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System for Environmental and Agricultural Modelling;
Linking European Science and Society

Approach towards an operational tool to apply institutional analysis for the assessment of policy feasibility within SEAMLESS-IF

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Report no.: 29
July 2007
Ref: D2.4.2
ISBN no.: 90-8585-117-3
and 978-90-8585-117-2

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Sixth Framework Programme

SEAMLESS integrated project aims at developing an integrated framework that allows ex-ante assessment of agricultural and environmental policies and technological innovations. The framework will have multi-scale capabilities ranging from field and farm to the EU25 and globe; it will be generic, modular, and open and using state-of-the art software. The project is carried out by a consortium of 30 partners, led by Wageningen University (NL).

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“This publication has been funded under the SEAMLESS integrated project, EU 6th Framework Programme for Research, Technological Development and Demonstration, Priority 1.1.6.3. Global Change and Ecosystems (European Commission, DG Research, contract no. 010036-2). Its content does not represent the official position of the European Commission and is entirely under the responsibility of the authors.”

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Schleyer. C., Theesfeld, I., Hagedorn, K., Aznar, O., Callois, J.M. et al., 2007. Approach towards an operational tool to apply institutional analysis for the assessment of policy feasibility within SEAMLESS-IF, SEAMLESS Report No.29, SEAMLESS integrated project, EU 6th Framework Programme, contract no. 010036-2, www.SEAMLESS-IP.org, 169 pp, ISBN no. 90-8585-117-3 and 978-90-8585-117-2.

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General Part

Objective within the Project

This Deliverable D2.4.2 comprises the work done by Task 2.4 (Activities 2.4.1-3) on the development of indicators characterising policy delivery systems and institutional environments. Task 2.4 addresses, in particular, the issue of the institutional conditions required to implement policies that acknowledge and promote sustainability and multifunctional aspects of agriculture. The final goal of Task 2.4 is to produce ex-ante an institutional assessment of agri-environmental policy options through their impact on the contribution of agriculture to sustainable development. This work will continue in WP 6, in particular in Task 6.4 where the "Procedure for Institutional Compatibility Assessment (PICA)" introduced in this Deliverable will be tested, improved, and further integrated in SEAMLESS-IF.

General Information

Task(s) and Activity code(s):	Task 2.4 Activity 2.4.1-3
Input from (Task and Activity codes):	Task 2.2; (Task 4.5)
Output to (Task and Activity codes):	Task 1.3; Task 2.2; Task 6.4
Related milestones:	M 2.4.1

Executive Summary

This Deliverable D2.4.2 comprises the work done by Task 2.4 (Activities 2.4.1-3) on the development of indicators characterising policy delivery systems and institutional environments. Task 2.4 addresses, in particular, the issue of the institutional conditions required to implement policies that acknowledge and promote sustainability and multifunctional aspects of agriculture. The final goal of Task 2.4 is to produce ex-ante an institutional assessment of agri-environmental policy options through their impact on the contribution of agriculture to sustainable development. For this purpose, the "Procedure for Institutional Compatibility Assessment (PICA)" has been developed as a formalised methodology to assess the compatibility between policy options and various institutional contexts.

In the introductory Section 1, the terms and concepts *Institutions*, *Institutional Change*, and *Institutions for Sustainability* are defined according to their utilisation in Task 2.4 and in the SEAMLESS-IF. *Institutions* are defined as the formal and informal rules of a society or of organisations that facilitate coordination among people by helping them form expectations. They also function as constraints that shape human interaction and the enforcement characteristics of these constraints. Institutions are not static, but dynamic, i.e. they evolve and change over time. Those processes of *institutional change* can be induced by a large

variety of triggers, such as new policies. *Institutions for Sustainability* are all institutional arrangements that help policies aiming at integrative sustainable development, i.e. integrating economic, social, and environmental dimensions of sustainability, to become effective.

Further, a *state-of-the-art review on institutional indicators* (based on PD2.4.1) that was carried out at an early stage of Task 2.4 in order to assess the suitability of existing approaches and indicators for ex-ante institutional analysis of policy options is summarised. The institutional indicators found in the literature can be divided into *four clusters* that reflect their origin in the literature as well as their characteristics and purpose: *good governance, social capital, institutions as the fourth dimension of sustainability, and transaction costs.* The review revealed that only few indicators are focussing on the aspects and perspectives that are relevant in SEAMLESS. Above all, most indicators have been developed and used for ex-post assessments of policies, or other forms of ex-post analysis. Yet in some other crucial areas, indicators are simply missing. In essence, there are only a limited number of appropriate indicators (proxies and variables) that can be made operational for institutional analysis in SEAMLESS. More precisely, the indicators not always fulfil scientific qualitative criteria, such as being *indicative, robust*, and *sensitive* and the causal relations between different indicators are often not clearly defined. Appendix 1 contains an extensive description and discussion of these clusters.

The subsequent Section 2 introduces the concept of institutional analysis in SEAMLESS-IF. In particular, the *institutional compatibility* approach is described. It refers to the compatibility between policy instruments and the respective institutional context to assess the effectiveness and efficiency of policymaking. Cost-efficiency and effectiveness of policies depend on the institutional arrangements (property rights and governance structures) in place. On the one hand, appropriate institutions increase the likelihood of actually achieving the policy objectives. On the other hand, appropriate institutions ensure that these policy objectives are achieved at reasonable costs.

Further, the contributions of institutional analysis to the *pre-modelling* as well as to the *post-modelling phase of SEAMLESS-IF* are highlighted. In the *pre-modelling phase*, first, components of PICA will be used to select and modify policy scenarios in the pre-modelling phase (see PD6.2.1.2). In particular, it will assist in developing an institutional typology of countries and regions for the definition of policy scenarios. Second, PICA will provide hints on whether institutional constraints in some or many countries and/or regions are likely to be prohibitive and the policy option will hardly become effective there. In the *post-modelling phase*, PICA will put the mainly quantitative model results into (institutional) context. This contributes to the validation of the model results on policy effects.

Section 3 focuses on the "Procedure for Institutional Compatibility Assessment (PICA)" that has been developed as a formalised methodology to assess the compatibility between policy options and various institutional contexts, thus, providing the conceptual basis for an institutional dimension in modelling. PICA comprises four distinct working steps: 1) clustering policy options according to the type of intervention, the area of intervention, possibly involved property rights changes, and the type of the natural resource(s) addressed by the policy options; 2) Linking each policy cluster to specific sets of crucial institutional aspects; 3) Using institutional indicators to evaluate the respective crucial institutional aspect, i.e. the degree of its potential to constrain or to foster implementation of the policy option; 4) Deriving statements - arranged in thematic categories of institutional compatibility - about the probable effectiveness of the policy options from an institutional perspective depending on the combination and degree of the identified relevant institutional aspects.

In Section 4, PICA is applied to the SEAMLESS Test Case 1 (Trade Liberalisation) and Test Case 2 (here: Nitrate Directive) to illustrate in a detailed way the concrete steps of institutional compatibility analysis within SEAMLESS.

Finally, the concluding Section highlights the necessary steps for making PICA operational within SEAMLESS-IF. This is complemented by a detailed visual depiction of the sequence and the form of interactions between the User(s), the PICA expert team, other SEAMLESS Working Groups and - if applicable - external experts and stakeholders in Appendix 3. The depiction also provides suggestions on the representation of the different PICA components in the Graphical User Interface (GUI).

Scientific and Societal Relevance

While the relevance of institutional analysis for assessing the effectiveness and cost-efficiency of (agri-environmental) policy implementation is largely accepted among scientists, the state-of-the-art in institutional economics offers hardly any standardised procedure for institutional analysis that can easily be combined with environmental and agricultural models widely used for ex-ante policy impact assessment. This Deliverable aims at filling this gap by introducing - at a conceptual level – a formalised methodology to assess the compatibility between policy options and various institutional contexts: the “Procedure for Institutional Compatibility Assessment (PICA)”. It will also present in detail information on missing data and other scientific information, thus, indicating knowledge gaps and assisting in clarifying future research needs.

PICA allows for the systematic institutional ex-ante assessment of (agri-environmental) policies. This enables policy makers to identify at an early stage (potential) institutional incompatibilities between policy options and the various institutional contexts in different countries and regions. In addition, PICA can provide hints for a better policy design in terms of effectiveness and cost-efficiency.

Specific Part: Institutional Analysis for the Assessment of Policy Feasibility

1 Introduction

Sustainable resource use often fails, among other reasons, due to missing or inadequate institutional arrangements, policy makers often assume to be in place. This reasoning draws on political science and institutional economics literature and is substantiated with ample empirical cases given, for instance, in the common-pool resource debate (Dovers, 2001; Esty et al., 2005; Meinzen-Dick and Knox, 2001; Ostrom, 1990; Pellegrini, 1999; Pistor, 2002; Theesfeld, 2004). Often the effective institutional arrangements are ignored and policies that are not compatible with the existing formal and informal rules of society are implemented. Thus, the policy turns out to be ineffective although it aims at integrative sustainable development. In turn, policies aiming at integrative sustainable development, i.e. integrating economic, social, and environmental dimension of sustainability, often require special institutional arrangements to reach their aims.

This Deliverable D2.4.2 comprises the work done by Task 2.4 (Activities 2.4.1-3) on the development of indicators characterising policy delivery systems and institutional environments. Task 2.4 addresses, in particular, the issue of the institutional conditions required to implement policies that acknowledge and promote sustainability and multifunctional aspects of agriculture. The final goal of Task 2.4 is to produce ex-ante an institutional assessment of agri-environmental policy options through their impact on the contribution of agriculture to sustainable development.

Institutions are defined as the formal and informal rules of a society or of organisations that facilitate coordination among people by helping them form expectations. They also function as constraints that shape human interaction and the enforcement characteristics of these constraints.

The Deliverable is structured as follows:

First, in this introductory Section 1, the terms and concepts *Institutions*, *Institutional Change*, and *Institutions for Sustainability*[1] are defined according to their utilisation in Task 2.4 and in the SEAMLESS-IF. Further, the main results of an extensive review on research and literature on institutional indicators are summarised (based on PD2.4.1). This *state-of-the-art review on institutional indicators* was carried out at an early stage of Task 2.4 in order to assess the suitability of existing approaches and indicators for ex-ante institutional analysis of policy options. Four *clusters of institutional indicators that reflect their origin in the literature as well as their characteristics and purpose* can be distinguished: good governance, social capital, institutions as the fourth dimension of sustainability, and transaction costs. Appendix 1 contains an extensive description and discussion of these clusters.

The subsequent Section 2 introduces the concept of institutional analysis in SEAMLESS-IF. In particular, the idea of *Institutional Compatibility* - the compatibility between a policy and

[1] The terms *sustainability* and *sustainable development* are used synonymously. The latter term was coined by the Brundtland Report in 1987 (WCED, 1987).

the respective institutional context – is elaborated on. Further, the different roles of institutional analysis within SEAMLESS-IF is described. Institutional analysis is contributing to the *pre-modelling* as well as to the *post-modelling analysis*.

In the *pre-modelling phase*, first, components of PICA will be used to select and modify policy scenarios in the pre-modelling phase (see PD6.2.1.2). In particular, it will assist in developing an institutional typology of countries and regions for the definition of policy scenarios. Second, PICA will provide hints on whether institutional constraints in some or many countries and/or regions are likely to be prohibitive and the policy option will hardly become effective there. As a result, it could be recommended - and discussed with the User(s) - to modify the policy option or to carry out additional in-depth institutional pre-studies before running the other models. In the *post-modelling phase*, PICA will put the mainly quantitative model results into (institutional) context. This contributes to the validation of the model results on policy effects.

Section 3 focuses on the "Procedure for Institutional Compatibility Assessment (PICA)" that has been developed as a formalised methodology to assess the compatibility between policy options and various institutional contexts, thus, providing the conceptual basis for an institutional dimension in modelling. PICA comprises four distinct working steps that are subsequently described in more detail: 1) clustering policy options according to the type of intervention, the area of intervention, possibly involved property rights changes, and the type of the natural resource(s) addressed by the policy options; 2) Linking each policy cluster to specific sets of crucial institutional aspects; 3) Using institutional indicators to evaluate the respective crucial institutional aspect, i.e. the degree of its potential to constrain or to foster implementation of the policy option; 4) Deriving statements - arranged in thematic categories of institutional compatibility - about the probable effectiveness of the policy options from an institutional perspective depending on the combination and degree of the identified relevant institutional aspects.

In Section 4, PICA will be applied to the SEAMLESS Test Case 1 (Trade Liberalisation) and Test Case 2 (here: Nitrate Directive[2]) to illustrate in a detailed way the concrete steps of institutional compatibility analysis within SEAMLESS.

Finally, the concluding Section will highlight the necessary steps for making PICA operational within SEAMLESS-IF. The description of the steps is complemented by a detailed visual depiction of the sequence and the form of interactions between the User(s), the PICA expert team, other SEAMLESS Working Groups and - if applicable - external experts and stakeholders in Appendix 3. The depiction also provides suggestions on the representation of the different PICA components in the Graphical User Interface (GUI).

1.1 Institutions

The basic functions of institutions are defined in accordance with the understanding of institutions prevailing in institutional economics and most areas of social sciences. Institutions are the rules of a society or of organisations that facilitate coordination among people by helping them form expectations, which each person can reasonably hold in dealing with others (Blaas, 1982). They reflect the conventions that have evolved in different

[2] While Test Case 2 in SEAMLESS will address environmental policies and agro-ecological technologies to preserve water resources and biodiversity, there is no final decision on the concrete policy option, yet. For illustrating the basic functions of PICA, the Nitrate Directive as an important water-related environmental policy will be focussed on.

societies regarding the behaviour of individuals and groups relative to their own behaviour and the behaviour of others.[3] Institutions are the rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction. They are made up of formal constraints (e.g., rules, laws, and constitutions), informal constraints (e.g., norms of behaviour, conventions, and self-imposed codes of conduct), and their enforcement characteristics. In consequence they structure incentives in human exchange, whether political, social, or economic (North, 1990: 3; North, 1994: 359).

In particular, "an institution can be defined as the set of working rules that are used to determine who is eligible to make decisions in some arena, what actions are allowed or constrained, what aggregation rules will be used, what procedures must be followed, what information must or must not be provided, and what payoffs will be assigned to individuals dependent on their actions" (Ostrom, 1990: 51). It is useful to distinguish three levels of rules that affect the actions taken and outcomes obtained in using a resource. These levels of rules may appear on each geographical scale.

1) *Operational rules* directly affect the day-to-day decisions made by appropriators concerning when, where and how to withdraw resource units, what information must be exchanged or withheld, and what rewards or sanctions will be assigned.

2) *Collective-choice rules* indirectly affect operational choices. These are the rules that are used by appropriators, their officials, or external authorities in making policies.

3) *Constitutional-choice rules* affect operational activities and result through their effects in determining who is eligible and determining the specific rules to be used in crafting the set of collective-choice rules that in turn affect the set of operational rules.

Here, Ostrom (1999: 52ff.) stresses that those rules are "nested". This means that the presence of some rules governs the choice of other rules (at other levels). For instance, an operational rule is that farmers are not allowed to take specific actions in farming their land. In some protected areas, they are not allowed to apply fertilisers and pesticides on their land (to ensure the quality of drinking water). Thus, farmers would adapt their production techniques in their day-to-day decisions accordingly, and would apply neither fertilisers nor pesticides. Of course, farmers could also opt for disregarding the rule, e.g., because there is no (effective) monitoring of compliance with the rule.

The collective choice rule defines how the above-mentioned regulation, i.e. the operational rule is established. This would include the definition of who (which actor or group of actors) is eligible to decide (establish, modify, and eliminate) on the operational rule and how the process of decision-making has to be structured. There might be actors at all administrative and political levels involved in defining the operational rules. For example, considering the designation of protected areas in Germany, the legislative framework is set at the national level, whereas detailed restrictions and requirements are defined in Federal State (*Laender*) acts. For instance, protected areas, such as nature reserves, are subject to stronger protection and the specific restrictions are determined, monitored, and enforced by the (local) administration of the nature reserves. Thus, in Germany, authorities at the *Laender* level can initiate the process of designation of a protected area but they have to follow the corresponding collective choice rules (determined in the respective national and *Laender*

[3] In the area of economic relations, they play a crucial role in establishing expectations about the rights to use resources in economic activities and about the partitioning of the income streams resulting from economic activity (Ruttan, 1984: 2f.).

acts) including rules on the process of setting up this area, such as compulsory stakeholder participation.

Collective choice situations (here, *Laender* designating protected areas and defining the corresponding land use restrictions using specific procedures) are structured by rules determined at a constitutional choice level. A constitutional choice rule is Germany's constitution, determining the federal character of the political and administrative structures, i.e. the distribution of competencies between the national level and Germany's 16 *Laender*. In that system, environmental protection including the designation of protected areas is in the responsibility of the *Laender*.

Finally, there is an important distinction between institutions and organisations. State agencies or other collective actors are *organisations*, yet, they obtain their meaning from institutions. In other words, organisations only exist because there is a set of working rules that defines them (Bromley, 1989: 43). Governance is often referred to as what governments do. However, when resource users govern themselves under customary institutions, e.g., managing natural resources locally, this often does not involve the state (directly). Yet, indirectly, the state is often involved even in the establishment of local resource management systems (e.g., providing the legal framework or financial support).

From these definitions, the functions of institutions can be summarised as giving structure, building expectations, and setting constraints to human interactions.

1.2 Institutional Change

Institutions are not static, but dynamic, i.e. they evolve and change over time. This is called institutional change. The large amount of theoretical literature on institutional change will not be explored here. However, it is emphasised that processes of institutional change can be induced by a large variety of triggers; not only by politicians implementing a new policy. More precisely, those triggers can start institutional change, but they can also aggravate, divert, and hamper ongoing processes of institutional change. Some examples are:

- *Implementation of a new policy:* The implementation of the EU Nitrate Directive, for instance, induces a change in the property rights of farmers on their land (see Section 4.2). Among other things, they are no longer allowed to use as much fertilisers on their land as they want. In order to make enforcement of this policy effective new controlling and monitoring systems will have to be introduced or existing ones changed, thus, the *governance structures*[4] will change. Here, new actors might become involved (e.g., some state authority responsible for monitoring farmers' behaviour and/or sanctioning misconduct). It is important to note, that the introduction of such a policy is - at the same time - a starting point for processes of institutional change *and* the outcome of a previous process of institutional change. In this example, the EU Nitrate Directive can be seen as a new (formal) rule governing the activities of farmers as a response to an increasing pollution of (ground) water due to the use of fertilisers on agricultural land. Policies can also be designed to change informal rules, such as understanding and perceptions of farmers related to fertiliser use. In such cases, policies aim at implementing good management practices, well-equipped and educated advisory systems, and arenas for communication and learning.

[4] *Governance structures* are the organisational solutions for making rules (institutions) effective, i.e. they are necessary for guaranteeing the rights and duties and their use in coordinating transactions. (e.g., Ostrom, 1990)

- *New transactions*[5] *may occur* that cause conflicts between actors and other problems: For example, due to technological innovations and their introduction in agriculture, new transactions can evolve, such as seeds from genetically modified organisms (GMO) blown to a neighbouring field planted with organic crops. For the organic farmer, this constitutes an unwanted problem - causing transaction costs[6] since he or she might not be able to market his or her crops as "organic". Outcomes of an institutional change induced by the wind-born transport of GMO seeds or pollen to a non-GMO-field (organic or conventional) might include new or adapted governance structures (or, at least, the need for it), e.g., fencing mechanisms, forming of GMO-free zones by farmers, and the introduction of a new EU Directive or national (liability) law on GMO.
- *New technologies may also induce changes of the properties of an already existing transaction (economic exchange):* For example, fishing in the Baltic Sea is an activity that leads - due to the characteristics of the resource, the involved actors, and the institutional arrangements (property rights and governance structures) in place - to the problem of over-fishing. The result is the depletion of the fish resource. Now, if it would be possible to operate a beam from a satellite that is able to register every single fishing boat this would allow the actors operating the beam to control the access to the Baltic Sea, and, perhaps, to sanction illegal access. This would change the character of the Sea from a common-pool resource – with low excludability and high rivalry in consumption - towards a resource with the character of a private good with high rivalry but also the possibility to exclude resource users from the resource system. This could lead to institutional change within the governance structures and the property rights and duties connected with fishing in the Baltic Sea. Since monitoring access to the Sea is easy now, establishing a private property regime over the resource Baltic Sea would be feasible and enforceable (given the ability of owner(s) to prosecute illegal access). In other words, a new technology – here, reducing the costs for monitoring resource use - might enable new modes of governance, i.e., provide new options to govern a resource-depleting activity or transaction. Another example is the introduction of Global Positioning System (GPS)-based Precision Farming that is effectively mitigating the problem of overuse of fertilisers and, thus, pollution of groundwater with nitrates.
- *Other triggers for institutional change might include changed price relations at product markets* that are caused, for example, by changed consumer preferences for organically produced food. Here, state or private organisations might evolve establishing (new) governance systems to monitor and sanction the production of organic produce or to co-ordinate marketing activities.
- *External shocks*, such as floods and other natural catastrophes, but also *rapid political and social system transformations*, e.g., in the Eastern European Countries (EEC), can trigger institutional change.

[5] *Transactions* (economic exchanges) are the basic unit of analysis in New Institutional Economics (NIE). That is distinct from other units of analysis widely used in environmental and resource economics, such as externalities, public goods, resource utilisation, and common pool resources. Following Williamson (1985: 1), "a transaction occurs when a good or service is transferred across a technological separable interface". See Section 1.4 in Appendix 1 for a more differentiated discussion of transaction characteristics in the field of agri-environment.

[6] *Transaction costs* comprise ex-ante costs of drafting, negotiating, and safeguarding an agreement but also the ex-post costs for maladaptation and adjustment that arise when contract execution is misaligned because of gaps, errors, omissions, and unanticipated disturbances: the costs of running the economic system (Williamson, 1996).

The discussion of the variety of possible triggers for institutional change leads to another important question: What actually determines the outcomes of a specific process of institutional change? What are relevant driving forces? For example, why does the introduction of GMOs in agriculture (for commercial usage) in Germany lead farmers in some regions to act co-operatively by forming GMO-free zones, but not in other regions? Why does privatisation of agricultural land, more precisely, the introduction of private property rights on land in some EEC countries lead to cost-efficient and competitive forms of agricultural land use, but not in others? Prominent theories trying to explain outcomes of institutional change include a) the Efficiency Theories of Institutional Change focusing on efficiency aspects and on competitive pressure as selection mechanisms for cost-efficient institutions (Eggertsson, 1990: 53; Allio et al., 1997), b) the Distributional Theory of Institutional Change explaining institutional change "as a by-product of strategic conflict over substantive social outcomes" (Knight, 1992: 126), and c) the Public Choice Theory of Institutional Change concentrating on the activities of political actors to govern and to control changes in institutions (Meyer, 1996; Weimer, 1997).

Moreover, institutions are not only modified intentionally, but institutional change does also happen spontaneously (Furubotn and Richter, 2000). Furthermore, institutional change can have both, intended and unintended outcomes.

1.3 Institutions for Sustainability

In the course of evaluating the progress in implementing Agenda 21, the Commission on Sustainable Development of the United Nations (UNCSD) defined sustainability as having four dimensions (Spangenberg and Bonniot, 1998; Spangenberg et al., 2002). Besides the economic, social, and environmental dimension, institutions are defined as the fourth dimension of sustainability. The same reasoning is applied in the MATISSE project (Methods and Tools for Integrated Sustainability Assessment) funded within the 6th Framework Program of the European Union. MATISSE starts from the assumption that no single tool or instrument can capture all stages and dimensions of sustainability. It calls for "new and improved tools and methods that integrate the social, economic, environmental, and institutional dimension of sustainability" (Weaver, 2005: 50). MATISSE follows a dual track approach, combining a pragmatic need to improve and inter-link existing tools and simultaneously develop a new generation of specifically designed *Integrated Sustainability Assessment Tools*. The process of methodological development highlights, in particular, institutional aspects as one dimension of sustainability. Likewise, in SEAMLESS, the fourth dimension represents an important challenge to fully integrate economic, social, and environmental sustainability objectives within the necessary institutional structures. Patterns of unsustainable behaviour have emerged over long periods of time and are highly resistant to change. They are largely determined by institutional arrangements. "Without institutional change we will not move purposefully toward sustainability" (Dovers, 2001).

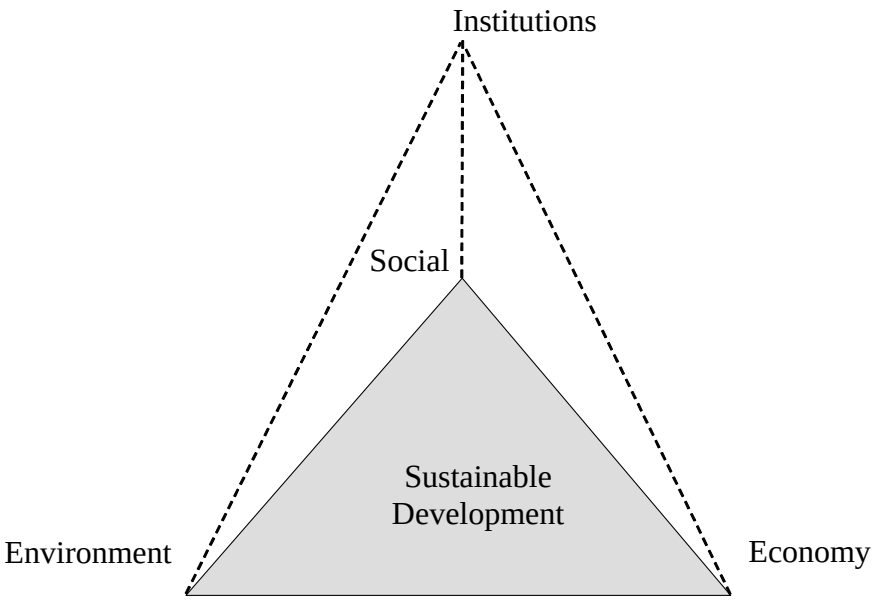

Figure 1: Institutions for Sustainability – The Fourth Dimension

Institutions include mechanisms that facilitate or hamper decision-making aiming at sustainability by political actors. Further, institutional arrangements affect (positively or negatively) the implementation of rules by the authorities and the behaviour in following these rules by farmers and other actors. Depending on the (natural) resource characteristics, those institutions that allow for sustainable development are often accompanied by specific governance structures, such as horizontal non-market coordination. This includes, for example, various forms of cooperation and collective action (Ostrom, 1990; Ostrom et al., 1994), formal and informal networks as knowledge and information systems, and methods and infrastructure for measuring, monitoring, and evaluating environmental damages and benefits, but also conflict resolution mechanisms and incentives and opportunities to promote innovation and learning (Hagedorn et al., 2002). These governance structures range from informal to formal, and their scales vary from local to international. Paavola and Adger (2005) coin this "environmental governance" and refer to the creation of new organisations, such as the establishment of environmental agencies or the delegation of authority to existing agencies to undertake governance activities.

In the SEAMLESS project, the ex-ante assessment of the impacts of policy options on sustainable development is at the core. Here, policies aiming at sustainable resource use might call for new, existing, or adapted forms of environmental governance in order to become cost-efficient and effective[7]; thus, policy makers might want to encourage or implement those forms of environmental governance in complementary policies, or modify the original policy accordingly. In this context, Dovers (2001: 4) stresses that institutions for sustainability must be persistent over time, be obedient to core principles, be informed and informing, be inclusive of a variety of interests, and be sufficiently flexible to learn and improve.

[7] *Effectiveness* refers to the accuracy and completeness with which the specified goals/policy objectives can be achieved. *Cost-efficiency* (or, cost-effectiveness) is determined by relating the resources (costs) expended to the accuracy and completeness of goals/policy objectives achieved.

1.4 State of the Art of Institutional Indicators

In order to assess the suitability of existing approaches and indicators for ex-ante institutional analysis of policy options an extensive research and literature review capturing the *state-of-the-art of institutional indicators*[8] was carried out at an early stage of Task 2.4 (PD2.4.1). Institutional analysis, in particular with respect to indicator development and methodological issues, is a comparatively young, yet growing area of research. For example, the United Nations Commission for Sustainable Development (UN, 2001) concluded from the testing period of their core set of indicators for sustainable development, that the institutional area need further development and refinement in comparison to the other three dimensions. Further, Guinomet (1999) carried out a comparative study on indicators for sustainable development in 26 initiatives by international organisations, research institutes, and governments. He found that both, institutional aspects and institutional indicators play a rather minor role. Only five of 26 projects mention institutional aspects at all, only two name institutional indicators, and in none of the projects institutional aspects are treated as of primary importance.

Underlining the above observations, the state-of-the-art review carried out by Task 2.4 revealed that only few indicators are focussing on the aspects and perspectives that are relevant in SEAMLESS. Above all, most indicators have been developed and used for ex-post assessments of policies, or other forms of ex-post analysis. Yet in some other crucial areas, indicators are simply missing. For example, the indicators scrutinized in this Section and in the Appendix 1 miss institutional aspects that are crucial when analysing the effectiveness and efficiency of policy implementation, such as effective property rights (i.e., rules-in-use) on nature components and proxies for effective governance structures at a certain geographical scale.

In essence, there are only a limited number of appropriate indicators that can be used directly for institutional analysis in SEAMLESS. More precisely, the indicators not always fulfil scientific qualitative criteria, such as being *indicative*, i.e. truly representing the phenomenon intended to characterised, *robust*, i.e. directionally safe with not significant changes in case of minor changes in the methodology or improvements in the data base, and *sensitive*, i.e. reacting early and sensibly to changes in what they are monitoring. Additionally, the causal relations between different indicators are often not clearly defined.

However, the mere existence of some indicators that are already operational, i.e. which have an accessible data set, and are indicative, robust, and sensitive does not mean that they are appropriate for the objectives of institutional analysis in SEAMLESS. In SEAMLESS it is aimed at measuring the impact of policies on sustainability and to assess the institutional context with respect to its impact on the effectiveness of policy implementation. Thus, the measurement of institutions within SEAMLESS has to be closely connected to the policy option to be implemented. This adds a particular difficulty, which is not yet addressed in the institutional indicators literature that does not aim at institutional compatibility of policy options. Further, the methodologies for *ex-ante* policy assessment from an institutional perspective are rare, and none of them can be directly used in a formalised way. Because of

[8] For convenience, in this Deliverable, the term “institutional indicator” is used capturing all variables and proxies that can be used for the analysis of institutions and governance systems. This might also encompass indicators that are usually referred to as economic, ecological, or social indicators. For example, farming structures or forms of land use that can be found in a Member State of region do have an impact on the institutional compatibility of proposed policy options since they are important signals “describing” the institutional context the policy is (supposed to be) implemented in. The level of social capitel would be another crucial indicator for institutional analysis.

this, the "Procedure for Institutional Compatibility Assessment" (PICA) that will be introduced in Section 3 was developed as an alternative/new approach to overcome the aforementioned deficits, or to limit their effects. Thus, quite a few of the reviewed proxies and variables can be made operational for institutional analysis in SEAMLESS.

The literature and research on institutional indicators that was reviewed can be divided into four *clusters that reflect their origin in the literature as well as their characteristics and purpose*: good governance, social capital, institutions as the fourth dimension of sustainability, and transaction costs (see also Theesfeld and Beckmann, forthcoming):

1. The *good governance cluster* provides indicators to assess primarily under which institutional conditions governance promotes rather than retards economic development. These well-developed indicators are based on statistical data at a national scale to suit international comparison. The developed indices are suitable for econometric analysis and the underlying data sets are well tended and accessible.
2. *Social capital* is widely seen as a prerequisite for collective action. This cluster deals with indicators that try to measure social cohesion, values, and communication capacities. The used indicators are either subjective - based on local case studies - or objective rough proxies from local or regional data. Case study data are scattered and not comprised in any data set and the proxies used are very indirect.
3. The third cluster - *institutions as the fourth dimension of sustainability* -, is conceived as being the closest to the SEAMLESS objective, in particular considering its objective to measure institutional performance with the help of indicators. This approach is rooted in the sustainability debate of the United Nations. Similar to the perspective on the role of institutions in SEAMLESS they are regarded as providing the necessary structures capable of delivering the other three dimensions of sustainability: social, environmental, and economic sustainability. The Statistical Office of the European Communities (Eurostat) has produced a set of indicators adapted to the situation in the EU, based on the indicator core set proposed by the United Nations Commission on Sustainable Development. However, the review of these indicator sets revealed that especially the institutional indicators are rudimentary. While there is indeed a limited number of scientific works focusing on their further development, it only takes place on a conceptual or theoretical level, i.e., these indicators are not operationalised.
4. The *transaction costs cluster* provides a number of case studies from various disciplines to measure transaction costs, in particular, limited to policy implementation costs on a case-to-case basis. These studies give some hints on the efficiency of a policy, e.g., a favourable institutional context may lead to higher effectiveness of a policy, yet, this might come along with higher transaction costs. In order to generalise from the case study results relevant attributes of a transaction have to be determined. This can lead to normative statements about governance structures that would mitigate the problem addressed by the policy option in a cost minimising way. Importantly, transactions related to nature often possess additional distinct and complex attributes that have to be considered, such as the excludability of actors from access to the resource, rivalry among the users of the resource, and separability of the provision of distinct environmental goods. Thus, the range of suitable, in particular horizontal non-market coordination mechanisms is arguably much broader in the field of agri-environment.

   There are two important conceptual and methodological reasons for the limited feasibility of measuring transaction costs empirically within the institutional analysis in SEAMLESS. First, and most important, direct measurement of transaction costs is only possible if a concrete organisational or contract arrangement is in place actually governing a relevant transaction. That is, (real) transaction costs cannot be observed and

quantified before a policy is implemented and is actually inducing or causing these costs. In general, calculating hypothetical transaction costs or initiating „simulation experiments“ would be options to overcome this problem. However, to gain useful results from these approaches a very precise description of the administrative procedures and requirements linked to the policy option for all relevant actors (groups), such as farmers, regional administrations, etc., would be needed. Further, these requirements - but also the related transaction costs - may differ even among the same actor groups. For example, large enterprises might face different regulations and application procedures than small subsistence farmers. Here, not only the level of transaction costs will differ, but also the relevant transaction cost categories. Second, given the SEAMLESS objective aiming at being able to assess every agricultural and environmental policy a policy maker can think of, identifying all relevant transaction costs categories and measuring all related transation costs would be an extremly time-consuming and costly undertaking.

Appendix 1 contains an extensive description and discussion of these clusters as well as detailed tables (A1-1 to A1-4) summarising the characteristics of the indicator found in the literature.

2 The Concept of Institutional Analysis in SEAMLESS-IF

Policy assessment in SEAMLESS from an institutional perspective follows the concept of institutions for sustainability, which is defined as the necessary institutional structure capable of delivering concrete economic, social, and environmental sustainability objectives that are set by the User(s) when choosing a policy option. Here, the effectiveness of a policy and the cost-effectiveness of its implementation depend largely on the degree of compatibility between this policy option and the respective institutional context. However, not least because institutions usually relate to a great diversity of situations, the state of the art in institutional economics offers hardly any standardised procedure for institutional analysis that can easily be combined with environmental and agricultural models widely used for policy impact assessment. To assess the compatibility between policy options and various institutional contexts[9] a formalised methodology has been developed that provides the conceptual basis for an institutional dimension in modelling: the "Procedure for Institutional Compatibility Assessment (PICA)". Before presenting the respective components of PICA in detail in Section 3, this Section 2 will, first, render more precisely the concept of *institutional compatibility* as well as elaborate on the basic role of institutional analysis as *pre- and post-model analysis* in SEAMLESS-IF.

2.1 Institutional Compatibility

Institutional compatibility refers to the compatibility between policy instruments and the respective institutional context to assess the effectiveness and efficiency of policymaking. A policy is cost-efficient and effective only if certain institutional arrangements (property rights and governance structures) are in place. Thus, on the one hand, appropriate institutions increase the likelihood of actually achieving the policy objectives, i.e. they increase the degree of actors' compliance and (intended) change of behaviour. On the other hand, appropriate institutions ensure that these policy objectives are achieved at reasonable costs. Policy instruments that have proven to be very cost-efficient in a specific institutional context might perform rather poorly in another institutional context, i.e. they might be not effective at all, or they might induce higher costs to become effective. For example, a regulatory or command-and-control policy that puts a ceiling on the allowed amount of pesticides to be used per hectare and year might be ineffective if there is no authority in place to monitor and sanction farmers' compliance. Here, effectiveness could be increased to establish such an authority; yet, the costs for establishing it might be substantial, thus, reducing the cost efficiency. The justifiable costs to be borne by society to make the policy effective cannot be defined by scientists; it depends upon public opinion and political will, both very dynamic factors. However, the role of scientists can be to identify and to specify those transaction costs in an objective manner, if possible. This information would enable policy makers to design better policies and to make their choices on a more solid basis.

