Prototypical Policy Impacts on Multifunctional Activities in rural municipalities

A collaborative project under the EU Seventh Framework Programme

FINAL REPORT

Deliverable no. D0.4

Nadine Turpin, Baptiste Hautdidier, Ramon Laplana, Diana Kopeva, Marian Raley, Omar Baqueiro, Guillaume Deffuant, Geert Woltjer, Burghard Meyer, Mario Njavro, Ladislav Jelinek, Géraldine Abrami, Olivier Aznar, Olivier Barreteau, Irina Bezlepkina, Arno Bouwman, Ramona Franic, Guy Garrod, Myriam Gomez, Wander Jager, Sylvie Huet, Eliška Kozáková, Maxime Lenormand, Jean-Bernard Marsat, Miloslav Delin, Éric Perret, Kenneth Rødseth, Eirik Romstad, Branka Šakic Bobic, Franziska Schaft, Hilary Talbot, Qijun Zhang

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The stated objectives in the application and DOW of the PRIMA project are:

- 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.

To a large degree these objectives have been met. The true test of the "PRIMA approaches" will be later applications of the tools and methods including how adjustments in the approach can be made for studies outside those that were part of the project.

Email: ramon.laplana@cemagref.fr & nadine.turpin@cemagref.fr

Internet: https://prima.cemagref.fr

Authors of this report and contact details

CO-ORDINATOR
Name: Cemagref-Ramon LAPLANA
Address: 50 Avenue de Verdun-33612 CESTAS Cedex
Phone Number: +33 5 57 89 08 46 Fax Number: +33 5 57 89 08 01
E-mail: ramon.laplana@cemagref.fr
Project web site: https://prima.cemagref.fr

SCIENTIFIC CO-ORDINATOR
Name: Cemagref-Nadine TURPIN
Address: 24 avenue des Landais – F-63172 AUBIERE Cedex
Phone Number: + 33 473 440 634
E-mail: nadine.turpin@cemagref.fr

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Name of the scientific representative of the project's co-ordinator[1], Title and Organisation: Dr Nadine Turpin, Irstea

Tel: + 33 473 440 634

Fax: + 33 473 440 698

E-mail: nadine.turpin@irstea.fr

Project website address: https://prima.cemagref.fr/

[1] Usually the contact person of the coordinator as specified in Art. 8.1. of the Grant Agreement.

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1 EXECUTIVE SUMMARY

Facing structural change, European rural areas still fulfil multiple social, economic and ecological functions. Because of scale interplays and sustainability trade-offs, their future dynamics are still difficult to ascertain. In addition to the inherent difficulties of this undertaking, challenges in actual assessments also depend on external shocks to the economy at large or to particular regions, along with spillover effects among neighbouring regions. PRIMA proposes to improve knowledge in scaling down this assessment. It focuses on agriculture, forestry, tourism, and ecosystem services, with special attention to the structural effects of the European policies at municipality levels.

The six case studies of PRIMA, conducted in Germany, United Kingdom, France, Croatia, Czech Republic, and Bulgaria, are important for two main reasons: they provide test cases for the PRIMA approaches, and they have influenced the development of the PRIMA approaches. These case studies have been chosen for their variety of rural dynamics and governance organisation.

Because of the bottom-up governance of the European cohesion policy, a large variety has been observed in the priorities and measures, targeted to several pillars of sustainable development. This variety has been narrowed in a pre-modelling stage, where 2 groups of stakeholders were interviewed: those who can assist in scenario and model development (coming from the institutions which implement policy), and the actors who may be affected by the policy and hence whose related behavioural changes should be captured by the model framework.

A conceptual model has then been developed. This model focuses on the population dynamics in rural municipalities and on the decision making behaviours observed. The conceptual micro-simulation model was successfully adapted to three of the study regions (France, United Kingdom and Germany). Additionally, the developed agent-based model was adapted for the United Kingdom region; this allowed studying the effects of social aspects that are not captured in the micro-simulation model.

For validation purposes, a series of workshops were conducted on the case study areas. The orientation of these workshops depended on the availability of the models for the given case study area. The workshops promoted stakeholder learning about modelling. On the whole, participants recognised models as simplifications of reality. They found explanations about the model components comprehensible, and reacted fairly favourably to the idea of having such a decision-support tool available. However, the lack of good data at a low geographical scale in most case study areas was seen as a severe limitation.

Beyond pathways for model revision, some methodological advances in the field of participatory modelling have been identified. Among these is making explicit the role of a model broker, the endorsement of which should improve the various interpretations of participants. Scenario development, though far in advance of their technical skills, has also proved an efficient tool to involve stakeholders in challenging a model.

Further conceptual work was identified and undertaken concerning the design of methods to reconstruct commuting network for regions where data was unavailable, to calibrate models with several number of variables and of new approaches to dynamically derive services jobs availability.

PRIMA also developed a conceptual work that includes the MAGNET (formerly LEITAP) model for downscaling from world level to the country level, and a downscaling tool from country level towards the NUTS2 level. An interface has been developed for easy downscaling of scenarios. Special attention has been paid to procedures to process data from Eurostat towards a database useful as input for the downscaling model.

Last, we progressed towards recommendations enhancing the scope of IA methods, with a review of literature and extensive work between all workpackages.

2 PROJECT CONTEXT AND OBJECTIVES

Rural regions play an important economic, social and ecological part in European states, but just like any other areas they are subject to change. Economic actors may adopt new practices, drop others, change the way they interact with fellow actors, alter the scale of their operations or quit operations completely due to shifting conditions. Multi-level policies are one factor that impacts the lives of rural communities. These policies are subject to regular evaluation, but assessment only exists at national and regional levels, implying that local effects may not be captured. PRIMA turns the attention to the lower levels of rural mechanisms in order to provide a more complete picture.

The difficulty of policy assessment comes with the scale of interplays and sustainability trade-offs, with their future dynamics proving particularly difficult to ascertain. PRIMA sought to unpack these issues through its main objective of developing methods for scaling down the assessment of policy impacts on multifunctional land-use and economic activities. The project focused on agriculture, forestry, tourism, and ecosystem services, with special attention to the structural effects of the policies.

The methodological challenge we face is not only to get an improved understanding of the multifunctionality of land uses and economic activities, but also to help define how this knowledge can be implemented in the impact assessment procedures used by the EU and its member states. In order to

explore these relationships while keeping some tractability, PRIMA scientists have focussed on the translation of broad policy orientations and actions programmes into local development scenarios.

Taking into account the important diversity of both policies and local contexts, the first important step of the analysis was to build a mapping between the contents of the policies, programmes and measures to be applied in our six case studies and their potential 'multifunctionality impacts'. Combined with an identification of driving forces that were most relevant for the PRIMA regions, it led to scenarios directly usable in the modelling work.

PRIMA expected outcomes are the following:

- 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?

PRIMA is organised in several work packages that group together scientific knowledge and specific skills:

- The core of the project is work package 3 that aims at designing and developing micro-simulation and agent based models.
- These models rely on behaviour rules drawn up at local level from stakeholders' consultation for the main actors in rural landscapes. All the stakeholders' consultations, during pre-, on- and post-modelling phases are grouped in work package 2.
- The models also require a deep analysis of the EU structural policies, the identification of driving forces at EU, national and regional levels, the design of national and regional scenarios. All these activities are grouped into WP1.

