, whereby individual actors or events are related to parameters and tracked from parameter to parameter as events unfold. This makes apparent the causal links which exist, including those driving multiplier effects. In this, well-designed scenarios in close collaboration with local stakeholders (Informants and Policymakers) improve the performance of policies implementation. Careful technique is required to ensure that stakeholder engagement activities yield credible results:

- Specify precisely the purpose of the engagement activity (questions / information gaps that need to be addressed). Collaboration with partners in other disciplines is essential.



- Identify the value-added to gain from a SH interaction compared with other approaches. (What difference will this interaction make?)
- Decide on the best method taking into account: type and complexity of information sought, available resources, SH characteristics including accessibility. Recognise that pragmatism is necessary.
- Design the instrument. Collaboration with partners in other disciplines is essential to ensure that the outputs to be obtained from the SH interaction are useful to them.
- Careful SH interactions to ensure findings are robust.
- Recognise that inter-disciplinary collaboration between partners is essential in defining the purpose of the interaction and ensuring that the research instrument will yield the desired information. These processes will require formal or informal management.

3.3 Modelling and stakeholders' involvement concerns

Improving the fidelity of agent-based and micro-simulation models can help to increase the trust that stakeholders give to these tools. Full understanding of local issues can only be completed by approaching the stakeholders dealing with the region development on a day to day basis and, linking the models with regional agents can improve the model assumptions and the accuracy of the modelling task.

The stakeholder/model interaction must be based on the acknowledgement of mutual benefit. Stakeholder communication can only be useful when stakeholders understand the objective of the interaction. Hence, the description of models and other tools must be done in terms that are familiar to the stakeholders. Even though in general stakeholders' view of the models remain 'cautiously positive', it may be useful to offer the models as an interactive tool that allows them to test different "what if" scenarios by themselves. Some stakeholders fail to see what the benefit of such tools is for them. While other stakeholders understand the potential and even envisage the use of similar models as "desktop tools" that helps them in day to day decision making.

Although these concerns should be addressed, it must be done with caution, as the reach of these tools can be overestimated. To improve the quality of the outcome from stakeholder engagement, model communicators must have a clear and concrete idea of the outcomes expected from such an engagement.



3.4 SIA recommendations for further development

Impact assessment is seen as a tool for the screening and scoping of impacts of policy, plans, programmes and projects. The methodological development, including modelling for screening and scoping, should be intensified on the basis of statistics to explore the interlinkages between social, economic and environmental characteristics. In this context population change, the ageing of the society, impacts of economic activities, and other major social and economic driving factors are included in the content of a Sustainability Impact Assessment (SIA) when widening the impacts definition from the environmental to social and economic indications. Major developments for further research to establish SIA are seen formulated:

- Give recommendation about Competent Authorities (CA) to apply in practice.
- Develop a typified and general list of projects, plans and programmes with impact on environment, society and economy.
- Formulate on these lists the key indicators for a SIA directive (progressing and comparable to EIA and SEA directives; define thresholds).
- Give more attention to Land use (land cover is not accurate enough).
- Give more attention about the population changes in the context of policy changes often agricultural subsidies does not help to sustain people in the rural).
- Provide the data of CMEF for Nuts 2 and Nuts 3 region by Eurostat level.
- Provide comparable data by National authorities for Statistics at Lau 1 and Lau 2 (without data: no scaling up and down; few assessments).
- Econometric driven modelling systems, scenario techniques and stakeholder experiments combined with ABM-Micro-Simulation can help to clarify impacts.