In particular when agricultural and environmental policies are concerned, suitable governance structures have to address the prevailing interdependencies of the actors, i.e. the fact that the

[9] Please note that this policy-oriented approach is distinct from the problem-oriented approach widely used for institutional analysis, which would evaluate different institutional arrangements potentially able to deal with a concrete resource use problem, and that would - based on this evaluation - derive recommendations for suitable institutional solutions.

choice of one actor may influence that of another, a situation often overlooked in conventional economics, which assumes that agents are independent (Paavola and Adger, 2005). For example, political jurisdictions targeted by a policy have to match, in an appropriate manner, with the range of physical, economic, social, and, in particular, institutional linkages found in the rural areas and in the agricultural sector. If carefully designed, governance structures can facilitate communication and coordination among diverse networks of stakeholders in EU agricultural and environmental policy, thus, making effective policy implementation more likely.

SEAMLESS-IF is supposed to be able to assess a policy option and provide a knowledgeable basis for decision makers to judge not only its likely effects on the environmental, economic, and social systems. It has also to provide indications on whether the policy can be expected to become effective. In principle, a positive research approach would give indications on the feasibility of policies and would refer to all phases of the *policy cycle*: issues entering the agenda, gathering information, discussion of concepts, policy formation, policy implementation, policy evaluation, feed back to decision makers, and policy adjustment or termination. In SEAMLESS, however, institutional analysis is conceptualised and operationalised to reveal where a policy option *in the implementation phase* would be compatible with the existing institutional structures, and where an institutional misfit likely to hamper policy implementation can be expected.

2.2 The Different Roles of Institutional Analysis within SEAMLESS-IF

The economic and environmental models used in SEAMLESS-IF do often assume that appropriate and required institutions are in place for resource governance towards sustainability. The PICA tool developed in Task 2.4 allows questioning these underlying assumptions by testing the institutional compatibility between a policy option and the respective institutional context. Thereby, the institutional analysis will strengthen the modelling approach of SEAMLESS in the *pre- and post-modelling phase*:

In the *pre-modelling phase*, first, components of PICA will be used to select and modify policy scenarios in the pre-modelling phase (see PD6.2.1.2). In particular, it will assist in developing an institutional typology of countries and regions for the definition of policy scenarios. Second, PICA will provide hints on whether institutional constraints in some or many countries and/or regions are likely to be prohibitive and the policy option will hardly become effective there. As a result, it could be recommended - and discussed with the User(s) - to modify the policy option or to carry out additional in-depth institutional pre-studies before running the other models. In the *post-modelling phase*, PICA will put the mainly quantitative model results into (institutional) context. This contributes to the validation of the model results on policy effects.

2.2.1 Institutional Pre-model Analysis

The pre-model analysis refers to the conceptualisation phase of the ex-ante impact assessment of policy options within SEAMLESS. The division between pre-model analysis and modelling phase is to some extent artificial, as pre-model analysis can also be understood as the first step of a model run. There are two distinct functions of institutional analysis in the pre-modelling phase:

First, components of PICA will be used to select and modify policy scenarios in the pre-modelling phase (see PD6.2.1.2). In particular, it will assist in developing an institutional

typology of countries or regions for the definition of policy scenarios. More precisely, for testing and improving the SEAMLESS-IF tools to assess the sustainability of agricultural systems at EU, national, and regional levels, the general testing procedure will begin to develop concrete broad "soft" and "hard" main scenarios for the policy option under scrutiny. This will be done in close interaction with the DG-Environment and in User Forums. Parts of the PICA tool will be used to identify institutional aspects related to the policy option that are likely to affect negatively the effective implementation of the policy. Thereafter, indicators that are particularly meaningful and able to assess the extent of the identified constraints are used to categorise countries or regions with respect to the relevant crucial institutional aspects. Taking the policy option "Nitrate Directive" as an example, "running" PICA might point to specific critical features of the institutional context, namely high levels of opportunism among actors as well as high levels of corruption in a country or region may have a constraining effect on the effectiveness and/or cost-efficiency of implementing the policy option. Thus, "real" information/data on the (average) level of opportunism and/or corruption in a country or region will be helpful for the development of more detailed scenarios according to different (institutional) zones (countries/regions) in the EU. In the example, in zones with high (average) levels of opportunism and/or corruption scenarios might include complementary measures, such as voluntary, incentive based measures (e.g., Agri-Environmental Measures) or cheap/costless advisory services for farmers as well as the establishment of an anti-corruption initiative. At this point, the institutional typology of countries or regions can also provide information on which complementary measure might be best in which country or region. For example, institutional analysis points to the fact that effective implementation of Agri-Environmental Measures depends on the experiences the targeted actor(s) have with this kind of measures. Here, farmers in the New Member States are likely to have less experiences with those incentive measures since AEM endorsed by the EU by the Rural Development Regulation (apart from SAPARD) have not been available there for such a long time as in the other Member States.

Changes in the policy scenarios might induce changes in the selection, sequence, or form of the other models. For example, institutional analysis might reveal that only certain changes in resource use due to policy implementation need to be taken into account by biophysical models. More precisely, some policy, which is supposed to be implemented for regulating water use, might affect (increase) the price for extracting groundwater, but might have no effect on the price for taking water from surface waters, such as rivers. Yet in other cases, some models might even be excluded due to their very strong assumptions that differ greatly and decisively from the respective real situations. Alternatively, if possible, these assumptions could be modified or "relaxed".

Second, the PICA tool will assist the User(s) of SEAMLESS-IF in assessing the possibilities to implement the chosen policy option in the different institutional contexts of the targeted countries and regions. PICA will assess, hence, whether it will be possible to implement a certain policy or whether institutional constraints will cause prohibitively high transaction costs resulting in the fact that the policy hardly will reach its objective(s). As a result, modifications of the policy option (e.g., adding complementary policy features to mitigate the likely institutional constraints) might be discussed with the User(s) before running the other models. Other suggestions may include more extensive in-depth institutional pre-studies at various geographical scales (from country to farm level) - and, perhaps, with a resource- or problem-specific focus - in those countries and regions where PICA indicates severe institutional incompatibilities.

2.2.2 Institutional Post-model Analysis

Institutional analysis has important functions in the post-modelling phase by relating the quantitative model outputs to the concrete institutional contexts identified in the countries and regions. Institutional analysis can *guide the interpretation* of the results and can contribute to the *validation of the model outputs*. For example, a decrease in employment in the agricultural sector predicted by the models might have a different meaning in a region where a large part of the population is employed in the agricultural sector if compared with a decrease in a region where only few people are employed in this sector. Further, if specific institutional aspects are prevalent in a region, such as strong farmers' associations with high lobbying capacities, the decrease in employment might be lower than predicted by the models. Taking another example, model results predicting extensive changes in land use from grassland to arable farming - due to changes in input prices - might prove to be invalid in regions where such a change in land use is forbidden (e.g., in nature protection areas). For institutional post-model analysis, participatory methods involving stakeholders and/or experts but also surveys may be particularly helpful.

This Section 2 has highlighted the various contributions institutional analysis, and in particular PICA, can make to strengthen the modelling approach of SEAMLESS in the *pre- and post-modelling phase*. However, it is important to note that PICA - introduced in the next Section - was designed as a coherent analytical tool that can function largely independent of its position within the SEAMLESS-IF modelling sequence. Appendix 3 contains a visual depiction of the suggested way of integrating PICA in the overall process of policy assessment within SEAMLESS-IF.

3 The Procedure for Institutional Compatibility Assessment (PICA)

As highlighted above, not least because institutions usually relate to a great diversity of situations, the state of the art in institutional economics offers hardly any standardised procedure for institutional analysis that can easily be combined with environmental and agricultural models widely used for policy impact assessment. To assess the compatibility between policy options and various institutional contexts a formalised methodology has been developed that provides for an institutional dimension in modelling: the "Procedure for Institutional Compatibility Assessment (PICA)".

PICA comprises four distinct working steps:

- **Step 1:** The policy options are clustered according to 1) type of intervention (regulatory, economic, and/or advisory), 2) area of intervention (hierarchy/bureaucracy, market, and/or self-organised network), 3) possibly involved property rights changes, and 4) the nature of the problem addressed (attributes of the resources)[10]. This classification allows identifying the generic structure of a policy option.
- **Step 2:** Each policy type is characterised by specific sets of crucial institutional aspects.
- **Step 3:** The respective crucial institutional is characterised by *institutional indicators*[11]. More precisely, the library of crucial institutional aspects developed in Step 2 for various policy types is linked with institutional indicators that help to evaluate the potential of the respective crucial institutional aspect to constrain or to foster the implementation of a policy option. The institutional indicators are selected from existing indicator lists, perhaps modified, or new proxies elaborated. Further, concrete assumptions on links and relationship between a crucial institutional aspect and the respective set of indicators will be made.
- **Step 4:** Combination and potential of the identified relevant institutional aspects lead to statements about the probable effectiveness of the policy options from an institutional perspective. PICA outputs - which are mainly qualitative in character - are grouped in thematic categories of institutional compatibility and, thus, allow for drawing conclusions about an institutional fit or misfit between policy options and institutional contexts. Results will be presented as text, tables, and maps (see Appendix 3).

In Figure 3.1, the basic concept of PICA is visualised, using the LEADER program as an example.

[10] Relevant attributes of the resources can include their "type" (e.g., water, soil, or biodiversity), their geographical dimension (local, national, global), their complexity, and many more.

[11] To avoid misunderstandings it should be kept in mind that in this Deliverable institutional *indicators* are defined as variables and proxies that are used as *input* to the institutional analysis within PICA. Unlike the common understanding of indicators within Work Package 2 and in the overall SEAMLESS project institutional indicators, such as members in farmers' associations, or government effectiveness do not represent the information/results of the institutional analysis given to the end users.

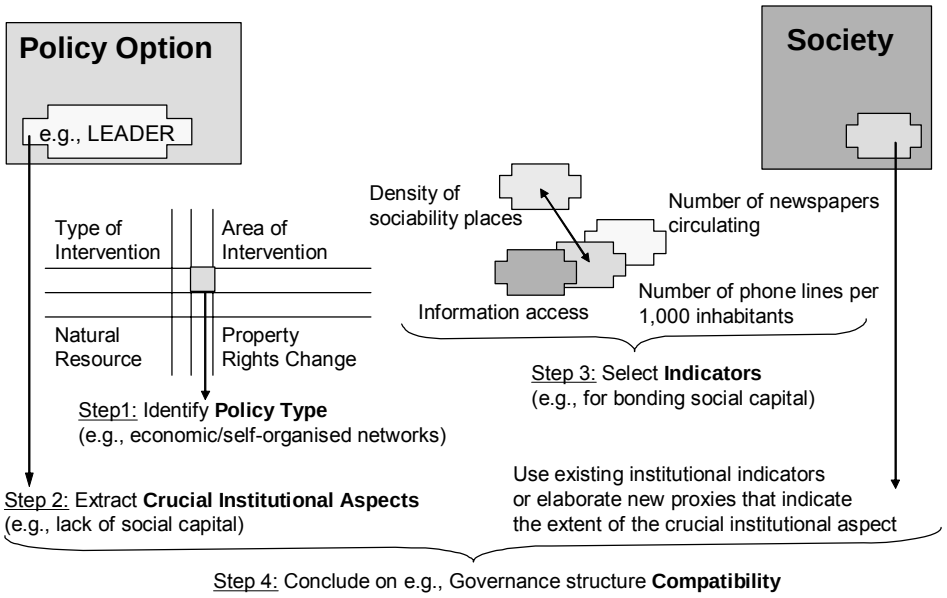

Figure 3.1: Scheme on the Procedure for Institutional Compatibility Assessment

3.1 Step 1: Classification of Policy Options – Deriving Policy Types

In this Section, a general classification system to identify the generic structure of policy options is presented. *Policy types* are introduced to offer a systematic way to classify every policy option that SEAMLESS-IF will ever have to assess. The particular *type of intervention* together with the *area of intervention* provides the basic information to describe a certain policy type. Additional dimensions used to classify policy options include *possibly involved property rights changes* and the *nature of the problem addressed* (attributes of the resources (see Table 3.1). The objective of this specification of policy types is to provide a suitable formalized structure to identify crucial institutional aspects (CIA) that are of particular importance for the policy option under scrutiny. It is assumed that the policy type (represented by distinct fields of the matrix) is decisive for the range and kind of crucial institutional aspects that can expected to be conducive or detrimental to implementation of this policy option.

Practically, this typology does allow limiting the number of CIAs that have to be reviewed when evaluating the policy to be implemented. In the absence of this classification, all identified CIA relevant for agricultural and environmental policies would have to be "computed" every time a policy option is to be assessed. In the following, the dimensions of the classification system will be explained in more detail.

The *type of intervention*, the rows of the matrix in Table 3.1, describes how and by which means the impact of a policy shall be reached, such as:

- Regulatory or command-and-control policies (compulsory): E.g., EU Directives, National, regional, and local laws, regulations, and provisions
- Economic instruments often using financial (dis)incentives: E.g., taxes, subsidies, grants and loans, tradable pollutions permits, Agri-Environmental Schemes
- Advisory/Voluntary[12] policies: E.g., codes of good practice, extension systems, environmental audits

A similar distinction is made by Moskowitz (1978: 65ff.) who analyses a wide range of alternative policy options that have the common objective to redirect financial investments from the private sector to ensure neighbourhood preservation. Here, Moskowitz distinguishes between three types of interventions: a) regulatory policies for mandatory investments, b) direct subsidies, such as tax benefits to change the final profit estimation, and c) persuasion by providing facts, figures, and experience to demonstrate that the private sector could realistically expect profits from these investments.

The *area of intervention* points to the *governance structures* a policy is supposed to have an impact on.[13] The differentiation used in PICA follows to a large extent the widely known categories of governance structures (hierarchy, market, and hybrids) suggested by Williamson (2004) for developing his alignment hypotheses (see Section 1.4 in Appendix 1). However, first, it can be assumed that almost every governance structure in the real world can indeed be seen as some hybrid form between the polar cases market and hierarchy[14]. Thus, in the respective columns those areas of intervention that are *closer* to either market or hierarchy are subsumed. Second, with specifying the third column *self-organised network*, the attention is directed to a specific (hybrid) form of governance structure that is of particular interest if pursuing agricultural, environmental, and rural development policy objectives.

The column *property rights change* is the third dimension to describe a policy type. It accounts for changes in private and collective property rights, in particular, on natural resources and covers the institutional specificities of environmental regulations.

An example shall illustrate the value added of the last dimension. In 2002, the European Commission established the European Food Safety Authority (EFSA) as a bureaucracy dedicated to provide independent scientific advice on food safety[15]. In the PICA typology, this can be categorised as a regulatory policy that is adding an element to the bureaucratic

[12] Of course, some economic polices, such as Agri-Environmental Schemes, are also voluntary in character since farmers can choose to participate in those schemes, or not. In contrast, in this category, the term "voluntary" refers to policies that motivate voluntary actions or behavioural changes of actors without direct financial incentives, i.e., for example, by convincing actors.

[13] More precisely, a policy aims at influencing (encourage/discourage) real-world transactions (e.g., use of pesticides, protection of species) by changing existing and/or creating new governance structures that coordinate these transactions in such a way that, e.g., their results are internalised by the actors.

[14] While in *markets* (repeated) economic exchange is based on voluntary bilateral agreements between individuals (e.g., auctions, stock markets, etc.), an authority on a higher level compulsorily selects economic action in *hierarchies* (e.g., state agencies, but also within private firms).

[15] In close collaboration with non-authorities and in open consultation with stakeholders EFSA shall provide independent scientific advice on all matters with direct or indirect impact of food safety and clear communication on existing and emerging risks.

structure in the EU. This category (Regulatory on Hierarchy/Bureaucracy) would also be appropriate for a policy that prescribes the demarcation of nature reserves including the establishment of some formal authorities to manage the reserves. However, the crucial difference for the purpose of ex-ante institutional analysis of policy options is that - additionally - the establishment of the latter bureaucracy (the nature reserve authority) has presumably a higher and more direct impact on the (private) property rights of the actors concerned, the farmers in the reserves. This fact is very likely to bring additional institutional aspects to the forefront that could hamper the effective implementation of this policy. For example, a high level of opportunism on part of the farmers in these reserves might be detrimental to a smooth implementation, as could be ambiguous property rights on land.

Undoubtedly, most policy options will imply some changes in property rights. However, here it is defined in a more narrow sense pointing to changes in the property rights of farmers on their natural production resources. For example, most of the environmental regulations, such as the Flora-Fauna-Habitat Directive or the Nitrate Directive reduce directly farmers' property rights. Restrictions on land use, such as the prohibition to spread manure on the field during winter months, have direct impacts on the individual production decisions of farmers. Thus, these environmental regulations, according to the matrix, would not only address the governance structure market (area of intervention) since the restriction in manure spreading is directly affecting the production function of the farmer resulting in higher productions costs and, hence, less profit. Clearly, these regulations are also linked to severe changes and constraints on (private) property rights of farmers that are not governed by market mechanisms.

According to Schlager and Ostrom (1992), bundles of property rights can be disaggregated into a) the operational level property rights, including access and withdrawal rights, and b) the collective-choice property rights, including management, exclusion, and alienation rights. Politically induced impact can be found on any of these dimensions of property rights. Further, although the effective property rights – unlike the formal property rights - are much harder to grasp empirically on any level above the case study level, they are regarded as crucial in giving indications about the institutional compatibility of policy options. For example, information about a (non-marginal) gap between formal and effective property rights on land use in a country or region could point to a limited effectiveness of future policies invoking changes in property rights on land use.

Table 3.1 Matrix of Policy Types

		Area of Intervention (Governance Structures)			**Property Rights Change**
		Hierarchy/Bureaucracy	Market	Self-organised network	
Type of Intervention	Regulatory	Policies that *intervene at* hierarchies/bureaucracies *using* regulatory (command-and-control) instruments; Example: Establishing the European Food Safety Authority and Nature Reserves	Policies that *intervene at* markets *using* regulatory (command-and-control) instruments; Example: Implementing certification rules for organic products	Policies that *intervene at* self-organised networks *using* regulatory (command-and-control) instruments; Example: Implementing new European Statutes for cooperatives	Policies that *induce* substantial changes in property rights for farmers regarding their natural production resources *using* regulatory instruments
	Economic	Policies that *intervene at* hierarchies/bureaucracies *using* economic instruments; Example: Budget cuts for (regional) administrative bodies	Policies that *intervene at* markets *using* economic instruments; Example: Subsidising organic milk and non-till farming practices	Policies that *intervene at* self-organised networks *using* economic instruments; Example: Providing funds for LEADER-groups	Policies that *induce* substantial changes in property rights for farmers regarding their natural production resources *using* economic instruments
	Advisory/ Voluntary	Policies that *intervene at* hierarchies/bureaucracies *using* advisory/voluntary instruments Example: Providing training material on efficient management structures and administrative procedures (Best-practice)	Policies that *intervene at* markets *using* advisory/voluntary instruments; Example: Providing information brochures on health and organic food to consumers; providing training on environmental friendly farming	Policies that *intervene at* self-organised networks *using* advisory/voluntary instruments Example: Providing information brochures with best-practice-examples; facilitating knowledge transfer between networks	Policies that *induce* substantial changes in property rights for farmers regarding their natural production resources *using* advisory/voluntary instruments

Natural Resource Addressed	Water	Land/Soil	Biodiversity	Forestry	Complex Resources

Example: Agri-Environmental Schemes focussing on reducing diffuse pollution of nitrates from agriculture would be allocated to the boxes “Economic on Market” and “Water”(grey boxes).

An additional dimension, which needs to be added to this matrix, considers *the natural resource addressed* by the policy option, i.e. water, land/soil, biodiversity, forestry, or complex resources[16]. Some crucial institutional aspects stem from the fact that the characteristics of a natural resource addressed or the attributes of a transaction related to nature might call for certain institutional arrangements to make a policy option effective (Hagedorn et al., 2002). For instance, addressing water quality often has to deal with non-point pollution from agriculture that constitutes challenges for adequate forms of monitoring and sanctioning. Further, policies for the protection of biodiversity or specific rare species face particular incentive problems, not the least because the future value of these rare species is uncertain and the benefits of protection cannot only be reaped by the one protecting it. In addition, the geographical dimensions (local, national, global) of resources can also be important. Thus, distinct institutional aspects for each of the resources addressed can be expected.

To sum up, the four dimensions necessary to describe a policy type comprehensively are illustrated as a four-dimensional graphic in Figure 3.2. The x-axis describes the area of intervention, the y-axis the type of intervention, and the z-axis the natural resource addressed. The colour of the cuboids reflects the forth dimension; *dark grey*, if a property rights change is involved, and *light grey*, if not. Each cuboid in the space represents a certain policy type. For illustration, Agri-Environmental Schemes focussing on reducing diffuse pollution of nitrates from agriculture can be assigned to the policy type of the light grey cuboid.

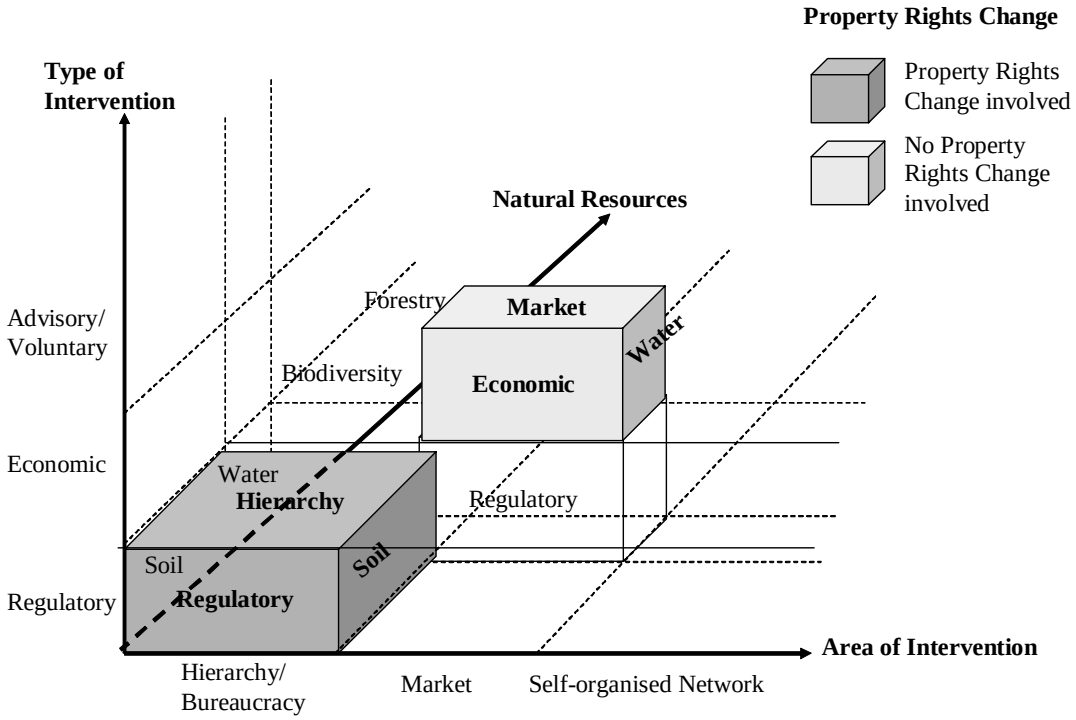

Figure 3.2: Four Dimensions of a Policy Type

[16] The category *complex resource system* refers to resource systems with many externalities involved (e.g., wetlands).

3.2 Step 2: Crucial Institutional Aspects of Policy Types

In this section, the main findings of the comprehensive literature review on crucial institutional aspects (CIA) are presented. While some crucial institutional aspects found in the literature are directly linked to a concrete policy, there is also a substantial body of literature that is *not* directly related to a concrete policy. Rather, the CIA discussed there are associated with broad policy fields, such as trade related policies and environmental policies, or address general institutional issues. Tables 3.2 and 3.3 summarise the CIAs that are directly linked to concrete policies by structuring them as policy types according to the matrix presented in Section 3.1 (PICA step 1). In Table 3.4, those CIAs not directly linked to policy types are presented.[17] In Appendix 2, the review of the literature is documented in a detailed manner.

To a large extent, the CIA found in the policy assessment literature are derived from ex-post analysis of the implementation of agricultural, environmental, and rural development policies. CIA are discussed which proved to have a positive or (mostly) negative effect on policy implementation. Further, institutional aspects that stem from theoretical or conceptual scientific studies were included. In many cases, the empirical and the theoretical literature point to the same CIA.

As illustrated by the empty boxes in Table 3.2, not all policy types could be linked with CIAs. This is mainly due to the fact that the literature review focussed on policy types that are related to the various Test Cases in SEAMLESS and on other very prominent policies, such as Rural Development Programs, etc. For the operational phase of SEAMLESS-IF this would imply that - once a policy type is identified that has not been linked with any (or only few) CIA yet - the literature review would have to be extended encompassing studies addressing this policy type. This library of CIA (Tables 3.2 – 3.4) will be revised and extended with every new policy option that is assessed by PICA.

Not all CIAs are exclusively linked to only *one* single policy type, or to only one type of intervention, e.g., economic or regulatory. This is in line with the results of the literature review suggesting that some CIAs can be (and have proved to be) conducive or detrimental to many (at least more than one) policy types. For example, the occurrence of the CIA "contradictory policy instruments/rules" in a specific region can hamper both, the implementation of 1) a regulatory policy and of 2) an economic policy:

1) An agricultural policy might allow, e.g., fertiliser use up to 100 kg/ha/year; an environmental policy introduced in the same region might reduce this limit to 50 kg/ha/year. Such contradictions are often due to different policy objectives. However, both rules might be valid legally. Thus, in case there is no given priority among these (regulatory) policies, there might be a conflict.

2) The same is true for economic policies. In the same region, there might be a policy in place that provides financial incentives encouraging a specific activity, and another policy paying actors not to carry out this very activity. Further, economic policies can also be in contradiction to regulatory policies active in the same region. For example, financial payments to turn grass land into arable land, which, at the same time, is forbidden in some regions.

The relevance of a specific CIA for a concrete policy type depends on the features of the policy to be implemented (or the requirements demanded by this policy for successful implementation). However, the relative importance of a specific CIA can vary among the

[17] In all three Tables, 3.2 - 3.4, the numbers in brackets refer to the number of this respective CIA in Table 3.5 where it is linked with institutional indicators (PICA step 3).

policy types it is related to. In addition, while most of the CIA derived from the literature seem to be linked to a specific type of intervention more closely than to the area of intervention this relationship and its implications still needs to be validated.

In some cases, an institutional aspect might only become conducive or detrimental (or becomes stronger in its effect) in combination with another institutional aspect. For example, strong consumer preferences might not be a constraint per se. However, if this institutional aspect is coupled with high levels of social capital it will become important since this might indicate that consumers are also able or likely to voice these preferences in an organised way. In turn, if social capital is low they might "only" be able to articulate their preferences individually (e.g., by not buying GMO-containing food). Similarly, farmers may face low private opportunity costs for changing land use (e.g., induced by a policy). Yet, this conducive aspect might be “neutralised” by farmers’ limited access to information on the policy or on alternative forms of land use.

It is important to note that CIAs often only make sense when they are related to a concrete policy. Therefore, the expert (team) running PICA in the operational phase of SEAMLESS-IF will have to decide which CIAs are indeed relevant for the policy option under scrutiny, which might this time be skipped for further analysis, and which "new" or adapted CIAs should be added.

Table 3.2: Summary of Crucial Institutional Aspects Encountered for Different Policy Types
Please note the numbers in brackets refer to the number of this respective CIA in Table 3.5 where it is linked with institutional indicators (PICA step 3).

		Area of Intervention			Property Rights Change (PR)
		Hierarchy/ Bureaucracy (Hi)	Market (Ma)	Self-organised Network (SON)	
Type of Intervention	Regulatory (Reg)	• Political and administrative inertia (1) • Administrative public Transaction Costs (2) • Bargaining power state vs. farmers' organisations (32) • Unclear distribution of responsibilities between administrative levels (Problems of interplay) (3) • Contradictory policy instruments & rules (joint production) (17) • Redundant policy instruments & rules (17) • Not matching financial means and capacities for administrative restructuring (6) • Adverse, but historically deep rooted institutions (11) • Heterogeneity of actors' interests (12) • Problems of (institutional) fit (16)	• Ambiguous property rights (more pronounced for New Member States) (28) • Information asymmetry state vs. firm (23) • Contradictory policy instruments & rules (joint production) (17) • Redundant policy instruments & rules (17) • High level of opportunism (22) • Monopoly power (25) • Lack of trust between economic actors (31) • High administrative public and/or private Transaction Costs (2) (7) • Weak consumer preferences (34) • Strong consumer preferences together with high level of social capital (29) (34) (35) • High level of corruption (21)		• Endowment effect (26) • Ambiguous property rights (more pronounced for New Member States) (28) • Information asymmetry state vs. firms (23) • High level of opportunism (22)
	Economic (Eco)	• Undifferentiated distribution of financial means for restructuring among regions (20)	• Contradictory policy instruments & rules (joint production) (17) • Redundant policy instruments & rules (17) • High level of opportunism (22) • More pronounced in New Member States: • No experiences with measures (10) • Insufficient information on policy (25) • Not matching farmers' competencies & capabilities (9) • Target group not (fully) eligible (14)	• Strong bargaining power of farmers' organisations (32) • Lack of social capital (among local actors, state vs. local, between levels) (29) • High public and private (administrative) Transaction Costs (2) (7) • High level of redistribution of decision making power (4) • Resistance to pluralisation of decision making (5)	• Endowment effect (26) • More pronounced in New Member States: • No experiences with measures (10) • Insufficient information on policy (25) • Not matching farmers' competencies and capabilities (9) • Target group not (fully) eligible (14)
	Advisory/ Voluntary (Adv)			• Very large water resource system (37) • Contradictory policy instruments & rules (joint production) (17) • Low incentives to resolve a problem (36) • High private opportunity costs (8) • High private Transaction Costs (7) • Dispersion/fragmentation of property rights (27) • High number of actors (13) • Environmental problem is not easy to identify in space and time (38)	• Dispersion/fragmentation of property rights (27) • High number of actors (13) • Environmental problem is not easy to identify in space and time (38)

Table 3.3: Summary of Crucial Institutional Aspects Related to Natural Resources Addressed by Some of the Policies

Natural Resources Addressed	Crucial Institutional Aspects
Complex resource systems with many externalities involved (e.g., wetlands) (ComRes)	• Lack of social capital (here, trust among local actors) (29)
Water resource systems with long-term and diffuse impacts stemming from farming activities (Water)	• Very large water resource system (37) • Not matching legal restrictions (17) • Low incentives to resolve a problem (36) • High opportunity costs for farmers (8) • High private Transaction Costs (7)
Land/Soil (Land)	• High heterogeneity of actors' interests (12) • High level of opportunism (22)

Please note the numbers in brackets refer to the number of this respective CIA in Table 3.5 where it is linked with institutional indicators (PICA step 3).

Table 3.4 Summary of Crucial Institutional Aspects – Not Linked to Concrete Policy Options

	Crucial Institutional Aspects
(Trade-related) Agricultural Protectionist Policies (Prot)	• Very large water resource system (37) • High political costs for reducing protectionist policies (39) • Political and administrative inertia (1) • Strong consumer preferences for health and quality products (35) • Strong environmental groups and environmental legislation (31) • High environmental awareness and strong environmental preferences of consumers (34) • Corruption (21) • Poor country with smallholder agriculture (41) • Inefficient credit markets for smallholders (42) • High perceived dependence on support/protection (40) • Contradictory policy instruments & rules (joint production) (17) • Redundant policy instruments & rules (17)
Environmental Policies (EnvP)	• Information asymmetry state vs. firm (producer) (23) • Opportunism (22) • Heterogeneous environment-related social values (33) • Lack of (environmental) political continuity (15) • Undifferentiated policy measures (19) • Legal restrictions to differentiation (18) • Contradictory policy instruments & rules (joint production) (17)
General Institutional Aspects (Gen)	• Low levels of interpersonal trust (in particular, if policies rely on spontaneous / endogenous collective action) (30) • Contradictory policy instruments & rules (joint production) (17) • Redundant policy instruments & rules (17) • Problems of interplay (3)

Please note the numbers in brackets refer to the number of this respective CIA in Table 3.5 where it is linked with institutional indicators (PICA step 3)

3.3 Step 3: Linking Crucial Institutional Aspects of Policy Types with Institutional Indicators

In this Section, the library on crucial institutional aspects (CIA) - developed in PICA step 2 for various policy types – is linked with institutional indicators that help to evaluate the respective CIA leading to statements about the effectiveness of policy implementation (PICA step 4). In Table 3.5, for all CIA identified so far several institutional indicators, possible data sources, and assumptions on links and relationships between CIAs and the respective indicators are suggested.

More precisely, the second column contains all CIA identified in PICA step 2 (see Tables 3.2 - 3.4 in Section 3.2). They are preliminarily grouped according to their "thematically closeness/proximity". In the third column one can find codes for the policy type(s) the respective CIA is related to (e.g., Reg-Hi: Regulatory on Hierarchy, or EnvP: Environmental Policies). The fourth and fifth columns contain one or more institutional indicator(s) and the respective descriptions and calculations. Here, not all suggested indicators need to be kept for future consolidated versions of PICA. In practice, some indicators might turn out to be rather redundant; some might prove to have less explanatory power for describing the respective CIA. Similarly, also other indicators that seem to be (more) meaningful can be added. Furthermore, for quite a few of these indicators the literature and related documents do not tell much about how they are measured. The fifth column presents (potential or likely) data sources/data bases one might make use of in order to "calculate" the institutional indicators.

In general, it can be differentiated between five types of data sources:

- A) Qualitative evaluation procedures, e.g., expert/stakeholder groups, screening of documents, etc.
- B) Existing data bases and proxies not yet integrated in SEAMLESS-IF, e.g., national statistical databases, indexes on social capital, environmental awareness, corruption, etc.
- C) Existing data bases already integrated in SEAMLESS-IF, e.g., current land use
- D) Outputs (variables) calculated by models integrated in SEAMLESS-IF, e.g., changes in land use and agricultural production
- E) (Non-institutional) Indicators calculated by SEAMLESS-IF, e.g., policy impact on budgetary expenditure and total welfare

In Table 3.5, the suggested institutional indicators draw on quite a few different sources, mainly existing data bases not yet integrated in SEAMLESS-IF. While conceptually useful for describing the CIA, they represent – at the moment – an *indicator wish list* since data availability cannot be guaranteed. However, for those (restricted list of) indicators relevant for assessing the policy options in Test Case 2 (see Section 4.2) - and, later, Test Case 3 – concrete data related issues will be addressed drawing on the expertise of Work Package 4. For Prototype 3 of SEAMLESS-IF it is also intended to integrate ("upload") the relevant data bases into SEAMLESS-IF.

While it is not very likely that all suggested data bases can be made available this does not create a problem for institutional analysis within SEAMLESS-IF. First, for most CIA a broad range of alternative institutional indicators each describing the extent of a CIA was suggested; varying in explanatory power of course. Second, if no "hard" data from data bases is available qualitative assessment procedures carried out by the PICA-expert team can be

regarded as similarly effective and robust for evaluating the likely effect of identified CIA for policy implementation.

Finally, the last column presents plausible relationships between the CIA and the suggested indicator. It describes the effect of changes in the indicator values (e.g., a percentage or index figure) on the level of the institutional constraint or potential under scrutiny. Given the extensive list of more than 40 CIA (and many more indicators) Task 2.4 was, arguably, not able to construct more precise relationships or even thresholds that are universally valid. Such as "If more than 20% of the basic (administrative) services are fully available online (full electronic case handling)" then public transaction costs are considered as "low" or "If less than 20% of the basic (administrative) services are fully available online" then public transaction costs are considered as "high". Also, instead of absolute (automatic and universally valid) statements about the level of constraints or potentials in a specific country the *relative* levels of the respective constraint or potential in the different Member States and/or regions are often more relevant and meaningful. In the operational phase of SEAMLESS-IF, the team of PICA-trained institutional analysts will evaluate the various indicators and the values they "produce" (PICA step 4; see Section 3.4). By focussing on a concrete policy to assess, these experts will be able to determine or assume relationships that are more precise and to define - in some cases - thresholds that are meaningful and valid for the policy option under scrutiny. This process can also be thought of as some kind of "model calibration" which is done for other SEAMLESS models, too.