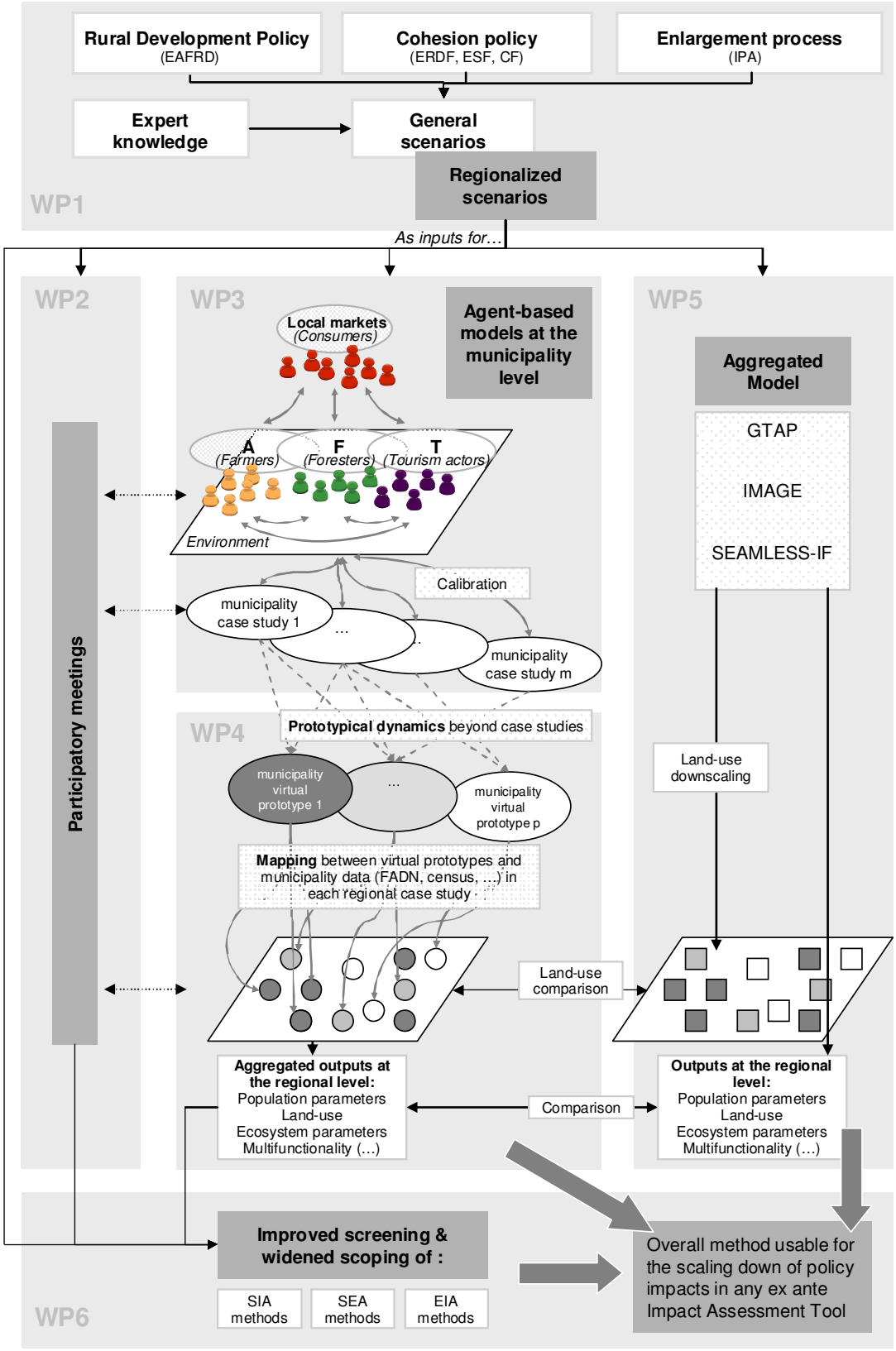


Figure 1 | Main steps of modelling and stakeholders interaction in PRIMA

- Once the models have been validated by the stakeholders (see WP2), their results are to be aggregated over all municipalities in each region. This aggregation requires a mapping between available data at municipality level (provided by WP1) and some settings of the models (provided by WP3). Mapping and aggregation form WP4.
- The models are be designed to be compatible with more usual European Policy models (SEAMLESS-IF for the agricultural sector, SIAT tools resulting from the SENSOR project for the forest and tourism sectors, GTAP-IMAGE for global changes and interactions between land use changes and land-related changes on emissions of greenhouse gases), when simplified to match the main assumptions of these aggregated models. Aggregated outputs of the agent based models should be compared to outputs of these aggregated models in WP5.
- As structural European policies are liable to modify the multifunctional characters of rural landscapes, while favouring new activities or associations of actors inside common projects, WP6 sets out to examine to which extent considering indicators that describe the multifunctionality of rural landscapes can widen the scope of SEA, SIA, EIA.
- Last, once the proposed project has gained locally validated models that can be aggregated and compared with those provided by already existing aggregated models, the project analyses the internal functions of these models to design a method that enhances the scope of Strategic Environmental Assessment (SEA), Environmental Impact Assessment (EIA) and Sustainable Impact Assessment (SIA). This activity entails all WPs.

3 MAIN S&T RESULTS/FOREGROUNDS

3.1 WP 1 | From policies objectives to scenario design at national and regional levels

Focussed on the impact assessment of general and specific EU policies on multifunctional land use, WP1 activities have entailed the development of general baselines for the design of national and regional scenarios.

3.1.1 Progress towards objective 1 (To analyse and assess EU policies on multifunctional land use activities)

An extensive document review of strategic and planning documents in the six case study countries (France, Germany, United Kingdom, Czech Republic, Croatia, Bulgaria) was achieved, with a specific focus on the existing policy application on different levels and areas (agriculture, forestry, tourism, environment) that focus on concepts related to the PRIMA project (T1 - M 1.1 and D1.1).

A screening impact matrix was developed, allowing ranking the detailed policy measures according to their importance, with regards to multifunctionality. The output of the matrix is used for the development of the scenarios and for the modelling of socio-ecological dynamics (WP3 and WP4).

During the review process, the relevant driving forces were identified, with a focus on major development trends, possible modifications, and their effects on the multifunctionality of land use and development of economic activities (D1.2, M1.2 and M1.3).

3.1.2 Progress towards objective 2 (To develop baselines for the design of national and regional scenarios on multifunctional land use activities)

Socio-economic profiles of the six case-study regions have been prepared (D1.3). Alternative scenarios have been developed on the basis of aforementioned assessments (D1.1) on policy changes and possible results/outputs of the EU policy implementation on regional and local (LAU) level. Base scenarios, i.e. reference points for the down/upscaling in WP3/4/5 have been be verified and improved during the project duration, as part of WP2 activities.

A set of criteria for the selection of municipalities was designed. A two-step clusterisation allowed identifying contrasted LAU 1 and LAU2 units in the six case study areas (M1.4). The selected municipalities (and sets of municipalities) are subject of in-depth studies in WP2 (pilot individual and focus group discussions), WP3 and WP4 (population dynamics and scenario dynamics).

As a subsequent result, a database of available socio-, economic, environmental statistical information on NUTS2, NUTS3 and LAU1 was developed (D1.4). The database is serving the needs of WP3, WP4, WP5 and WP6.

3.1.3 Significant results

Multifunctionality is relevant for the regional governance of structural funds, but remains mostly unaccounted for in previous analyses.

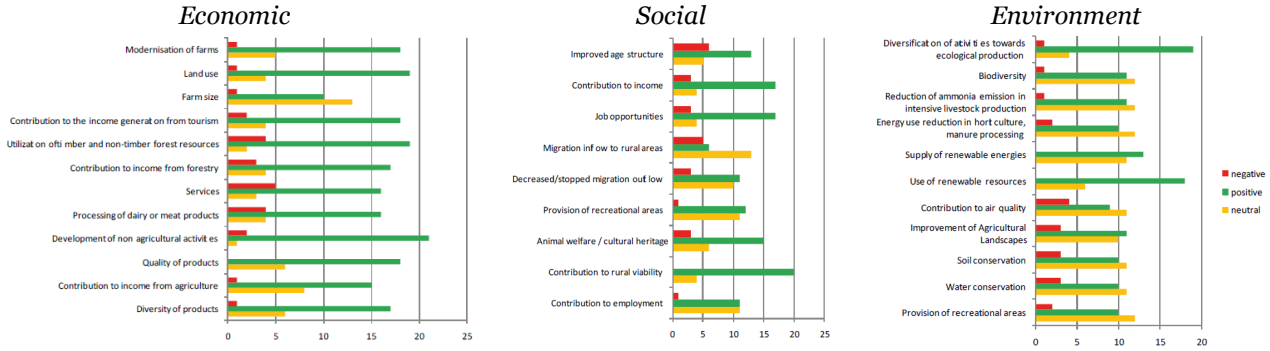
The detailed review and analysis of the EU policies (on national and regional level and their impact on multifunctional land use) revealed that, in most cases, regional strategic and planning documents support measures for multifunctional land use activities only in an indirect way.

The study revealed significant differences between country and thus the necessity of developing participative initiatives integrating these specificities in the different case studies. The diversity of institutions and organizations involved in the process of implementation of Structural and Cohesion Funds, and European Agricultural Fund for Rural Development (EAFRD) appeared high within case study regions. Direct Beneficiaries (excluding Local authorities) are not involved directly in the process of policy measures' development. Moreover, they rarely participated in the regional strategy development and in the identification of measures and priorities in the national planning documents.

The complexity of 'MF' impacts is tractable with detailed expert-based assessments

An original analytical framework was developed for the analysis of the impact of policy priorities / measures on multifunctionality. Based on indicators translating the multifunctional character of the activities on the basis of the three SD pillars, the framework was confronted with every measure of the policies on the basis of an expertise from PRIMA scientists; the potential impacts were informed according to three levels 'positive', 'neutral' or 'negative'; a synthesis joining all the indicators was made by measure of policy, followed by a classification of the various measures by priority. (Cf. Figure 2 for the general overview of IPA).

Figure 2 | Potential impacts of the Instrument for Pre-Accession (IPA) on multifunctionality indicators, broken down in economic / social / environmental domains



Source: PRIMA D1.1, § 4.2

This analysis of the potential impacts of policies on the multifunctional character of the activities shows the domains of action supposed to have the greatest influence in terms of multifunctionality. To quote Croatia as an example, IPA highest positive effects are strongly related to measures focusing on support of new enterprises or restructuring, capacity building, environment protection, local sectoral knowledge, education and diversification of local activities

Regional scenarios highlight four plausible futures with regards to MF impacts of EU policies

Four alternative scenarios for general development based on strategic documents related to the multifunctional land use activities as illustrated by Figure 3:

- The *'baseline'* scenario, is a projection of the status quo in terms of agricultural and environmental policies, technological and market conditions, and the projection of technological trends and of decided policy changes to be implemented until the target year 2013.
- An *'Environment'* scenario was built on the assumption that measures for landscape, natural and cultural heritage preservation is

leading, with an explicit recognition of multifunctional land use activities.

- The *'Rural development'* scenario puts the emphasis on: increasing competitiveness of agriculture and forestry; improving land management; implementing complex measures for environment protection and preservation, wider rural economy through new agricultural and non-agricultural activities; increasing the role of local initiative groups in regional and local decision making process.
- The *'Infrastructure & Competitiveness'* scenario assumes that Cohesion policies will have leading role on national and regional level, focusing on improvement of business environment, establishment of business opportunities and favourable environment for business initiatives linked to multifunctional land use on regional level.

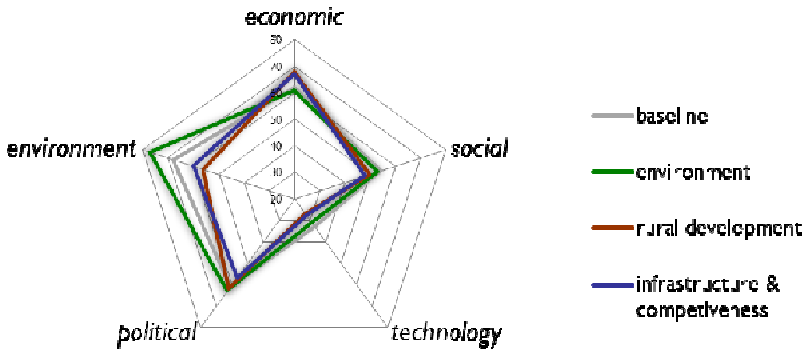


Figure 3 | Combined impacts of selected driving forces (external/internal), for the four scenarios *Source: adapted from PRIMA D1.3, § 7.4*

Restricted sets of LAU1/LAU2 levels indicators capture convincingly the social-ecological internal diversity of case study regions

A database was designed and developed with statistical information related to the domains of agriculture, forestry, tourism and environment at different levels (NUTS2 to LAU2). Based on existing sources (National Statistical Offices, FADN, National/Regional surveys, EUROSTAT, ESPON, and other), the dataset consists of eight modules (General information, Land, Population / Labour, Economic Indicators, Tourism, Agriculture, Forestry and Environment).

Original approaches based on cluster analysis were developed to select municipalities for the construction of prototypical cases representing typical, contrasted macroeconomic features and multifunctional aspects of land use in a given region. Relying on the extraction/adaptation of only seven indicators from the database (population density, population growth over the last 15 years, remoteness, share of GDP/GVA by sector, areas in NATURA 2000, unemployment rate, old-age dependency ratio), the exercise demonstrated the relevance and feasibility of parsimonious indicators lists for the analysis of social-ecological change in rural municipalities.

3.2 WP2 | Stakeholder perspectives and participatory approaches

WP2's objectives can be summarized as four sequential steps:

- Step 1: Identification of stakeholders and stakeholder roles in terms of pre-model, on-model and post-model analysis (D2.1, D2.2)
- Step 2: Pre-model engagement with stakeholders in terms of scenario design and formulating agent decision rules for agent-based models (of WP3) (D2.3)
- Step 3: On-model engagement with stakeholders mirroring agent-based models (of WP3) (D2.4.1)
- Step 4: Post-model engagement with stakeholders in terms of assessing model outputs (of WP3 and WP4) (D2.4.2)

3.2.1 Identification of stakeholders and stakeholder roles

A literature review of stakeholder identification, drawing on both business management and environmental management literature, was submitted as D2.1. (Task 2.1.1). Two groups of stakeholders were identified. First those who can assist in scenario and model development, and in model validation, who are drawn from the institutions which implement policy. Second, the actors who are the targets of policy (or who may be affected by it) and whose behaviour is to be captured in the agent based model. An interest-influence matrix is used to identify the most relevant actors for the particular policies studied.

A limited scoping study was conducted in early 2009 by partners to gain contextual information about their wider case study region. Employing a written interview guide, a round of approximately 5 informal interviews with officials (both public sector and practitioners) with an interest in the rural economy, farming, forestry and tourism was conducted. As well as supporting stakeholder identification, by investigating institutional structures and access to EU development funds, the interviews identified categories of municipalities and their differential evolutions, and relevant EU policy options and their likely impacts.

During discussion at the Zagreb meeting (Croatia, October 2009) it was decided that stakeholder participation in scenario design would occur at two stages, one at the pre-model stage and the other at the on-model stage. First, for each individual case study area, the views of institutional and local stakeholders would be elicited to identify policy areas of local relevance for further study. These would reflect the social, economic and environmental characteristics and needs of individual areas, and permit researchers subsequently to develop scenarios ('storylines'), consisting of plausible sequences of events and appropriate policy responses. At a second stage, in Autumn 2010, stakeholders would be confronted with these scenarios and the results obtained from modelling them. They would be asked to comment critically on scenario plausibility, the model's underlying assumptions about causality and actor behaviour, and the model's scope. At the same time, stakeholders are invited to create new scenarios for the model.

3.2.2 *Pre-model engagement with stakeholders*

D2.2 reviews the literature on stakeholder input to scenario development and formulating agent decision rules (Task 2.2.1). Participative techniques were used for a number of functions including identifying a focal issue; defining how systems work and the driving forces behind them; and development of storylines and policy options. Stakeholder participation is likely to enhance the robustness of the subsequent scenarios and hypothetical actor behaviour.

As outlined in the previous section, a second round of interviews was conducted early in 2010 in relation to one specific case-study municipality per project partner, and the results are presented in D2.2. These interviews identified relevant policy issues and appropriate policy measures, and provide material for scenario development.

3.2.3 *On-model engagement with stakeholders*

A two days workshop was conducted in Montpellier, France in February 2010 which explored a range of participative methods suitable for on-model stakeholder engagement (Tasks 2.1.2 and 2.3.1). These included participative simulations; role-playing games, participative (conceptual) modelling, and interactive storytelling. The preferred method for use in PRIMA was interactive story telling for the purposes of: refining the pre-determined scenario, its scope and outcomes; checking the conceptual models, and improving and validating the computer models. This method is based on the generation of a framework for telling a story from simulation outcomes. Its main advantage is that more concrete elements are provided for generating discussion with stakeholders.

Critically this engagement, in the form of a workshop, aims to provide information to assist the development of area-specific models which have been adapted from the generic micro-simulation model. However, by the time the workshops were finally conducted in the last 6 months of the project, it had become clear that an adapted model could not be produced for Croatia or Bulgaria due to a lack of suitable data, and that the Czech Republic's adapted model would not be ready in time.

Consequently two different types of workshop were conducted:

- *Type 1 workshop: supporting model development* was conducted in Germany, France and the UK. This had the benefit of having an early version of the adapted model available.
- *Type 2 workshop: stakeholder reactions to agent-based models* was conducted in Croatia, the Czech Republic and Bulgaria.

3.2.4 *Significant results*

The identification of appropriate stakeholders to participate in model development and validation is an important step in PRIMA. Some useful tools are offered by stakeholder analysis, by which the human landscape in which policies are enacted, or where firms operate, can be systematically described.

A useful starting point is a stakeholder map, whereby a policy is dissected into its component elements and processes, prior to relevant actors being mapped onto it. From the first maps drawn, we decided that two types of stakeholders are to be engaged in the participative processes. First, the actors whose behaviour is to be represented in the agent based models. These stakeholders, have been selected in a three step procedure: i. defining the policy, its effects, processes and boundaries. ii. identifying the groups and individuals who are affected by those social and natural systems , and iii. prioritising those groups and individuals for involvement in the process. Identifying key contacts has been achieved by starting with known contacts and then snowballing.

The second group is involved in policy scenario development and model output validation. It includes policy experts and practitioners who may also be conceptualised as stakeholders who represent the interests of civil society, on whose behalf they develop appropriate policies. One approach for policy scenario development is to attempt to mirror the group actually involved in formulating policy for the locality, although a final decision on the approach to be taken has not yet been reached. Both groups have been involved in the on-model stage (model improvement) workshops.

The following outputs were extracted from the interviews during the pre-model engagement step:

1. A description of the main processes and events which have occurred in the last 20 years (approximately) and which have shaped the municipality as it is today.
2. A list of Policy Outcomes, with scores allocated by respondents to show their perceived desirability for the case study area (priorities) and contextual information to help explain these responses.
3. For the high priority outcomes, a table showing the current measures available under EU funding streams, and the perceptions of interviewees as to whether these measures have the capacity to deliver the desired outcomes in the case study area.
4. Where measures have been found inadequate, the reasons for expected failure.
5. Proposals for changes to existing measures, or proposals for new measures which are expected to achieve the Policy Outcome.
6. A comparison of the perceptions of the 2 stakeholder groups: do 'institutional' people have a different perception of the priorities and the likely effectiveness of policies from 'local' people?
7. A list of current policy measures which a) contributes to the delivery of the desired policy outcomes; and b) are thought to be effective; and also a list of 'improved' and new policy measures suggested by interviewees. This list forms the starting point for the development of a draft storyline, including policy response and hypothesised agent behaviour, which can subsequently be modified in the light of discussions with stakeholders.

During the on-model engagement step, both workshop types promoted stakeholder learning about modelling. On the whole, participants recognised models as simplifications of reality. They found explanations about the model components comprehensible, and reacted fairly favourably to the idea of

having such a decision-support tool available. Tensions exist between the need to obtain locally-specific insights to support adaption of the model to the case study area and yet without generating from stakeholders a level of detail that the model cannot accommodate, or which can't be supported by data. The model concept was considered to be broadly plausible. However, the lack of good data at a sufficient disaggregated geographical scale in most case study areas was seen as a severe limitation. Due to the heterogeneity of each area, the alternative of using data derived from larger geographical units was deemed unsatisfactory.

The Type 2 workshop explored policymakers' reactions to models. While being receptive to a decision-support tool which could improve the impact of policy locally, the current problem was not so much that the policy goals were unsympathetic to their area, but that their impact was low because the rules and structures for their implementation were poorly designed. Policy-makers would be able to understand such a model although a model of greater complexity might be avoided. However in Croatia and Bulgaria there was mistrust about any possible future model outputs due to the lack of low level input data. For pragmatic reasons (availability of datasets and local knowledge) it was preferred that the model should be administered in the region.

Beyond pathways for model revision, stakeholder on-model involvement in PRIMA's workshops identified some possible methodological advances in the field of participatory modelling. Among these is making explicit the role of a model broker, the endorsement of which should improve the various interpretations of participants. This can be further enhanced if a specific stage within the workshop is dedicated to interpretation. Scenario development, though far in advance of their technical skills, has also proved an efficient tool to involve stakeholders in challenging a model.

A last study was conducted to shed light on the pertinence of the downscaled model outputs as provided by WP5. In Work Package 5 the model outputs have been developed for the Netherlands as well as they have been scaled down to the provincial level for employment, population by age class, immigration by age class, value added by sector, land use by sector and the output of the agricultural sector.

In order to give an indication of the pertinence of these aggregated outputs we focus on the data presented by policy makers in their exploratory reports on the impacts of population decrease. We have done this by reviewing the scale frames used to describe the issue of population decrease by provincial policy makers. Several for three Dutch regions facing a decrease of population were analysed, with the use of the ATLAS.TI software.