In general, an automatic or formalised interpretation of indicators and their parameter values does not make sense and will not produce useful results. What is more, data might not be available, or might be available only at Member State level. Yet, for certain institutional policy assessment, regional data will provide more useful and meaningful results.

Table 3.5: Crucial Institutional Aspects, Institutional Indicators, and Expert Assumptions on Links between them

No.	Crucial Institutional Aspects (CIA)	Related to Policy Type(s)	Institutional Indicator	Description / Data	Data Sources / Databases	Expert assumptions on links between indicator and CIA
1	Political and administrative **inertia**	Reg-Hi; Prot	Transposition of European Community law (by policy area)	Percentage of implemented EU Directives in a Member State: Directives for which measures or implementation have been notified by Member States divided by Directives applicable on the reference date by Member States	EUROSTAT	Low percentages indicate high political and administrative inertia
			Government effectiveness	Composite indicator measuring the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies Values: -3 (low) to +3 (high)	World Bank	Negative values indicate high political and administrative inertia
			Bureaucratic quality	Measure for institutional strength and quality of the civil service; assesses how much strength and expertise bureaucrats have and how able they are to manage political alternations without drastic interruptions in government services, or policy changes *(also part of World Bank composite indicator "Government effectiveness")*	International Country Risk Guide (ICRG) – Political Risk Services (see also World Bank)	Low values indicate high administrative inertia
			Adaptation rate of economic policies	Non-representative measure for "Government economic policies do not adapt quickly to changes in the economy" *(also part of World Bank composite indicator "Government effectiveness")*	Institute for Management Development (WCY) (see also World Bank)	Low adaptation rates indicate high political inertia

2	High administrative **public transaction costs**[18]	Reg-Hi; Reg-Ma; Eco-SON	E-government on-line availability	Percentage of the 20 basic services which are fully available online (full electronic case handling)	EUROSTAT	Low percentages indicate high public transaction costs
			E-government usage by individuals	Percentage of individuals (16-74 years old) who have used the Internet in the last 3 months for interaction with public authorities (obtaining information, downloading forms, sending filled in forms)	EUROSTAT	Low percentages indicate high public transaction costs
			Importance of the public sector	Ratio = Number of civil servants / Number of total population	National Statistical Databases	Assumed "U-shaped" relationship with public transaction costs: few or many civil servants (high or low ratios) indicate high public transaction costs
			Bureaucracy	Measure of the quality of a country's bureaucracy *(also part of World Bank composite indicator "Government effectiveness")*	World Markets Online (see also World Bank)	Low values indicate high administrative public transaction costs
3	Unclear **distribution of responsibilities between administrative levels (Problems of interplay)**	Reg-Hi; Gen	Degree of federalism / Allocation of financial means at regional administrative levels	Ratio = Regional (Sub-Central) budget / Central budget	National Statistical Databases	Assumed "Bell-shaped" relationship: Very low ratios (highly centralised) and very high ratios (highly decentralised) indicate a low potential of contradictions and redundancies between central and regional administrative levels

[18] Political inertia and public transaction costs can be very close. However, "inertia" refers to a general inability and/or unwillingness to do something (work) and also to a (negative or sceptical) attitude towards change, e.g., of the policy set or policy design. Yet, high administrative public transaction cost might also be found/occur in bureaucracies that are very keen to be active and/or are open to change.

			Bureaucratic quality	Measure for institutional strength and quality of the civil service; assesses how much strength and expertise bureaucrats have and how able they are to manage political alternations without drastic interruptions in government services, or policy changes *(also part of World Bank composite indicator "Government effectiveness")*	International Country Risk Guide (ICRG) – Political Risk Services (see also World Bank)	Low values indicate an unclear distribution of responsibilities between administrative levels
			Quality of decentralised government systems *(does only apply for post-communist countries)*	Qualitative assessment of government decentralization, independence and responsibilities of local and regional governments, and legislative and executive transparency (*also part of World Bank composite indicator "Government effectiveness")*	Freedom House – Nations in Transit (see also World Bank)	Negative assessments indicate an unclear distribution of responsibilities between administrative levels
4	High level of **redistribution of decision making power**	Eco-SON	Redistribution of decision making power	Degree of redistribution of decision making power likely to be caused by implementing policy option	Qualitative assessment by expert group	High degrees indicate a raised likelihood that policy implementation is constrained
			Administrative Levels	Number of administrative levels in a Member State	National Statistical Databases	A high number of administrative levels indicates that it is more difficult to redistribute decision making power because each public actor at every level is likely to defend his influence and power
5	**Resistance to pluralisation of decision making**	Eco-SON	Administrative levels	Number of administrative levels in a Member State	National Statistical Databases	Number = 1 indicates the existence of a singular decision making structure which is assumed to signal a high resistance to a pluralisation of decision making

			Quality of decentralised government systems *(does only apply for post-communist countries)*	Qualitative assessment of government decentralization, independence and responsibilities of local and regional governments, and legislative and executive transparency (*also part of World Bank composite indicator "Government effectiveness")*	Freedom House – Nations in Transit (see also World Bank)	Negative assessments indicate a high resistance to a pluralisation of decision making
6	Not matching **financial means and capacities for administrative restructuring**	Reg-Hi	Financial potential of public administrations	Ratio = Public budget / Gross National Product (GNP)	National Statistical Databases	Low ratios indicate a low importance of public administration, thus, having a poor potential to carry out administrative restructuring
7	High **private transaction costs**	Reg-Ma; Eco-SON; Adv-SON; Water	E-government on-line availability	Percentage of the 20 basic services which are fully available online (full electronic case handling)	EUROSTAT	Low percentages indicate high private transaction costs
			E-government usage by individuals	Percentage of individuals (16-74 years old) who have used the internet in the last 3 months for interaction with public authorities (obtaining information, downloading forms, sending filled in forms)	EUROSTAT	Low percentages indicate high private transaction costs
			Educational level of farmers	Percentage of farmers with an education level below X	SEAMLESS social indicators	High percentages indicate high private transaction costs
			Illiteracy of farmers	Percentage of illiterate farmers	SEAMLESS social indicators	
			Educational level of population	Pupils and students (ISCED 1-6) aged 5-29 as percentage of total population aged 5-29 years	EUROSTAT	Low percentages indicate high private transaction costs
			Land owner – tenant relationship	Average number of land owners per tenant	National Statistical Databases	High numbers indicate high private transaction costs since farmers have to negotiate with many owner(s) for some changes in land use

			Land farmed under leasehold contracts	Percentage of agricultural land farmed under leasehold contracts	National Statistical Databases	High percentages indicate high private transaction costs since farmers have to negotiate with owner(s) for some changes in land use
8	High **private opportunity costs**	Adv-SON; Water	Opportunity costs related to land use	Soil quality index	SEAMLESS databases	High quality of soils indicates a high productivity of land use and, thus, high (marginal) opportunity costs for farmers for changes in land use away from the optimum
			Opportunity costs related to farming practices	Average revenue per hectare	SEAMLESS databases; SEAMLESS economic indicators	High average revenues per hectare indicate a high productivity of land use and, thus, high (marginal) opportunity costs for farmers for changes in farming practices away from the optimum
9	Not matching **farmers' competencies and capabilities**	Eco-Ma; Eco-PR	Small farms	Percentage of farms with less than 5 ha	SEAMLESS Databases; EUROSTAT	Small farm(er)s are assumed to have a lower capabilities and competencies. Thus, high percentages of small farms indicate high constraints.
			Educational level of farmers	Percentage of farmers with an education level below X	SEAMLESS social indicators	High percentages indicate an increased likelihood of mismatch between policy and farmers' competencies and capabilities
			Illiteracy of farmers	Percentage of illiterate farmers	SEAMLESS social indicators	

			Educational level of population	Pupils and students (ISCED 1-6) aged 5-29 as percentage of total population aged 5-29 years	EUROSTAT	Low percentages indicate an increased likelihood of mismatch between policy and farmers' competencies and capabilities
10	**No experiences** with measures	Eco-Ma	Experiences with Agri-Environmental Measures or similar measures	Time with implemented Agri-Environmental Schemes or similar measures (Years) *or* Date of implementation of Rural Development Regulation (RDR)	National Integrated Administration and Control System (IACS); Assessment by expert group	Few (no) years with implemented AES *or* a recent date of RDR implementation indicate a low level of experiences with AES
			Experiences with other measures or policies	Time with implemented measures or policies similar to the measures or policies under scrutiny (Years)	Assessment by expert group	Few (no) years with implemented AES indicate a low level of experiences with respective measures
11	**Adverse**, but historically deep rooted **institutions** (in administrative and political structures)	Reg-Hi	Existence of adverse, but historically deep rooted institutions (in administrative and political structures)	Adverse, but historically deep rooted institutions (in administrative and political structures) exist	Qualitative assessment by expert group	The existence of adverse, but historically deep rooted institutions (in administrat. and political structures) indicates high constraints
12	High **heterogeneity of actors' interests**	Reg-Hi; Land	Heterogeneity of actors' interests	Degree of heterogeneity of actors' interests	Qualitative assessment by expert group	High degrees of heterogeneity indicate high constraints (e.g., more difficult & costly mediation)
13	High **number of actors**	Adv-SON; Adv-PR	Farmer density	Average number of farms per 100 ha	SEAMLESS Databases	High numbers indicate a high number of actors
			Land Owner density	Average number of land owners per 100 ha	National Statistical Databases	High numbers indicate a high number of actors

			Structure of farming system	Ratio = Number of farms / Number of people employed in the farming sector	SEAMLESS Databases	A high ratio indicates a farming system *not* dominated by large farms (latifundium system) and, thus, high numbers of actors
14	**Target group not (fully) eligible**	Eco-Ma; Eco-PR	Very small farms	Percentage of farms with less than X ha	SEAMLESS Databases	Very small farms are often not eligible to participate in specific schemes, thus, a high percentage of very small farms indicates a high number of farms that might not be eligible
			Eligibility of target group	Degree of eligibility of target group	Qualitative assessment by expert group	Low degrees of eligibility of target group indicate high constraints
15	Lack of (environmental) **political continuity**	EnvP	Political instability and violence	Composite indicator measuring the perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including political violence and terrorism Values: -3 (low) to +3 (high)	World Bank	Positive values imply a lack of political continuity
			Government stability	Measure for the government's ability to carry out its declared programs, and ist ability to stay in office *(also part of World Bank composite indicator "Political instability and violence")*	ICRG – Political Risk Services (see also World Bank)	Low measures indicate a lack of political continuity
			Policy consistency and forward planning	Measure of how confident businesses can be of the continuity of economic policy stance: whether a change of government will entail major policy disruption, and whether the current government has pursued a coherent strategy *(also part of World Bank composite indicator "Government effectiveness")*	World Markets Online (see also World Bank)	Low measures indicate a high probability of a lack of political continuity

			Transposition of European Community law	Percentage of implemented EU Directives in a Member State: Directives for which measures or implementation have been notified by Member States divided by Directives applicable on the reference date by Member States	EUROSTAT	Low percentages indicate a lack of political continuity
			Participation in international environmental agreements	Measure for the participation of a country in international environmental agreements (combines ratifications of treaties and conventions with the level of active participation in, contribution to, and compliance with the treaties' obligations) (also part of ESI) Values: 0 (no participation) to 1 (full participation)	Different sources (see also Environ-mental Sustainability Index - ESI)	Values below 0.5 indicate low degrees of active participation in international environmental agreements and, thus, a lack of (environmental) political continuity
			Environmental political continuity	Degree of environmental political continuity	Qualitative assessment by expert group	Low degrees indicate high constraints
16	Problems of **(institutional) fit**	Reg-Hi	Administrative Levels	Number of administrative levels in a Member State	National Statistical Databases	Low numbers of administrative levels indicate that it would be more difficult to find an administrative unit able to manage a resource or a problem appropriately (i.e., spatial externalities are reduced)
17	**Contradictory policy instruments** and rules (joint production)	Reg-Hi; Reg-Ma; Eco-Ma; EnvP; Prot; Gen	Contradictory policies (incl. joint production)	Methodology to identify contradictory policies that are, e.g., due to joint production: 1) Compile a short list of relevant policies that are applied in the area and that could be contradictory to the policy option; 2) Identify more precisely and evaluate contradictions between policy option under scrutiny and policies in this short list	Qualitative assessment by expert group	The existence of contradictory policies and rules indicates high constraints

	Redundant policy instruments and rules	Reg-Hi; Reg-Ma; Eco-Ma; Prot; Gen	Redundant policies	Methodology to identify redundant policies: 1) Compile a short list of relevant policies that are applied in the area and that could be redundant to the policy option; 2) Identify more precisely and evaluate redundancies between policy option under scrutiny and policies in this short list	Qualitative assessment by expert group	The existence of redundant policies and rules indicates high constraints
18	**Legal restrictions to differentiation**	EnvP	Legal system	Member State with case-based common law or statute law	Qualitative assessment by expert group	Common law is usually more differentiated and more open-minded to case-specific restriction, thus, statute law indicates a high constraint
19	**Undifferentiated policy measures**	EnvP	Differentiation potential	Degree of differentiation potential / possible for policy measure	Qualitative assessment by expert group	Low degrees indicate a low level of differentiation of the policy measures
20	**Undifferentiated distribution of financial means** for restructuring among regions	Eco-Hi	Distribution of financial means among regional administrations	Variance of regional (Sub-Central) budgets per inhabitant in a country	National Statistical Databases; Assessment by expert group	Low variances indicate an undifferentiated distribution (other than the number of inhabitants) of financial means for regional administrations
21	High level of **corruption**	Reg-Ma; Prot	Corruption Perception Index	Combination of various sources measuring overall extent of corruption (frequency and/or size of bribes) as determined by expert assessments and opinion surveys	Transparency International	High levels of the various measures and indexes of corruption in the political system and in the bureaucracy contributes to lax enforcement of
			Control of Corruption	Composite indicator of the extent public power is exercised for private gain, including both petty and grand corruption as well as and state “capture” by elites and private interests	World Bank	

			Corruption within the political system	Measure of corruption within the political system, which distorts the economic and financial environment, reduces the efficiency of government and business by enabling people to assume positions of power through patronage rather than ability, and introduces an inherently instability in the political system. *(also part of the World Bank composite indicator "control of corruption")*	ICRG - Political Risk Services (see also World Bank)	
			Intrusiveness of bureaucracy	Measure of the intrusiveness of the country's bureaucracy: amount of red tape likely to encounter is assessed, as is the likelihood of encountering corrupt officials and other groups. *(also part of the World Bank composite indicator "control of corruption")*	World Markets Online (see also World Bank)	
22	High level of **opportunism**	Reg-Ma; Eco-Ma; Reg-PR; Land; EnvP	Infringement cases	Number of infringement cases in a country brought before the Court of Justice	National Statistical Databases	High numbers of infringement cases indicate high levels of opportunism
			Rule of Law	Composite indicator of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence	World Bank	Low "rule-of-law-measures" indicate high levels of opportunism
			Order	Assessment of popular observance of the law (Part of composite indicator „Rule of Law")	World Bank	Low measures indicate high levels of opportunism

23	**Information asymmetry state vs. firm** (Controlling and monitoring problems)[19]	Reg-Ma; Reg-PR; EnvP	Information asymmetry	Methodology to identify information asymmetry: 1.) Identify potential sources of information asymmetry related to the policy under scrutiny; 2.) Evaluate the impact of this information asymmetry on the efficiency of this policy; 3.) Assess the additional controlling and monitoring costs necessary to reduce the level of information asymmetry to an "*acceptable*" level	Qualitative assessment by expert group	High additional controlling and monitoring costs necessary to reach an *"acceptable"* level of information asymmetry indicate a high constraint
			Affinity of governments towards devolution	Degree of affinity of the government of a country towards devolution	Qualitative assessment by expert group	Low degrees indicate high information asymmetries since centralised control and monitoring is more costly
			Farmer density	Average number of farms per 100 ha	SEAMLESS Databases	High numbers indicate higher controlling and monitoring cost, thus, likely higher information asymmetries
			Rule of Law	Composite indicator of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence	World Bank	Low measures indicate an ineffective/inefficient existing controlling and monitoring system causing information asymmetries

[19] Please note: 1) Information asymmetries are conceived as the result of problems on part of the state to control and monitor the activities of firms. These problems depend, among other things, on the ability (technical/knowledge/human resources) or even willingness of the administration in charge to control and monitor actors' behaviour, but also on the characteristics of the resources (and the related activities to be monitored) concerned. Thus, information asymmetries might exist (or persist) because costs for monitoring and controlling are high or even prohibitive. In other words, if controlling and monitoring are possible and available at zero costs, there would be no information asymmetries. 2) There is a strong link between the level of opportunism (see CIA 22) and controlling and monitoring costs. High levels of opportunism in a country might indicate high costs for controlling necessary to deter actors from cheating.

24	**Monopoly power**	Reg-Ma	Oligopolistic structure	Number of firms in a sector (e.g., food processing industry, water supply firms, etc.)	National Statistical Databases; Qualitative assessment by expert group EUROSTAT	Low numbers indicate a tendency towards an oligopolistic structure in a sector (or a monopoly = 1)
25	**Insufficient information** on policy	Eco-Ma; Eco-PR	Agricultural specialised press	Number of agriculture related journals, newspapers, newsletters, etc.	National Statistical Databases	Low numbers indicate a low variety of specialised press and, thus, a high likelihood of insufficient information
			Dissemination of specialised press among farmers	Ratio = total circulation (or printed copies) of specialised press / number of farms	National Statistical Databases; SEAMLESS Databases	Low ratios indicate a low dissemination level of specialised press and, thus, a high likelihood of insufficient information
26	**Endowment effect**	Reg-PR; Eco-PR	Change of property rights	Degree of (substantial) cut back on relevant property rights endowments of actors addressed by the policy and of other actors (including the state)	Qualitative assessment by expert group	High degrees of cut back on relevant property rights of actors indicates a stronger resistance of actors
27	**Dispersion/ fragmentation of property rights**[20]	Adv-SON; Adv-PR	Land owner - tenant relationship	Average number of land owners per tenant	National Statistical Databases	High numbers indicate that property rights on the land farmed by one tenant are dispersed

[20] Here, term “fragmentation” refers to “land fragmentation”, i.e., owners per hectare. However, “dispersion” refers to the distribution of specific components of property rights on a concrete piece of land (access, alienation, withdrawal, etc.).

			Land farmed under leasehold contracts	Percentage of agricultural land farmed under leasehold contracts	National Statistical Databases	High percentages indicate that property rights on a high proportion of land (of a country) are dispersed
			Land ownership (land fragmentation)	Average size of land per land owner	National Statistical Databases	Low numbers indicate a high degree of land fragmentation
			Dispersion of farm size	For each country a farm size distribution curve (farms with size < 5 ha, between 5-20 ha, between 20-50 ha, and > 50 ha) will be calculated for each year. Difference between years will serve as a measure of farm size dispersion.	EUROSTAT; Own calculations	n.a.
28	**Ambiguous property rights**	Reg-Ma; Reg-PR	Land ownership disputes	Number of infringement cases in a country brought before the Court of Justice that are related to disputes on land ownership	National Statistical Databases	High numbers indicate a high level of ambiguity of property rights on land
			Confiscation/Expropriation Private property protection	Measure on the likelihood of confiscation / expropriation **or** Measure on private property protection *(also part of the World Bank composite indicator "rule of law)*	Economist Intelligence Unit (see also World Bank)	High likelihoods of confiscation / expropriation or low measures of private property protection indicate a high ambiguity of (private) property rights
			Transition Country / New Member State	Binary indicator: New Member State (joined EU 1. May 2004 or after) = 1 Old Member State (joined EU before 1. May 2004) = 0	EUROSTAT	It is assumed that property rights are more ambiguous in the New Member States
29	**Social capital** (among local actors = *bonding* social capital)	(Reg-Ma); Eco-SON; ComRes	Membership in relevant associations and NGOs	Percentage of farmers that are members in relevant associations and NGOs	Assessment by expert group; Statistics of relevant associ-ations and NGOs	Low percentages indicate a low level of bonding social capital among farmers
			Associations and NGOs	Number of relevant associations and NGOs	Assessment by expert group	Low numbers indicate a low level of bonding social capital

		Telecommunication	Number of mobile phones per 1.000 inhabitants	EUROSTAT	Low numbers indicate a low level of bonding social capital
		Intensity of Email-exchange and telecommunication	Number of E-mail or phone exchange inside and outside a region	EUROSTAT	Low numbers indicate a low level of bonding social capital
		Remoteness	Average distance of farms to public transport	n.a.	High average distances indicate a low level of bonding social capital (in countries with limited availa-bility of private transport
		Social Capital	Social Capital Measure (ex-ante policy implementation) *Measure will be specified by WP2 – social indicator group*	SEAMLESS social indicators	A low measure indicates a low level of bonding social capital
Social capital (between local actors and actors at other levels, e.g., state = *bridging* social capital)	(Reg-Ma); Eco-SON; ComRes	Level of Internet access – households	Percentage of households who have internet access at home	EUROSTAT	Low percentages indicate low bridging social capital
		Voter turnout in national parliamentary elections	Percentage of the (accredited) population who cast a vote or turn out at a national parliamentary election	EUROSTAT	Low percentages indicate low bridging social capital
		E-government usage by individuals	Percentage of individuals (16-74 years old) who have used the internet in the last 3 months for interaction with public authorities (obtaining information, downloading forms, sending filled in forms)	EUROSTAT	Low percentages indicate low bridging social capital
		Trust between actors	Percentage of respondents who answer “Most people can be trusted”	EVSS (World Values surveys)	Low percentages indicate low bridging social capital
		Level of citizen’s confidence in EU institutions	Share of positive opinions expressed (people who declare that they “tend to trust”) towards the European Parliament, the European Commission, and the Council of Ministers of the EU, respectively.	EUROSTAT	Low shares indicate low bridging social capital

30	**Trust** between actors (interpersonal trust)	Reg-Ma; Gen	Relative trust European citizens have for citizens of other countries	Average response to the question "I would like to ask you a question about how much trust you have in people from various countries. For each, please tell me whether you have a lot of trust, some trust, not very much trust or no trust at all" (1 = no trust at all; 2 = not very much trust; 3 = some trust; 4 =a lot of trust).	Eurobarometer	Average values between 1 and 2 indicate low trust between actors
			Trust between actors	Percentage of respondents who answer "Most people can be trusted"	EVSS (World Values surveys)	Low percentages indicate low trust between actors
31	Strong **environmental groups and / or environmental legislation**	Prot	Memberships in environmental intergovernmental organisations	Number of memberships (of a country) in environmental intergovernmental organizations	Different sources (see Environ-mental Sustainability Index - ESI)	High numbers indicate strong environmental groups and/or legislation
			Participation in international environmental agreements	Measure for the participation of a country in international environmental agreements (combines ratifications of treaties and conventions with the level of active participation in, contribution to, and compliance with the treaties' obligations) *(also part of ESI)* Values: 0 (no participation) to 1 (full participation)	Different sources (see also Environ-mental Sustainability Index - ESI)	Values above 0.5 indicate strong environmental groups and/or legislation
			Environmental Governance	Measure on the severity of environmental policy of a country (*also part of ESI)*	World Economic Forum (see also ESI and Damania et al. 2004)	High measures indicate strong environmental groups
			Environmental Subsidies	Level of environmental motivated subsidy; Also: (Ratio = Environmental motivated subsidy / Gross National Product)	OECD	High ratios indicate strong environmental groups and/or legislation
			Eco-label awards	Number of (Community) Eco-label awarded to products and services with reduced environmental impacts	EUROSTAT	High numbers indicate strong environmental groups and/or legislation

			Ethical Financing	Number of organisations that have implemented and Eco-Management and Audit Scheme (EMAS) or an ISO 14001 certification	EUROSTAT	High numbers indicate strong environmental groups and/or legislation
			Protected Areas for Biodiversity: Habitats Directive	Percentage of Area proposed under the Habitats Directive relative to total agricultural area in a country	EUROSTAT	High percentages indicate strong environmental groups and/or legislation
			Environmental associations and NGOs	Number of environmental associations and NGOs	Assessment by expert group; National Statistical Databases	High numbers indicate strong environmental groups and/or legislation
			Memberships in environmental associations and NGOs	Ratio = Number of memberships in environmental associations and NGOs / total population of the country	Assessment by expert group; National Statistical Databases	High ratios indicate strong environmental groups and/or legislation
32	Strong **bargaining power** of farmers' organisations	Reg-Hi; Eco-SON	Memberships in farmers associations	Total number of members in farmers associations	National Statistical Databases	High numbers indicate a strong bargaining power of farmers organisations
			Fragmentation of farmers associations	Number of farmers associations	National Statistical Databases	High numbers indicate a relatively *weak* (total) bargaining power of farmers organisations
			Lobbying power of farmers unions	Percentage of farmers in a country that are members of farmer unions	National Statistical Databases; Assessment by expert group	High percentages indicate a strong bargaining power of farmers unions.

			Proximity between farmers associations and EU authorities	(Number of) farmers associations (of a country) with official representatives in Brussels	Data assembled by expert group	A high number indicates a high influence on the political decision making process at EU level and strong bargaining power
			Structure of farming system	Ratio = Number of farms / Number of people employed in the farming sector	SEAMLESS Databases	A low ratio indicates a farming system dominated by large farms (latifundium system) and, thus, a high influence on the political decision making process at national level
			Producer Support Estimate	Monetary budget of producer support (e.g., market price support, payments based on overall farming income, etc.) in a country	OECD	High estimates indicate a strong bargaining power of farmers organisation
33	**Heterogeneous** environment-related **social values**)	EnvP	Eco-label awards	Number of different Eco-labels awarded to products and services with reduced environmental impacts	National Statistical Databases	High numbers indicate heterogeneous environment-related social values
			Protected Areas for Biodiversity: Habitats Directive	Percentage of Area proposed under the Habitats Directive relative to total agricultural area in a country	EUROSTAT	Low percentages indicate strong local opposition against the demarcation of protected areas, thus, heterogeneous environment-related social values
			Transposition of environment-related European Community law	Percentage of implemented environment-related EU Directives in a Member State: Environment Directives for which measures or implementation have been notified by Member States divided by Environmental Directives applicable on the reference date by Member States	EUROSTAT	Low percentages indicate strong opposition of actor groups against implementation of these directives, thus, heterogeneous environment-related social values

			Environmental conflicts	Number of infringement cases *concerning environmental issues* brought before the Court of Justice in country as a percentage of total infringement cases	National statistical databases	High percentages indicate a high heterogeneity of environment-related social values
			Environmental associations and NGOs	Number of environmental associations and NGOs	Assessment by expert group; National Statistical Databases	High numbers indicate a high number of different environmental goals and, thus, a high heterogeneity of environment-related social values
34	High **environmental awareness** and strong **environmental preferences of consumers**	Prot	Policitical influence of Green Party	Percentage of votes cast for a green party at parliamentary elections at national level	National Statistical Databases	High percentages indicate a high environmental awareness
			Environmental awareness	Positive answers to the question "I would give part of my income if I were certain that the money would be used to prevent environmental pollution"	Inter-university Consortium for Political and Social Research (European Values Surveys Series - EVSS)	High numbers of positive answers indicate a high environmental awareness
			Environmental expenditure	Percentage of environmental public expenditure of Gross Domestic Product	EUROSTAT	High percentages indicate strong environmental preferences
			Enterprises with an environmental management system	Number of organisations that have implemented and Eco-Management and Audit Scheme (EMAS) or an ISO 14001 certification	EUROSTAT	High numbers indicate strong environmental preferences
			Eco-label awards	Number of (Community) Eco-labels awarded to products and services with reduced environmental impacts	EUROSTAT	High numbers indicate strong environmental consumer preferences

35	Weak / Strong **consumer preferences for health or quality products**	Reg-Ma; Prot	Health and quality label awards	Number of health- or quality-labels awarded to (agricultural products)	Assessment by expert group	Low/High numbers indicate weak/strong consumer preferences for health or quality products
			Opposition to GMO-products	Percentage of population opposed to GMO products	Eurobarometer	Low/High numbers indicate weak/strong consumer preferences for health or quality products
			Composite Consumer's environmental awareness and health concerns	Principal component analysis (PCA) on different items related to environmental concerns (decompose Environmental Awareness Index?) and health concerns (number of health-labels awarded to products)	EVSS; Assessment by expert group	Low/High numbers indicate weak/strong consumer preferences for health or quality products
36	**Low incentives to resolve a problem**	Adv-SON; Water	Incentives for resolving problems	Degree of incentives to resolve the problem	SEAMLESS environmental indicators; Qualitative assessment by expert group	Low degrees indicate low incentives to resolve a problem
37	Very **large water resource system**	Adv-SON; Water	Size of water resource system	Binary indicator: Very large water resource systems addressed by policy = 1; Or not = 0	Qualitative assessment by expert group	Value = 1 indicates the existence of the constraint
38	**Environmental problem is not easy to identify in space and time**	Adv-SON; Adv-PR	Identifiability in space and time	Degree of identifiability of environmental problem in space and time	Qualitative assessment by expert group	Low degrees indicate high constraints

39	High **political costs** for reducing protectionist policies	Prot	Proximity between farmers/consumers associations and EU authorities	(Number of) farmers associations / consumers associations (of a country) with official representatives in Brussels	Datasets	High numbers indicate a high influence of farmers/consumers on the political decision making process at EU level and, thus, high political costs for reducing protectionist policies for farmers/ consumers
			Lobbying power of farmers associations	Percentage of farmers of a country that are members of a farmers association	National Statistical Databases; Assessment by expert group	High percentages indicate high influence of farmers on the political decision making process, thus, high political costs for reducing protectionist policies.
			Voters employed in the farming sector	Percentage of voters (population eligible to vote) that are employed in the farming sector	National Statistical Databases; SEAMLESS Databases	High percentages indicate high political costs for reducing protectionist policies for farmers
			Structure of farming system	Ratio = Number of farms / Number of people employed in the farming sector	SEAMLESS Databases	A low ratio indicates a farming system dominated by large farms having larger potentials for lobbying and, thus, high political costs for reducing protectionist policies for farmers
40	High perceived **dependence on support/protection**	Prot	Perceived dependence on support/protection	Degree of perceived dependence on support/protection	Qualitative assessment by expert group	High degrees indicate high constraints

41	Poor country with **smallholder agriculture**	Prot	Small farms in poor countries	Percentage of farms with less than 5 ha in countries with a Gross Domestic Product per person below X	EUROSTAT	High percentages indicate a dominance of smallholder agriculture in poor country, thus, higher constraints
42	Inefficient credit markets for s**mallholders**	Prot	Very small farms	Percentage of farms with less than X ha	EUROSTAT; National Statistical Databases	High percentages indicate higher constraints since very small farms usually have problems to get credits

Legend: Reg-Hi: Regulatory on Hierarchy/Bureaucracy; Reg-Ma: Regulatory on Market; Eco-Hi: Economic on Hierarchy/Bureaucracy; Eco-Ma: Economic on Market; Reg-SON: Regulatory on Self-organised network; Eco-SON: Economic on Self-organised networks; Adv-SON: Advisory/Voluntary on Self-organised network; Reg-PR: Regulatory on Property Rights Change; Eco-PR: Economic on Property Rights Change; Adv-PR: Advisory/Voluntary on Property Rights Change; ComRes: Complex resource systems with many externalities involved; Water: Water resource systems with long-term and diffuse impacts stemming from farming activities; Land: Land/Soil; Prot: (Trade-related) Agricultural Protectionist Policies; EnvP: Environmental Policies; Gen: General Institutional Aspects

3.4 Step 4: Method to Aggregate Information on Crucial Institutional Aspects of Policy Types

In this Section, the method to aggregate the information on crucial institutional aspects of policy types will be introduced. The application examples of PICA described in Sections 4.1 and 4.2 will illustrate the operationalisation of this step.

It is important to note that there is no automatic calculation process producing quantitative values for the extent of the identified CIAs by evaluating the outcomes of the various institutional indicators employed. Rather, the expert team that runs PICA - with the help of external experts and/or users and/or stakeholders - will use the information provided by the indicators for a qualitative assessment of the relevant CIA. Subsequently, the expert team will combine the information on the respective constraints or potentials to an overall assessment on institutional compatibility of the policy option (with respect to a country or region). During this process, they will elaborate on qualitative composite output indicators, such as:

- institutional diversity,
- property rights compatibility,
- communication capacity,
- governance structures compatibility, and
- embeddedness compatibility.

Crucial institutional aspects relevant for the policy option under scrutiny will be subsumed under these categories of institutional compatibility. Depending on the policy, other or additional categories might be introduced. Finally, those categorised region- or country wise qualitative statements on the compatibility of the policy option will be communicated - explained by the PICA expert team - to the User(s) of SEAMLESS-IF.

4 Integration of PICA in SEAMLESS-IF

In this Section, PICA will be applied to the SEAMLESS Test Case 1 (Trade Liberalisation) and Test Case 2 (here: Nitrate Directive) to illustrate the concrete steps of institutional compatibility analysis within SEAMLESS.[21] It is assumed that a small team of experts trained in institutional economics supervises the entire procedure. This expert team runs PICA with the help of - and in close interaction with - the respective User(s), other relevant SEAMLESS scientists (e.g., modellers, data base group, etc.), relevant national and/or regional stakeholders, and other experts.

While the overall procedure of institutional compatibility analysis has been formalised and structured to enable a focussed and time efficient ex-ante institutional policy assessment there is no automatic quantitative calculation process covering all steps of PICA. Qualitative forms of assessment are important elements within PICA. Yet, this qualitative assessment is based - to varying degrees - on quantitative data (e.g., the values/results of institutional indicators describing the extent of a respective Crucial Institutional Aspect). Furthermore, in the context of integrating PICA in Prototype 3, a more detailed protocol will be developed that will guide any future PICA team through the process of institutional analysis within SEAMLESS (see also Appendix 3).

4.1 Integration of PICA in SEAMLESS-IF: Test Case 1 (Trade Liberalisation)

4.1.1 Description of the Policy Option in Prototype 1 (Test Case 1)

In Test Case 1, the policy option “Trade Liberalisation” is to be adopted. The policy option is aiming at eliminating trade-distorting instruments, relates to the market level of the agricultural sector, and affects all commodities through the price mechanism which can (and will) be modelled using CAPRI, GTAP, and other modelling systems. More precisely, the “Trade Liberalisation” policy scenario is encompassing four main elements: 1) Reductions in import tariffs (based on the details of the so-called Harbinson 1½ proposal); 2) Elimination of export subsidies (assuming the complete elimination of all export subsidy practices, such as direct export subsidies, producer financed subsidies, and cost reduction measures); 3) Expansion of tariff rate quotas (assuming the same reduction commitments as by Harbinson for import tariffs); 4) Specific bilateral trade agreements signed and implemented. Here, the year 2012 is taken as simulation year since at this time the reform of the EU Common Agricultural Policy (CAP) of 2003 is considered to be fully implemented.[22]

[21] Please not that redundancies between the two Test Cases concerning the description of the procedure are intended. This is supposed to ensure that the reader can focus on one example only.

[22] The CAP reform of 2003, as it would be implemented in 2012 in the EU-25 is part of the reference scenario assumptions. It thus includes the currently most plausible implementation of decoupling and payment scheme options (single farm payments, regional uniform payments, or hybrid forms) for the different EU Member States, modulation of direct payments, capping of export subsidies and EU preferential trade agreements with least developed and other countries. It also comprises specific and ad-valorem tariffs, and tariff rate quotas as currently being regulated by the different WTO members.

4.1.2 PICA step 1: Classification of the Policy Option

Using all available information on the concrete form and content of the policy option provided by the User(s) the PICA expert team is categorising the policy option according to the matrix of policy types (see Table 4.1). "Trade Liberalisation" is identified as a policy type aiming to *intervene at markets* (here, for 12 raw commodities and 8 intermediates) using *economic instruments* (here, tariff cuts and reduction in subsidies) as type of intervention. Further, Crucial Institutional Aspects (CIA) related to *trade-related agricultural protectionist policies* have to be considered. This categorisation allows focusing the subsequent review of relevant policy assessment literature (and other literature) that is screened for CIAs.