The discourse analysis shows that the issue of population decrease is primarily framed as a regional and municipal issue. This scale frame is supported by the use of data that is downscaled to the regional and municipal level. This indicates that the level at which the aggregated model outputs are produced do not coincide with the level at which the issue is framed by the target group. Although in their explorative analysis the regional governments ('*Provincie*' in Dutch) include the impact of population decrease on economic development, no specific prognoses are made for the impact of added value and land use for specific sectors. Therefore the outputs of the aggregated

model with regard to the development of the agricultural sector (a.o.) will be complementary to the exploration of the impacts of population decrease by policy makers on the provincial level.

3.3 WP3/WP4 | Agent Based Modelling and Generalisation of Prototypical dynamics

Work Packages 3 and 4 focus on the development of agent-based and micro-simulation models and their use for the extraction of general rules to describe development dynamics of the studied regions. Initially, the micro-simulation model was expected to be applied only on a small set of pilot municipalities in WP3. Then, it was planned that WP4 would define simplified versions of these dynamics, to be extended to all rural municipalities of a region, based on available data. Within the duration of the project, we designed a common micro-simulation model to study the dynamics on the selected regions used in WP3 and WP4 (see working papers (*1*)). The creation and use of this model increased the interrelation between WP3 and WP4, which was already high within project plan. For this reason, the WP3 and WP4 project outcomes are presented as a common progress report for these two work packages.

Objectives of WP3 and WP4:

1. Design and implement a micro-simulation and agent based model framework,
2. Adapt simulation models to small sets of municipalities in different regional settings, carry out simulations to be used in stakeholders workshops
3. Define a mapping between available data at municipality level and prototypical dynamics derived from the AB model developed in WP3
4. Extension of the micro-simulation model to a larger municipality set

3.3.1 Progress towards objective 1 (Design micro-simulation and agent based model framework, and implement it)

As first step towards this objective, we performed an extensive literature review to look at the available frameworks and models that share concepts related to the PRIMA project (D3.1 (*2*)). In addition, the survey contains an overview of the main actors and dynamics which are present in rural areas.

As a subsequent step, we developed the conceptual model of social-ecological dynamics. The focus of the model is on the population dynamics of rural municipalities and the decision making behaviour of actors of such areas. Output requirements from WP6 were considered as part of this modelling effort. This was followed by the implementation of the simulation framework prototype to be used for pilot simulations.

The development of the model was done using feedback obtained by regional stakeholders (work being coordinated on Work Package 2); by using the stakeholder feedback (such as the description of main issues in the municipalities, current state and future trends forecasted by stakeholders) to drive the definition of the aspects considered in the model.

3.3.2 *Progress towards objective 2 (Adapt simulation models to municipalities in different regional settings)*

The conceptual micro-simulation model created during the first period of the project was successfully adapted to three of the study regions. Adapted models were performed for France (*3*), the United Kingdom and Germany (*4*). The adapted models allowed performing simulation studies. Additionally, the developed agent-based model, focusing on the migration decisions, was adapted for the UK region (*5*); this work studied in particular the effect of different hypothetical social networks on the migration. A strong effort has been made to adapt the models to the remaining regions (the Czech Republic, Bulgaria and Croatia), but the lack of sufficient data would have made the adaptations unstable in the sense that policy responses could become random. Thus, it was decided to focus on evaluating the validity of the conceptual model through stakeholder contact. This validation was performed in WP2.

For the adaptation of the models, a number of research studies were performed, such as the development methods to reconstruct commuting network for regions where data was unavailable (*6, 7*), developed methods to calibrate models with several number of variables (*4, 8*); and proposed new approaches to dynamically derive services jobs availability (*9*).

We calibrated the models on the available data of the past using genetic algorithms (*10*) or Approximate Bayesian Computing (*8*). The verification and validation of the adapted models was performed in two steps. First, standard statistical analysis methods were used to ensure the replicative validity (i.e., ensure that the simulation results are equivalent to the evolution of the region). A number of workshops were performed to evaluate and improve the structural validity of the adaptations. On these workshops, regional experts were confronted with the description of the model, their key assumptions and main outcomes. As a result of this evaluation, some assumptions of the adapted models were enhanced, specific significant issues for each region were detected, and the general validity of the structure of the model was strengthened. This process was facilitated by work done for Work Package 2. As an additional outcome from the use of the models, supplementary information on the state of the regions was obtained. This was possible by confronting regional experts with simulation results which stirred discussion on the detailed causes of the regional dynamics reproduced by the model. Indeed, simulation results provided a common base for discussion between scientists and regional decision makers. The results obtained from the verification and validations are described on (*3, 4*)

3.3.3 *Progress towards objective 3 (mapping between available data and dynamics of AB model)*

First, the elaboration of the agent-based model led our view of this mapping to evolve. With the common model for WP3 and WP4, the problem of the mapping becomes: how to use the data available at municipality level to initialise and parameterise the model in all the rural municipalities of a region. This problem concerns each main variable of the model: population

(households), activities of the inhabitants of the municipality, distribution of housing, distribution of land-use, main services and activities taking place on the municipality.

In this respect, the significant progresses for mapping to initialisation data are:

- We designed a general method for generating a population of households from a variety of generally available statistical data at municipality level. This method is original and led to a publication [8].
- We mapped the initialisation of the land use using CORINE land-cover (see working paper (*11*)).
- We used the available data in Auvergne to detect a variety of network structures between the municipalities (see working paper (*12*). This approach helps us to determine prototypical dynamics depending on these structures.

The significant progresses in the mapping of the dynamics are:

- We used job surveys (see working paper (*13*)) to assess general probabilities for activity changes.
- We used general demographic data for individual and household dynamics.
- We established statistical rules linking a variety of municipality population characteristics and the presence of services of different types in Auvergne (see working paper (*14*)). The same method can be used in other regions.
- We studied the transitions in the land use.
- We established a format for scenarios of evolutions of the main variables which are outside the model dynamics (see working paper (*15*)).

3.3.4 Progress towards objective 4 (Extension of the micro-simulation model to a larger municipality set)

We applied the model to the Cantal *département* (150000 inhabitants, 260 municipalities) and we had to proceed to a few adjustments on the model we used for small sets of municipalities. These modifications are also improvements of the model. They are described in details in (*3*). Basically, they are related to a better representation of the dynamics of commuting, moving and migrating. The distance to the border of the region of study is taken into account in the dynamics of moving and migrating, and the distances between municipalities is better taken into account in the moving and commuting decisions.

Unfortunately, we did not have time to calibrate the model within the time frame of the project. We shall achieve this task in the months to come. Nevertheless, we identified sets of parameter values that provide already encouraging results.

Moreover, we included in the software specific visualisation functions allowing the user to choose different indicators and to visualise aggregated values of these indicators over time.

3.3.5 Significant results:

Design and implementation of a common general micro-simulation model for WP3 and WP4: initially, we planned to design a micro-simulation model to be applied on a set of municipalities, and then design simplified version of the dynamics extracted form the first model outcomes. Indeed, a common version of the model was finally developed, which is a major outcome of the project.

Design of a general method for generating households from different available data at municipality level: at this level, only average data are available and the method enables to generate relevant individual data to be included in the models (led to a publication, see (8)).

Adaptation and implementation of the general model to the six case studies (see working paper (*11*)), considering specificities in demography, productive activities, population dynamics, services and land. The generation of data used for the initialization of the micro-simulation is based on the same process which has been described by (8). However, as this process was conceived for the generation data of a specific region, it considers some data sources that are not available in other regions. For this reason the algorithm has been modified in some cases, with the objective of using the data that is available for the adapted regions. After the generation of model individuals and their household structure has been done, the next step in the adaptation of the model is the definition and distribution of the productive activities which describe the structure of the employment in the region. This step is completed first by defining the set of activities to consider in the model and then by distributing these activities, along with other employment information, to the previously generated individuals. Currently, the initialization of the synthetic population and their activities has been:

- First mapping of the model to the data available at municipality level, related to: household generation, land-use, services, to the six case studies.
- First prototype for visualising the data at different type steps and different levels of aggregation based on data warehouse techniques.

An agent-based model was developed to study migration dynamics. The model is capable of simulating a population with agents that make a decision to migrate or not. Economic, social and environmental satisfactions are key drivers of migration. Jobs deliver economic satisfaction, the number of friends living close determines social satisfaction, and the quality of the environment determines environmental satisfaction. Agents are connected in a similarity based network, and can share information.

The simulation model is applied to Derbyshire & Nottinghamshire in the UK, including 14 wards, which is a low-level election unit in UK. A population of 58.000 agents is initialized reflecting age, income, qualification (education)

and social professional status (working status) in the area. For those individuals whose working status is 'worker', information is generated about their Socio Professional Category, sector of activity, working location; and the commuting distance. Furthermore, we generate individual's qualification level and income.

Running the UK adaptation of the agent-based model shows how the population evolves over time, as for example in the Figure 4, for two wards. Also we can see the strong difference between the presence (full line) or absence (dotted line) of the social need on in particular the workers' (green) decision to migrate. It can be seen that the working population decreases the most.

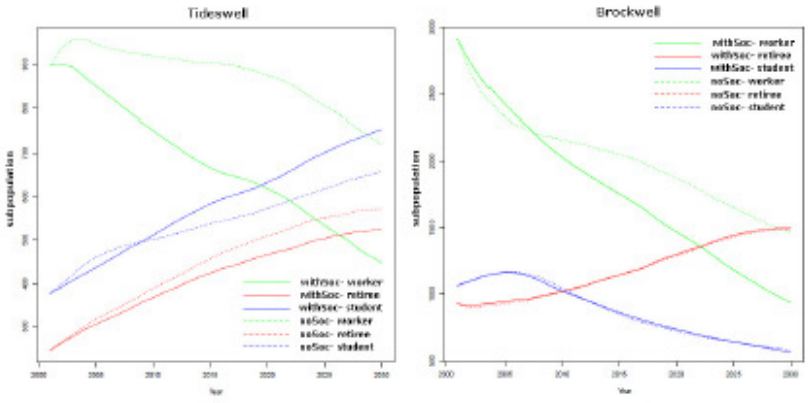


Figure 4 | Evolution of Agent-Based model Simulation, example of two wards

The experiments demonstrate that in particular social needs may have a strong impact on population dynamics. Most interestingly it is that in the context of a declining population the presence of a social need causes the population to initially decrease at a slower rate because of their social satisfaction (stabilizing effect). However, if a critical population size is reached, the social satisfaction decreases, and causes more people to move, resulting in a self-amplifying dynamical process. This is typically what happens in the ward of Brockwell, and we observed this in other wards dealing with a substantial population declines as well.

For the policy maker the question thus is how to anticipate such a sudden population decline and how to prevent it, if possible and desired. The empirically parameterized model we developed allows having a deeper look at the attributes of the agents that are moving away. This makes it possible to make more fine-grained projection s of what type of people are more likely to move away, and for what reasons. Having a simulation tool that is capable of exploring the population dynamics at the same level as the policies that are implemented opens a perspective on developing more effective policies, and possibly on testing policies using the same simulation tool.

3.4 WP5 | Aggregated modelling and compatibility checking

3.4.1 Progress towards the PRIMA WP 5 Tasks

Task 5.1: Identify key economic and demographic factors at European and global level driving land use patters at regional and local scales. A distinction is made between external economic and demographic factors (e.g. economic growth, population trends, patterns of consumption and production) and policies (liberalisation of international trade through WTO, global agreements on biodiversity (CBD) and the control of greenhouse gas emissions (Kyoto), agricultural policy (CAP), etc.). Task 5.1 has been finished. A report is available as D5.1. A baseline has been developed as a background for the case studies. Additional policies may be implemented when they are relevant for the case studies or policy experiments.

Task 5.2: Link IMAGE and GTAP to provide a working modelling framework supporting interactions between sectoral production growth rates, with the use, productivity and intensity of land from GTAP and the demand for land and environmental indicators from the IMAGE model. Task 5.2 has been finished. A report is available as D5.2.

Task 5.3: Develop a working regional economic model that interacts between global changes (GTAP-IMAGE interactions) and multi-agent based tool at local level. The regional economic tool for downscaling has been developed and is a smoothly working instrument. Because the aggregation of the results of agent-based models was more complicated than expected, the link with the agent-based models has not been established. Instead, a methodology has been developed to establish an interaction of the models at different level in a little bit different way.

Task 5.4: Interact land use patterns at a range of scales and interact with multi-agent based modelling. The modelling of land use changes at a range of scales has been accomplished, but again the link with the agent-based models has not been established. Because the agent-based models have a focus on population dynamics, a lot of attention is given to population modelling in the downscaling procedure.

Task 5.5: The SEAMLESS IF framework has been proposed as a comparison framework at the beginning of PRIMA project, because the latter was highly focussing on multifunctional agriculture. During the project development, it became evident that attractiveness of rural areas and agent migration decisions were more important drivers to municipality dynamics. As a consequence, SEAMLESS if became relatively far away from the approach as it developed in PRIMA. For this reason, the SEAMLESS framework has not been applied. Instead of this, a methodology has been developed to compare results of downscaling with different methods, with a focus on CAPRI that was also used in SEAMLESS.

3.4.2 Significant results

An integrated simulation tool has been developed, that includes the MAGNET model for downscaling from world level till country level, and a downscaling tool from country level towards NUTS2 level.

An interface has been developed for easy downscaling of scenarios, and as an example stylized versions of the four scenarios developed in WP1 have been run. Results are presented from a worldwide till a NUTS2 level, where the ease of using the tool is impressive.

Procedures to process data from Eurostat towards a database that is useful as input for the downscaling model and for econometric analysis of the downscaling model has been developed. It includes checks on consistency of data from different sources, and explicit mapping procedures towards sectors used in the MAGNET model.

Econometric estimates have been made to underpin some coefficients of the downscaling model.

The downscaling model is flexible to include different policies in the downscaling procedures. Examples are structural funds or second pillar CAP policies.

The downscaling model includes:

- A shift share approach to tackle different sector composition in different regions.
- An explicit population and migration module
- A labour market
- A land market
- Land cover changes
- Results at different aggregation levels

A methodology has been developed for the interaction between local studies and downscaled results at a NUTS2 level. The downscaled results can be used as an environmental setting for local models, or as a context for stakeholder research. Stakeholder analysis and local models can be used as an input for the design and paramétrisation of the MAGNET model and the PRIMA downscaling methods.

A methodology is available to analyse the results of different downscaling methods.

3.5 WP6 | Improvement of Impact Assessment

The objectives of WP6 are:

1. To translate the transformed outputs of WP3 and 5 (i.e. population parameters and land-use change) into indicators that are comparable to the indicators that come out from WP4
2. To implement the impact assessment analysis
3. To enhance IA methodologies. Aim is (i) to confront PRIMA outputs to criteria defining the screening and the scope of SIA, SEA and EIA guidelines, (ii) to enhance these two dimensions of procedures assessment and by the way (iii) to increase impact assessment efficiency.

3.5.1 Progress towards the WP6 Objectives

Aim of the WP is the enhancement of IA methodology in the fields of screening, scoping and assessment. Indicators of the three main dimensions of sustainability (economic, social and environmental) for rural areas are extracted for the usage in PRIMA. The general methodological and theoretical discussion about the scaling down of policy impacts of the economic and land uses activities, with regard on potential results of ABM, aggregated models, policy analysis and stakeholder participation and Impact Assessment approaches is done.

Progress of the three main objectives of WP 6 was done (1) to discuss how to translate the transformed outputs of WP3, WP 4 and WP 5 into comparable indicators (D 6.2) (2) to structure the impact assessment analysis (D 6.2) and (3) to enhance IA methodologies (D 6.1, D6.4 reports, M 6.2 report. The methodological basis to confront PRIMA outputs to criteria defining the screening and the scope of SIA, SEA and EIA guidelines is now available.

3.5.2 Progress towards the WP6 Tasks

Task 6.1: Theory and methodology on SIA, SEA and EIA). A review of literature and theory on impact assessment analysis with special emphasis on eco-system and biodiversity functionalities in SIA, SEA and EIA and recent ongoing EU-projects is applied in the reports on M 6.1 and D 6.1. The review on SIAT has been updated during the project run according to the availability of results of those projects (D 6.1). The Screening methodologies and the identification of the most important impacts EU policies are analysed by WP 1 and are confronted with the essential impacts in terms of IA (D 6.2). A workshop about “theory and methodology of impact assessment in PRIMA in the context of SIA, SEA and EIA” was organized in Dortmund (M 6.2).

Task 6.2: SIA impact indicators and agent behaviours. A balanced list of impact indicators for ecologic, economic and social impacts to qualify land use changes on the basis of the CMEF (Common Monitoring and Evaluation Framework) was intensively discussed during PRIMA meetings (M 6.1 and D 6.2). The applicability of the indicators on agent behaviour is worked out together with WP3 for impact assessment and generalization (D 6.2). First discussions about thresholds concepts are applied.

Task 6.3: Impact matrix methods. Work was done for development of impact matrix to "translate" changes of land uses and agent behaviours to impact assessment (D 6.2). Results are depicted in M 6.3 and D6.3 .

Task 6.4: Screening and scoping. Screening analysis was done (in WP 1) to list measures proposed for inclusion into IA because of potential significant impacts on sustainability. Main aspects of screening and scooping are methodologically integrated in the D6.1 and D 6.2 reports. The full methodology for screening and scoping is the content of the 'Impact matrix methods' and also of the update of D 6.1 report. The handbook of efficient recommendations D6.4 includes the methodological advances of the PRIMA approach.

Task 6.5: The Guidelines for technical procedure are described in more details in D 6.5.

Task 6.6: Elaboration of GEO-compatible databases with all data from the project is described in D6.6. M 6.4 is available.

3.5.3 Significant results

The PRIMA Deliverable D6.4 "Handbook of efficient recommendations" as a summarising result of the multitude of interdisciplinary experience and work-together of the different PRIMA teams deals about the main methods 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 under the background of the experiences in Environmental Impact Assessment and Strategic Environmental Assessment.

Key recommendations (D6.4) are 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.

This report on "Report on the "Impact matrix methodology to "translate" changes of agent behaviours to impact assessment for ABM and aggregated models" (D6.3) includes three main parts. First the updating of the indicators usage in PRIMA focussed on the integrated modelling outputs from the agent-based model (WP 3), the micro-simulation model (WP 4) and the regional equilibrium model (WP 5). Second the methodology of impact matrices is addressed. Third the content of assessment indicators for Sustainability Impact Assessment (SIA) is discussed.

An updated PRIMA list of Indicators in the context of ABM, micro-simulation and regional model is linked to the workflow from modelling to impact

assessment. 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 of WP 5. Conclusions for the following application of impact matrices methods are stated. Matrices on potential impact indicators for ecological, economic and social impacts of economic activities were prototypically developed (primarily together with WP 3 and 4).

Last, With D6.5, PRIMA proposes a cookbook that provides guidelines for the assessment of decentralized policies, in a synthetic format and style, accessible to a broad non-academic audience.

3.6 Key scientific questions raised during the project, upcoming collaborations, dissemination

As explained above, several methodological analyses have been initiated during PRIMA project, such as:

- Making explicit the role of a model broker, the endorsement of which should improve the various interpretations of participants within stakeholders' interaction during model development. Scenario development has also proved an efficient tool to involve stakeholders in challenging a model.
- A general method for generating households from different available data at municipality level has been designed: at this level, only average data are available and the method enables to generate relevant individual data to be included in the models.
- The development of methods to reconstruct commuting network for regions where data was unavailable, developed methods to calibrate models with several number of variables and proposed new approaches to dynamically derive services jobs availability.
- Procedures to process data from Eurostat towards a database that is useful as input for the downscaling model and for econometric analysis of the downscaling model has been developed. It includes checks on consistency of data from different sources, and explicit mapping procedures towards sectors used in the MAGNET model.