4.1.3 PICA step 2: Crucial Institutional Aspects related to the Policy Option

The literature review that is carried out by the PICA expert team reveales a number of Crucial Institutional Aspects potentially hampering the effective implementation of the policy option "Trade Liberalisation", in particular, the implementation of tariff cuts and reductions in subsidies.[23] Those CIAs are summarised in Table 3.2 (Box: Economic – Market) and in Table 3.4 (Trade-related agricultural protectionist policies) in Section 3. The complete set of potentially relevant CIA encompasses:[24]

1. Contradictory policy instruments & rules (joint production)
2. Redundant policy instruments & rules
3. High level of opportunism
4. No experiences with measures
5. Insufficient information on policy
6. Not matching farmers' competencies & capabilities
7. Target group not (fully) eligible
8. Strong consumer preferences together with high level of social capital
9. High level of corruption
10. Very large water resource system
11. High political costs for reducing protectionist policies
12. Political and administrative inertia
13. Strong consumer preferences for health and quality products
14. Strong environmental groups and environmental legislation
15. High environmental awareness and strong environmental preferences of consumers
16. Poor country with smallholder agriculture
17. Inefficient credit markets for smallholders
18. High perceived dependence on support/protection

Together with the User(s), relevant national and/or regional stakeholders, and other experts, the PICA expert team is discussing the relevance of every identified CIA for the policy option under scrutiny. Here, some of these CIAs might be regarded as relevant for the policy type (economic on market) in general, but not be considered as crucial for the concrete policy option to be assessed. Thus, the expert team can decide to skip some CIAs at this stage, e.g., the CIA *very large water resource system*. In turn, additional CIAs that have not been covered by the literature reviewed - or not in relation to the policy type under scrutiny - might

[23] Depending on the policy option under scrutiny, the (then) PICA expert team can make - largely - use of the already existing library of CIAs that was compiled during former applications of PICA. Effectively, there will be an evergrowing library of CIAs that only has to be updated and complemented if a "new" policy option is to be assessed.

[24] The order of the CIAs in the list does not imply a ranking according to their relative importance.

be added. For example, *strong bargaining power of farmers' organisations* is found to be an important additional CIA.

The detailed description and explanation of every CIA identified can be found in the respective Sections in Appendix 2. However, for illustrative purposes the relevance of some identified CIA will be highlighted and linked to the policy option. These CIAs are considered of primary importance for the implementation of the policy option "Trade Liberalisation".

1) Contradictory policy instruments & rules (joint production)

An important strand of institutional aspects found in the literature stems from the fact that agricultural production is usually marked by *joint production* of commodities (e.g., meat or milk) and non-commodities (e.g., landscapes attractive for tourists). For example, lifting import tariffs for milk (meat) might cause a decrease in domestic prices for milk (meat) which can lead to a decrease in domestic milk (meat) production. Thus, less grassland is needed; farmers in some (marginal) regions might stop farming at all and / or using their land for other purposes (e.g., as fallow land or for housing). However, there are special support programs in place in some countries and regions that encourage farmers to use their land in a particular way (e.g., using grassland as pastures) because it 'produces' a landscape attractive for tourists, thus, preventing the predicted change in land use. Such financial support might come from the state but also from the regional tourist council; eventually 'buying' a particular landscape from the farmer. There might also be formal laws (regional, national, and/or international) preventing the use of land other than 'the traditional way' in some regions.

The existence of those contradictory financial incentives as well as formal laws might be the result of the presence of *strong environmental groups and environmental legislation* in a country or region, a *high environmental awareness and strong environmental preferences of consumers*, or a *strong bargaining power of farmers' organisations*. Therefore, a particular country might have signed international agreements having institutional constraining effects. For example, a country might have agreed to reduce their emission of climate gases by creating appropriate 'sinks'. Here, certain types of land cover (e.g., grasslands) might serve this purpose better than others do (e.g., arable or housing). Thus, there might be financial incentive programs in place - or even formal restrictions - for changing land use, again, preventing the predicted decrease in e.g., milk (meat) production.

2) High environmental awareness and strong environmental preferences of consumers

Consumers in a particular country or region might have a *strong preference for buying products that are produced in an environmentally friendly fashion* (e.g., dolphin friendly tuna) or that are not produced using genetically modified organisms (e.g., maize) or growth hormones (e.g., BST beef). If this is the case, there might be no markets (or smaller ones than predicted) for those products bearing the risk of being produced in a way not preferred by the consumers in this country.

3) Strong consumer preferences for health and quality products

Similar to the CIA above, consumers in a particular country or region might have a *strong preference for health and quality products*, thus, (foreign) produce not meeting these preferences will face lower consumer demands. Linking up to the CIA presented first (contradictory policy instruments & rules), those preferences might have been manifested/formalised in countrywide health and quality standards. Here, a high level of social capital is facilitating the expression of preferences in the political arena, thus, the CIA *strong consumer preferences together with high level of social capital* is of importance here, too. For example, for milk there might be very high state-sanctioned hygienic standards in

place (in a particular region or country). Assuming a positive relation between quality and marginal production costs, fulfilling this particular standard might not be possible for every potential foreign milk producer (alternatively, his/her marginal production costs increase and he/she can not (longer) offer the milk at a (comparatively) low price).

4) High political costs for reducing protectionist policies

Implementation of policies reducing agricultural protection might be constrained in a specific country or region due to *high political costs*. These costs can be expected to be high a) if the relative income position of farmers is decreasing, b) if the commodities concerned represent a high share in consumer expenditures, c) if policies are defined at EU level, d) if capital intensive agricultural production branches are concerned, and e) in the presence of low income rates and high real food prices (Swinnen et al., 2000). The level of political costs might also be influenced by the *degree of the perceived dependence on support/protection*. Since direct aid schemes for farmers were found to convey a stronger subjective impression of dependence (Daugbjerg et al., 2003) it can be expected that policies that aim to reduce those direct aid schemes will face stronger opposition from farmers ('lobbies), thus, increasing political costs, than indirect support schemes. Furthermore, the level of political costs that a government has to face when reducing agricultural protection will be higher if *farmers' organisations have strong bargaining power*.

5) High level of corruption

The existence of (powerful) domestic actors who profit from trade regulations in place might hinder a successful implementation of reducing protectionist policies. This might be because they help them to extract *corruption* rents that can be used partly to keep them in power. Extraction of corruption rents may either be through opportunities for bribery or the exercise of an import monopoly (Kerr, 2004).

4.1.4 PICA step 3: Linking Crucial Institutional Aspects of the Policy Option to Institutional Indicators

In PICA step 2, the expert team suggests a restricted/short list of CIAs that are considered to be of particular importance for assessing the effectiveness of implementing the policy option "Trade Liberalisation" (the numbers in brackets indicate the position of the respective CIAs in Table 4.1):

1. Contradictory policy instruments & rules (joint production) (1)
2. High environmental awareness and strong environmental preferences of consumers (2)
3. Strong environmental groups and environmental legislation (3)
4. Strong consumer preferences for health and quality products (4)
5. Strong consumer preferences together with high level of social capital (2) (4) (5)
6. High political costs for reducing protectionist policies (6)
7. High perceived dependence on support/protection (7)
8. Strong bargaining power of farmers' organisations (8)
9. High level of corruption (9)

In Table 4.1, the selected CIAs are linked with at least one institutional indicator that can help to evaluate the respective CIA; eventually leading to statements about the effectiveness of policy implementation in PICA step 4. For further "processing" only those indicators are selected from the available portfolio that are considered to have some explanatory power with respect to the concrete policy option under scrutiny, here, "Trade Liberalisation". At this stage, the expert team that has compiled the list of institutional indicators is interacting closely with other SEAMLESS scientists, in particular with the modelling and data bases

groups. In particular, the availability, quality, and (geographical/regional) scope of quantitative data are discussed in order to select the most appropriate indicators.[25] Further, the precise forms (e.g., focus groups, interviews, document analysis, etc.) and scopes (stakeholder and/or experts at regional and/or national and/or EU-level, etc.) of suggested qualitative assessments are discussed and decided on.

For illustration, some indicators drawing on different data sources or processes of generating data are discussed in more detail.

A) In order to identify *contradictory policies* that are, e.g., *due to joint production*, the following methodology is suggested*:* 1) Compile a short list of relevant policies that are applied in the area and that could be contradictory to the policy option; 2) Identify more precisely and evaluate contradictions between policy option under scrutiny and policies in this short list. This *qualitative assessment* is carried out by the PICA expert team together with other experts

B) In order to describe the extent of the CIA *high level of corruption* it is suggested, among other things, to make use of the *Corruption Perception Index* compiled by *Transparency International*. It contains a combination of various sources measuring the overall extent of corruption as determined by expert assessments and opinion surveys. Additionally, the *Control of Corruption Indicator* provided by the *World Bank* can be used to describe the extent of the CIA. This is a composite indicator of the extent public power is exercised for private gain, including both, petty and grand corruption as well as state "capture" by elites and private interests. Both data sets include national data for various years. For both indicators, it is assumed that high levels of the various measures and indexes of corruption in the political system and in the bureaucracy contributes to lax enforcement of regulations and an ability on the part of producers and consumers to evade responsibility for the harms they cause, thus, indicate high constraints.

C) For describing the social capital element of the CIA *strong consumer preferences together with high level of social capital* it is suggested to assess the membership [of consumers] in relevant associations and NGOs (percentage) by reviewing national statistics of relevant associations and NGOs and employing national expert groups. Here, low percentages indicate a low level of bonding social capital among consumers. The Social Capital Measure that is constructed and further specified by the social indicator group of SEAMLESS Work Package 2 provides further insight on social capital in the various countries. Here, it is assumed that a low measure indicates a low level of bonding social capital.

D) For assessing the *political costs for reducing protectionist policies*, among other things, the indicator *structure of farming system* is introduced. It is construed as the ratio between the number of farms (in a country or region) and the number of people employed

[25] Future Prototypes of SEAMLESS-IF are likely to include/have access to some of the data bases suggested in Table 3.5, e.g., some relevant and freely available data sets from the World Bank, EUROSTAT, or the like. However, other quantitative data bases will only be included on a case-to-case basis, depending on both, the relative importance of the indicator described by this data set and the policy option under scrutiny.

in the farming sector. This information can be provided by *data bases already integrated in SEAMLESS-IF*. Here, a low ratio indicates a farming system dominated by large farms having larger potentials for lobbying and, thus, high political costs for reducing protectionist policies for farmers.

Table 4.1: Restricted List of Crucial Institutional Aspects and Institutional Indicators Relevant for the Policy Option "Trade Liberalisation"

No.	Crucial Institutional Aspects (CIA)	Related to Policy Type(s)	Institutional Indicator	Description / Data	Data Sources / Databases	Expert assumptions on links between indicator and CIA[26]
1	**Contradictory policy instruments** and rules (joint production)	Reg-Hi; Reg-Ma; Eco-Ma; EnvP; Prot; Gen	Contradictory policies (incl. joint production)	Methodology to identify contradictory policies that are, e.g., due to joint production: 1) Compile a short list of relevant policies that are applied in the area and that could be contradictory to the policy option; 2) Identify more precisely and evaluate contradictions between policy option under scrutiny and policies in this short list	Qualitative assessment by expert group	The existence of contradictory policies and rules indicates high constraints
2	High **environmental awareness** and strong **environmental preferences of consumers**	Prot	Policitical influence of Green Party	Percentage of votes cast for a green party at parliamentary elections at national level	National Statistical Databases	High percentages indicate a high environmental awareness
			Environmental awareness	Positive answers to the question "I would give part of my income if I were certain that the money would be used to prevent environmental pollution"	Inter-university Consortium for Political and Social Research (European Values Surveys Series - EVSS)	High numbers of positive answers indicate a high environmental awareness
			Environmental expenditure	Percentage of environmental public expenditure of Gross Domestic Product	EUROSTAT	High percentages indicate strong environmental preferences

[26] Please note that this column will contain "*Specific* assumptions on links between indicator, CIA, and policy option" when actually running PICA. It will be filled by the PICA team after discussing the relevance and sufficiency of available indicators for evaluating the identified CIA with respect to the concrete policy option. This process is also likely to produce a restricted (smaller) list of those institutional indicators related to a respective CIA that can be linked meaningfully with the policy option under scrutiny. See also Appendix 3.

			Enterprises with an environmental management system	Number of organisations that have implemented and Eco-Management and Audit Scheme (EMAS) or an ISO 14001 certification	EUROSTAT	High numbers indicate strong environmental preferences
			Eco-label awards	Number of (Community) Eco-labels awarded to products and services with reduced environmental impacts	EUROSTAT	High numbers indicate strong environmental consumer preferences
3	Strong **environmental groups and / or environmental legislation**	Prot	Memberships in environmental intergovernmental organisations	Number of memberships (of a country) in environmental intergovernmental organizations	Different sources (see Environ-mental Sustainability Index - ESI)	High numbers indicate strong environmental groups and/or legislation
			Participation in international environmental agreements	Measure for the participation of a country in international environmental agreements (combines ratifications of treaties and conventions with the level of active participation in, contribution to, and compliance with the treaties' obligations) *(also part of ESI)* Values: 0 (no participation) to 1 (full participation)	Different sources (see also Environ-mental Sustainability Index - ESI)	Values above 0.5 indicate strong environmental groups and/or legislation
			Environmental Governance	Measure on the severity of environmental policy of a country (*also part of ESI)*	World Economic Forum (see also ESI and Damania et al. 2004)	High measures indicate strong environmental groups
			Environmental Subsidies	Level of environmental motivated subsidy; Also: (Ratio = Environmental motivated subsidy / Gross National Product)	OECD	High ratios indicate strong environmental groups and/or legislation
			Eco-label awards	Number of (Community) Eco-label awarded to products and services with reduced environmental impacts	EUROSTAT	High numbers indicate strong environmental groups and/or legislation

			Ethical Financing	Number of organisations that have implemented and Eco-Management and Audit Scheme (EMAS) or an ISO 14001 certification	EUROSTAT	High numbers indicate strong environmental groups and/or legislation
			Protected Areas for Biodiversity: Habitats Directive	Percentage of Area proposed under the Habitats Directive relative to total agricultural area in a country	EUROSTAT	High percentages indicate strong environmental groups and/or legislation
			Environmental associations and NGOs	Number of environmental associations and NGOs	Assessment by expert group; National Statistical Databases	High numbers indicate strong environmental groups and/or legislation
			Memberships in environmental associations and NGOs	Ratio = Number of memberships in environmental associations and NGOs / total population of the country	Assessment by expert group; National Statistical Databases	High ratios indicate strong environmental groups and/or legislation
4	Strong **consumer preferences for health or quality products**	Reg-Ma; Prot	Health and quality label awards	Number of health- or quality-labels awarded to (agricultural products)	Assessment by expert group	Low/High numbers indicate weak/strong consumer preferences for health or quality products
			Opposition to GMO-products	Percentage of population opposed to GMO products	Eurobarometer	Low/High numbers indicate weak/strong consumer preferences for health or quality products
			Composite Consumer's environmental awareness and health concerns	Principal component analysis (PCA) on different items related to environmental concerns (decompose Environmental Awareness Index?) and health concerns (number of health-labels awarded to products)	EVSS; Assessment by expert group	Low/High numbers indicate weak/strong consumer preferences for health or quality products

5	**Social capital** (among local actors = *bonding* social capital)	(Reg-Ma); Eco-SON; ComRes	Membership in relevant associations and NGOs	Percentage of farmers that are members in relevant associations and NGOs	Assessment by expert group; Statistics of relevant associ-ations and NGOs	Low percentages indicate a low level of bonding social capital among farmers
			Associations and NGOs	Number of relevant associations and NGOs	Assessment by expert group	Low numbers indicate a low level of bonding social capital
			Telecommunication	Number of mobile phones per 1.000 inhabitants	EUROSTAT	Low numbers indicate a low level of bonding social capital
			Intensity of Email-exchange and telecommunication	Number of E-mail or phone exchange inside and outside a region	EUROSTAT	Low numbers indicate a low level of bonding social capital
			Remoteness	Average distance of farms to public transport	n.a.	High average distances indicate a low level of bonding social capital (in countries with limited availa-bility of private transport
			Social Capital	Social Capital Measure (ex-ante policy implementation) *Measure will be specified by WP2 – social indicator group*	SEAMLESS social indicators	A low measure indicates a low level of bonding social capital
	Social capital (between local actors and actors at other levels, e.g., state = *bridging* social capital)	(Reg-Ma); Eco-SON; ComRes	Level of Internet access – households	Percentage of households who have internet access at home	EUROSTAT	Low percentages indicate low bridging social capital
			Voter turnout in national parliamentary elections	Percentage of the (accredited) population who cast a vote or turn out at a national parliamentary election	EUROSTAT	Low percentages indicate low bridging social capital

			E-government usage by individuals	Percentage of individuals (16-74 years old) who have used the internet in the last 3 months for interaction with public authorities (obtaining information, downloading forms, sending filled in forms)	EUROSTAT	Low percentages indicate low bridging social capital
			Trust between actors	Percentage of respondents who answer "Most people can be trusted"	EVSS (World Values surveys)	Low percentages indicate low bridging social capital
			Level of citizen's confidence in EU institutions	Share of positive opinions expressed (people who declare that they "tend to trust") towards the European Parliament, the European Commission, and the Council of Ministers of the EU, respectively.	EUROSTAT	Low shares indicate low bridging social capital
6	High **political costs** for reducing protectionist policies	Prot	Proximity between farmers/consumers associations and EU authorities	(Number of) farmers associations / consumers associations (of a country) with official representatives in Brussels	Datasets	High numbers indicate a high influence of farmers/consumers on the political decision making process at EU level and, thus, high political costs for reducing protectionist policies for farmers/ consumers
			Lobbying power of farmers associations	Percentage of farmers of a country that are members of a farmers association	National Statistical Databases; Assessment by expert group	High percentages indicate high influence of farmers on the political decision making process, thus, high political costs for reducing protectionist policies.
			Voters employed in the farming sector	Percentage of voters (population eligible to vote) that are employed in the farming sector	National Statistical Databases; SEAMLESS Databases	High percentages indicate high political costs for reducing protectionist policies for farmers

			Structure of farming system	Ratio = Number of farms / Number of people employed in the farming sector	SEAMLESS Databases	A low ratio indicates a farming system dominated by large farms having larger potentials for lobbying and, thus, high political costs for reducing protectionist policies for farmers
7	High perceived **dependence on support/protection**	Prot	Perceived dependence on support/protection	Degree of perceived dependence on support/protection	Qualitative assessment by expert group	High degrees indicate high constraints
8	Strong **bargaining power** of farmers' organisations	Reg-Hi; Eco-SON	Memberships in farmers associations	Total number of members in farmers associations	National Statistical Databases	High numbers indicate a strong bargaining power of farmers organisations
			Fragmentation of farmers associations	Number of farmers associations	National Statistical Databases	High numbers indicate a relatively *weak* (total) bargaining power of farmers organisations
			Lobbying power of farmers unions	Percentage of farmers in a country that are members of farmer unions	National Statistical Databases; Assessment by expert group	High percentages indicate a strong bargaining power of farmers unions.
			Proximity between farmers associations and EU authorities	(Number of) farmers associations (of a country) with official representatives in Brussels	Data assembled by expert group	A high number indicates a high influence on the political decision making process at EU level and strong bargaining power

			Structure of farming system	Ratio = Number of farms / Number of people employed in the farming sector	SEAMLESS Databases	A low ratio indicates a farming system dominated by large farms (latifundium system) and, thus, a high influence on the political decision making process at national level
			Producer Support Estimate	Monetary budget of producer support (e.g., market price support, payments based on overall farming income, etc.) in a country	OECD	High estimates indicate a strong bargaining power of farmers organisation
9	High level of **corruption**	Reg-Ma; Prot	Corruption Perception Index	Combination of various sources measuring overall extent of corruption (frequency and/or size of bribes) as determined by expert assessments and opinion surveys	Transparency International	High levels of the various measures and indexes of corruption in the political system and in the bureaucracy contributes to lax enforcement of regulations and an ability on the part of producers and consumers to evade responsibility for the harms they cause, thus, indicate high constraints
			Control of Corruption	Composite indicator of the extent public power is exercised for private gain, including both petty and grand corruption as well as and state "capture" by elites and private interests	World Bank	
			Corruption within the political system	Measure of corruption within the political system, which distorts the economic and financial environment, reduces the efficiency of government and business by enabling people to assume positions of power through patronage rather than ability, and introduces an inherently instability in the political system. *(also part of the World Bank composite indicator "control of corruption")*	ICRG - Political Risk Services (see also World Bank)	
			Intrusiveness of bureaucracy	Measure of the intrusiveness of the country's bureaucracy: amount of red tape likely to encounter is assessed, as is the likelihood of encountering corrupt officials and other groups. *(also part of the World Bank composite indicator "control of corruption")*	World Markets Online (see also World Bank)	

Legend: Reg-Hi: Regulatory on Hierarchy/Bureaucracy; Reg-Ma: Regulatory on Market; Eco-Ma: Economic on Market; Eco-SON: Economic on Self-organised networks; Adv-SON: Advisory/Voluntary on Self-organised network; ComRes: Complex resource systems with many externalities involved; Prot: (Trade-related) Agricultural Protectionist Policies; EnvP: Environmental Policies; Gen: General Institutional Aspects

4.1.5 PICA step 4: Aggregating Information on Crucial Institutional Aspects of the Policy Option

In this final step of PICA, the expert team that runs PICA with the help of external experts, the User(s), and stakeholders is using the information provided by the indicators for a qualitative assessment of the restricted list of CIAs. This includes, first, combining the various indicator information available for every single CIA of the restricted list to arrive at a qualitative (or, depending on the indicators, quantitative) statement about the relative extent of this CIA in all countries and/or regions. For example, the level of corruption can be determined for every country where the policy option is to be implemented, thus, providing insights in the relative - country-wise - likelihoods for a reduced effectiveness of policy implementation. This information can be compiled, for example, in tables and/or interactive maps where different colours signal different levels of corruption.[27]

Second, the PICA expert team together with the User(s), stakeholders, and other experts is constructing qualitative composite output indicators.[28] These output indicators draw on information from one or a group of Crucial Institutional Aspects. For the policy option "Trade Liberalisation" the expert team suggests to aggregate the information according to the following four thematic categories:

The CIAs aresubsumed under the following four categories:

1. Property rights compatibility
   - Contradictory policy instruments & rules (joint production)
   - High political costs for reducing protectionist policies
2. Communication capacity
   - High levels of social capital
   - Strong bargaining power of farmer's organisations
   - Strong environmental groups
3. Governance structures compatibility
   - High level of corruption
4. Embeddedness compatibility
   - High environmental awareness
   - Strong environmental preferences of consumers
   - Strong consumer preferences for health and quality products
   - High perceived dependence on support/protection

Alternatively, the CIAs might also be subsumed under the following five categories:

1. Contradictory policy instruments & rules (joint production)
2. High environmental awareness, strong environmental preferences of consumers, and strong environmental groups (including high levels of social capital)

[27] These tables and maps might also be made available to the User(s), or they can be integrated in the final qualitative statements on the institutional compatibility of the policy option.

[28] While it is certainly helpful to use „classic" categories, such as property rights compatibility, embeddedness compatibility, etc., the User(s) might prefer other categories and/or the PICA expert team – depending on the policy option under scrutiny and on the CIAs identified – might suggest other and/or additional categories.

3. Strong consumer preferences for health and quality products (including high levels of social capital)
4. High political costs for reducing protectionist policies (including high perceived dependence on support/protection and strong bargaining power of farmer's organisations)
5. High level of corruption

Finally, these categorised region- or country-wise qualitative statements on the compatibility of the policy option will be presented to the User(s) of SEAMLESS-IF by the PICA expert team. Here, an interactive form of communication is preferred since this provides the opportunity to discuss the results and, perhaps, the introduction of complementary policy instruments in countries or regions with specific CIAs.

4.2 Integration of PICA in SEAMLESS-IF: Test Case 2 (here: Nitrate Directive)

4.2.1 Description of the Policy Option in Prototype 2 (Test Case 2)

In Test Case 2, environmental policies and agro-ecological technologies are to be studied. Among other things, their ability to reduce the use of water, the water pollution by nitrate and pesticides, and to preserve biodiversity is to be assessed. The Nitrate Directive (Council Directive 91/676/EEC) (EC, 1991) that was adopted in 1991 will be taken as an example to illustrate PICA. This policy can be seen as a prominent and typical example for an EU environmental policy addressing water pollution.

One of the core elements of the Nitrate Directive is that Member States have to draw up and implement action programmes in vulnerable zones designated before that shall consist, among other things, of mandatory rules. These rules determine, e.g., periods when the land application of certain types of fertiliser is prohibited, and limitations of the land application of fertilisers taking into account the characteristics of the zones concerned, in particular soil conditions, soil type and slope, land use, and agricultural practices (see annex III of the Directive). Furthermore, Member States have to establish suitable monitoring and enforcement systems to ensure actors' compliance with the rules.

4.2.2 PICA step 1: Classification of the Policy Option

Using all available information on the concrete form and content of the policy option provided by the User(s) the PICA expert team categorises the policy option "Nitrate Directive" – according to the matrix of policy types (see Table 3.1) – as a *regulatory type of policy having affects on markets*. As described above, it demands from the Member States that action programmes are to be implemented that shall consist of, among other things, concrete mandatory measures determined in annex III. However, only the national regulations determine the precise limits of restrictions in time and space. Further, it is assumed that no compensations are paid for these restrictions.[29] These uncompensated restrictions have an impact on the production costs of farmers (e.g., because yields decrease due to restrictions in fertiliser use) and, thus, on his/her position at the market. More precisely, the farmer might be

[29] National laws to implement the Nitrate Directive might be complemented with various forms of compensation schemes that ease the burden for some stakeholders and/or which are active in selected areas.

forced to offer his produce at a higher price resulting in a decrease in demand for this produce, or he/she might keep the price and accept reduced profits. Furthermore, the "Nitrate Directive" is an example of an *environmental policy*, thus, CIAs relevant for this group of policies are also to be searched for in the relevant literature. This categorisation allows focusing the subsequent review of relevant policy assessment literature (and other literature) that is screened for CIAs.

4.2.3 PICA step 2: Crucial Institutional Aspects related to the Policy Option

The literature review that is carried out by the PICA expert team reveals a number of Crucial Institutional Aspects potentially hampering the effective implementation of the policy option "Nitrate Directive", in particular, the implementation of restrictions in fertiliser use.[30] Those CIAs are summarised in Table 3.2 (Box: Regulatory – Market) and in Table 3.4 (Environmental Policies) in Section 3. The complete set of potentially relevant CIA encompasses:[31]

1. Ambiguous property rights
2. Information asymmetry state vs. firm
3. Contradictory policy instruments & rules (joint production)
4. Redundant policy instruments & rules
5. High level of opportunism
6. Monopoly power
7. Lack of trust between economic actors
8. High administrative public and/or private Transaction Costs
9. Weak consumer preferences
10. Strong consumer preferences together with high level of social capital
11. High level of corruption
12. Heterogeneous environment-related social values
13. Lack of (environmental) political continuity
14. Undifferentiated policy measures
15. Legal restrictions to differentiation

Together with the User(s), relevant national and regional stakeholders, and other experts, the PICA expert team is discussing the relevance of every identified CIA for the policy option under scrutiny. Here, some of these CIA might be regarded as relevant for the policy type (regulatory on market) in general, but not be considered as crucial for the concrete policy option to be assessed. Thus, the expert team can decide to skip some CIAs at this stage, e.g., the CIA *monopoly power*. In turn, additional CIAs that have not been covered by the literature reviewed - or not in relation to the policy type under scrutiny - might be added. For example, *strong bargaining power of farmers' organisations* is found to be an important additional CIA.

The detailed description and explanation of every CIA identified can be found in the respective Sections in Appendix 2. However, for illustrative purposes the relevance of some identified CIAs will be highlighted and linked to the policy option. These CIAs are

[30] Depending on the policy option under scrutiny, the (then) PICA expert team can make - largely - use of the already existing library of CIAs that was compiled during former applications of PICA. Effectively, there will be an evergrowing library of CIAs that only has to be updated and complemented if a "new" policy option is to be assessed.

[31] The order of the CIAs in the list does not imply a ranking according to their relative importance.

considered of primary importance for the implementation of the policy option "Nitrate Directive".

1) Strong bargaining power of farmers' organisations

Implementation of mandatory measures restricting the use of fertilisers and pesticides in designated vulnerable zone affects directly the production costs of farmers in these zones, often leading to income losses. Yet, the (degree of the) concrete restrictions is determined by the respective Member States or regions. Here, a strong agricultural lobby might be able to soften these mandatory restrictions, or to sue out/obtain exception clauses. Thus, strong farmers' organisations might hamper the effective implementation of the Directive.

2) Information asymmetry state vs. firm and high level of opportunism

Information asymmetries between public administrations (state) and agricultural producers can be conceived as the result of problems on part of the state to control and monitor the activities of firms. These problems depend, among other things, on the ability (technical/knowledge/human resources) or even willingness of the administration in charge to control and monitor actors' behaviour, but also on the characteristics of the resources (and the related activities to be monitored) concerned. Mandatory measures to reduce water pollution by nitrates and/or pesticides are difficult – or very costly – to observe and to measure, e.g., the exact amount of nitrates applied per hectare. Thus, farmers' non-compliance with prescribed restrictions is not easy to detect and/or non-compliance (or the degree of it) cannot be associated clearly to single actors/farmers since nitrates diffuse slowly into often huge groundwater bassins. Furthermore, *high levels of opportunism* on part of the farmers concerned are likely to exacerbate the problem leading to high costs for controlling necessary to deter actors from cheating.

4.2.4 PICA step 3: Linking Crucial Institutional Aspects of the Policy Option to Institutional Indicators

In PICA step 2, the expert team suggests a restricted/short list of CIAs that are considered to be of particular importance for assessing the effectiveness of implementing the policy option "Nitrate Directive" (the numbers in brackets indicate the position of the respective CIAs in Table 4.2):

1. Strong bargaining power of farmers' organisations (1)
2. Information asymmetry state vs. firm (2)
3. High level of opportunism (3)

In Table 4.2, the selected CIAs are linked with at least one institutional indicator that can help to evaluate the respective CIA; eventually leading to statements about the effectiveness of policy implementation in PICA step 4. For further "processing" only those indicators are selected from the available portfolio that are considered to have some explanatory power with respect to the concrete policy option under scrutiny, here, "Nitrate Directive". At this stage, the expert team that has compiled the list of institutional indicators is interacting closely with other SEAMLESS scientists, in particular with the modelling and data bases groups. In particular, the availability, quality, and (geographical/regional) scope of quantitative data are discussed in order to select the most appropriate indicators.[32] Further, the precise forms (e.g.,

[32] Future Prototypes of SEAMLESS-IF are likely to include/have access to some of the data bases suggested in Table 4.5, e.g., some relevant and freely available data sets from the World Bank, EUROSTAT, or the like. However, other quantitative data bases will only be included on a case-to-

focus groups, interviews, document analysis, etc.) and scopes (stakeholder and/or experts at regional and/or national and/or EU-level, etc.) of suggested qualitative assessments are discussed and decided on.

For illustration, some indicators drawing on different data sources or processes of generating data are discussed in more detail.

A) For assessing the *bargaining power of farmers' organisations*, among other things, the indicator *structure of farming system* is introduced. It is construed as the ratio between the number of farms (in a country or region) and the number of people employed in the farming sector. This information can be provided by data bases already integrated in SEAMLESS-IF. Here, a low ratio indicates a farming system dominated by large farms having larger potentials for lobbying.

B) Another indicator for assessing the *bargaining power of farmers' organisations* suggested by the PICA expert team is the *Producer Support Estimate* provided by the OECD. This indicator is reflecting the monetary budget of producer support (e.g., market price support, payments based on overall farming income, etc.) in a country. Here, high estimates indicate a strong bargaining power of farmers organisation.

C) Among other indicators, the PICA expert team suggests a *concrete methodology to identify information asymmetries*: 1) Identify potential sources of information asymmetry related to the policy under scrutiny; 2.) Evaluate the impact of this information asymmetry on the efficiency of this policy; 3.) Assess the additional controlling and monitoring costs necessary to reduce the level of information asymmetry to an "acceptable" level. This qualitative assessment is carried out by the PICA expert team together with other experts. Here, high additional controlling and monitoring costs necessary to reach an "acceptable" level of information asymmetry indicate a high constraint.

case basis, depending on both, the relative importance of the indicator described by this data set and the policy option under scrutiny.

Table 4.2: Restricted List of Crucial Institutional Aspects and Institutional Indicators Relevant for the Policy Option "Nitrate Directive"

No.	Crucial Institutional Aspects (CIA)	Related to Policy Type(s)	Institutional Indicator	Description / Data	Data Sources / Databases	Expert assumptions on links between indicator and CIA[33]
1	Strong **bargaining power** of farmers' organisations	Reg-Hi; Eco-SON	Memberships in farmers associations	Total number of members in farmers associations	National Statistical Databases	High numbers indicate a strong bargaining power of farmers organisations
			Fragmentation of farmers associations	Number of farmers associations	National Statistical Databases	High numbers indicate a relatively *weak* (total) bargaining power of farmers organisations
			Lobbying power of farmers unions	Percentage of farmers in a country that are members of farmer unions	National Statistical Databases; Assessment by expert group	High percentages indicate a strong bargaining power of farmers unions.
			Proximity between farmers associations and EU authorities	(Number of) farmers associations (of a country) with official representatives in Brussels	Data assembled by expert group	A high number indicates a high influence on the political decision making process at EU level and strong bargaining power

[33] Please note that this column will contain "*Specific* assumptions on links between indicator, CIA, and policy option" when actually running PICA. It will be filled by the PICA team after discussing the relevance and sufficiency of available indicators for evaluating the identified CIA with respect to the concrete policy option. This process is also likely to produce a restricted (smaller) list of those institutional indicators related to a respective CIA that can be linked meaningfully with the policy option under scrutiny. See also Appendix 3.

			Structure of farming system	Ratio = Number of farms / Number of people employed in the farming sector	SEAMLESS Databases	A low ratio indicates a farming system dominated by large farms (latifundium system) and, thus, a high influence on the political decision making process at national level
			Producer Support Estimate	Monetary budget of producer support (e.g., market price support, payments based on overall farming income, etc.) in a country	OECD	High estimates indicate a strong bargaining power of farmers organisation
2	**Information asymmetry state vs. firm**	Reg-Ma; Reg-PR; EnvP	Information asymmetry	Methodology to identify information asymmetry: 1.) Identify potential sources of information asymmetry related to the policy under scrutiny; 2.) Evaluate the impact of this information asymmetry on the efficiency of this policy; 3.) Assess the additional controlling and monitoring costs necessary to reduce the level of information asymmetry to an "*acceptable*" level	Qualitative assessment by expert group	High additional controlling and monitoring costs necessary to reach an *"acceptable"* level of information asymmetry indicate a high constraint
			Affinity of governments towards devolution	Degree of affinity of the government of a country towards devolution	Qualitative assessment by expert group	Low degrees indicate high information asymmetries since centralised control and monitoring is more costly
			Farmer density	Average number of farms per 100 ha	SEAMLESS Databases	High numbers indicate higher controlling and monitoring cost, thus, likely higher information asymmetries
			Rule of Law	Composite indicator of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence	World Bank	Low measures indicate an ineffective/inefficient existing controlling and monitoring system causing information asymmetries

3	High level of **opportunism**	Reg-Ma; Eco-Ma; Reg-PR; Land; EnvP	Infringement cases	Number of infringement cases in a country brought before the Court of Justice	National Statistical Databases	High numbers of infringement cases indicate high levels of opportunism
			Rule of Law	Composite indicator of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence	World Bank	Low "rule-of-law-measures" indicate high levels of opportunism
			Order	Assessment of popular observance of the law (Part of composite indicator „Rule of Law")	World Bank	Low measures indicate high levels of opportunism

Legend: Reg-Hi: Regulatory on Hierarchy/Bureaucracy; Reg-Ma: Regulatory on Market; Eco-Ma: Economic on Market; Eco-SON: Economic on Self-organised network; Reg-PR: Regulatory on Property Rights Change; Land: Land/Soil; EnvP: Environmental Policies

4.2.5 PICA step 4: Aggregating Information on Crucial Institutional Aspects of the Policy Option

In this final step of PICA, the expert team that runs PICA with the help of external experts the User(s), stakeholders is using the information provided by the indicators for a qualitative assessment of the restricted list of CIAs. This includes, first, combining the various indicator information available for every single CIA of the restricted list to arrive at a qualitative (or, depending on the indicators, quantitative) statement about the relative extent of this CIA in all countries and/or regions. For example, the level of corruption can be determined for every country where the policy option is to be implemented, thus, providing insights in the relative - country-wise - likelihoods for ineffective policy implementation. This information, for example, can be compiled in tables and/or interactive maps where different colours signal different levels of opportunism.[34]

Second, the PICA expert team together with the User(s), stakeholders, other experts is constructing qualitative composite output indicators.[35] These output indicators draw on information from one or a group of Crucial Institutional Aspects. For the policy option "Nitrate Directive" the expert team suggests to aggregate/group the information according to the following two thematic categories:

1) Communication capacity
   - Bargaining power of farmers' organisations
2) Governance structures compatibility
   - Information asymmetries between state & firm (including high levels of opportunism)

[34] These tables and maps might also be made available to the User(s), or they can be integrated in the final qualitative statements on the institutional compatibility of the policy option.