Most of these advances will be further developed in research projects that the teams involved in PRIMA plan to design in a near future. Moreover, some concepts investigated within PRIMA already lead to extended local research projects:

- The methods developed within PRIMA for impact analysis of local policies under multilevel governance have interested local policy makers and we have been proposed to assist the DATAR Auvergne to perform the on-stage quantitative impact assessment of the *Massif Central* interregional funds. The small applied research project will start in February 2012.
- During PRIMA, we explored the drivers towards attractiveness of rural areas, which is an important theme for the Region Auvergne who granted a PhD allocation on this theme, start Spring 2012.

- Another issue raised was the importance of biodiversity and ecosystem services in well-being: following the various presentations of PRIMA results, several expertises have been requested on this topic, including CSRPN assistance (CSRPN is the *Conseil Scientifique Régional du Patrimoine Naturel d'Auvergne*).

We also plan to present the last outcomes of the project to the French stakeholders during an important conference that will hold in June 2012 among research for and With Regional Development in Clermont-Ferrand, France.

IPTS (JRC in Sevilla) is going to use MAGNET; they got a training to start with it, and we will cooperate in further development. This implies that the downscaling methods developed for PRIMA will become available for IPTS, too.

We participated to a survey managed by the FP7 NoE LIAISE (Linking Impact Assessment Instruments to Sustainability Expertise) who focus on making scientific tools available for policy impact assessment. Further collaboration with LIAISE is planned in the next months.

During the last PRIMA conference we invited the coordinator of the ERA-Net RURAGRI supported by the European Commission with the aims to foster agricultural research and sustainable development in rural areas.

We have been invited to join the International Program committee of the Conference Track "Policy Modelling" along the 26th European Conference on Modelling and Simulation ECMS 2012, which will be held May 29-June 1st 2012 in Koblenz, Germany and hosted by the University of Koblenz-Landau.

The PRIMA partners plan to develop collaborations upon these contacts.

4 USE AND DISSEMINATION OF FOREGROUND

Table 11*: LIST OF SCIENTIFIC (PEER REVIEWED) PUBLICATIONS, STARTING WITH THE MOST IMPORTANT ONES*

NO.	Title	Main author	Title of the periodical or the series	Number, date or frequency	Publisher	Place of publication	Year of publication	Relevant pages	Permanent identifiers (if available)	Open access
(*16*)	An iterative approach for generating statistically realistic populations of households'	Gargiulo, F	PLoS ONE	5(1)	PloS		2010	e8828	doi:10.1371/journal.pone.0008828	yes
(*17*)	Featured graphic: What's in a NUTS? Visualizing hierarchies of Europe's administrative/statistical regions	Hautdidier B.	Environment and Planning A	43(8)	Pion		2011	1754-1755	doi:10.1068/a4457	yes
(*18*)	Fostering the development of European regions: a spatial dynamic panel data analysis of the impact of cohesion policy	Turpin, N. ; Vedrine, L.	Regional Studies	Early Online, 08 Dec 2011	Taylor and Francis	London	2012	pending	doi:10.1080/00343404.2011.628930	Yes, on cemOA
(*19*)	Estimation strategies for Spatial Dynamic Panel using GMM. A new approach to the convergence issue of European regions	L. Védrine	Spatial Economic Analysis	5(2), june 2010	Taylor and Francis	London	2010	205-227	doi:10.1080/17421771003730711	Yes, on cemOA
(*20*)	The Role of the EC Rural Development Policy Over Multifunctional Land Use Activities	Kopeva D.	Economic Alternatives, UNWE.	forthcoming	UNWE, Bulgaria	Sofia	2011		http://alternativi.unwe.acad.bg/index-en.php	yes
(*21*)	Bulgarian Rural Development Policy Implementation and New Rural Paradigm.	Peneva M., Kopeva D.	Economic Alternatives, UNWE.	forthcoming	UNWE, Bulgaria	Sofia	2011	17-31	http://alternativi.unwe.acad.bg/index-en.php	yes
(*22*)	Analyzing demographic and economic simulation model results: a semi-automatic spatial OLAP approach	Mahboubi H.	Lecture Notes in Computer Science	6782	Springer		2011		doi:10.1007/978-3-642-21928-3_2	No but indexed in cemOA
(*23*)	Towards Sustainability Impact Assessment (SIA) of policies	Meyer B.C.	The Problems of Landscape Ecology	XXVIII	Polish association for landscape ecology		2011	201–208	http://www.paek.ukw.edu.pl/wydaw/vol28/201__pek_vol28_2010_Meyer.pdf	yes
(*24*)	A multidimensional model for data warehouses of	Mahboubi H.	International Journal of	1(2)	IGI Global		2010	1-19	doi:10.4018/jaeis	No but

	simulation results.		Agricultural and Environmental Information Systems - IJAEIS						.2010070101	indexed in cemOA
(25)	Critical analysis and assessment of EU policy on multifunctional land use activities in rural areas	Kopeva D.	Regional and Business Studies	3 (1)	Kaposvár University, Hungary		2011	271-287	http://journal.ke.hu/rbs/index.php/rbs/article/viewFile/45/53/	yes
(26)	Rural development in Istria: PRIMA-project-based preliminary	Njavro M.	Bulletin of Szent Istvan University, Special Issue	Special Issue	*Szent Istvan University, Hungary*		2011		ISSN 1586-4502	no

Links to the papers are available on the PRIMA Website: https://prima.cemagref.fr/the-outputs/publications/view

CemOA is the *Open Access* repository of Cemagref:

- 2 papers are stored as author manuscripts on CemOA, with an Open Access status
- 2 other papers are only indexed, due to licensing restrictions. An 'email to author' link is provided though.

Table 2: **LIST OF DISSEMINATION ACTIVITIES**

NO.	Type of activities	Main leader	Title	Event	Date	Place	Type of audience	Size of audience	Countries addressed
	Web	B. Hautdidier	PRIMA website : https://prima.cemagref.fr/				Research, civil society, policy makers	see Figure 5	Europe
	Presentation	L. Jelínek	Dissemination meeting of European Projects in the Czech Republic; organizer: UZEI - Kouty, Vysocina		2-3/12/2008	Czech republik	Research, civil society, policy makers		Czech Republik
(27)	Poster	N. Turpin	PRIMA, Prototypical Policy Impacts on Multi-functional Activities in rural municipalities	AgSAP conference 2009. Wageningen University and Research Centre [book of abstracts: 64-65]	10-12 March 2009	Wageningen (NL)	Scientific community	350	Europe
(28)	Presentation	L. Védrine	Estimation strategies for Spatial Dynamic Panel using GMM. A new approach to the convergence issue of European regions	8th International Workshop of Spatial Econometrics	June 2009	Besançon (France)	Scientific community	100	France
	Presentation	Kopeva D.	The PRIMA project	Annual Scientific Conference of the UNWE	September 2009	Sofia, Bulgaria	Scientific community		Bulgaria
(29)	Presentation	S. Ternes	Double modelling of the dynamic of activities in rural municipalities	7th Brazilian Congress of Agro-informatics (7. Congresso Brasileiro de Agroinformática)	21-25 September 2009	Brasil	Scientific community		
(30)	Presentation	E. Romstad	Understanding the demand side and coordinating the supply side for connected goods and services [link to paper]	EAAE 113th seminar: The role of knowledge, innovation and human capital in multifunctional agriculture and territorial rural development	December 9-11, 2009	Belgrade (Serbia)	Scientific community	300	Europe
(31)	Presentation	Turpin N.	Indicators for landscape change at different spatial scales	International Research Workshop "Towards improved measurement of landscape preferences: mixing methods and using GIS"	27th and 28th January 2010	Groningen, The Netherlands	Scientific community	25	Europe
	Presentation	Gargiulo F.	Link to data and main assumptions of the model	Seminar on modelling municipality dynamics IRES - Istituto di Ricerche Economico Sociali del Piemonte	April 19th 2010	Italy	Scientific community		

	Presentation	Mahboubi H.	Design of data warehouse for model results	Seminar in University of Tours Computer Science Laboratory	May 20th 2010	Tours, France	Scientific community		France
(32)	Presentation	L. Védrine	Fostering the endogenous potential development of European regions: a spatial panel data analysis of the cohesion policy on regional convergence over the period 1980-2005 [link to paper]	Regional Studies Association International Conference	May 24-25, 2010	Pecs, Hungary	Scientific community	350	Europe
(33)	Presentation	Meyer B.C.	Sustainability Impact Assessment (SIA) of policies.	ILECO 2010: 1st IALE-Europe Thematic Symposium on Landscape Ecological Knowledge in Practice	June 16-19 2010	Poznań, Poland	Scientific community	60	Europe
(34)	Presentation	L. Védrine	Fostering the endogenous potential development of European regions: a spatial panel data analysis of the cohesion policy on regional convergence over the period 1980-2005 [link to paper]	9th International Workshop of Spatial Econometrics	June 24-25, 2010	Orléans, France	Scientific community	120	Europe
(35)	Presentation	Védrine L.	Identifying impacts of regional policies on convergence in the presence of impact externalities	50th Congress of the Regional Science Association International (ERSA)	19-23 August 2010	Jonköping (Sweden)	Scientific community	200	Europe
(36)	Invited presentation	N. Turpin	PRIMA, scaling up of case studies.	TRUST/RUFUS Workshop: Diversities of rural areas in Europe and beyond,	August 25-26, 2010	Hannover (Germany)	Scientific community	80	Europe
(37)	Poster	M. Lenormand	From the Auvergne commuting network to every commuting network	ECCS'10: European Conference on Complex Systems [book of abstracts]	September 13-17, 2010	Lisbon, Portugal	Scientific community		Europe
(38)	Presentation	L. Védrine	Allocation des fonds structurels et interactions stratégiques: Existe-t-il une concurrence indirecte entre régions dans la demande d'aide au développement ?	Colloque ASRDLF – AISRE [conference website]	September 20-22, 2010	Aoste, Italy	Scientific community	200	Europe
(39)	Presentation	Hautdidier B.	Population and facilities, do they really scale? Empirical test and exploratory data analysis on French municipal data.	ThéoQuant 2011: Les 10es rencontres de Théo Quan [book of abstracts:198-199]	February 23-25, 2011	Besançon, France	Scientific community		France
(40)	Presentation	Njavro M.	Rural development in Istria: PRIMA-project-based preliminary	CASEE 2011: The EU Strategy for the Danube region – with specific emphasis on Land and Water Management and the Environment	April 28-29, 2011	St. Istvan University, Gödöllö, Hungary	Scientific community	100	Europe
(41)	Presentatio	Kopeva D.	Critical analysis of EU Policies on	3rd International Conference of	May 19-20,	Kaposvar,	Scientific community		Europe