[35] While it is certainly helpful to use „classic" categories, such as property rights compatibility, embeddedness compatibility, etc., the User(s) might prefer other categories and/or the PICA expert team – depending on the policy option under scrutiny and on the CIAs identified – might suggest other and/or additional categories.

Finally, these categorised region- or country-wise qualitative statements on the compatibility of the policy option will be presented to the User(s) of SEAMLESS-IF by the PICA expert team. Here, an interactive form of communication is preferred since this provides the opportunity to discuss the results and, perhaps, the introduction of complementary policy instruments in countries or regions with specific CIAs.

5 Concluding Remarks

The “Procedure for Institutional Compatibility Assessment (PICA)” introduced in this Deliverable provides - at a conceptual level - a formalised methodology to assess the compatibility between policy options and various institutional contexts, thus, allowing for the systematic institutional ex-ante assessment of (agri-environmental) policies. Next working steps to be carried out in WP 2 (Task 2.4) and WP 6 (Task 6.4 and 6.5) will encompass the operationalisation of the approach and the practical integration (as far as possible) in SEAMLESS-IF. The first sketch of the detailed visual depiction of the sequence and the form of interactions of between the User(s), the PICA expert team, and other actors as well as the suggestions made on the representation of the different PICA components in the Graphical User Interface (GUI) in Appendix 3 will serve as a starting point for further discussions with the respective SEAMLESS work packages. This includes, in particular, a close collaboration with WP 4 regarding the availability and integration of (or, access to) selected databases (e.g., EUROSTAT, World Bank, etc.) for a restricted list of institutional indicators. Further, an intensive interaction is necessary with WP 5 to ensure – at least - the representation of the permanent elements (tables, graphs, maps, and texts) of PICA in the GUI. The major share of this work will be done in Task 6.4 where PICA will be tested in the region Auvergne (France), improved, and further integrated in SEAMLESS-IF.

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Glossary

Cost-efficiency	Cost-efficiency (also, cost-effectiveness) is determined by relating the resources expended to the accuracy and completeness of goals achieved.
Crucial institutional aspects	Crucial institutional aspects are those institutional factors that foster or hamper the effective and cost-efficient implementation of policies.
Effectiveness	Effectiveness refers to the accuracy and completeness with which specified goals can be achieved.
Governance structures	Governance structures are the organisational solutions for making rules (institutions) effective, i.e. they are necessary for guaranteeing the rights and duties and their use in coordinating transactions.
Institutions	Institutions are the rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction. They are made up of formal constraints (e.g., rules, laws, and constitutions), informal constraints (e.g., norms of behaviour, conventions, and self-imposed codes of conduct), and their enforcement characteristics.
Institutional compatibility	Institutional compatibility refers to the compatibility between policy instruments and the respective institutional context to assess the effectiveness and cost-efficiency of policymaking.
Institutional indicators	Institutional indicators are defined as variables and proxies that are used as *input* to the institutional analysis within PICA. Unlike the common understanding of indicators within Work Package 2 and in the overall SEAMLESS project institutional indicators, such as members in farmers' associations, or government effectiveness do not represent the information/results of the institutional analysis given to the User(s). Further, institutional indicators often also encompass indicators that are usually referred to as economic, ecological, or social indicators.
Institutions for sustainability	Institutions for sustainability represent the institutional structures necessary to fully integrate economic, social, and environmental sustainability objectives.
Policy cycle	The policy cycle encompasses the whole "life" process of a policy; from the creation to ending the policy. It includes the following stages: Agenda setting, policy formation, decision-making, policy implementation, and policy evaluation (resulting in the decision to continue, modify, or terminate the policy).

Transaction	Transactions (economic exchange) are the basic unit of analysis in New Institutional Economics (NIE). That is distinct from other units of analysis widely used in environmental and resource economics, such as externalities, public goods, resource utilisation, and common pool resources. Following Williamson (1985: 1), "a transaction occurs when a good or service is transferred across a technological separable interface".
Transaction costs	Transaction costs comprise ex-ante costs of drafting, negotiating, and safeguarding an agreement but also the ex-post costs for maladaptation and adjustment that arise when contract execution is misaligned because of gaps, errors, omissions, and unanticipated disturbances: the costs of running the economic system.
Organisations	State agencies or other collective actors are organisations; yet, they obtain their meaning from institutions. Organisations only exist because there is a set of working rules that defines them.

Appendices

Appendix 1 **Review on Research and the Literature on Institutional Indicators for Sustainability**

Appendix 2 **Crucial Institutional Aspects of Policy Types: PICA Step 2**

Appendix 3 **Suggestions for Operationalisation of PICA and its Integration in the Graphical User Interface (GUI**

Appendix 1: Review on Research and the Literature on Institutional Indicators for Sustainability

In order to assess the suitability of existing approaches and indicators for ex-ante institutional analysis of policy options an extensive research and literature review capturing the *state-of-the-art of institutional indicators* was carried out at an early stage of Task 2.4 (PD2.4.1). The literature and research on institutional indicators that was reviewed can be divided into *four clusters that reflect their origin in the literature as well as their characteristics and purpose*: 1) Good Governance, 2) Social Capital, 3) Institutions as the fourth dimension of Sustainability, and 4) Transaction Costs (see also Theesfeld and Beckmann, forthcoming). Section 1 contains short descriptions of the main characteristics of the four clusters as well as concrete available indicators found in the literature and general reflections on their applicability for institutional analysis in SEAMLESS. In Section 2, gaps and interlinkages of institutional indicators found in the literature are discussed. In the subsequent Section 3, a system to classify the various indicators (variables and proxies) in a more differentiated way is suggested. Relevant criteria address, for example, the type of the indicator (nominal, ordinal, and cardinal), the geographical coverage, and the data availability. This classification system is used in Section 4 to structure the detailed tables of indicators provided for each cluster separately.

1 Cluster of Institutional Indicators

1.1 Good Governance Cluster

The first cluster of institutional indicator research is closely related to institutions and growth. In the late 1980s and early 1990s, the term *good governance* emerged among individuals and organisations who were concerned with the influences of governance on economic performance. Here, governance means the delivery of political goods[36] to citizens by nation-states. According to Besancon (2003), good governance is achieved when a high order of certain political goods is provided and when nation-states perform effectively and well on behalf of their inhabitants. The judgement of crucial political goods is based on societal norms and beliefs, often beginning with the supply of security.[37] Management, supply, and delivery of most of the public goods constitutes governance and the extent to which nation-states do perform can, in theory, be measured (Besancon, 2003). This cluster analyses under which institutional conditions different forms of governance promote rather than retard economic development. Social scientists are aware that institutions underpin economic

[36] Besancon (2003: 1) gives a useful definition of political goods: "Good governance" is defined as providing political goods, such as "rule of law, political and civil freedom, medical and health care, schools and educational instructions, roads, railways, the arteries of commerce, communications networks, a money and banking system, a fiscal and institutional context within which citizens can prosper, support to civil society, and a method of regulating the sharing of the environmental commons".

[37] Kaufmann et al. (2000) gives another broad definition of governance.

development, but this particular strand of research specifically asks which political institutions are most conducive to development and reform. However, this research field seems to be a rather contested area (Angy, 2005).

By and large, this cluster originates from the need of the World Bank and other international agencies 1) to allocate scarce resources to governments so that they will use them most effectively, and 2) to help countries in diagnosing governance failures and in finding solutions. Thus, a new interest in measuring the performance of governments using indicators of governance and institutional quality has emerged (World Bank, 2001). This approach is based on the assumption that weak governance and slow economic development go hand in hand, while improved governance fosters development success (Kaufmann et al., 2000). However, this area of research is developing rapidly since "[m]ore specific measures of government performance, coupled with more specific measures of governmental process or institutional arrangements are needed to permit tests that provide more indication of which reforms are likely to be effective" (Knack and Keefer, 2003). Measurements of governance should set standards for improvement and achievement as well as indicate where funds could best be used and where a policy might prove most effective. From the viewpoint of development aid, its aim is to show which nation states have improved and which ones are in need of improvement. A reasonable amount of literature in this cluster is devoted to the relation between corruption and prosperity.

Another use of the approach underlying this cluster comes from the need to rank countries for credit markets and for international investors. This is done mainly with subjective expert evaluation on ordinal mathematical scales. Different integration techniques are used to compose indices.

1.1.1 Good Governance Indicators in Detail

1) In this cluster, a good starting point is the compendium of institutional indicators "Indicators of Governance and Institutional Quality" provided by the World Bank (2001). This compendium analyses several data sets and studies mainly dealing with *performance indicators of governance* but also some data sets with process indicators (see Table A1-1):

   a) The *Freedom House Index* of political freedoms and civil liberties is based on analytical reports and numerical ratings by country experts and a central panel of experts. It is an additive point methodology for categorising political rights and civil liberties. The index is widely used in published studies referring to the relationship between civil liberties and per capita income as well as income growth.

   a) The *International Country Risk Guide* includes variables of corruption in government, law and order tradition, and bureaucratic quality. Knack and Keefer (1995) construct from these data sets an index reflecting the security of private property and the enforceability of contracts.

   b) The *Business Environmental Risk Intelligence Index* is produced for sale to subscribers who are primarily investors interested in information on political risks associated with overseas investments. In general, higher values of the index are associated with income growth.

   c) One part of the *World Development Report 1997* (World Bank, 1997) represents a survey with actual investors that was conducted in 67 countries about the perceptions of the quality of governance.

d) The *Corruption Perception Index* of Transparency International gives an indication on the perception of corruption. It is a performance indicator based on ratings of 'elite' experts. It shall give a signal to donors where to invest in order to fight corruption (Transparency International, 2006).

e) Another *worldwide governance research indicator data set* is the one from Kaufmann, Kraay and Zoido-Lobaton (Kaufmann et al., 1999a, b) (KKZ-indeces). This is a composition of indeces from numerous indicators collected from other sources including the data sets listed above. The KKZ indices currently represent the most extensive study on governance indicators. There are regular updates and good access to data.

f) Motivated by scepticism regarding subjective governance indicators, Clague et al. (1999), introduce an objective measure, the *Contract-Intensive Money*. This measure is equal to the proportion of M2 that is not comprised of currency outside banks. The logic behind is that money lent to financial organisations is less safe where one cannot rely on contracts. Similar to the other data sets, the intention is to show the relation to growth rates and, here in particular, to investment's share of Gross Domestic Product (GDP).

2) Besides these data sets that are mainly based on performance indicators, the World Bank (2001) also refers to some references of *process indicators*:

a) The Civil Service Employment and Pay is a data set compiled by Schiavo-Campo et al. (1997 a, b) giving ratios on government employment and wages.

b) The Weberian Comparative State Data Project is a data set based on qualitative expert rankings in 35 developing countries. Evans and Rauch (1999) construct indicators, such as a meritocratic hiring index, an internal promotion and career stability index, a civil service compensation index, and an overarching "Weberian State Scale".

c) The Polity98 Project on Regime Characteristics provides descriptive measures of political structures and regime change for the period 1800-1986. Some variables, such as measures providing information on political participation, on centralisation and scope of government authority, and on the institutionalisation of autocracy and democracy could be of interest for constructing institutional indicators of ex-ante policy assessment within SEAMLESS.

d) The Political Constraint Index incorporates information on the number of independent branches of government with veto power and the distribution of preferences across and within those branches.

e) There is a large new cross-country data set on political institutions: the Database of Political Institutions, which might include interesting variables referring to the SEAMLESS objectives. For this, it is described in more detail in the following.

3) The *Database on Political Institutions (DPI)* has been compiled by the Development Research Group of the World Bank and contains 113 variables for 117 countries over the years 1975-1995 (Beck et al., 2000). The DPI seeks to add to existing knowledge on political institutions, and to gather into one source information that had previously been scattered.[38] The variables provide details about elections, electoral rules, type of political

[38] The DPI can be compared with other political databases: the "Polity III" compiled by Gurr et al. (1998) and the "objective assessments of government checks and balances" created by Henisz (1997). Polity III includes numerous subjective indicators of the political and institutional environment

system, party composition of the opposition and government coalitions, and the extent of military influence on government. The database also contains a number of new variables, compiled from raw data, such as measures of checks and balances and political stability. The DPI variables are almost all quantitative and their construction is entirely transparent.[39] The data set is accessible free of charge.

These variables can be linked and applied to several problems and hypotheses in political economy. For instance, variables describing electoral competitiveness in the database (e.g., indices of electoral competitiveness, vote shares of parties, and directly elected executives) allow for cross-country investigation into the following questions: Whether greater competition in contests for political office increases or reduces the willingness to reform. "Faced with the prospect of more competitive elections, politicians might be more sensitive to redistributive concerns and less likely to reform. However, politicians who feel few competitive pressures to reform may be more likely to engage in policies that benefit them and their core supporters at the expense of the rest of society" (Beck et al., 2000: 6).

4) Among others, Besancon (2003) provides another *comprehensive compendium on 47 projects on measuring governance* or its various subsets. It includes sources and descriptions of each particular data project, the empirical scope of those efforts, and describes what types of indicators (subjective or objective) are employed.

5) What is known under the notion *"second-generation governance indicators"* (Knack et al., 2003) is the progress made by the World Bank to shift from qualitative and broad indicators of corruption - or the rule-of-law - towards quantitative indicators of governance. These indicators are supposed to measure the progress towards reaching the major UN conference goals and to be more useful for practical reforms.

6) A conceptual contribution is presented by Bovaird and Löffler (2003). The authors call for measuring not only the quality of services but also the improvements in quality of life and in governance processes. They draw from the fact that a public organization cannot be judged only on the excellence of its services; it also has to be excellent in the way it exercises its political, environmental, and social responsibilities. The notion of good governance is split into the components a) improvements in public policy outcomes and b) implementation by all stakeholders of a set of principles and processes. What is new in the concept of Bovaird and Löffler is that they aim to measure the success of public interventions in terms of the quality of life changes which they bring about for those affected by them (i.e. the perceived outcomes), rather than the quality of the activities themselves. For instance, "the level of community safety perceived by citizens", rather than "the quality of police and crime prevention services", or "the quality of the environment which people experience" rather than "the quality of environmental protection or improvement services" needs to be assessed. This proposed change in orientation of good governance assessment implies the challenge to find ways how quality of live improvements can be measured. It is partly based on a new survey mainly done at local scale. Some proxies at a higher geographical scale might be found in the

(evaluating both, formal and informal conditions) but tend to be highly aggregated. Thus, qualities of the political system are captured in very few variables.

[39] The variables are also disaggregated, allowing researchers to get away from such useful but broad indicators of countries as whether they allow elections or not, whether elections are "free", or whether the executive is "constrained". Instead, the DPI allows researchers to use precise and concrete institutional features of countries (Beck et al., 2000: 3).

Human Development Index of the United Nations that ranks nations. Yet, given the differences between local areas, quality of life indicators are difficult to compare.

Regarding the geographical scales, research and literature subsumed in the good governance cluster mainly tries to develop indicators at the national scale to allow for cross-country studies.

1.1.2 Reflections on the Applicability of the Good Governance Cluster for Institutional Analysis in SEAMLESS-IF

The intention to measure the impact of institutions on economic growth and economic development refers only to one dimension of sustainability, the economic one.

Data sets of the DPI are closely linked to the political economy of policymaking. Those questions mainly appear in the beginning of a policy cycle (see Glossary). In the SEAMLESS project, with respect to the implementation and enforcement of a policy, it is assumed that the politicians are willing to introduce the reform and the policy option, ignoring the political economy in place in the pre-implementation phases of the policy cycle. However, the pre-implementation phases of the policy cycle – including, e.g., choosing issues, gathering information, and discussing of and deciding on options for the design of the policy – certainly have important ramifications for the overall performance, but also for the institutional compatibility of a policy option. For example, extensive and transparent forms of stakeholder participation integrating different and possibly contrary interests in the design process may increase the acceptance of a policy, its actual uptake (in the case of voluntary schemes), and the likelihood of compliance (in the case of command-and-control or regulatory policies). With regard to the latter type of policies, requirements for appropriate governance structures, e.g., for monitoring and enforcement might be different. Here, the results of the institutional analysis carried out within SEAMLESS-IF can be seen as an important input into the political discussions in the pre-implementation phases of the policymaking process by informing the User(s) about critical aspects related to the political economy, such as corruption or political predictability of governments in Member States.

Other variables within the DPI, such as the one capturing the extent of federalism in a country's political structure could turn out to be valuable for constructing institutional indicators, such as a measure of *institutional diversity*; for instance, the number of contiguous autonomous regions in a country. A region, area, or district that has some degrees of autonomy or that is self-governing requires certain kind of policy measures if nationwide reforms shall be implemented. If this is not the case, the effectiveness of the policy is at stake. Likewise, the indication whether multiple levels of sub-national governments are in place, or not, can be important to construct indicators giving insights on the institutional compatibility of a policy. The jurisdiction of local governments (e.g., if provinces have authority over taxing, spending, or legislating) may also be useful.

Some of the second-generation performance indicators (Knack et al., 2003), such as waiting time for a free telephone line, policy unpredictability, predictable judiciary, enforcement of property rights and share of population fearful of crime are generally interesting for the objectives of institutional ex-ante policy assessment in SEAMLESS, but require further examination.

1.2 Social Capital Cluster

Although *social capital* is not a new concept, most of the social capital literature stems from Robert Putnam's (1993) seminal work on the relationship between government performance and sociological attributes in Italy. The literature on social capital grew rapidly during the late nineties, covering various topics, such as economic development, political efficiency, and quality of life. The *Social Capital Initiative* launched by the World Bank in 1996 allowed many empirical investigations in developing countries on the role of social cohesion and the structure of social networks in development. In comparison, there have been very few studies in industrialised countries.

Social capital can be considered as a rather vague concept. One of the most rigorous and operational definition is made by Nan Lin; social capital encompasses the "[r]esources embedded in a social structure which are accessed/mobilised in purposive actions" (Lin, 2001: 35). Social capital is, thus, a set of sociological features that provide several advantages to individuals.

Theoretical literature on social capital distinguishes two broad classes of mechanisms by which sociological characteristics might influence efficiency and effectiveness (of policies). First, they may facilitate collective action and the reliability of relationships between individuals. This aspect is associated with the density of social networks and the existence of shared values of trust and cooperation. The second kind of mechanism is that social links may give preferential access to new resources, such as information about technologies or job opportunities. This is because information is far from being efficiently allocated by markets, especially when it concerns innovative activities. This second aspect implies extremely different features than the first one. From this perspective, the structure of the network is important rather than its density. Thus, networks should be able to bridge very different social groups and communities, for example, in order to distribute and share information in a society. The former aspect of social capital is commonly known as "*bonding social capital*", whereas the latter is called "*bridging social capital*" (Woolcock and Narayan, 2000).

Most empirical literature on social capital deals with the role of bonding social capital on development. This is because trust and cohesion are often critical ingredients that are missing from credit markets (for instance) in developed countries. Most studies report a positive effect of social capital on growth or other performance indicators. However, as argued by Durlauf and Fafchamps (2004), the evidence is not yet very compelling, due to many methodological problems in econometric analysis.

The main problem with empirical literature assessing social capital is the lack of relevant indicators. Due to data availability problems, measures of social values (e.g., trust and propensity to co-operate), and network characteristics (e.g., density and geographical span) are often crude or very indirect. In Table A1-2, the main measures that have been used when measuring social capital are summarised. Most of them stem from databases, although many specific data collections also have been conducted in developing countries.

1.2.1 Social Capital Indicators in Detail

Table A1-2 provides a list of social capital indicators used in empirical studies. As social capital literature has grown rapidly and is very rich now, only the most relevant papers have been selected as a basis for this review. The indicators can be grouped into three broad categories:

1) *Cognitive indicators*: They aim at assessing the degree of social cohesion that facilitates collective action, low opportunism, and mutual aid, thus, reducing transaction costs.

2) *Density indicators*: They reflect the intensity of social interaction among regions/communities. High density of social networks implies cost-efficient social control (which reduces opportunistic behaviour) and fosters the emergence of collective actions.

3) *Outer links indicators*: They measure the access to outer resources through social links (e.g., information about new technologies, markets, and trading partners).

The first and the second categories measure the *bonding* component of social capital; whereas the third measures the *bridging* component.

- Among *cognitive indicators*, the most widely used measures are ethnolinguistic diversity and trust indicators. The former is mostly relevant for African and South-American countries where ethnic diversity is high which often explains the lack of cohesiveness of these countries. The latter is generally measured by using survey results, such as answers to the question "Do you agree that most people can be trusted?". Some indirect measures have also been proposed to proxy the level of reciprocity and openness to others, such as blood donations (Guiso and Zingales, 2004), charity gifts, and the rate of phone users in the directory (Callois and Schmitt, 2006). Conversely, the Gini Index on Income seems to be a poor indicator of social cohesion, at least for industrialised countries. Specific surveys conducted in order to assess social capital include measures that are more detailed[40], but these are hard to replicate in developed countries.

  Cognitive social capital does not only refer to relationships between individuals, but also between individuals and formal actors. In particular, trust towards authorities and bureaucratic actors and civic behaviour can be an essential aspect of a society's cohesiveness. Again, surveys are often necessary to get precise estimates. Indirect measures are also possible. Variables used by Helliwell and Putnam (1995) on their seminal work in Italy include various measures of civic values such as newspaper readership, political behaviour, and satisfaction with government. Guiso and Zingales (2004) use electoral turnout. Last, regarding cooperation between local politicians, Callois and Schmitt (2006) use the fiscal integration coefficient, which measures the share of fiscal resources that are pooled between municipalities.

- The most popular *density indicator* is association density, which was one of the key indicators used by Helliwell and Putnam (1995) to measure sociability, i.e., the ability of actors for social interaction. Assessing the density of social networks directly implies significant fieldwork. Many sociological studies have taken the sociometric approach. Sociometry consists of visualising the actual network between a set of individuals, by asking each of them with whom they have relationships, for what purposes and with what intensity. Ronald Burt's (2000) work at the individual level showed the arbitration between dense (rich in bonding social capital) and open (rich in bridging social capital) networks. Brian Uzzi's (1996; 1999) work on small industrial firms showed that the relationship between density/bonding and efficiency followed a reversed U-shaped curve: there was a threshold over which bonding social capital was detrimental to efficiency.

  As to the geographical scale, for higher levels than the local level it is generally infeasible to construct any direct indicators to be used in surveys. Instead, indirect indicators are used, such as the share of recent migrants (migrants are supposed to interact less with

[40] See the World Bank questionnaire at: http://poverty2.forumone.com/files/11998_IntegratedQuestionnairefortheMeasurementofSC(03-04-2002).doc

others), the average size of households, or the density of sociability places (e.g., bars and sport facilities).

- In empirical literature, the outer links indicators *bridging social capital* have not yet been investigated very deeply. Some ideas are to be found in international economics literature, in particular in studies of the relationships between trade and international social networks. Indicators include the share of migrants of a given ethnical group, or the existence of cultural links (e.g., common language and former colony). They remain generally quite crude due to a lack of relevant statistical data. One problem with bridging social capital indicators is that they generally focus on social *links* but not on the *resources* they can give access to. Yet, it is insufficient to know people to have social capital – you have to know the *right* people. In order to integrate this resource aspect into the definition of bridging indicators, Callois and Schmitt (2006) propose composite indicators weighting the density of links to the outside world by an indicator of the level of resources (namely the logarithm of employment). These indicators can be computed both for social links due to migration and for economic networks.

1.2.2 Reflections on the Applicability of the Social Capital Cluster for Institutional Analysis in SEAMLESS-IF

Social capital indicators are relevant for the analysis of institutional compatibility as social values may directly influence the way policies are perceived and implemented. In particular, it is certainly valuable to look at the following sociological features:

- Trust towards formal actors and cooperation between politicians
- Propensity to co-operate (notably in agriculture) as cooperation may reduce transaction costs and help solving market failures
- Bridging social capital indicators that can give an idea of a region's openness and access to opportunities to development

One great difficulty concerning social capital indicators - that also applies to the other clusters - will be to establish measures that allow comparisons between EU Member States. Different data sources will be available in different countries. That is why European surveys could be a valuable source of information. However, they will typically provide information at country (or NUTS I) level, which may not be sufficient, given the diversity of agricultural systems and sociological features at infra-country levels.

Moreover, some indicators that are related to formal institutions may be biased by the differences in national institutional systems. This is for instance the case for political cooperation as national political systems are not directly comparable. Consequently, comparisons between countries based on different indicator values should be done with great caution.

For the embeddedness level of social analysis (norms, customs, traditions, and religions), several publications based on extracts of the Eurobarometer statistics of the Public Opinion Analysis sector of the European Commission could provide data that can be incorporated into institutional indicators. The Standard Eurobarometer surveys have polled EU citizens' attitude towards the Common Agricultural Policy (CAP), their perception of the objectives it should pursue, and its main benefits. The quality of food products has also been dealt with in these surveys, as well as the perception of the EU enlargement or the environment (Special Eurobarometer, 2004, 2005). The principal results of how Europeans think about the environment are derived from polls in 2002 within the framework of the Eurobarometer 58.0 and Flash Eurobarometer 123 Survey.

1.3 Sustainability Cluster

The sustainability debate can easily be separated from the other clusters of literature. It is rooted in the United Nations international conferences on sustainable development. The debate started with introducing *sustainable development* as the main principle of the Declaration of Rio and Agenda 21 established in 1992 at the United Nations Conference for Environment and Development (Earth Summit). The report "Our Common Future" of the World Commission on Environment and Development, known as the Brundtland report, had already defined sustainability in 1987 as a "development which meets the need of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987). The Amsterdam Treaty of 1997 made sustainable development an objective of the EU, resulting in the present European Union Strategy for Sustainable Development (EC, 2002). This means that sustainable development is now an important part of the European Union's agenda.

The evolution of institutional indicators within the sustainability debate can be traced back to the evaluation of the implementation of Agenda 21 by the Commission on Sustainable Development of the United Nations. They defined sustainability as having four dimensions (Spangenberg et al., 2002): Besides the economic, environmental, and social dimensions, institutions are defined as being the fourth dimension of sustainability. Institutions deliver the necessary structures capable to deliver the other three objectives of social, environmental, and economic sustainability (EC, 2001a).

1.3.1 Sustainability – the Fourth Dimension's Indicators in Detail

The UN Commission on Sustainable Development (UNCSD) is currently developing one common indicator set for measuring sustainable development at national level. This is based on chapter 40 of the Agenda 21 that calls on countries to develop and identify indicators of sustainable development that can provide a solid basis for decision-making at all levels. The main aim of the UNCSD Work Programme was to make indicators of sustainable development accessible to decision makers (UN, 2001). The UNCSD is leading this process, supported by the EU Member States and the European Commission. Eurostat has produced a set of sustainable development indicators adapted to the situation in the EU, based on the UNCSD proposals for a sustainable development indicator core set (EC, 2001a). Some specific complements have been added to the UNCSD core list of 59 indicators in order to include important EU issues that would otherwise be neglected. Thus, 66% of the selected indicators are comparable to those in the UNCSD core list. Some were added, others modified, changed, or omitted, resulting in 63 EU-suitable indicators. Out of this number, only four indicators refer to the institutional dimension.

The core institutional indicators for sustainable development deal with two broad themes: 1) *institutional framework* and 2) *institutional capacity*. These themes are divided into subthemes, each dealing with one specific aspect of the institutional issues. Institutional framework indicators are linked to national strategic sustainable development implementation and international cooperation to achieve sustainable development goals. However, the indicators on National Sustainable Development Strategy and on Implementation of Ratified Global Agreements that were defined as Institutional Framework indicators by the UN (2001) - which were supposed to indicate the progress in relation to the preparation of national sustainable development strategies - could not be quantified and was omitted by Eurostat from the UN list. The institutional capacity indicators comprise the population's level of information access, the communication infrastructure, the degree of science and technology

support, and natural disaster preparedness and response (EC, 2001a). The UNCSD and Eurostat initiative mainly aim at developing quantitative indicators.

In the frame of a Communication by the Directorate General-Agriculture (EC, 2001b), the European Commission stresses the importance to broaden the approach from indicators for the integration of environmental concerns into the CAP towards the economic and social dimension of sustainable agriculture and rural development. In the presented framework, a set of indicators is proposed for the economic and social dimensions for sustainable agriculture and rural development. The social dimension also subsumes institutional aspects, yet, only institutional efficiency is mentioned as an indicator. Although it is mentioned that indicators on institutional efficiency have to be included (EC, 2001b: 13) the concrete formulation of this indicator remains rather vague.

Spangenberg, Pfahl, and Deller are part of a group of scientists dealing with institutional indicators analysing and enhancing the UNCSD approach. They have published a series of articles on that topic. They take up the UNCSD's set of sustainability indicators and focus explicitly on the fourth dimension of sustainability, the institutional one. Although the fourth dimension is conceived as a major achievement for sustainability policies, the institutional indicators proposed by UNCSD have major inherent weaknesses. One reason for this is that the UNCSD core list of sustainability indicators is a result of a multi-stakeholder process based on a politically negotiated document like Agenda 21.

Spangenberg et al. (2002) work on an improved list of institutional indicators. They analyse the institutional content of Agenda 21 with the objective to link up cardinal indicators that give simple facts and data with explicit institutional references to become more meaningful. For instance, the measured terms of publications, patents, and the like would assess the effectiveness of the Research and Development Community much better than the number of scientists. Thus, Spangenberg and colleagues aim at defining cardinal performance indicators. Cardinal performance indicators would indicate the level of implementation of policy objectives as a quantitative measure for the effectiveness of the respective institution. In this process, it turned out that indicators - that were thought to be specific for one of the other three dimensions - are also meaningful for assess the institutional context. For example, human capital is an important social indicator that is also significant for institutional analysis. Here, the level of human capital in a country or region will indicate whether very knowledge intensive policy measures will be implemented effectively, or whether these measures have to be complemented by some form of knowledge transfer or education.

Spangenberg (2002: 3) raises another interesting point from the perspective of the SEAMLESS objectives. The UNCSD selection of indicators has been focussed on well-founded, consensus-based indicators for which data are already available and which can be realised within the constraints currently given in national administrations. This results in focussing on problems already experienced in the past (ex-post). For SEAMLESS, however, a procedure is needed that is also sensitive to capture *new* potential threats in the future.

Another comprehensive approach within the sustainability debate is the Environmental Sustainability Index (ESI) developed by the Yale University and the Columbia University. It aims at assessing the ability of nations to protect the environment over the next several decades. Thus, the index is calculated at a national scale to allow for international comparison. In 2005, 146 countries have been included. It integrates 76 data sets covering natural resource endowments, past and present pollution levels, environmental management efforts, and the capacity of a society to improve its environmental performance. The variables are integrated into 21 indicators of environmental sustainability. These indicators permit for national comparisons across a range of issues that fall into five broad categories, one of them is "societal and institutional capacity to respond to environmental challenges". This institutional component starts from the assumption that "a country is more likely to be

environmentally sustainable to the extent that it has in place institutions and underlying social patterns of skills, attitudes, and networks that foster effective responses to environmental challenges" (Esty et al., 2005: 11).

Considering institutions as the fourth dimension of sustainability, the ESI report (Esty et al., 2005) concludes that the role of governance is central. Thus, when comparing the correlation between the ESI and the 76 underlying variables, the strongest bivariate correlation is with civil and political liberties, suggesting that countries where robust political debate takes place, facilitated by fair elections, free speech, a dedicate press, active NGOs, and vibrant legislatures are more likely to focus on environmental challenges. The sixth strongest correlations are with similar variables from the institutional indicators, i.e. governmental effectiveness and rule-of-law. The coincidence of strong governance with high ESI scores is evident.

Further, Ehler (2003) provides an applied approach to an integrated coastal management project. He develops indicators to assess the performance of the governance processes involved in integrated coastal management. This is an interesting contribution emphasising on performance indicators as assessing outcome-based results rather than process-oriented input-based accounting.

1.3.2 Reflections on the Applicability of the Fourth Dimension Cluster for Institutional Analysis in SEAMLESS-IF

The literature within this cluster is closely related to the approach of institutions for sustainability that conceives institutions as facilitating or hampering the other three sustainability objectives. This cluster indicates how challenging this new sphere of research is. On the one hand, the proposed indicators are very close to the relationships that need to be constructed. On the other hand, compared to the Good Governance, the Social Capital, and the Transaction Cost cluster the indicators introduced here are less developed. Most of them are propositions or conceptualization, but there are no data. For some indicators there are data available, but not area-wide or compiled within a data set.

In contrast to this cluster, the focus of institutional analysis in SEAMLESS is different. Instead of analysing existing institutions with respect to their contribution to sustainable development, institutional analysis in SEAMLESS will assess the various impacts of the institutions in place on the effectiveness of different policy options to be implemented. This adds a new aspect into the existing debate within this cluster.

1.4 Transaction Costs Cluster

Ronald Coase (1937) was the first to introduce the term *transaction costs* as an important component of his theoretical framework for predicting under what conditions certain economic tasks would be best co-ordinated by firms or by markets, thus, introducing firms as a hierarchical allocation unit and markets as alternative modes of co-ordinating economic activities. According to Coase (1937), transaction costs are the costs incurred in organising an economic exchange/transaction, i.e., they are either "costs of using the price mechanism" or "costs of organizing transactions inside the firm". For example, when buying or selling a stock most people must pay a commission to their broker. This commission is one part of the transaction costs incurred when conducting the stock deal. Considering buying cheese from a store, the costs incurred will not only include the price of the cheese itself, but also the energy and effort it requires to travel from the house to the store and back, the time waiting in line, and the effort of the paying itself. The costs incurred beyond the (market) price of this cheese

are transaction costs. There might be many other ways to organise the purchase of cheese, e.g., through a home delivery service offering cheese on the internet. Clearly, buying the cheese directly from the producing farmer would entail much higher transaction costs on part of the buyer. Thus, when evaluating the costs of a transaction, - here, purchase of cheese - it is important not to neglect transaction costs since those costs might prove to be significant and on some occasions even prohibitive.

Williamson (1975; 1985) advanced Coase' arguments and developed a research agenda for New Institutional Economics (NIE). Most importantly, the basic unit of analysis is the transaction[41]. "...a transaction occurs when a good or service is transferred across a technological separable interface" (Williamson, 1985: 1). He operationalises the concept of transaction costs and identifies four determinants that influence transaction costs in a more or less predictable way:

1) Behavioural attributes of actors (under the assumption that economic agents are bounded rational[42] and may behave opportunistically[43])
2) Attributes of the transaction, including:
    - Asset specificity (the nature of assets and their transferability determine the level of transaction costs: e.g., human-capital specificity (training) and physical-capital specificity (investment in equipment))
    - Uncertainty (the unanticipated changes in circumstances surrounding a transaction)
    - Frequency of transactions
3) The type of governance structure chosen, such as (spot) markets, hierarchies, and hybrids (e.g., subcontracting coordination networks of firms, franchising, collective trademarks, partnership, co-operatives, and alliances (Ménard, 2004));
4) The institutional environment (e.g., property rights and contract law)

At this point, Transaction Costs Economics invokes the discriminating *alignment hypothesis*, according to which "transactions, which differ in their attributes, are aligned with governance structures, which differ in their cost and competence, so as to effect a (mainly) transaction cost economising result. Testing this hypothesis requires that the key attributes that define both transactions *and* governance structures be named and the ramifications worked out." (Williamson, 2004: 30). He refers to three attributes of principal importance for describing governance structures: 1) incentive intensity, 2) administrative controls, and 3) contract law regime.

This framework, which was initially developed for studying the economic organisation of the private sector (more precisely, it stems from the field of industrial organisation and the theory of the firm), has been more and more extended to include the public sector[44] as well as agri-

[41] That is distinct from other units of analysis widely used in environmental and resource economics, such as externalities, public goods, resource utilisation, and common pool resources.

[42] Bounded rationality can be defined as intendedly rational, but only limited so.

[43] Opportunism refers to the assumption that an economic agent may seek his/her self-interest with guile and that such behavior cannot be predicted clearly.