	n		Multifunctional Land Use Activities in Rural Areas [book of abstracts: 83]	Economic Sciences	2011	Hungary			
(*42*)	Presentation	Kopeva D.	Assessing EU Policy Impacts on the Multifunctional Characters of Rural Areas.	2nd International Scientific Conference: Business and Regional Development. Rural Areas – a look towards Europe 2020,	June 22-23, 2011	Stara Zagora, Bulgaria	Scientific community		Europe
(*43*)	Poster	Meyer B.C.	PRIMA: Prototypical Policy Impacts on Multifunctional Activities in rural Municipalities.	3rd World Planning Schools Congress [conference website]	July 4-8, 2011	Perth, Australia	Scientific community	800	World
(*44*)	Presentation	Meyer B.C.	Modelling and Integration of multiple indicators for the Sustainability Impact Assessment (SIA) of policies	3rd World Planning Schools Congress [conference website]	July 4-8, 2011	Perth, Australia	Scientific community	800	World
(*45*)	Presentation	Meyer B.C.	Sustainability Impact Assessment - Methods Development for the Localization of Policy Impacts	IALE 2011: The 8th World Congress of the International Association for Landscape Ecology; landscape ecology for sustainable environment and culture [programme]	August 18-23, 2011	Beijing, China	Scientific community	1200	World
(*46*)	Poster	Meyer B.C.	PRIMA: Prototypical Policy Impacts on Multifunctional Activities in rural Municipalities.	IALE 2011: The 8th World Congress of the International Association for Landscape Ecology; landscape ecology for sustainable environment and culture [programme]	August 18-23, 2011	Beijing, China	Scientific community	1200	World
(*47*)	Presentation	Meyer B.C.	Recommendations for the methodological linkage of the modelling of potential policy impacts and Sustainability Impact Assessment (SIA)	IALE Europe Laufen Conference: implementation of landscape ecological knowledge in European urban practice [book of abstracts: 29-31]	September 20–22, 2011	Laufen, Germany	Scientific community	80	Europe
(*48*)	Presentation	Lenormand M.	Calibrating a complex social model	*ECCS'11: European Conference on Complex Systems*. [book of abstracts: 29]	September 12-16, 2011	Vienna, Austria	Scientific community	400	Europe
(*49*)	Presentation	Huet S.	Modelling a network rural municipalities: an individual-based approach	*ECCS'11: European Conference on Complex Systems*. [book of abstracts: 29]	September 12-16, 2011	Vienna, Austria	Scientific community	400	Europe
(*50*)	Poster	Kopeva D.	The Role of Multilevel Governance for Multifunctional Land Use Activities.[link to	2011 IASC European meeting: Shared Resources in a Rapidly Changing World. European Regional Conference	September 14-17, 2011	Agricultural University, Plovdiv,	Scientific community		

			paper]	of the International Association for the Study of the Commons		Bulgaria.			
(*51*)	conference	Lenormand M.	A commuting generation model requiring only aggregated data.	ESSA 2011: 7th European Social Simulation Association Conference *[conference website]*	September 19-23, 2011,	Montpellier, France	Scientific community		
(*52*)	conference	Huet S., Lenormand M., Deffuant G.	Modelling a network of rural municipalities.	ESSA 2011: 7th European Social Simulation Association Conference *[conference website]*	September 19-23, 2011,	Montpellier, France	Scientific community		
(*53*)	conference	Zhang Q.	Modeling Rural Residences' Decision Making of Activity Change	ESSA 2011: 7th European Social Simulation Association Conference *[conference website]*	September 19-23, 2011,	Montpellier, France	Scientific community	200	Europe
(*54*)	Thesis	Lionel Védrine	Interactions spatiales entre régions euro-péennes et politique de cohésion: quell effet sur el développement économique ?	PhD defence	April 22th, 2011	Clermont-Ferrand (France)	Scientific community	75	France
(*55*)	Thesis	Kenneth Rødseth	Treatment of undesirable outputs in production analysis: desirable modelling strategies and applications	PhD defence	August 19th, 2011	Aas (Norway)	Scientific community	75	Norway
(*56*)	Conference	Kopeva D.	Rural development and multifunctional agriculture in Bulgaria.	International Scientific Conference: Economic Policy and Agri-Food Sector	December 1, 2011	Warsaw Poland	Scientific community		
	Workshop	Railey M.	United Kingdom Stakeholders workshop		May, 2011	Bakewell, UK		15	UK
	Workshop	Schaft F..	German Stakeholders workshop		Septembre 2011	Hohenberg Krusemark, Germany		15	Germany
	Workshop	Barreteau O.	French stakeholders workshop		Avril 2011	Condat, France		30	France
	Flyer	Hautdidier B.	PRIMA, Prototypical Policy Impacts on Multifunctional Activities in rural municipalities						
	Press release	Turpin N.	Investigating Europe's rural policies	International Innovation	October 2010				

	Invited presentation	Turpin N.	Environnement et développement durable des zones rurales	Mois de l'environnement, Ambassade de France à Budapest	November 4-5, 2010	Budapest		75	Europe
	Presentation	Njavro M.	Presentation of PRIMA project	FP7 Info day , Organized by: University of Zagreb Faculty of Agriculture	13th of April 2011	Zagreb			
	Presentation	Njavro M.	Presentation of PRIMA project	FP7 Info Day: Energy and Environment - Organized by: University J.J. Strossmayer Osijek	6th of July 2011	Osijek			
	Presentation	Njavro M.	Presentation of PRIMA project	FP7 Workshop for scientists in the field of biotechnics and natural sciences. Organized by: University of Zagreb	27th of May 2010.	Zagreb			
	Conference		Evaluating Decentralized Policies: Challenges, Evaluation techniques and Policy impacts	PRIMA final conference	27-28 October 2011	Clermont-Ferrand, France	Scientific community, policy makers	65	Europe
	Other	Woltjet G.	share of model with IPTS (JRC in Sevilla)						

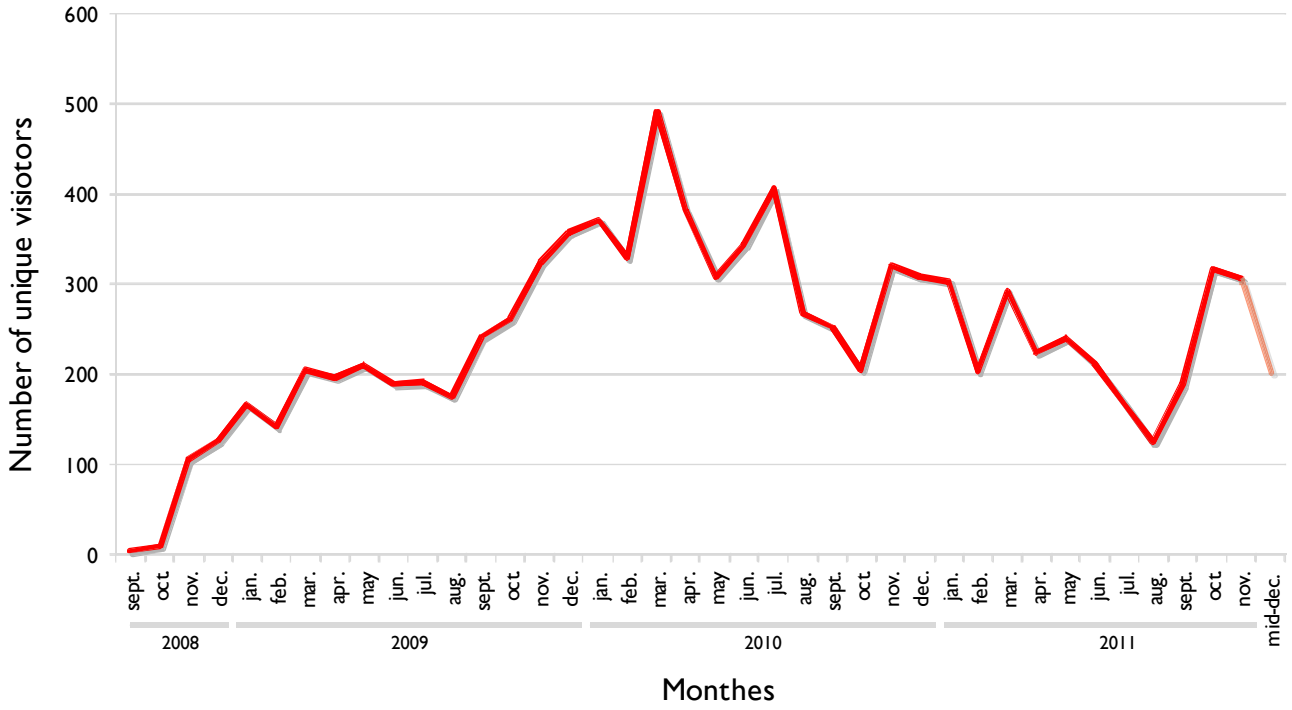


Figure 5 | PRIMA Website audience

The website's traffic, after having reached a peak in march 2010, oscillated during the 2nd reporting period around a modest but rather steady flow of 250 unique visitors per month. In addition to the nationalities of the prima consortium, the visitors' top ten countries include the United States, Austria, Switzerland, Canada and other European countries

Section B (Confidential or public: confidential information to be marked clearly)

Part B1

The applications for patents, trademarks, registered designs, etc. shall be listed according to the template B1 provided hereafter.

The list should, specify at least one unique identifier e.g. European Patent application reference. For patent applications, only if applicable, contributions to standards should be specified. This table is cumulative, which means that it should always show all applications from the beginning until after the end of the project.

TEMPLATE B1: LIST OF APPLICATIONS FOR PATENTS, TRADEMARKS, REGISTERED DESIGNS, ETC.					
Type of IP Rights:	Confidential Click on YES/NO	Foreseen embargo date dd/mm/yyyy	Application reference(s) (e.g. EP123456)	Subject or title of application	Applicant (s) (as on the application)

Part B2

Please complete the table hereafter:

Type of Exploitable Foreground	Description of exploitable foreground	Confidential Click on YES/NO	Foreseen embargo date dd/mm/yyyy	Exploitable product(s) or measure(s)	Sector(s) of application	Timetable, commercial or any other use	Patents or other IPR exploitation (licences)	Owner & Other Beneficiary(s) involved

In addition to the table, please provide a text to explain the exploitable foreground, in particular:

- Its purpose
- How the foreground might be exploited, when and by whom
- IPR exploitable measures taken or intended
- Further research necessary, if any
- Potential/expected impact (quantify where possible)

5 REPORT ON SOCIETAL IMPLICATIONS

A General Information

Grant Agreement Number:	212345
Title of Project:	Prototypical Policy Impacts on Multifunctional in rural municipalities
Name and Title of Coordinator:	Dr Ramon LAPLANA

B Ethics

1. Did your project undergo an Ethics Review (and/or Screening)? • If Yes: have you described the progress of compliance with the relevant Ethics Review/Screening Requirements in the frame of the periodic/final project reports?	***No***
2. Please indicate whether your project involved any of the following issues (tick box) :	***NO***
RESEARCH ON HUMANS	
• Did the project involve children?	
• Did the project involve patients?	
• Did the project involve persons not able to give consent?	
• Did the project involve adult healthy volunteers?	
• Did the project involve Human genetic material?	
• Did the project involve Human biological samples?	
• Did the project involve Human data collection?	
RESEARCH ON HUMAN EMBRYO/FOETUS	
• Did the project involve Human Embryos?	
• Did the project involve Human Foetal Tissue / Cells?	
• Did the project involve Human Embryonic Stem Cells (hESCs)?	
• Did the project on human Embryonic Stem Cells involve cells in culture?	
• Did the project on human Embryonic Stem Cells involve the derivation of cells from Embryos?	
PRIVACY	
• Did the project involve processing of genetic information or personal data (eg. health, sexual lifestyle, ethnicity, political opinion, religious or philosophical conviction)?	
• Did the project involve tracking the location or observation of people?	
RESEARCH ON ANIMALS	
• Did the project involve research on animals?	
• Were those animals transgenic small laboratory animals?	
• Were those animals transgenic farm animals?	
• Were those animals cloned farm animals?	
• Were those animals non-human primates?	
RESEARCH INVOLVING DEVELOPING COUNTRIES	
• Did the project involve the use of local resources (genetic, animal, plant etc)?	

• Was the project of benefit to local community (capacity building, access to healthcare, education etc)?	
DUAL USE	
• Research having direct military use	
• Research having the potential for terrorist abuse	

C Workforce Statistics

3. Workforce statistics for the project: Please indicate in the table below the number of people who worked on the project (on a headcount basis).

Type of Position	Number of Women	Number of Men
Scientific Coordinator	1	
Work package leaders	2	4
Experienced researchers (i.e. PhD holders)	17	21
PhD Students	2	4 [2]
Other	7	6

4. How many additional researchers (in companies and universities) were recruited specifically for this project?	**3**
(3 postdocs) Of which, indicate the number of men:	1

[2] one of these PhD students got a permanent position in a research center only one month after completing his PhD.

D Gender Aspects

5. Did you carry out specific Gender Equality Actions under the project?

○ Yes

6. Which of the following actions did you carry out and how effective were they?

		Not at all effective				Very effective
❑	Design and implement an equal opportunity policy	⊙	○	○	○	○
☒	Set targets to achieve a gender balance in the workforce	○	○	○	⊙	○
❑	Organise conferences and workshops on gender	⊙	○	○	○	○
❑	Actions to improve work-life balance	⊙	○	○	○	○
○	Other:					

7. Was there a gender dimension associated with the research content – i.e. wherever people were the focus of the research as, for example, consumers, users, patients or in trials, was the issue of gender considered and addressed?

○ Yes- please specify

⊙ No

E Synergies with Science Education

8. Did your project involve working with students and/or school pupils (e.g. open days, participation in science festivals and events, prizes/competitions or joint projects)?

○ Yes- please specify

⊙ No

9. Did the project generate any science education material (e.g. kits, websites, explanatory booklets, DVDs)?

○ Yes- please specify

⊙ No

F Interdisciplinarity

10. Which disciplines (see list below) are involved in your project?

⊙ Main discipline[3]: 1.1; 4.1; 5.2; 5.4

○ Associated discipline[3]: | ○ | Associated discipline[3]:

[3] Insert number from list below (Frascati Manual).

G Engaging with Civil society and policy makers

11a	**Did your project engage with societal actors beyond the research community?** *(if 'No', go to Question 14)*	○	Yes

11b If yes, did you engage with citizens (citizens' panels / juries) or organised civil society (NGOs, patients' groups etc.)?

- ○ No
- ○ Yes- in determining what research should be performed
- ⊙ Yes - in implementing the research
- ⊙ Yes, in communicating /disseminating / using the results of the project

11c	**In doing so, did your project involve actors whose role is mainly to organise the dialogue with citizens and organised civil society (e.g. professional mediator; communication company, science museums)?**	○	Yes

12. Did you engage with government / public bodies or policy makers (including international organisations)

- ○ No
- ○ Yes- in framing the research agenda
- ⊙ Yes - in implementing the research agenda
- ⊙ Yes, in communicating /disseminating / using the results of the project

13a Will the project generate outputs (expertise or scientific advice) which could be used by policy makers?

- ⊙ Yes – as a **primary** objective (please indicate areas below- multiple answers possible)
- ○ Yes – as a **secondary** objective (please indicate areas below - multiple answer possible)
- ○ No

13b If Yes, in which fields?

Agriculture		Energy		Human rights	
Audiovisual and Media		Enlargement		Information Society	
Budget		Enterprise		Institutional affairs	
Competition		Environment		Internal Market	
Consumers		External Relations		Justice, freedom and security	
Culture		External Trade		Public Health	
Customs		Fisheries and Maritime Affairs		Regional Policy	
Development Economic and Monetary Affairs		Food Safety		Research and Innovation	
Education, Training, Youth		Foreign and Security Policy		Space	
Employment and Social Affairs		Fraud		Taxation	
		Humanitarian aid		Transport	

13c If Yes, at which level? ⦿ Local / regional levels ⦿ National level ⦿ European level ○ International level	
H Use and dissemination	
14. How many Articles were published/accepted for publication in peer-reviewed journals?	**11**
To how many of these is open access[4] provided?	**8**
How many of these are published in open access journals?	**6**
How many of these are published in open repositories?	**2** (authors manuscript on CemOA, the Cemagref repository)
To how many of these is open access not provided?	**3**
Please check all applicable reasons for not providing open access:	
☑ publisher's licensing agreement would not permit publishing in a repository ❑ no suitable repository available ❑ no suitable open access journal available ❑ no funds available to publish in an open access journal ❑ lack of time and resources ❑ lack of information on open access ❑ other[5]: ……	2 of the 3 remaining papers are indexed in CemOA, with an 'email to author' link. Cf. Prima website

15. How many new patent applications ('priority filings') have been made? *("Technologically unique": multiple applications for the same invention in different jurisdictions should be counted as just one application of grant).*		**0**
16. Indicate how many of the following Intellectual Property Rights were applied for (give number in each box).	Trademark	**0**
	Registered design	**0**
	Other	**0**

[4] Open Access is defined as free of charge access for anyone via Internet.

[5] For instance: classification for security project.

17. How many spin-off companies were created / are planned as a direct result of the project?	**0**
Indicate the approximate number of additional jobs in these companies:	

18. Please indicate whether your project has a potential impact on employment, in comparison with the situation before your project:

❑	Increase in employment, or	❑	In small & medium-sized enterprises
❑	Safeguard employment, or	❑	In large companies
❑	Decrease in employment,	❑	None of the above / not relevant to the project
☒	Difficult to estimate / not possible to quantify		

19. For your project partnership please estimate the employment effect resulting directly from your participation in Full Time Equivalent (FTE = one person working fulltime for a year) jobs:	*20*
Difficult to estimate precisely	❑

I Media and Communication to the general public

20. As part of the project, were any of the beneficiaries professionals in communication or media relations?

○ Yes ⊙ No

21. As part of the project, have any beneficiaries received professional media / communication training / advice to improve communication with the general public?

○ Yes ⊙ No

22 Which of the following have been used to communicate information about your project to the general public, or have resulted from your project?

☒	Press Release	❑	Coverage in specialist press
☒	Media briefing	❑	Coverage in general (non-specialist) press
❑	TV coverage / report	❑	Coverage in national press
❑	Radio coverage / report	❑	Coverage in international press
☒	Brochures /posters / flyers	☒	Website for the general public / internet
❑	DVD /Film /Multimedia	❑	Event targeting general public (festival, conference, exhibition, science café)

23 In which languages are the information products for the general public produced?

❑	Language of the coordinator	☒	English
☒	Other language(s)		

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