[44] For example, analysing the organisation of sovereign transactions, Williamson (1999) compares privatisation (contracting out), public agency, and regulation (public agency plus private firm).

environmental problems.[45] However, applying the concept of transaction costs to environmental problems e.g., caused by agricultural activities, makes it necessary to consider not only the transfer of private goods between actors (as classic NIE would focus on) but also various forms of public goods, such as club goods and common-pool resources. Clearly, the aforementioned attributes of transactions can also be found with public (environmental) goods. For example, *asset specificity* in this field would include site specificity (AOC[46] cheese regions in France) but also human-capital specificity (a specific knowledge is necessary to make this cheese) and capital specificity (investments in special cheese-making equipment is required, e.g., specific cellar for maturing the cheese). Further, *uncertainty* plays a major role for transactions related to the demand and supply of agri-environmental goods and services. Above all, this is often "because farmers and regulators do not know very precisely either whether certain environmental problems will arise, and when they will occur, or what the nature of these problems will be, and to what extend they will have serious impacts and who will be affected" (Hagedorn et al., 2002: 8). Furthermore, the *frequency* of transactions would also be relevant. For instance, milk production is continuous throughout a year. However, the number of transactions would be different between farmers and dairy industry and between dairy industry and retail stores throughout a year. In contrast, heat cropping would be an example for seasonal utilisation patterns.

Notably, there is also a number of new attributes that have to be considered. Hagedorn et al. (2002) suggest to include a) the excludability of actors from access to environmental goods, b) rivalry among the users of environmental goods, c) the often low separability of the provision of distinct environmental goods into the analysis. For example, producing milk on a larger scale can also have negative impacts on the environment, thus, causing (unwanted) transactions between dairy farmers and other actors, such as higher nitrate emissions into the groundwater or emissions of malodour, d) the complexity of the causal relationships of ecological systems, e) the heterogeneity and variability of transactions, and f) the legitimacy of transactions.

In this context, Hagedorn et al. (2002) separate between two types of transactions relevant for the impact of agriculture on environment (nature and ecosystem):

1) An environmental problem caused by production and consumption activities is a result of a transaction between farmer(s) and the community concerned (e.g., polluting groundwater by applying pesticides on farmland).

2) There are (or ought to be) related activities (transactions) between the actors suffering from the pollution and the farmer(s) to solve or to diminish this specific environmental problem. Here, effective mechanisms (governance structures) are needed to organise these transactions in an appropriate way, i.e., minimising transaction costs. For instance, some compensation payments from the farmer to the water users or simply a ban on pesticide usage on farm land.

The aforementioned distinct and complex attributes of transactions in the field of agri-environment - but also ample empirical evidence - has brought about the insight that markets, hierarchies, and hybrid forms might often not be the most effective and cost-efficient modes of governance when it comes to agri-environmental problems. Thus, other governance structures have been suggested instead, such as horizontal non-market coordination (e.g., cooperation and collective action (Ostrom, 1990; Ostrom et al., 1994)), formal and informal

[45] Bougherara et al. (2005) consider the environmental-related transaction as an elementary coordination problem between two parties that involves a transfer of property rights.

[46] AOC = Appellation d'Origine Contrôlée (Protected Denomination of Origin, (PDO))

networks as knowledge and information systems, and methods and infrastructure for measuring, monitoring, and evaluating environmental damages and benefits. They also include conflict resolution mechanisms and incentives and opportunities to promote innovation and learning (Hagedorn et al., 2002). In practice, various forms and combinations of governance structures used to co-ordinate agri-environmental transactions can be observed. There are governance structures based on voluntary agreements that involve state agencies and local communities (referred to as collaborative management or co-management). Those co-management arrangements may also include private sector organisations such as tourism enterprises. Birner et al. (1999) propose to model co-management arrangements as relational contracts. There are also attempts to apply adapted market-oriented forms of governance. For example, Stoneham et al. (2003) propose auctioning as a solution for nature conservation. They consider that markets for nature conservation on private land are missing because of the problem of asymmetric information. Thus, auctions of conservation contracts were proposed to reveal hidden information needed to facilitate meaningful transactions between landholders and government. In contrast, Hagedorn et al. (2002) suggest co-operative strategies might play a major role in coping with agri-environmental problems.

1.4.1 Transaction Costs Indicators in Detail

The literature review on transaction costs indicators has unearthed a rather small sample of studies that actually develop indicators and measure transaction costs related to environmental and/or agricultural policies and activities. The reviewed indicators were developed and measured in close relation to very specific cases, which does limit the direct use within SEAMLESS. Yet, these case studies provide valuable methodical information on how to develop appropriate indicators and on how to measure transaction costs that can be regarded as a valuable contribution to assess the efficiency of policy implementation but also policy design. In congruence with the SEAMLESS objectives, it was aimed to identify determinants for transaction costs in particular in the agri-environmental context.

Apart from the conceptual study by Aubert et al. (2004), all studies reviewed deal with transaction costs related to policy implementation. However, indicators for determining the attributes of transactions and the observed governance structures are missing.

For economic organisation and contractual arrangement, Williamson (1996) distinguishes between transaction costs defined as the *ex-ante* costs of drafting, negotiating, and safe-guarding an agreement and more especially, the *ex-post* costs of mal-adaptation and adjustment that arise when contract execution is misaligned as a result of gaps, errors, omissions, and unanticipated disturbances. Further, the costs of conducting transactions in one organisational or contractual form relative to the others are important. For Clemons et al. (1993), transaction costs are represented by two components. The first component is *coordination costs*, i.e. the costs of exchanging information and incorporating that information into the decision process. The second one is *transaction risks*, which refers to the risk that other parties in the transaction will shirk agreed responsibilities.

Quite a few studies measuring transaction costs also focus the distribution of these costs among actors or actor groups. Many of them distinguish between private transaction costs that, e.g., farmers or other private actors have to carry (Kumm and Drake, 1998; Falconer, 2000), and public transaction costs that public authorities and administrations have to bear (Kersten, 2004; Falconer and Whitby 1999a, b).

Within SEAMLESS, it will also be necessary to distinguish between transaction costs related to the policy design and transaction costs related to implementation, monitoring, and enforcement. Yet, in the reviewed studies, indicators for the costs related to the policy design process are missing.

1.4.2 Reflections on the Applicability of the Transaction Cost Cluster for Institutional Analysis in SEAMLESS-IF

The following reflections start from the insights gained by reviewing the literature on institutional indicators, and, in particular, on the theoretical considerations described in Section 1.4.1. It is assumed that both, the designing and implementation of policies are connected with transaction costs. For instance, co-ordinating transactions between administrative layers (i.e., within hierarchies) is important when designing and implementing public policies. Such transactions entail specific transaction costs, incurred as a result of collecting information, making decisions, formulating institutional rules, monitoring compliance with these rules, and enforcing these rules (Paavola and Adger, 2005). If the same objective (environmental, economic, or social) can be provided by different policy options, the most cost-efficient organisation is the one connected with the lowest transaction costs.

Furthermore, the way in which administrative processes are designed and foreseen within the policy option is expected to affect their institutional quality, such as transparency and reliability of processes. Here, a higher institutional quality may request higher transaction costs but may lead to an improved effectiveness of the policy option.

Thus, policy options cannot be evaluated only according to their costs but also according to the required institutional quality of the institutional arrangements, such as the administrative processes in order to be effective. Within the ITAES Project (Integrated Tools to Design and Implement Agro-Environmental Schemes) funded by the EU 6th Framework Program, indicators of institutional quality have been introduced; yet, at a conceptual stage: transparency, reliability, continuity, legitimacy, responsibility, complexity, and sensitivity to mistakes (Beckmann et al., forthcoming).

2 Gaps and Interlinkages of Institutional Indicators for Sustainability in SEAMLESS

As described in Section 1, there is only a limited number of - often also less developed - indicators for institutional analysis compared to other dimensions. Apart from the relative juvenescence of institutional research, this is also due to the fact that the functions and characteristics of institutions, such as rules forming structures, building expectations or setting constraints are much more complex to tackle. In general, statements on gaps in institutional indicators depend on:

a) the available indicators to measure institutions

b) the institutional approach necessary for reaching the SEAMLESS objectives

a) The most developed indicators were found in the *good governance* debates of the World Bank. Those indicators comply with scientific quality criteria and can be computed with existing data sets. Data sets with slightly different purposes are accessible. They are used to compose indices describing the impact of institutions on growth and economic performance in a narrow sense, and on public welfare and development aims in a broader sense. These indicators allow for international comparison and, thus, they are only available on national scale. Yet, according to Beck et al. (2000: 2), there is still a lack of detailed data on the political and institutional characteristics of countries and their changes over time.

The *social capital indicators* provide valuable information about the social embeddeddness level of a society and its communication capacities. Such indicators have been computed, but they are mainly based on local case study data and draw on subjective information. However, some objective proxies have been developed for single regions or countries, such as number of members in associations. Most social capital data are not included in data sets; they are only available from singular sources.

The debate on institutions as the *fourth dimension of sustainability* provides the least developed indicators in this review. Most of them are at a conceptual level, i.e. they are formulated, but there is no method how to compute them. Moreover, even if there is an indication on how to compute the proposed indicators, the required data are often not available, scattered or in an inappropriate form. Nevertheless, the UNCSD and ESI institutional indicators are very promising as the underlying concept that institutions favour or hinder sustainable development is in line with the SEAMLESS approach (PD1.2.1). The institutional indicator sets assess the performance of implementing sustainability policy goals of the Agenda 21, or the institutional effectiveness to respond to environmental challenges, respectively.

Like in most of the literature on sustainability indicators, the approach chosen in Work Package 2 of SEAMLESS separates society in four discrete dimensions or subsystems. However, there is a permanent interaction between the economic, social, environmental, and institutional dimensions. These interactions constitute the linkages of the four dimensions and should be characterised by *interlinkage indicators* (Spangenberg, 2002: 4). Interlinkage indicators do not refer to one single dimension of sustainable development, but are e.g., socio-environmental or institutional-economic. Focusing exclusively on single dimensions of sustainability would imply the risk to loose the coherence of the approach and begin to trade-off between different goals instead of looking for integrated approaches (Spangenberg and Bonniot, 1998: 12).

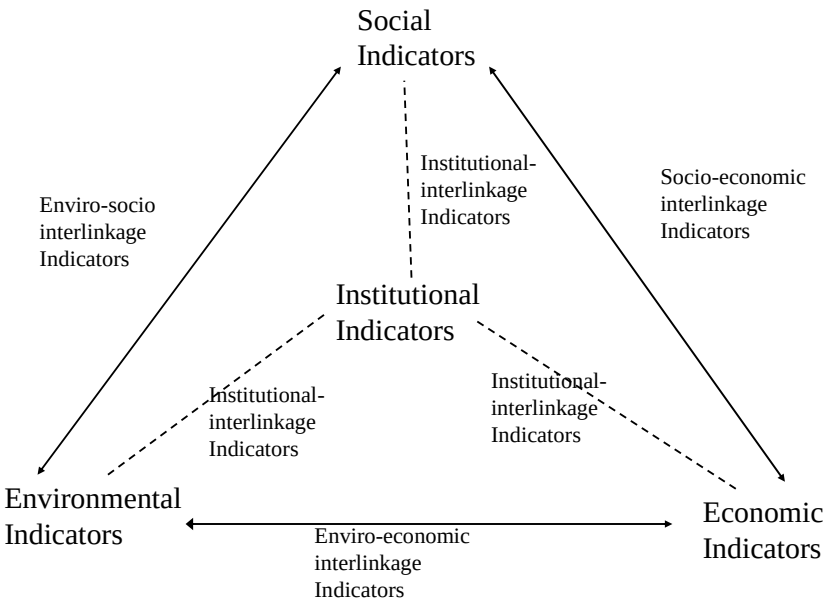

Figure 2: Interlinkage Indicators between Four Dimensions of Sustainability

Source: adapted form Spangenberg and Bonniot (1998: 13)

The closest interlinkage of institutional indicators will be with social indicators. Clearly, it can be regarded an advantage if indicators used to define social sustainability can also be used to define institutions for sustainability. Thus, some institutional indicators may overlap with economic and in particular social indicators. It can be assumed that there will be less overlap with environmental ones. However, it is not crucial whether an indicator is classified as economic, social, or institutional. Indicators may also be correlated positively or negatively with one another. By putting them into an appropriate framework and combining them to form complex indicators, the indicators will gain evidence. Thus, the outcome of the domain's specific models, such as world trade models or bio-physical models, will be different indicators as those feed into the models. Many social indicators (see PISIS – D2.1.2) are indicators which refer to institutional as well as social questions, depending on the focus. For example, a) participation of population in various sorts of cultural events, divided according to its nature and age, b) participation in nature conservation associations, or c) indicators related to information accessibility, such as number of radios per household, number of televisions per household, and internet access per households. Here, indicators on social health issues such as participation in insurance schemes could simultaneously give indications on people's risk assessment important to judge their opinion towards certain policy issues.

The *transaction costs indicators* can be conceived as calculations of transaction costs on a case-to-case basis. Accordingly, there is no data set summarising the results of the varying studies of different disciplines. Some aggregated and methodological studies exist, trying to find determinants and attributes of transactions either indicating high or low transaction costs or pointing to discrete institutional arrangements. The latter approach does implicitly minimise transaction costs. Only until recently, scientists have not applied the approach to transactions related to natural resources.

In general, in all four clusters, the coverage of different geographical scales is very limited. There is a high share of data relying on (local) case study material (social capital) and relative well-tended data sets of international statistics providing data on good governance at a national scale.

b) The existence of some indicators that are already operational, i.e. which have an accessible data set, and are indicative, robust, and sensitive does not mean that they are appropriate for the objectives of institutional analysis in SEAMLESS.

In SEAMLESS it is aimed at measuring the impact of policies on sustainability and to assess the institutional context with respect to its impact on the effectiveness of policy implementation. Thus, the measurement of institutions within SEAMLESS has to be closely connected to the policy option to be implemented. This adds a particular difficulty, which is not yet addressed in the institutional indicators literature. The methodologies for *ex-ante* policy assessment from an institutional perspective are rare, and none of them can be directly used in a formalised way. This implies that there is a need to elaborate on the existing indicators but also, partly, to develop new indicators as none of the four clusters directly aims at institutional compatibility of policy options. Furthermore, most of the subjective performance indicators of the UNCSD or the World Bank are designed for ex-post analysis, i.e. they measure the effects after policy implementation.

3 Developing a Classification System for Institutional Indicators

In order to follow a systematic approach for analysing the literature, a classification system (matrix) of the various institutional indicators was constructed. This matrix represents an effort to facilitate the classification and, thus, the comprehension of indicators (variables and proxies) concerning their origin, characteristics, and purpose (Theesfeld and Beckmann, forthcoming). The classification system serves as the basis for the following Tables A1-1 to A1-4. All columns in the matrix represent characteristics that can be used to map the similarities and differences between the four clusters described above when their capability of measuring different aspects of institutional performance is concerned. The colums in the tables are 1) cluster of origin/research program, 2) methodology, 3) typology, 4) level of social analysis, 4) purpose of indicators, 5) example indicators, 6) data availability, 7) geographical coverage, and 8) references. In the following, the different categories are explained in detail.

Methodology

The column methodology highlights the steps and tools used to construct the indicators and to compile indices from relevant datasets. For the purpose of this Deliverable, the information provided in this column mainly applies to subjective versus objective data. Here, subjective indicators are based on expert or informed opinions, yet, systematically gathered; objective data represent data that are gathered from statistics and similar sources. It is important to note that indicators that are marked as “subjective” can also be quantitative in nature. In particular, in the good governance debate, the widely assumed superiority of quantitative over qualitative measures is a central issue. Hence, several approaches have been followed to quantify subjective information stemming, e.g., from qualitative assessments of experts. In turn, quantitative data from statistics are often not totally objective because of, for example, underlying subjective processes of data selection. Being aware of the blurred borderlines between quantitative, qualitative, subjective, and objective data, the latter two categories (subjective, objective) are considered to be more explanatory for the purposes of this Deliverable.

Typology

Each of the four clusters presented above developed its own typology for structuring indicators. One has to be aware of these different kind of typologies used to make indicators comparable.

One prominent issue of debate shall be stressed here: the applicability of the *Pressure-State-Response (PSR)* and the *Driving-force-State-Response (DSR)* typologies favoured by natural scientists, criticised by sociological scientists, and regarded as not suitable by institutional economists. Within the sustainability cluster, the typology starts with the PSR concept promoted by the OECD (1998) that exclusively focusses on the environment. The UNCSD has been adding the economic and the social dimension to the typologies, thus, the category “pressures” was changed to a more general one, “driving forces leading to the system”. Yet, Spangenberg (2002: 3) concludes that, for the institutional dimension, the DSR typology is misguiding. It is rather suited to deal with situations where measures are designed as a tailor-made reaction to specific problems. Institutions, however, are only partly designed intendedly; they evolve partly as a result of changing mindsets, experiences, and public discourses. The diffuse impacts of institutions as well as the rebound effects of political

decisions on institutions make it difficult to define direct links from driving-forces to responses. Due to these conceptual difficulties, neither the PSR nor the DSR typology is used to classify institutional indicators in this Deliverable.

Instead, many other typologies are presented in the literature, such as: a) themes and subthemes, b) specific analytical criteria, c) process (outcome and resources) and performance (contextual and sectoral), and d) stocks, efficiency, and equity. In the following, typology elements used in Tables A1-1 to A1-4 are introduced.

Especially in the good governance cluster, two broad types of indicators can be found: performance and process indicators. *Performance* measures provide assessments of the quality of governance. For example, governments are rated with respect to corruption levels or predictability of policymaking. Indicators linked to a reference goal or sustainability target are termed performance indicators (Spangenberg and Bonniot, 1998). *Process* measures describe the institutional inputs that produce governance outcomes. Unlike performance measures, process measures have no normative content; for instance, "the average salary of civil servants relative to the private sector or to per capita income". Performance indicators can be both *quantitative* and *qualitative* (see also Section "Methodology" above). For instance, the widely known Transparency International Corruption Perception Index represents a performance indicator constructed by aggregating multiple indicators from various sources.

Another typology is grouping indicators according to the measuring scale: *nominal, ordinal, and cardinal.* A typical cardinal indicator is "potential scientists and engineers per million inhabitants" or "access to information by number of newspaper circulating". Some nominal indicators are presented in statistical studies as *binary* or *dummy* variables. For instance, a variable that equals "one" in a concrete region has a particular institutional feature, and "zero" another feature, or the existence of National Councils for Sustainable Development indicated with "yes" or "no".

Many indicators are counts of a phenomenon (e.g., number of transactions, number of associations, etc.). They are then usually normalised as *ratios* for statistical purposes, e.g., "average number of transactions per firm", "average number of associations per inhabitant", "ratio of agreements legislated for", "agreements ratified from a list of six", or "telephone lines per 1.000 inhabitants". Last, some indicators are *composite*, i.e. they are the result of a computation of different data. For example, when a phenomenon is measured indirectly by several indicators principal component analysis can yield aggregate indices of that phenomenon.

Level of Social Analysis

The Level of Social Analysis refers to Williamson (2000: 597) and differentiates four logical levels: L1) the *social embeddedness* level (this is where norms, customs, mores, traditions, and religions are located; changes happen very slowly); L2) the *institutional environment* (includes the formal rules, such as constitutions, laws, and property rights; conceived to change within decades or centuries); L3) the *governance structures* (e.g., legal system for defining contract laws and enforcing contracts; changes conceived to happen within a year to a decade); L4) the level of *resource allocation and employment* (prices and other incentives affecting decision making; changes may happen daily or even more often). This classification is widely used by institutional economists. Elements also inform the categories of qualitative composite output indicators that are elaborated on in the last step of the Procedure for Institutional Compatibility Assessment (PICA).

Data Availability

In the column *data availability*, first, the criterion *geographical coverage* of the indicators found in the literature will be addressed. According to SEAMLESS-IF, categories used will range from farm-level, local, regional, national, to international scales. While most indicators are only available at national level, regional and local information on institutions – in particular, on informal institutions – would be exceedingly helpful for assessing the institutional compatibility of policy options. As is true for environmental systems, local institutional systems within a country can be very heterogeneous.

Further, other aspects of *data availability* are refered to in this column. Some proposed indicators are still at a conceptual level. Other indicators are in principle measurable, but data does not exist, yet. There are also indicators that have been measured, but that are not operational for the purpose of SEAMLESS-IF because they refer to local case study data only. Finally, there are indicators which are operational, i.e. data sets are accessible, either free of charge or fee-based. This information is important to assess the (practical or technical) applicability of the indicators for institutional analysis and their (potential) use for Prototype 3.

4 Tables

Table A1-1: Good Governance Institutional Indicators

Research Program	Methodology	Typology	Level of Social Analysis	Purpose	Examples of Indicators	Data Availability	Reference
Freedom House Index	Subjective	Performance, Ordinal scale	L3	Assess political freedom and civil liberties Explain relations to income growth	Countries are assigned a status of “free”, “partly free”, or “not free”, by averaging ratings.	Cross-country data Annual since 1978, 192 countries http:freedomhouse.org/ratings/index.htm	World Bank, 2001
International Country Risk Guide (ICRG)	Subjective assessment of experts; composite scores 0-100	Qualitative Performance, Ordinal scale	L3	Explain relation to income growth Index that reflects the security of private property and the enforceability of contracts.	Index Variables reflect corruption in government, law and order tradition, repudiation of contracts by governments, bureaucratic quality, and democratic accountability.	Broad coverage across countries (140) and over time Fee required to access data by Political Risk Services Group of Syracuse, NY. http://www.prsgroup.com/icrg/icrg.html	World Bank, 2001; Knack and Keefer, 2003; Besancon, 2003
Business Environmental Risk Intelligence (BERI)	Subjective assessment of experts	Performance, Ordinal scale	L3	Assess political risks for overseas investments	Index The index includes aspects, such as contract enforceability, nationalisation risk,	Private source Limited country coverage (50) Fee required to assess	World Bank, 2001; Besancon, 2003; Knack and Keefer, 1995, 2003

					bureaucratic delays, and infrastructure quality	data http://www.beri.com	
World Development Report 1997 (WDR1997)	Subjective assessment of actual investors	Performance	L3	Assess perceptions of governance among investors Explain investment rates related to the quality of governance	Policy unpredictability, quality of government services, corruption, judicial unpredictability.	67 countries data available	World Bank, 1997
Corruption Perception Index	Subjective Survey of business people, investors, journalists, and risk analysts. Composite index using different data sources.	Performance, Ordinal scale	L3	Assess the perception of corruption. Give indications for donors where investment is needed to fight corruption	Index Example question: Bribing and corruption prevail or do not prevail in the economy?	Annually updated, broad country coverage (163) Rating accessible www.transparency.org	Transparency International, 2006
Worldwide Governance Research Indicators Data set (KKZ)	Subjective Construct six aggregate indexes	Performance	L3	Explain relation of these indexes to higher per capita incomes	Aspects of governance assessed: Rule of law, graft, voice and accountability, government effectiveness, political instability and violence, and regulatory burden.	Covers 199 countries Web-Interactive Governance indicators. Four time series: 1996, 1998, 2000, 2002: http://www.worldbank.org/wbi/governance/pub/govmatters.html, http://www.worldbank.o	Kaufmann et al., 1999a,b, 2003

						rg/wbi/governance/pub/govmatters3.html, http://www.worldbank.org/wbi/governance/govdata2002/	
Contract-Intensive Money (CIM)	Objective	Ratio	L3, L4	Explain reliance on contract enforcement and its relation to growth rates and investment's share of GDP.	CIM		Clague et al., 1999
Civil Service Employment and Pay	Objective	Process Ratio	L4	Give ratios of government employment and wages as a share in the whole economy	Average government wages as a ration of manufacturing wages. Total government wage bill as a percentage of GDP	Not updated since 1993 http://www.worldbank.org/html/dec/publications/workpapers/WPS1700series/wps1771/wps1771.pdf	Schiavo-Campo et al., 1997a, b
Weberian Comparative State Data Project	Subjective Ranking of experts	Qualitative, Ordinal Scale	L3	Relation to economic growth	Various dimensions of bureaucratic structure and meritocracy	35 developing countries data for 1993-1996: http://weber.ucsd.edu/~jrauch/webstate/	Evans and Rauch, 1999
Polity98 Project on Regime Characteristics/ Polity IV	Subjective, Survey data	Qualitative and quantitative, Process, Ordinal scale		Describe political structures and regime change over almost 200 years.	Variables on how chief executives are selected, or sources and extent of constraints on the chief executive as power. Measures on political participation, on centralization and scope of government authority	161 countries http://www.cidcm.umd.edu/inscr/polity/index.htm	Marshall and Jaggers, 2001
Political Constraint	Objective	Quantitative,	L4	Relation to growth rates	Number of independent	140 countries	Henisz, 2000

Index		Process			branches of government with veto power. Distribution of preferences across and within those branches.	http://www-management.wharton.upenn.edu/henisz/	
Database of Political Institutions (DPI)	Objective	Qualitative and quantitative, Process, binary, cardinal	L1	Answers questions of political economy: Which political institutions are most conducive to development and reform? Investigate institutional and political conditions under which governments promote or retard reforms and assumed economic development.	Indices for Competitiveness in election Indicators for federalism (regulatory power of sub-national governments)	Cross-country database with 113 variables on 177 countries Free access http://www.worldbank.org/wbi/governance/pdf/wps2283	Beck et al., 2000
Second-generation governance indicators	Objective	Process and Performance		Indicators should be more policy relevant, politically acceptable, and quantitative. Areas taken into account: Good governance, human rights and democratization and participatory development	Examples: Timeliness of audited financial statements Percentage of population fearful of crime Enforcement of property rights	40 candidate indicators in a mean number of 80 countries OECD DAC website	Knack et al., 2003
Evaluating the quality of public governance	Subjective	Process and Performance	L1, L3	Conceptualising a new orientation in evaluating the quality of public governance. Measuring improvements in quality of life and in governance process instead of a quality of a service.	Level of community safety perceived by citizens Level of understanding of citizens, in relation to the issues about which they wish to know Quality of the environment which people experience	Conceptual work; Data sets which go into this direction are the Human Development Index of the United Nations, The Compass Project of the Bertelsmann Foundation in German, or the Audit Commission in Britain	Bovaird and Löffler, 2003

Table A1-2: Social Capital Institutional Indicators

Research Program	Methodology	Typology	Level of Social Analysis	Purpose	Examples of Indicators	Data Availability	Reference
Social capital	Objective	Composite	L1	Explain growth	Ethnolinguistic diversity	At country level	Easterly and Levine, 1997
Social capital	Subjective & objective	Composite	L1	Explain program adoption	Trust and reciprocity indices	No (survey data)	Pargal and Huq, 1999
Social capital	Objective	Composite	L1	Explain fertiliser adoption	Social homogeneity	No (survey data)	Isham, 2002
Social capital	Objective	Composite	L1, L2	Explain household expenditure	Number of groups weighted by quality	No (survey data)	Narayan and Pritchett, 1999
Social capital	Objective & subjective	Composite	L1	Explain growth	Civic behaviour indicators: Associations, newspaper readership, political behaviour, satisfaction with government;	At regional level in Italy	Helliwel and Putnam, 1995
Social capital	Objective	Ratios	L1	Explain household investment	Electoral turnout Blood donation	At municipality level in Italy	Guiso and Zingales, 2004
Social capital	Objective	Ratios	L1	Explain growth	Association density	At county level in the US	Rupashinga and Goetz, 2002; (and many others)
Social capital	Objective & subjective	Cardinal	L1	Explain individual success	Number of moves Parental involvement	At district level in the US	Hagan and MacMillan, 1996
Social capital	Objective	Cardinal	L1	Explain food trader success	Number and types of links	No (survey data)	Fafchamps and Minten, 2002

Social capital	Objective	Ratios	L1	Explain mean income and its standard deviation	Number of monoparental families Criminality rate	At district level in the US	Robison and Siles, 1999
Social capital	Subjective	Ratio	L1	Explain growth	Trust (general)	At country level	Knack and Keefer, 1997
Social capital	Subjective & objective	Ordinal, Cardinal	L1, L2, L3	Explain program adoption	Leaders' charisma, groups, co-operative behaviour	No (survey data)	Krishna, 2001
Social capital	Subjective Rating (source: EVS)	Ordinal	L1	Explain growth	Taste for sociability Materialism	At NUTS I level in the EU (European Values Study)	Beugelsdijk and Smulders, 2003
Social capital	Objective	Composite	L1, L3	Explain growth	Various bonding and bridging indicators	At municipality level in France	Callois and Schmitt, 2006
International economics	Objective	Ratio	L1	Explain trade	Share of immigrants	At country level	Gould, 1994; Rauch and Trindade, 2002
International economics	Objective	Ratio	L1	Explain equity investment	Phone calls between countries	At country level	Portes and Rey, 2001
International economics	Objective	Binary	L1	Explain trade	Common history, language, etc.	At country level	Rauch, 1999
International economics	Objective	Binary	L1, L2	Explain trade	Presence of business group	Canada only	Head and Ries, 1998
Economic sociology	Objective	Composite, Sociometric	L1	Linking individual success and network structure	Structural measures of individual network	No (survey data)	Burt, 2000
Economic sociology	Objective	Composite, Sociometric	L1	Firm's success	Frequency of interaction with suppliers: concentration index	No (survey data)	Uzzi, 1996;1999

Table A1-3: Sustainability Institutional Indicators

Research Program	Methodology	Typology	Level of Social Analysis	Purpose	Examples of Indicators	Data Availability	Reference
United Nation Commission for Sustainable Development,	Objective binary (existence: yes/no) Subjective (effectiveness)	Themes and Subthemes	L2, L3	International core set of indicators for sustainable development	Subtheme: Institutional Framework 1) National Sustainable Development Strategy. 2) Implementation of Ratified Global Agreements In addition to the four indicators of institutional capacity described below	1) only existence can be monitored, no methodology for this indicators 2) data available but no meaningful indicator	UN, 2001
Eurostat and United Nations Commission for Sustainable Development,	Objective	Themes and Subtheme Cardinal Ratio	L3	Adaptation to the European requirements of the international core set of indicators for sustainable development	Subtheme Institutional capacity 1) Internet access 2)Communication infrastructure 3) Expenditure on research and development 4) Risks to human and natural capital	Eurostat, national scale 1), 4) Caution is advised in using some data. Relevance or quality is questionable, 2), 3) Good quality and comparable data	EC, 2001a

Enhancing institutional indicators of the United Nation Commission for Sustainable Development	Objective	According to analytical levels Aims at cardinal and performance	L1-L3	Developing more meaningful institutional indicators out of the core set of indicators for sustainable development	Number of elected representatives in parliaments, councils etc. per 100,000 inhabitants for level of decentralization, Funding for NGOs as share of the total subsidies paid by government, Average of real tax paid by the top 20% of private income as compared to the national average for distributional dynamics	Most of the indicators proposed are proposed new once, but data is partly available. However not gathered in a database www.wupperinst.org	Spangenberg, 2002; Spangenberg et al., 2000, 2002
Framework for economic and social dimension of sustainable Agriculture and Rural Development		Typology of "Stocks", "Efficiency", and "Equity" indicators	L3 for institutional aspects	Developing a framework which besides the agri-environmental indicators take the economic and social dimension into account	Institutional efficiency Assessed by aspects of the regulatory framework, informal relationships and steering mechanisms	Only listed, not conceptual and no data available	EC, 2001b
Environmental Sustainability Index Report	Objective/Subjective Annex C of the report outlines the methodology for each variable	Building block for indicators out of 5 components, each out of a group of indicators and out of a group of variables.	L2, L3	To compare nations in their ability to protect the environment over the next several decades with a more quantitative approach to environmental decision-making.	The indicator "environmental governance" is build out of a group of variables such as, corruption measures, government effectiveness, and percentage of total land	National scale Institutional variables are taken from existing indexes, such as Freedom House, or new calculated from existing data sets, such as World Bank, and UNCSD, or	Esty et al., 2005 www.yale.edu/esi

					area under protected status, rules of law, civil and political liberties, and democracy measures.	based on a conducted survey.	
Governance performance in integrated coastal management	Objective / Subjective	Input, Process, Output, Outcome Performance	L3	Measure the outcome and impacts of a project to measure the actual success in both environmental and socioeconomic terms.	Political support obtained and maintained; Scientific advisory groups established; Public access to information is assured	Conceptual	Ehler, 2003

Table A1-4: Transaction Costs Institutional Indicators

Research Program	Methodology	Typology	Level of Social Analysis	Purpose	Examples of Indicators	Data Availability	Reference
Transaction costs and environmental policies	Objective Survey, government reports, financial account, proposed budget		L1, L2, L3	To explain transaction costs in environment policies	Type of transaction costs: Research and information, enactment or litigation, contracting, monitoring/detection, prosecution/ enforcement	Conceptual case	McCann et al., 2005
Dairy production in East Africa	Objective Survey on smallholder farmers	Cardinal	L3	Explain dairy production after liberalisation	Distance Travel price Time (search, bargain, monitor, etc.)	Survey, case study	Staal et al., 1997
Policy Administrative Costs to implement environnemental sensitive area in England	Objective Survey, negotiation between actors	Ratio	L3	To maintain, improve, and extend habit or landscape features on agricultural land.	Share of policy expenditure: for information, contracting, monitoring, etc.	Survey, case study	Falconer et al., 2001
Industrial firm reduce pollution due to Kyoto protocole	Objective	Ratio	L3	Analysis of cost and institutional rigidities for projects implementation within the Kyoto	Proportional, fixed, degressive of each transaction cost (search, negotiation, approval, validation, registration,	Data from the Swedish activities implemented jointly	Michaelowa and Jotzo, 2005

				Protocol flexibility mechanism	monitoring, verification, certification, and enforcement costs) in relation to project size		
Transaction costs case: electronic commerce	Objective Collecting data from Singapore	Cardinal	L3	Use transaction cost assessment to understand consumers' willingness to pay	Time for search, monitoring, etc.	Survey, case study	Teo and Yu, 2005
Agriculture in USA	Objective	Ratio Cardinal	L3	Description of links among organisational economic, policy analysis and agriculture	Share of value of product under contract Contract characteristics: contract fees, contract quantities, length, confidentiality clause, specified investment / spot market alternative	Data from a survey	MacDonald et al., 2004
Outsource information technology	Objective	Ratio	L3	Analysis of outsourcing determinants	Asset specificity, Share of materials outsouced: hardware, printer, etc.	Conceptual, Survey, case study.	Aubert et al., 2004

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Appendix 2: Crucial Institutional Aspects of Policy Types: PICA Step 2

In Appendix 2, the literature reviewed for identifying crucial institutional aspects is documented in a detailed manner. Section 1 presents 16 concrete policies that are analysed for their CIAs. They are grouped according to the policy type matrix. An overview of policy types covered in this Section can be found in Table A2-1. For each policy, a description of the policy option is given first followed by the categorisation into a policy type. Thereafter, related CIAs are discussed. Section 2 elaborates the literature on those CIAs not directly linked to concrete policies.

1 Crucial Institutional Aspects of Policy Types

Table A2-1: Policy Types Covered in Section 1

		Area of Intervention			Property Rights Change
		Hierarchy/ Bureaucracy	Market	Self-organised Network	
Type of Intervention	Regulatory	1.1; 1.12; 1.13; 1.15	1.6; 1.7; 1.11; 1.14; 1.15		1.4; 1.6; 1.14
	Economic	1.12	1.3; 1.11; 1.16	1.2; 1.5; 1.8	1.3; 1.4; 1.16
	Advisory/Voluntary			1.9; 1.10	1.10

Natural Resources Addressed	
Complex resource systems with many externalities involved (e.g., wetlands)	1.5
Water resource systems with long-term and diffuse impacts stemming from farming activities	1.9
Land/Soil	1.16

1.1 Subsidies for the Production of Environmental Services

Description of the policy option

Agri-environmental measures and rural development schemes connected with financial incentives aim at inducing farmers to produce what may be considered as environmental services (maintaining grasslands, traditional landscape, and biodiversity, adopting farming practices that limit pollution and erosion). They are based on the idea of making the farmer individually responsible towards the environment (Hodge, 2001). In this section, we concentrate on the aspect of implementation of these measures within the public administration.

Policy type and corresponding crucial institutional aspects

Policy type: Regulatory on hierarchies

These measures deeply transformed the activity of local administrations in charge of agriculture, as well as their relationships with professional organisations. The high workload of administrations induced by the policy, and the high resistance of farmer unions (who claim that they are not supposed to be "gardeners of the countryside"), explained the slowness of progress of these measures (Bousset et al., 2002). Moreover, in practice, the implementation of these measures is often characterised by both confused definition of objectives and complicated implementation. The objectives also tend to evolve with time during the implementation of the policy (Macombe et al., 2004). Note that in some cases, professional organisations managed to divert the concrete measures and premiums of the policy and transform it into another type of automatic subsidy. For instance, the criteria for getting the subsidy were set at a low level, corresponding in fact to the present situation of land use (Vollet et al., 2001). Most farmers did not have to change anything to their behaviour to get the subsidy.

Here, the main crucial institutional constraint is related to **political and administrative inertia** as a source of transaction costs. Concretely, inertia means that civil servants generally need to devote many resources (time, meetings, memos, etc.) in order to become acquainted with the policy and to build new procedures to implement it properly. Inertia might cause reluctance to implement policies that come along with substantial changes in procedures. When the redistribution effects of the workload and budgeting within the administrative bodies are high and connected with negative effects for a certain unit, than the inertia of that unit is expected to be higher. Depending on the existing administrative structures, substantial changes can be costly and lead to the crucial institutional constraint of **administrative public transaction costs** for policy administration. To a lesser extent, there is also the issue of **bargaining power between the State and farmers' organisations**. The latter relates to influencing the content of the measures and the premiums.

1.2 Rural Development Schemes Encouraging Self-organised Networks

Description of the policy option

Here we refer to a special type of rural development schemes, the so-called "territorial actions". These are special measures of the rural development scheme aiming at stimulating

collective action, in particular, for the development of specific/traditional products, or for stimulating relationships between agriculture and other sectors.

Policy type and corresponding crucial institutional aspects

Policy type: economic on self-organised network

In practice, the results of these measures were poor, notably because farmer organisations were reluctant to see non-farmers involved in these measures (Ministère de l'Agriculture, 2004). Due to the power of these farmers' organizations (in particular in France), incentives were insufficient or not directed to the right people in order to stimulate cost-efficient actions. In countries where the bargaining power in rural communities is more evenly distributed (Germany for instance as opposed to Spain or France), the policy seemed to give quicker and more cost-efficient results (Lynggaard, 2001; Wilson et al., 1999).

The main crucial institutional constraint is the **bargaining power of the farming sector's representatives**. When it is strong, the policy objectives may bring about not intended effects.

1.3 Agri-environmental Schemes in the New Member States

Description of the policy option

Following the agreements on the Agenda 2000, the direct payments to the farmers are linked to the "Good Farming Practice". For agri-environmental measures exceeding this standard, agri-environmental schemes (AES) have been established according to the Rural Development Regulation No. 1257/1999 (Eggers, 2005). These are modes of compensatory allowances for farmers who will be compensated for the income forgone and the cost incurred when carrying out those agri-environmental measures. The AES are incentive-based policies. Farmers are to participate voluntarily in the respective schemes and they have to commit to the scheme for five years. The Member States are responsible for the design of the AES. Thus, the measures vary widely in terms of number, design, targeted environmental problem, and content. Partly, they aim to change the production structure of farmers, thus, effecting their market position. Regulatory constraints of implementing the policies are discussed in Section 1.1. Here, we look at the aspect of the impacts on the farm level, the private changes of production and transaction costs.

Policy type and corresponding crucial institutional constraint

*Policy Type: Economic on market **and** economic on property rights*

As mentioned above, the scope of AES varies widely and accordingly, the scope of possible institutional constraints is even broader. Therefore, we need to concentrate on specific AES to be able to derive conclusions about institutional constraints. The crucial institutional constraints elaborated in the following appear in the whole EU, yet, they are often more likely and more pronounced in the New Member States.

Crucial institutional aspects which will decide on the uptake of and compliance with AES are that farmers are aware and convinced of potential benefits and they must feel confident in a stable policy approach. The main institutional constraints for uptake - no matter how carefully the scheme and single measures are designed - are if a) **in-sufficient information on policy** is available; in contrast to clearly presented and easily understood and announced/advised by organisations and well-regarded by the farming community, b) the scheme or single measures are too complicated to apply, or c) farmers are not convinced of the potential benefits. They doubt that the costs they incur will really be compensated. The

latter aspect hints to the crucial institutional constraint that farmers in the New Member States have **no experiences with such schemes and measures**. The more complex and risky a management prescription is the higher the financial incentive needed to attract farmers. Furthermore, it is always more easy to include an additional financial incentive than to reduce or eliminate it once an expectation to be compensated has been generated (Zélie, 2002).

In particular, Zélie (2002) points to the following institutional constraints:

Those principally responsible for the much-vaunted richness of the rural environment in the Central and Eastern European Countries (CEEC) are often the least advantaged in society. Subsistence farmers can be regarded as being too poor to care for the environment. Often, farmers have to reach a certain farm size in order to be eligible for the AES. Thus, the **lack of eligibility of sub-groups within the target group** (here, 'subsistence farmers' within the target group 'farmers') seems to be another crucial institutional constraint. If policies aim to protect the environment effectively those (sub-) groups must be eligible to and benefit from these policies.

Measures that should be realistically incorporated into the farming system and should be attractive to potential applicants must be adequate and sufficiently simple. More precisely, they must be a) content-wise simple, which means applicable to a targeted farm type and b) procedure-wise simple, which means sufficient resources (bookkeeping, time, knowledge) to apply must be available. Thus, **not matching farmers' competencies and capabilities** is a crucial institutional constraint.

Furthermore, schemes and measures have to fit to the existing mental models of farmers to facilitate a change in production functions. For instance, farmers do not like to step back to "old" - often more extensive - production practices. Thus, it seems to be easier to preserve existing habitats and areas of high environmental values as encouraging farmers to return to less intensive farming practices, perceived as less modern.

1.4 The Endowment Effect of Property Rights

Description of the policy option

Pistor (2002: 75) points out that every formal legal system relies heavily on voluntary compliance as state controlled resources are insufficient to ensure legal compliance only by means of coercion. Whenever a policy changes the property rights of a resource, the allocation of the cost and benefit streams that stem from (using) the resource are changed as well. Sunstein (1993) discusses an additional effect: people have preferences of a good, a right, or anything else depending on whether the government, some other authorities or the law, has allocated it to them in the first instance. For Sunstein (1993: 224) the key point is "the decision to grant an entitlement to A rather than B can affect the valuation of that entitlement by both A and B. More specifically, the initial grant of the entitlement to A frequently makes A value that entitlement more than he would if the right had been allocated to B".

Although both contributions do not deal with a specific policy option, they can be related to all policies changing the initial endowment of property rights, as acceptance and voluntary compliance with policy measures are closely linked to the property rights distribution.

Policy type and corresponding crucial institutional constraint

*Policy type: economic on property rights **and** regulatory on property rights*

What Sunstein (1993) describes is the **endowment effect**. This is a crucial institutional constraint related to voluntary compliance with policies affecting negatively the previous property allocation of an actor. Introducing a policy option that will cut back on the previously allocated property rights of an actor will meet stronger resistance as assigning limited property rights in the first place. Strictly speaking, this refers to reallocations of concrete property rights between the state and a farmer. Crucial for the degree of resistance is here, how this exchange process is organised; in particular, if the decrease in benefits due to the cutting back on the property rights is to be fully compensated, partly, or not at all. For example, if specific agri-environmental production activities that have been paid for by the state (via AES) are suddenly considered becoming non-compensated productions standards (Good Farming Practices) by farmers, ceteris paribus, resistance is likely to be high. In contrast to the Old Member States, the endowment effect in the New Member States might be even stronger, in particular, related to property rights on land. Frequently, land has been restituted during the transition phase. Therefore, changes to these recently re-gained rights are regarded as very sensitive, compared to farmers in the Old Member States who are used to several restrictions to their property rights on land.

1.5 Subsidising Collective Action of Landowners to Restore Wetlands

Description of the policy option

The problem of inciting land users to behave environmentally friendly is even more difficult when there are externalities between them. Because many pollutants (pesticides, nitrogen, etc.) diffuse in space, and because land properties are parcelled out across the country, it is difficult to identify who caused (to what extent) the externality. It is in particular the case for wetland restoration programmes, when there are numerous landowners whose participation is necessary for the measure to have a noticeable effect. In that case, collective action is required. In particular, this policy refers to complex natural resource systems where the sources of externalities are not easy to identify and the effects are not easy to internalise.

Policy type and corresponding crucial institutional constraint

*Policy type: Economic on self-organised network **and** complex natural resource systems with many externalities involved*

Related policies generally include subsidies for initiating collective action (e.g., covering costs for meetings, advertising, studies, and other coordination costs). In some cases, these policies are supplemented by financial means to compensate for changes in production. Despite financial incentives for collective action to address the externality problems, other, regulatory, measures should be complementary. Therefore, in general, a mixture between authoritarian decisions and economic incentives seems to be the best solution (Hodge and McNally, 2000).

The main crucial institutional aspect is **trust between landowners**, which is an essential component of **social capital** that facilitates the co-ordination of the objectives of these policies, thus, reducing coordination costs. This is because, in general, there is no local formal organization that could manage co-operation cost-efficiently. Free-riding behaviour is likely if trust is lacking in the local communities. Likewise, the costs for monitoring the compliance with the (collectively agreed) activities will be lower if trust among the actors is high.

1.6 Compulsory Restrictions in New Member States

Description of the policy option

Compulsory restrictions constitute - besides incentive-based policies - another set of instruments within a coherent and comprehensive agri-environmental policy. Decisions regarding the appropriate levels at which to set compulsory requirements, how and when to apply sanctions, and even the question what constitutes complementary compensated services are based on decisions regarding property rights and are often based on the application of the Polluter Pays Principle. In the following, we consider policies that start from the assumption that the basic distribution of property rights is already fixed and effective. Yet, the implementation in the New Member States might be difficult as rights and obligations are not clearly set and enforced, and property rights are often ambiguous and/or not effective (Zélie, 2002).

Policy type and corresponding crucial institutional constraint

*Policy Type: Regulatory on market **and** regulatory on property rights*

Many property rights are not yet clearly defined in the Central and Eastern European countries. Thus, prevailing **ambiguous property rights** are particularly a constraint with regulatory policies on markets, which are based on clearly assigned property rights. For instance, if the ownership on land is not clear, restrictions on production patterns, such as the prohibition to mow during certain periods, will not be effective.

1.7 Implementation of Tradable Permits

Description of the policy option

The implementation of tradable permits within the Kyoto Protocol flexibility mechanism consists in creating and regulating new markets for environmental goods. It is designed as a way to internalise the negative externalities produced by industrial firms. The creation of the market itself would refer to the policy type regulatory on market, as new governance structures are established. Yet, we will focus here on the regulatory intervention on the production function of the firms, and thus, on the effects of the intervention on their market position.

Policy type and corresponding crucial institutional constraint

Policy type: regulatory on market

The Clean Development Mechanism (CDM) is likely to entail considerable costs of baseline development, project registration, verification, and certification. Transaction costs are mainly supported by the public authorities, although the firms bear some of them too (Michaelowa and Jotzo, 2005). The latter refers to the issue of who is paying the costs for establishing the new market. The public intervention defines the rules of the trading market but also needs to manage organizations dealing with information, administration, and monitoring.

High **information asymmetries between state and polluters** as a crucial institutional constraint lead to inefficient policy implementation, as the transaction costs might be prohibitively high. The state cannot monitor the pollution cost-efficiently, nor does it know precisely the cost of cleaning measures (or, alternatively, measures for avoiding pollution). This information problem implies a lot of transaction costs and opportunism issues.

1.8 Fostering Endogenous Development Strategies through "Territorial Policies"

Description of the policy option

The so-called "territorial policies" encourage local actors to self-organise in order to build a common development strategy, and to find new synergies (e.g., scale and scope economies in the development of tourism products). Territorial policies may have a quite narrow scope (e.g., landscape management), but they can also cover all three dimensions (economic, social, environmental) of sustainable development (e.g., the "Pays" policy in France). Probably the best-known territorial policy is the LEADER-Programme (Ray, 2000). Groups that meet in the frame of such kind of policies are typically cross-sectoral and link private and public actors.

Policy type and corresponding crucial institutional aspects

Policy type: economic on self-organised network

Territorial policies seem to be in tune with social demand, due to their "participative democracy" feature. However, their implementation is hindered by several significant institutional aspects:

For instance, already only at the level of ministries, they transcend classical sectors. There is a need to co-ordinate several ministries (agriculture, environment, industry, equipment etc.), whereas all of them have different cultures and working habits. Civil servants from different ministries may make contradictory requirements to local actors (Candau et al., 2003). (See also "Problems of interplay" in Section 1.13).

We have **administrative public transaction costs**, but also **private transaction costs**, in particular, huge public administrative costs, for meetings and the compilation of many documents that are supposed to lead to the awaited territorial strategy.

Territorial policies rely on "bottom-up" development mechanisms, but this requires an appropriate level of **social capital (**know-how to socially interact, trust in state organisations, and inter-level trust between involved levels), which may be missing in some places (Arlot et al., 2002, 2004; Atmanagara et al., 2002).

With this kind of policies, the governance structures are changed towards more participation. When the initial distribution of actors' resources and interests is very heterogeneous self-organisation and participation is unlikely to emerge (Arzt, forthcoming) and will lead to non-effective policy outputs. Thus, the crucial institutional constraint **- heterogeneity of actors' interests -** hinders participation.

Besides, policies may be seen as implying a loss of power for some local actors, in particular elected representatives (Callois and Bonnel, 2002). This is due to the fact that often economic intervention in form of subsidised investments is included. For instance, when the *pays* policy was initiated regional development funds were supposed to be reserved for the areas under a *pays* contract. However, in practice, this rule was soon abandoned under the pressure of local elected representatives (Callois and Bonnel, 2002). The resistance of elected local representatives stems from the fact that they loose decision power and the power to distribute otherwise local funds with increasing participation of other, non-elected, rural actor groups. The fear of loosing influence leads to their resistance. With increasing scope of change from the existing distribution of decision power, including the power to decide over the distribution of funds, the resistance increases. In other words, the **level of redistribution of decision-making power** is a crucial institutional constraint. Whenever pluralistic decision-making structures are imposed on previously singular decision making structures opposition

will be high, thus, **resistance to a pluralisation of decision-making** can become a constraint.

1.9 Voluntary Co-operative Agreements between Farmers and (Private) Water Suppliers in Europe

Description of the policy option

To overcome the difficulties in implementing command-and-control policies to reduce water pollution from agriculture and the weaknesses of usual water-related AES **voluntary co-operative agreements (CA) between water suppliers and farmers** in a catchment area have been developed in Germany and other European countries. In general, voluntary CAs bring about more site-specific rules and/or tailor-made compensatory payments including farm-specific advisory services, investment aids (e.g., enlargement of storage capacities), and monitoring of soils and waters. They are considered as a complementary instrument to regulations and AES. Voluntary CAs differ greatly in terms of geographical scope, number of involved farmers, objectives (e.g., preventative and discretionary), legal conditions, involvement of state authorities, funding sources for compensation payments, and the role of additional activities, such as advisory services. Typically, involved actors include local water authorities, representatives of involved farmers, water suppliers, chambers of agriculture, agricultural advisors, and nature conservation authorities. CAs are financed to varying degrees from the water suppliers, EU-co-financed AES, and the respective Regional State mostly using revenues from water abstraction charges.

Policy type and corresponding crucial institutional aspects

*Policy Type: voluntary/advisory on self-organised network **and** water resource systems with long-term and diffuse impacts stemming from farming activities*

Voluntary CAs are seen as complementary to traditional policy instruments, such as statutory rules and pure, mostly non-catchment-specific compensation schemes. Effective implementation of command-and-control policies (e.g., Drinking Water Directive (EC) 83/1998 and Nitrate Directive (EEC) 676/1991) directed, among other things, at the prevention of water pollution from agriculture is often hampered because enforcement of these regulations is difficult and costly. This is often due to the large number of farmers, the different farming activities carried out by the individual farmers, and the typically long-term and diffuse impact of farming activities on the water quality. Furthermore, while compensation payments from water-related AES can induce farmers to, e.g., apply extensive farming practices, they often are not targeted – in terms of premium levels and rules – to local conditions prevalent in a particular catchment area and usually do not include payments for advisory services and investment aids that might be more cost-efficient in preventing water pollution.

Here, voluntary CAs have been shown to be more economically cost-efficient and environmentally effective means compared to alternative instruments, such as command-and-control, taxes, and AES (alone). In general, CAs have a high potential – as a complementary instrument – to increase the economic efficiency and environmental effectiveness of regulatory and economic policy instruments. Implemented measures can better account for the spatial and temporal variations of production costs and environmental benefits. Further, monitoring of farmers' compliance with the rules will tend to be easier since regional water suppliers are directly involved in this monitoring process being (spatially) closer to the subjects monitored than state agencies. Compared to statutory rules, farmers also have fewer incentives for violating the obligations in the case of CAs (Brouwer et al., 2003).

Brouwer (2003) presents several factors that might influence the implementation of CAs positively or negatively, and, thus, account for their varying occurrence across the EU. He finds first, very large water catchment areas to be a severe obstacle. Second, the establishment of groundwater protection zones – sometimes accompanied with the introduction of compensation schemes for farmers – provides incentives to create CAs. In other words, regulatory requirements, such as compulsory rules coming along with groundwater protection zones, facilitate the emergence of CAs. Other *promoting factors* include the existence of both, site-specific rules, and monitoring programmes, as well as the availability of compensation schemes (e.g., AES) for the income foregone, innovative farmers, good communication between farmers and water suppliers, the provision of advisory services, and a (culturally determined) preference of water consumers for high-quality drinking water. In turn, the establishment of CAs might be *hampered* if there are no major diffuse pollution and/or water scarcity problems caused by agriculture (or, if the existing instruments prove to be sufficiently effective), if farmers face high opportunity costs and, thus, demand very high compensation payments, and if there are inadequate resources to initiate CAs (e.g., because the "public" is unwilling to provide financial funds to farmers for "not-polluting the environment") (Brouwer, 2003; Heinz, 2003). Apart from financial means for compensating farmers and/or for providing advisory services, there are also those substantial costs to be considered that participating actors will incur, e.g., for organizing and running meetings held in the context of the CA. Further, if farmers are involved in the process of designing the farming practices from the very beginning they will be more ready to join the CA; even if compensation payments are not provided.

In conclusion, crucial institutional aspects are **very large natural resource systems (here, a water resource system)**, **contradictory policy instruments, low incentives to resolve the problem, high opportunity costs of farmers, and high private transaction costs.**

1.10 Pollution Licences

Description of the policy option

This section deals with the special policy of issuing pollution licenses as a direct negotiation over property rights between private parties. Déprés et al. (2005) deal with the problem of water pollution by farmers in the area of Vittel water production, and give a comparison with other cases in Europe. It is a typical example of the use of pollution licenses.

Policy type and corresponding crucial institutional aspects

*Policy Type: voluntary/advisory on self-organised network **and** on property rights*

This study shows that the Coasian bargaining process (Coase, 1960) may work when the **number of actors is not too high**, and when the **environmental problem is easy to identify in space and time**. The main crucial institutional constraint is the **dispersion and fragmentation of property rights**[47]. A high dispersion/fragmentation is detrimental to efficiency of the policy since transaction costs are higher.

[47] Here, the term "fragmentation" refers to "land fragmentation", i.e., owners per hectare. However, "dispersion" refers to the distribution of specific components of property rights on a concrete piece of land (access, alienation, withdrawal, etc.).

1.11 Contracting between National and Regional Levels in Economic Development Actions

Description of the policy option

The "CPER" (Contrat de Plan Etat-Region – State-region planning contract) is a contract between the national and local (mainly regional, i.e. NUTS II) levels that aims at co-ordinating the action of these different levels to stimulate economic development. Historically, it is the outcome of the decentralisation process in the early 1980s. Before 1982, France was a highly centralised state within which local levels had a very low autonomy. The decentralisation laws instituted autonomous local governments with their own budget and a full range of competences, in particular for economic development.

Policy type and corresponding crucial institutional aspects

*Policy type: regulatory on markets **and** economic on markets*

The analysis of the actions undertaken in the CPER reveals two kinds of problems. First, national and regional actions may be redundant or contradictory in which case the interest of having two separate programs for the same thing is questionable, as it basically doubles administrative transaction costs. Second, the definition of eligible projects may be influenced by powerful local actors (unions, elected representatives who also have interests in a particular economic sector), and create distortion in the allocation of subsidies (Guérin and Vollet, 2000).

The main crucial institutional constraint is the existence of either **contradictory or redundant policy instruments**, which cause unnecessary transaction costs.

1.12 Decentralisation of Rural Development Interventions

Description of the policy option

Here, we look at all rural development interventions that delegate new competencies to local governments. Recently, we observe a tendency for federal and central governments to give up some competences to more local levels, especially for economic interventions (Callois and Moquay, 2006). This transfer of responsibilities is generally supposed to better adapt policies to local needs.

Policy type and corresponding crucial institutional aspects

Policy type: regulatory on hierarchy

There is often an **ambiguity in** the definition of r**esponsibilities** between the federal/central level, and local levels (Joyal and El Batal, 2005). Basically, the central level tries to keep a control on the local decisions, while decreasing its expenditure for regional development. Sometimes, this takes the form of **redundant** interventions by central and local administrative bodies. Another crucial institutional constraint is the **not matching financial means and capacities** between the responsible administrative levels. For instance, local civil servants are considered less neutral than central ones, because they are more directly under political pressure. This may cause distortions in the allocation of funds.

Another crucial institutional constraint is the **bargaining power between the state and local governments**. Whereas local governments usually have better information than the state on their needs, it is of little use to them because the state has a far greater power.

Policy type: economic on hierarchy

The central level generally transfers money to local government in order to cope with the new responsibilities, but the amount granted is seldom sufficient to cover the needs. The decentralisation process may be the source of new inequalities between regions, and thus of a loss of social cohesion, as the poorer regions seldom have the necessary resources for implementing a cost-efficient policy (Callois and Moquay, 2006). **The un-differentiated distribution of financial means** is here the crucial institutional constraint. Ignoring the heterogeneity of target regions and too easily set criteria for the distribution of funds may lead to the fact that rich regions are better off and poorer regions are worse off.

1.13 Introduction of River Basin Management within the Water Framework Directive

Description of the policy option

The introduction of river basin management is one of the most important features of the Water Framework Directive (WFD) that is currently being implemented in the EU. Systems of water management have to be organised along natural geographical and hydrological borders instead of following administrative or political borders. River basin management involves all tasks related to water protection (surface water and ground water), e.g., inventories, monitoring, reporting, drawing up and putting into practice of management plans or programmes of measures. Apart from the cross-spatial co-ordination of water management river basin management within the WFD also includes the need to coordinate across different sectors, such as water management, agriculture, and transport, as well as elaborated forms of participation (Moss, 2003a).

Policy type and corresponding crucial institutional aspects

Policy Type: regulatory on hierarchies/bureaucracy

An analysis of the institutional change likely to be induced by implementation of the policy option mentioned above raises issues 1) of compatibility and adaptability of well-established national and sub-national institutions of water management, 2) of *problems of interplay* that might be relevant if resource management requires the interaction between different levels of the political and administrative hierarchy (national, federal, regional, etc.) and/or if (horizontal) interaction across different sectoral (administrative) units (e.g., spatial planning, agriculture, or nature conservation) and related organisations, and 3) the *problem of fit* - that occur if the boundaries of a biophysical system do not fit the boundaries of the institutional arrangements governing the management of this resource system. As regards, river basin management this refers to organising water management along biophysical rather than political-administrative boundaries (Moss, 2003b). Here, institutional change towards the implementation of (fully functional) river basin management systems will be hampered if **adverse but historically deep-rooted institutional structures** are in place. For example, federal administrative and politically systems, such as in Germany, are more likely to make the implementation of river basin management difficult. Furthermore, it is argued that possible implementation problems may arise 1) if interests of particular actors in the river basin are very diverse, e.g., with regard to ecological effectiveness and economic efficiency of measures, 2) if financial resources (public and private) are limited, 3) if there are adverse political necessities, such as, specific (adverse) priorities in the regional economy and high distributional asymmetries. Implementation problems might be caused by the WFDs explicit demand for flexible goals and elaborated forms of participation (Moss, 2003b).

The main crucial institutional aspects derived are first, the **problems of interplay**, including the existence of **contradictory** (or **redundant**) policies, and second, the **problems of (institutional) fit** Further institutional aspects include the **heterogeneity of actors**' interests and **limited financial resources for administrative restructuring**.

1.14 Privatisation of Public Services

Description of the policy option

In particular, we look at policies delegating public services to private operators and we will concentrate our analysis on the effects on the property rights. Since the early 1980s, there has been a general trend of entrusting the private sector to activities that used to be considered as natural monopolies (e.g., electricity (Glachant, 1998; Perez, 2004), railway (Yvrande-Billon, 2003), phone, water distribution and treatment (Ménard and Saussier, 2003)). The lowering of fixed costs (e.g., phone sector) or the fragmentation of the industry (e.g., separating infrastructure from trains in the railway sector), was supposed to allow for genuine competition and thus for a greater efficiency of the private sector (Yvrande-Billon, 2004). Instead of limiting our view to the creation of new governance structures, here markets, as new state assets are introduced on the market, which would highlight a regulatory on hierarchy policy type, we will focus on the regulatory type of intervention which intervenes on the market, as the process does not only consist of *creating* new markets.

Policy type and corresponding crucial institutional aspects

*Policy type: regulatory on markets **and** regulatory on property rights*

When intervening on the markets, governments do have to keep these sectors under close scrutiny, and full privatisation is seldom the case. The transfer of property rights is never complete, because of the high risk of opportunism (benefiting from private information) and collusive behaviour from private structures. There are diverse possible governance structures, which imply various levels of autonomy for private operators, and thus different levels of transaction costs. The literature above suggests that the most efficient contractual arrangement highly depends on the institutional situation (e.g., which level of government is responsible for that sector), but also on the size and variability of the market. This is especially clear for water distribution, which may generate high economies of scale, but for which demand may be quite variable in time.

The main crucial institutional constraint is again the **information asymmetry between the state and the private firms** and the **high risk of opportunism** on part of the latter.

1.15 Implementing Agricultural Labels

Description of the policy option

Due to an increasing number of food scares and the fact that consumers continue to be more health conscious, quality signals at food markets have become increasingly important. Apart from quality signals closely related to specific "production processes" (e.g., organically produced food), in particular, the quality signal "regional origin of food" has gained more prominence in food purchasing decisions (Balling, 2000; Becker, 2002). The EU recognises and supports those agricultural labels that differ from trademarks in that the production must be linked to a particular area. Within the WTO negotiations, agricultural labels are presented as a means of reducing information asymmetries about the quality of food products, especially when quality is supposed to be linked to a particular area (Barjolle and Chappuis,

2000). It should be noted that objectives of policies promoting agricultural labels for regional origin of food might also include the potential benefits to the rural economy, in particular to less-favoured or remote areas, by improving the income of farmers and by retaining the rural population in these areas (Regulation EC No. 2081/1992). However, in the following only the policy objective "reducing information asymmetries" is focused on. On the other hand, labels are accused of facilitating collusion and distorting competition. For example, food producers have an incentive to benefit from using agricultural labels (realising price premiums and/or higher consumer demands) while at the same time avoiding the costs for meeting the related superior quality standard. Therefore, in the EU, the regional-origin labelling has to be associated with a quality-control system that ensures the superior quality.

The debate around labels is rooted in cultural habits. Some authors find that people in Southern Europe countries (including France) tend to value local specificities (French notion of "terroir"), whereas people in Northern countries (in particular, England and the Netherlands) only think in terms of industrial brands (Ménard and Klein, 2004). Yet, also in Germany, consumers have at least some willingness to pay for the characteristic "regional origin" (Schröder et al., 2005).

Policy type and corresponding crucial institutional aspects

*Policy option: regulatory on hierarchies **and** regulatory on markets*

Implementation of agricultural labels raises several institutional issues. First, policymakers need to devise a system of quality control that reduces the likelihood of collusion and that avoids situations where the organization in charge of the quality monitoring has a direct interest in the food sector. In France, for example, this took the form of the separation between certification organizations and producers associations. In other countries, state agencies were created or made responsible for ensuring independent quality control. Here, implementation costs might be substantial. Second, the quality policy needs to define ways of distinguishing the protection of traditional processes from pure collusive and anti-competition behaviour, in the context of high cultural differences between countries. In other words, the policymaker has to make sure that protecting and promoting products of regional origin by introducing agricultural labels actually serves the purpose of reducing information asymmetries about the quality of food products. Further, the regional origin needs to be linked to a superior quality demanded by consumers. Thus, misuse of agricultural labels has to be avoided as well as inadequate levels of protection and promotion. Here, weak consumer preferences with regard to regional and quality aspects of food products might indicate that there is no actual demand for information on food origin and quality, thus, providing no "societal legitimisation" of policies promoting agricultural labels. On the other hand, strong consumer preferences together with the ability to voice their interests (determined by social capital) are likely to increase the level of protection or the number of labelled products.

There are four main crucial institutional aspects. First, the likelihood of collusion is positively correlated to the **monopoly power** of the food-processing industry which is partly derived from the industry structure (Raynaud and Sauvée, 2000), but increases also with the level of **trust** between private operators (Perrier-Cornet and Sylvander, 2000). Second, **administrative public transaction costs** for establishing independent certification organisations. Third, **weak consumer preferences for healty and quality products** indicate low actual demands for agricultural labels. Forth, **strong consumer preferences together with high levels of social capital** and, to a lesser extent, the degree of **corruption** (here, agreement between producers and administration) might lead to "over-labelling" or misuse of agricultural labels.

1.16 Agricultural Subsidies Subject to Compliance with Environmental Standards

Description of the policy option

The Policy Food Security Act from 1985 in the USA encompassed farm program payments that were linked to the conservation of soil practices to induce the desired producer behaviour. When producers apply an approved conservation plan on highly erodible land potential they receive government payments. The analysed policy option can be compared with the European cross-compliance policy provisions that tie eligibility for agricultural subsidies to producer compliance with certain environmental standards (Giannakas and Kaplan, 2005).

Policy type and corresponding crucial institutional aspects

*Policy Type: economic on market **and** economic on property rights; natural resource addressed is land/soil*

Crucial institutional aspects influencing this policy's effectiveness are that monitoring and enforcement of compliance and adoption is costly and the conventional assumption of producer homogeneity. There are economic incentives for producers not to comply with the conservation provisions but to claim government payments (for which they are not entitled). Compliance depends on, among other things, the farm specific costs incurred by adopting the environmental standards in relation to the level of agricultural subsidies linked to it. Thus, **given uniform environmental standards** to be met by all producers, **heterogeneity of actors' interests** and **opportunistic behaviour** are the main institutional aspects.

2 Crucial Institutional Aspects not Directly Related to Policy Options

(Trade-related) Agricultural Protectionist Policies

2.1 Deregulation of Agricultural Trade in Russia

Main message of the article

Kopsidis (1997) starts from the observation that from 1990 to 1994 the economic and political process of disintegration within the Russian Federation halved the domestic trade of grain between the various regions and caused significant reductions in production. From European economic history and the experience of several developing countries it is argued, that there is a strong correlation between the formation of domestic markets and sustainable growth in agricultural output. It is shown that economic reforms (Ordnungspolitik) and a deregulation of the agricultural trade can only generate positive effects on agricultural production in Russia if the infrastructure is greatly improved. Yet, such reforms and an overall modernization of the infrastructure can only be implemented if the central power can establish a consistent market conform economic and agricultural policy all over Russia. The

unwillingness to implement reforms in all parts of the Russian agricultural sector is identified as main obstacle to the formation of a cost-efficient domestic market.

Crucial institutional aspects

Political and administrative inertia (here, the unwillingness to implement reforms) might hamper the implementation of policies aiming at the deregulation of trade and a cost-efficient domestic market for agricultural products.

2.2 New (Potentially Legitimate and Welfare-enhancing) Arguments for Trade-related Protectionism

Main message of article

Kerr (2004) provides important insights on institutional aspects related to economic policies addressing the market. He starts from the argument that following the economic model that underlies the WTO the only group that can be expected to ask for protection is producers in importing countries. Other arguments for protectionisms, such as balance of trade, infant industry, national security, revenue-raising tariff, infant economy, import substitution industrialisation were shown not to be generally welfare enhancing. However, seeking of protection is no longer confined to producer interests in importing countries but rather includes new groups that have different motives and incentives. Prominent ones are:

1) *Consumer issue–based*

For the most part, consumer concerns are comprised of individuals (or subsets of the consumer population) who have strong preferences related to a particular issue including animal welfare, labour standards, the use of growth hormones in animal production, and the use of biotechnology in food production. In the case of biotechnology, for example, trade liberalisation might indeed not be unambiguously welfare enhancing if information asymmetry between consumer and producer is accounted for. Thus, politicians might impose trade barriers legitimately to protect consumer-based interests. However, since those trade barriers often also provide economic benefit to domestic producers of products that would compete with imports it is difficult to determine the true underlying source of protectionist pressure.

2) *Environmental issue–based*

Environmentalists (often on behalf of consumers) request to deny market access to products not produced in an environmentally friendly fashion or want higher standards of scientific evidence to be used for determining when imports are to be considered safe for the environment. Furthermore, the risk trade itself presents for the environment is the concern: In some cases the perception is that economic growth is bad for the environment and, as trade liberalisation leads to economic growth, it should be opposed. In other cases, environmental groups worry that lowering environmental regulations will impart a competitive advantage for tradable goods and will cause deleterious effects on the global environment. Here again, traditional producer protectionist interests and their allies such as labour unions that are concerned with the loss of competitiveness and the offshore movement of investment and jobs are able to make common cause with environmental groups and lend their resources to fostering a cause that has considerable legitimacy.

3) Failed economy–based

“Failed economies” are often dysfunctional to a degree (e.g., uncompetitive or severely distorted markets) that they can be expected to receive only marginal benefit from an open

trade regime. What is more, regulating trade often becomes one of the most lucrative means for domestic politicians to extract corruption rents that can, in part, be used to keep them in power. This may either be through opportunities for bribery or the exercise of an import monopoly. Thus, implementation of trade liberalisation policies might be constraint by national/regional governments.

Crucial institutional aspects

There are three main categories of issues that might hamper effective implementation of policies eliminating trade-related protectionism: 1) consumer-based (**strong consumer preferences for health and quality products**), 2) environment-based (**strong environmental groups, environmental legislation, or environmental awareness of consumers**), and 3) failed-economy based (e.g., **corruption**). In particular in the first two cases, policies for trade liberalisation cannot be considered as generally welfare enhancing. Further, since those arguments are often perceived as legitimate by the general public trade liberalisation might face strong opposition, thus, hampering effective implementation. Yet, detecting the true underlying source of protectionist pressures in order to determine the legitimacy of protectionist policies is difficult.

2.3 Trade Policy Liberalisation in Poor Countries with Smallholder Agriculture

Main message of article

Kydd et al. (2002) argue that trade policy liberalisation requires institutional change. The authors raise the question whether these changes produce „superior institutions“ judged in terms of a reduction of transaction costs, improved coordination, stronger strategic commitment to investing in needed specific assets, and allocative efficiency. Applying a theoretical framework informed by the various strands within institutional economics, the authors content that smallholder agriculture in poor countries needs coordinated market economy type institutions if it is to develop, at least at the earlier stages. Ideally, these would be based on deliberative institutions, working horizontally inside a sector, but also working vertically along the supply chain. However, a way must be found in which the state and other powerful actors can initiate deliberative processes and take a lead in encouraging appropriate asset specific investments, while at the same time planning to fade into the background as initial success is achieved. Furthermore, it is noted critically that current institutional analysis can not sufficiently provide insights, in particular quantifiable, into the consequences of those liberalisation policies which drive changes in such features as „non-standard institutional arrangements“; non-market coordination; and the roles of government.

Crucial institutional aspects

If trade liberalisation policies are to be implemented effectively in poor countries with smallholder agriculture they need to be accompanied - at least in the early stages - by a process of deliberately crafting institutions (by either the state or other powerful actors; i.e., some form of non-market coordination) that are able to reduce transactions costs and to improve market coordination, that encourage investment in specific assets, and that improve allocative efficiency. Thus, in the case of **poor countries with smallholder agriculture**, trade liberalisation policies that are not complemented by some form of non-market coordination might face high transaction cost and might not be welfare enhancing. This is often due to **inefficient credit markets for smallholders**.

2.4 Direct Versus Indirect Agricultural Support Schemes: Farmers' Perceived Dependence on Support

Main message of the article

Based on a survey of 4,500 farmers asked in the UK, Germany, and Portugal, respectively, Daugbjerg et al. (2003) emphasise that design and nature of agricultural support schemes have an influence on farmers' perception of their level of dependence on agricultural support. In contrast to direct aid payments for farmers, indirect support mechanisms veil the level of subsidisation. For example, price support through artificially high consumer prices might give an illusion of free and competitive markets amongst farmers. Thus, Daugbjerg et al. show that the visibility of agricultural subsidies affects how farmers perceive their dependence on agricultural support, albeit at a modest level. Farmers cannot be said to be rational actors possessing full information on the regulatory context in which they conduct their farming activity. Farmers operating predominantly under commodity market regimes applying indirect support tend to believe that they are less dependent on agricultural support than those receiving direct support

Crucial institutional aspects

Farmers seem not to possess full information on the regulatory context of agricultural support schemes. Since direct aid schemes for farmers convey a stronger subjective impression of dependence, it can be argued that **policies that aim to reduce those direct aid schemes will face stronger opposition from farmers ('lobbies) than indirect support schemes**.

2.5 Political Costs of (Reducing) Agricultural Protection

Main message of the article

Swinnen et al. (2000) focus on the impact of the changing role of agriculture and food production in the economy with economic development and changes in the relative income situation of farmers as the primary causes of change in agricultural protection, as well as institutional changes affecting decision-making. Changes in the structure of the economy affect the distribution and the size of political costs and benefits of agricultural protection and, thus, the government's political incentives in decision making. The results are based on a quantitative empirical analysis of the determinants of agricultural protection, based on hundred years of commodity level annual data from Belgium.

Crucial institutional aspects

- Decreasing farmers' incomes relative to incomes of the rest of the economy reduce the political costs and increase the benefits for politicians in supporting farm incomes [and, arguably, vice versa]. Thus, EU policies aiming at reducing agricultural support while the relative income position of farmers is decreasing is likely to be resisted (or the expected losses to be compensated) by national/regional governments in order to avoid high political costs.
- Agricultural protection has been higher for those commodities that represented a smaller share in consumer expenditures, as policy-induced price increases for those commodities had less impact on consumer welfare, and met with less opposition. Thus, it is likely that a policy reducing subsidies for those commodities representing a small share in consumer expenditures will face only limited opposition (political costs) since the corresponding decrease in consumer welfare (due to higher prices, ceteris paribus) will be small.

- The integration of Belgian agricultural policies in the CAP in 1968 had a positive impact on protection, ceteris paribus. It is argued that the specific characteristics of the EU decision-making institutions cause higher agricultural protection. For example, consumers tend to be less informed about decision-making at the EU level than at the national/regional level and less organised at the EU level than producer groups and, therefore, have less influence on the decision-making. From this it can be expected that those policies reducing subsidies which are decentrally defined (at national/regional level) will be more in line with consumer interests, resulting in – comparatively – limited opposition from (national/regional) consumer lobbies and lower levels of (remaining) protection.
- The considerable increase in capital intensity of Belgian agriculture, and the associated reduction in employment, which occurred around the time of EU integration, would increase agricultural protection. If agricultural protection is reduced in capital-intensive agricultural production branches opposition against policy implementation will be higher than in labour intensive branches.
- With increasing incomes, declining real food prices, and innovations in food processing and marketing, consumers are caring less about the price effect of agricultural policy, and increasingly more about other aspects (quality, health, and later on environment, animal welfare, etc.), unlike the producer groups who remain heavily affected by the price effects of the policies. Thus, consumers in economies with high income rates, low real food prices, and innovative food processing and marketing systems will respond to price shocks (higher commodity prices following a decrease in subsidies) less drastically (decreasing demand; political lobbying) than consumers in low income countries, etc.

To sum up, implementation of policies reducing agricultural protection might be constrained (due to **high political costs**) in a specific country/region a) if the relative income position of farmers is decreasing, b) if the commodities concerned represent a high share in consumer expenditures, c) if policies are defined at EU level, d) if capital intensive agricultural production branches are concerned, and e) in the presence of low income rates and high real food prices.

Environmental Policies

2.6 Transaction Costs in Environmental Policies

Main message of the article

McCann and Colby (2005) provide a theoretical framework for analysing the different kinds of transaction costs occurring for setting up and management of **environmental policies**. Based on the standard Williamson approach they develop a typology of costs (e.g., information, research, negotiation, monitoring, etc.). They also discuss the distribution and the magnitude of these costs that vary greatly between the different levels of administration (national, regional). They stress the need to consider transaction costs for evaluating environmental policies systematically, in particular monitoring costs that can be substantial. However, direct measurement of transaction costs is difficult.

Crucial institutional aspects

This article identifies several crucial institutional aspects:

- High monitoring costs due to both, measurement problems in environmental practices and uncertainties about causal relationships between these practices and the state of the environment. Here, **information asymmetry between state and producer(s)** as well as **opportunism** on part of the latter can constitute an institutional constraint.
- Co-ordination/negotiation costs between (groups of) actors with divergent interests and different – culturally determined – attitudes with respect to the environment can be high. Thus, **heterogeneous environment-related social values** (e.g., environmental awareness) of the relevant (groups of) actors can pose an institutional constraint.
- In particular, environmental policies need to be implemented during a sufficient amount of time to be effective. Thus, frequent changes because of a **lack of (environmental) political continuity** (for instance, due to the electoral process) can reduce the effectiveness of environmental policies.

2.7 Constraints to Cost-efficient and Equitable Environmental Policy Design

Main message of the article

Theoretical considerations by Lichtenberg (2002) explore to three determinants for cost-efficient and equitable environmental policy design: farmers' incentives, heterogeneity, and uncertainty. In particular, it is focussed on a) the extent to which farmers have incentives for protecting environmental quality voluntarily and how those incentives are influenced by technical change, b) the implications of heterogeneity in physical, chemical and biological characteristics of the environment, the variations in crop choice and the cultivation methods for the choice of cost-efficient environmental policy types: So-called *best management practices*, *imposing restrictions* on the use of specific inputs, *taxing inputs* associated with environmental problems, or *subsidizing* environmental quality measures, and c) the implications of uncertainty of the agricultural production and its environmental effects for environmental policy design.

Crucial institutional aspects

According to heterogeneity of the characteristics of the environment the social optimum cannot be implemented for instance by a uniform tax on inputs that impair environmental quality or by a uniform subsidy on inputs that enhance environmental quality. For instance, if nitrogen leaching is lower on higher quality land then the optimal nitrogen tax should be lower on fields of higher quality. Thus, **undifferentiated policy measures** (premiums, restrictions, etc) can reduce a policies' effectiveness.

However, there is often an institutional constraint preventing the implementation of differential taxes needed, as law often prohibits those differentiations. Hence, **legal restrictions to differentiation** likely constitute the most significant barriers to adapt, for instance, policy measures against soil erosion to topography, soil characteristics, location, crop choice or farm production practices.

Another institutional constraint is the **information asymmetry between agricultural firms and the state** due to the characteristics of natural resources. To handle environmental problems associated with the use of variable inputs, such as fertilisers and pesticides, it is crucial that these inputs are storable and easily repacked. Here, effective taxes, for instance, would involve extensive reporting. Other environmental measures are unenforceable without extensive, intrusive government inspection, which often lead to high transaction costs. For example, if a tax involves differentiated premiums related to input quantities, the government

must be able to monitor cumulative purchases to ensure that farmers do not simply avoid high tax rates through multiple purchases of smaller quantities. In addition, if the government offers a payment in return for a specific conservation effort, it must be able to observe that effort or infer it from observable outcomes.

Due to the aforementioned difficulties to monitor environmental measures, the problem of **opportunism (moral hazard)** on part of the producers is exacerbated. For example, input taxes and subsidies are ineffective in cases where pollution control effort can neither be observed directly nor inferred from production.

Furthermore, effectiveness of environmental policies aimed at agriculture is often hampered by existing agricultural policies and policies focussing at other resources. Thus, **contradictory policy instruments** constitute an institutional constraint.

General Institutional Aspects

2.8 Redundant and Contradictory Public Policies

Main message of the article

Demazière (2002) emphasises the competition between interventions/policies of public authorities at different administrative levels (EU, national state, regions, *départements*) for local development actions in France. The example of the Nord-Pas-de-Calais region indicates the difficulty to take environmental aspects into account in the definition of public local actions targeted at the same companies/producers (e.g., subsidies to reduce pollutions or to treat polluted soils) in the presence of other public (non-) environmental policies.

Crucial institutional aspects

The crucial institutional constraint here is the multiplicity of public interventions aiming at the same companies but with (slightly) different objectives that sometimes can be **contradictory** (e.g., incentives to raise productivity versus incentives to reduce the emission of environmentally unfriendly substances) or **redundant**. Since different administrative levels (horizontally and vertically) are involved, the **unclear distribution of responsibilities between administrative levels (problem of interplay)** is relevant, too.

2.9 Acceptance of Policies by Citizens

Main message of the articles

Citizens' response to a policy is centrally important in whether this policy will achieve its objectives, and thus be effective (Pistor, 2000). Whether policies result in compliance, resistance, or withdrawal depends not so much on *what* the policy actually does, but on *how* people socially construct the meaning of the policy and what they believe are appropriate and correct actions for citizens to take.

Crucial institutional aspects

The acceptance of policies belongs to the embeddedness level of crucial institutional aspects. Depending on the policy options and "policy design elements" governments can appear fair or unfair, logical and straightforward or illogical with hidden agendas, helpful or antagonistic,

as an important aspect of life or irrelevant (Schneider and Ingram, 1997: 79). In accordance, with respect to an implemented policy people may feel informed, empowered, helpless, ignorant, or important. Therefore, the implementation of policies might be constrained if there is a lack of **trust in state authorities**, if **insufficient information on policy objectives** between state and people prevail, and if political objectives are not congruent with the mental models and values of the people,

2.10 Social Capital Dimensions: Interpersonal Trust and Trust Towards Government Authorities

Main message of the article

Alesina and Ferrara (2002) and Callois and Aubert (2005) discuss the distinction between two important determinants of social capital: interpersonal trust (trust between individuals) and trust towards government authorities. Although the articles do not focus on policies, both ingredients of social capital as well as there interrelation are seen as determinants for effective policy implementation.

Crucial institutional aspects

The articles raise two important institutional aspects. First, depending on the level of trust of actors towards government authorities **interpersonal trust may facilitate as well as hinder the implementation of policies**. When trust towards government authorities is high and trust between individuals is also high then the latter will reduce transaction costs and facilitate the implementation of a policy. However, when trust towards government authorities is low and trust between individuals is high, than the latter will foster collusion (e.g., non-compliance, low uptake of schemes, etc.) against government action. Second, **low levels of interpersonal trust will hamper the implementation of policies (or cause high transaction costs) relying on spontaneous/endogenous collective action**, such as territorial policies. In that case, a more authoritarian scheme may be more cost-efficient, in order to enhance collaboration. Cook et al. (2005: 1) argue that trust works primarily at the interpersonal level to produce microlevel social order and to lower the costs of monitoring and sanctioning that might be required if individuals were not trustworthy.

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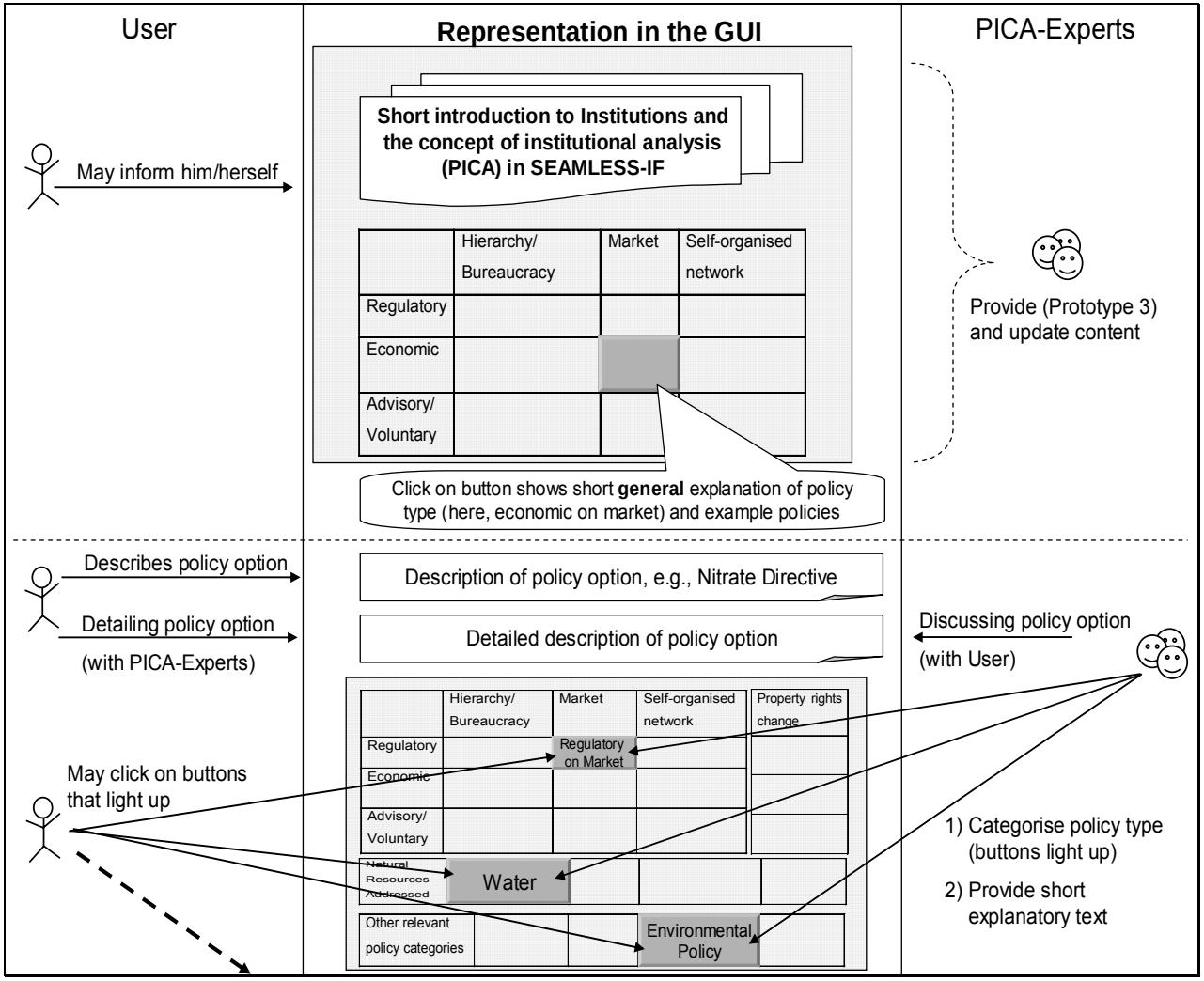
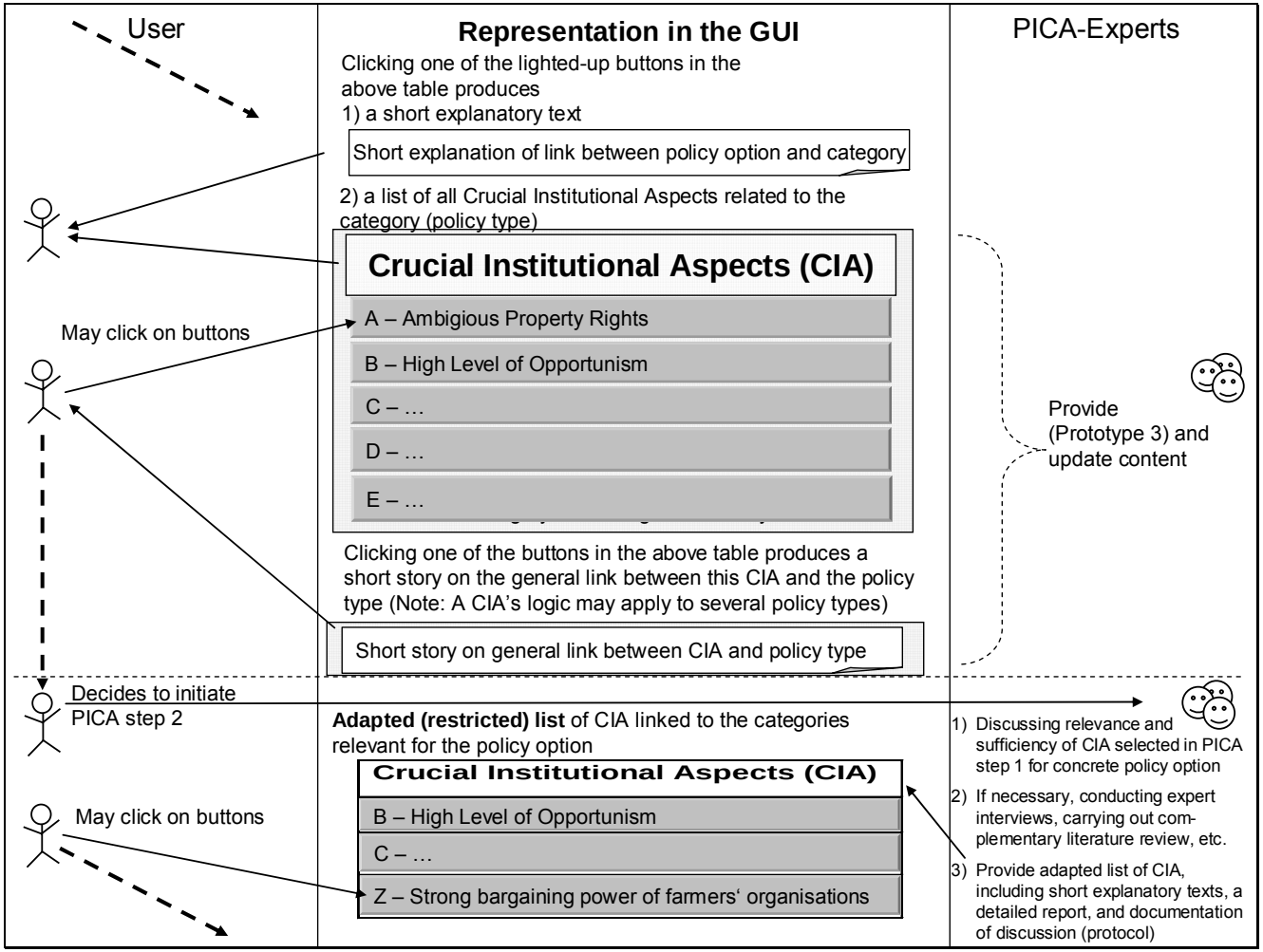
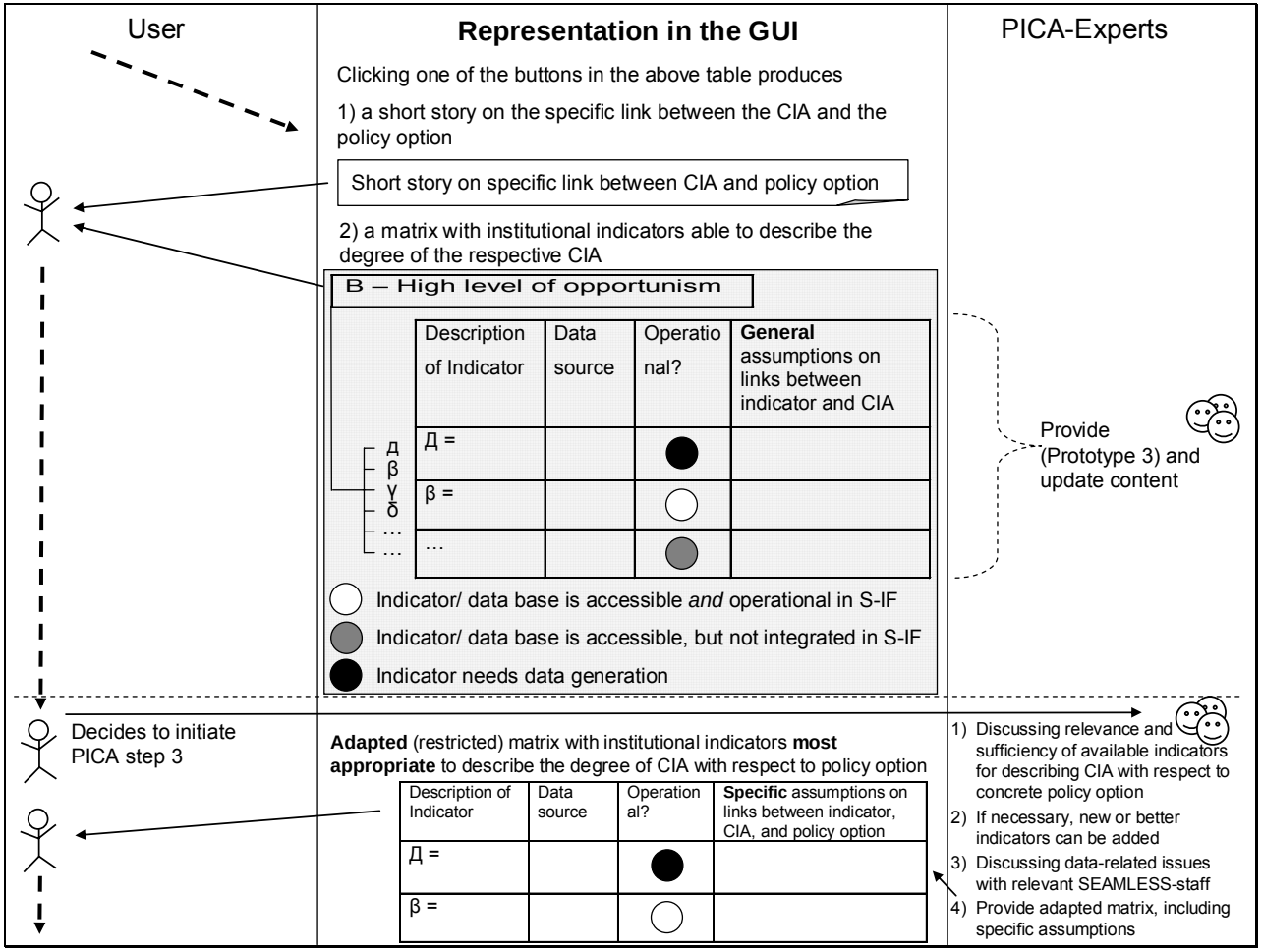
Appendix 3: Suggestions for Operationalisation of PICA and its Integration in the Graphical User Interface (GUI)

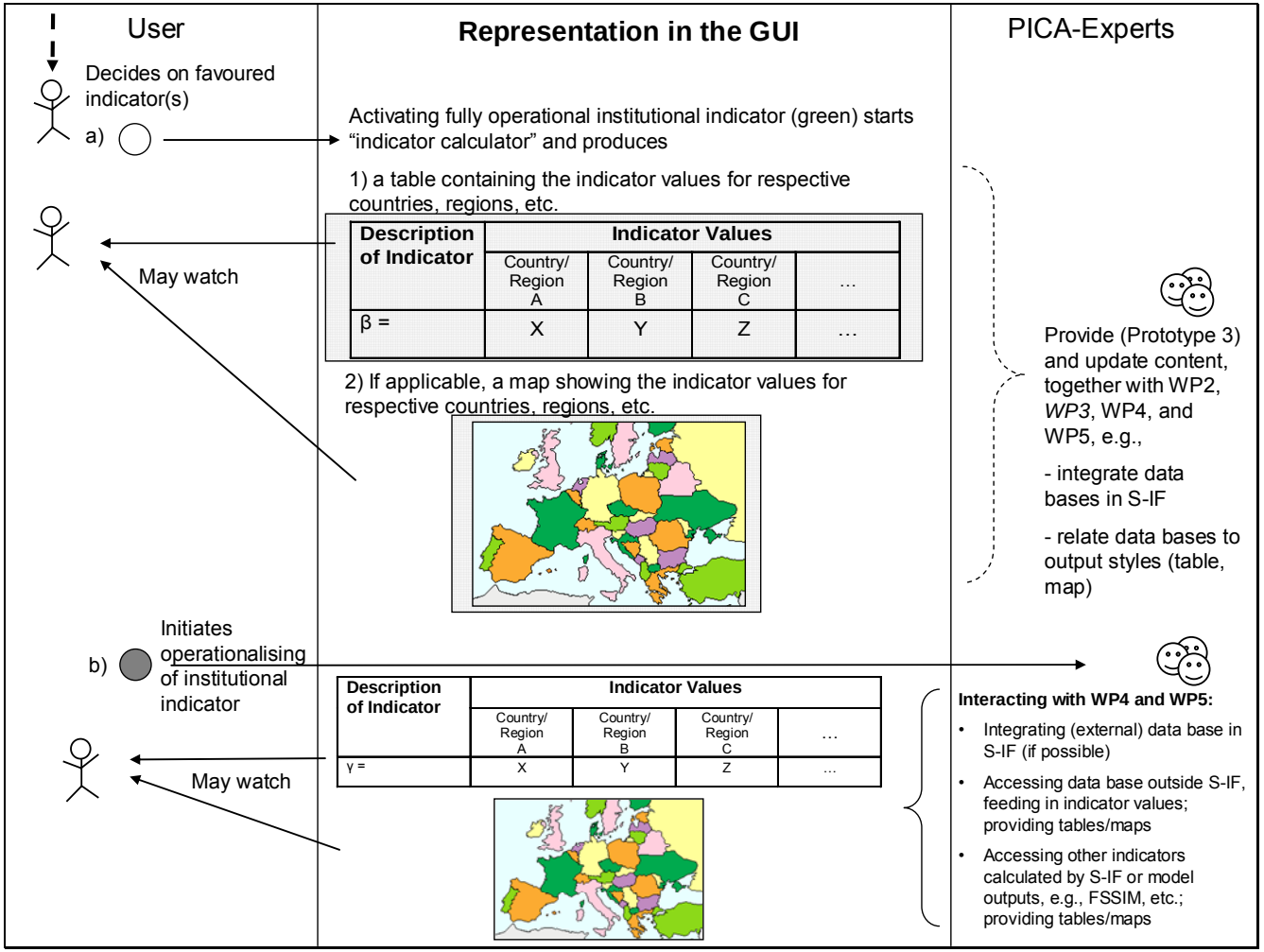
This Section contains a detailed visual depiction of the sequence and the form of interactions between the User(s), the PICA expert team, other SEAMLESS Working Groups and - if applicable - external experts and stakeholders. The depiction also provides suggestions on the representation of the different PICA components in the Graphical User Interface (GUI). This first sketch will be further discussed and improved together with all relevant SEAMLESS work packages.

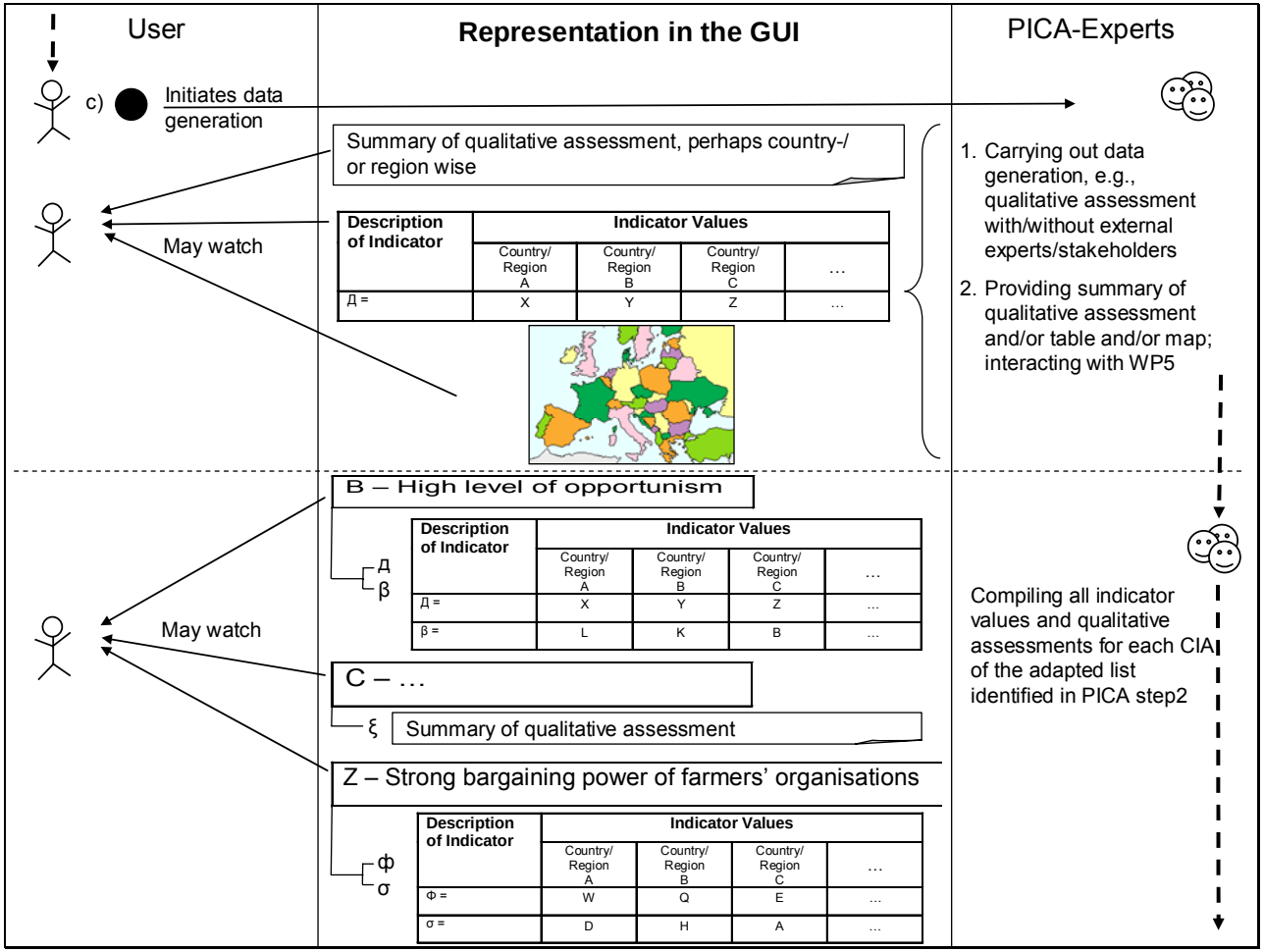
Tables, graphs, maps, and texts that are placed on a *light grey* background are supposed to be permanent elements of the GUI and SEAMLESS-IF integrated in Prototype 3 and later versions. However, their form and content will be updated continually. All other tables, graphs, maps, and texts will be constructed, i.e., filled with information and data, according to the needs and outcomes of the respective PICA “run”.

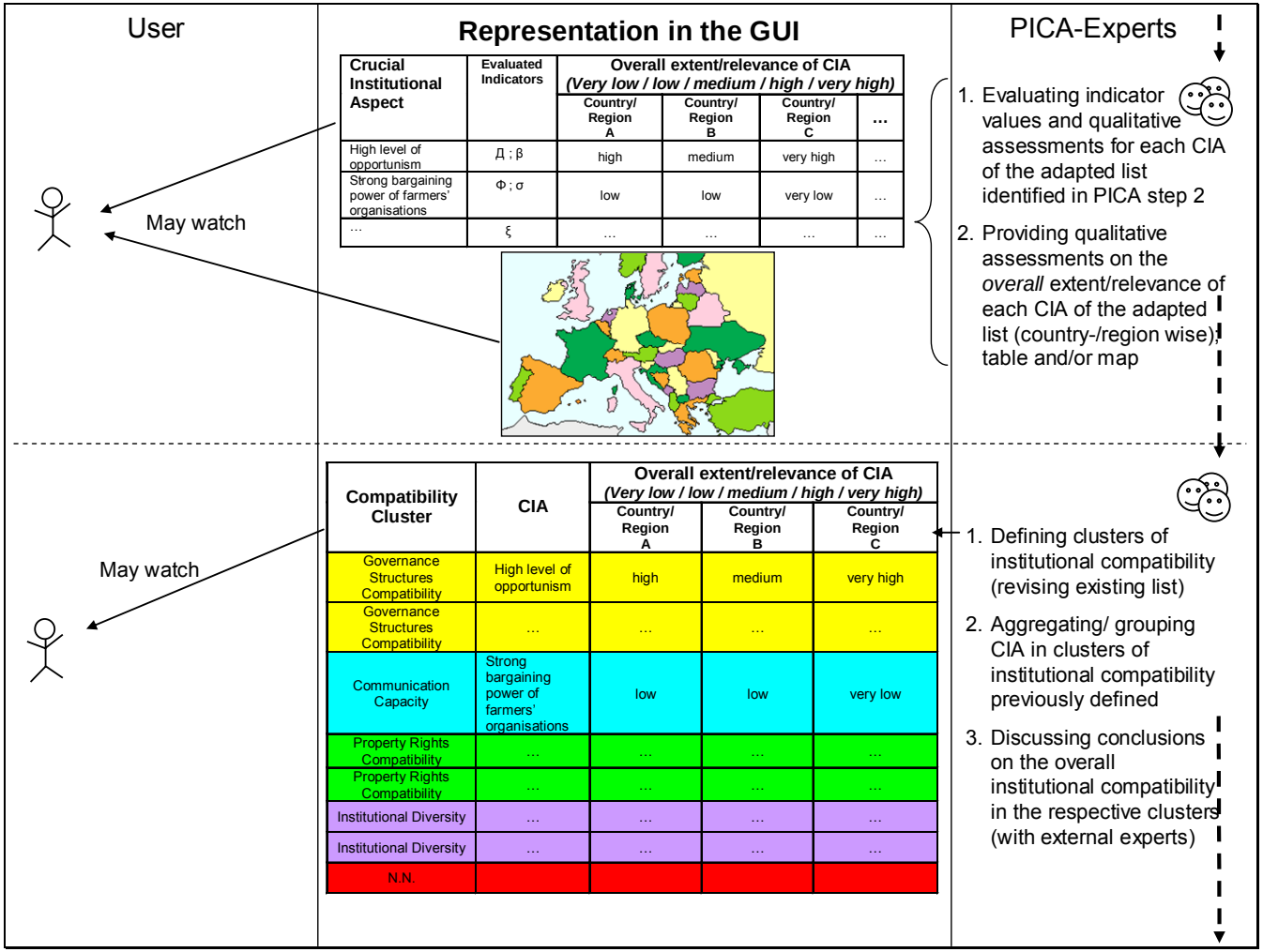

User
Representation in the GUI
PICA-Experts
May inform him/herself
Short introduction to Institutions and the concept of institutional analysis (PICA) in SEAMLESS-IF
Hierarchy/ Bureaucracy
Market
Self-organised network
Regulatory
Economic
Advisory/ Voluntary
Provide (Prototype 3) and update content
Click on button shows short general explanation of policy type (here, economic on market) and example policies
Describes policy option
Detailing policy option
(with PICA-Experts)
Description of policy option, e.g., Nitrate Directive
Detailed description of policy option
Discussing policy option
(with User)
Property rights change
Regulatory on Market
May click on buttons that light up
Natural Resources Addressed
Water
Other relevant policy categories
Environmental Policy
1) Categorise policy type (buttons light up)
2) Provide short explanatory text


User
Representation in the GUI
PICA-Experts
Clicking one of the lighted-up buttons in the above table produces
1) a short explanatory text
Short explanation of link between policy option and category
2) a list of all Crucial Institutional Aspects related to the category (policy type)
Crucial Institutional Aspects (CIA)
A – Ambigious Property Rights
B – High Level of Opportunism
C – …
D – …
E – …
May click on buttons
Provide (Prototype 3) and update content
Clicking one of the buttons in the above table produces a short story on the general link between this CIA and the policy type (Note: A CIA's logic may apply to several policy types)
Short story on general link between CIA and policy type
Decides to initiate PICA step 2
Adapted (restricted) list of CIA linked to the categories relevant for the policy option
Crucial Institutional Aspects (CIA)
B – High Level of Opportunism
C – …
Z – Strong bargaining power of farmers' organisations
May click on buttons
1) Discussing relevance and sufficiency of CIA selected in PICA step 1 for concrete policy option
2) If necessary, conducting expert interviews, carrying out complementary literature review, etc.
3) Provide adapted list of CIA, including short explanatory texts, a detailed report, and documentation of discussion (protocol)


User
Representation in the GUI
PICA-Experts
Clicking one of the buttons in the above table produces
1) a short story on the specific link between the CIA and the policy option
Short story on specific link between CIA and policy option
2) a matrix with institutional indicators able to describe the degree of the respective CIA
B – High level of opportunism
Description of Indicator
Data source
Operational?
General assumptions on links between indicator and CIA
Д =
β =
…
Provide (Prototype 3) and update content
Indicator/ data base is accessible and operational in S-IF
Indicator/ data base is accessible, but not integrated in S-IF
Indicator needs data generation
Decides to initiate PICA step 3
Adapted (restricted) matrix with institutional indicators most appropriate to describe the degree of CIA with respect to policy option
Description of Indicator
Data source
Operational?
Specific assumptions on links between indicator, CIA, and policy option
Д =
β =
1) Discussing relevance and sufficiency of available indicators for describing CIA with respect to concrete policy option
2) If necessary, new or better indicators can be added
3) Discussing data-related issues with relevant SEAMLESS-staff
4) Provide adapted matrix, including specific assumptions

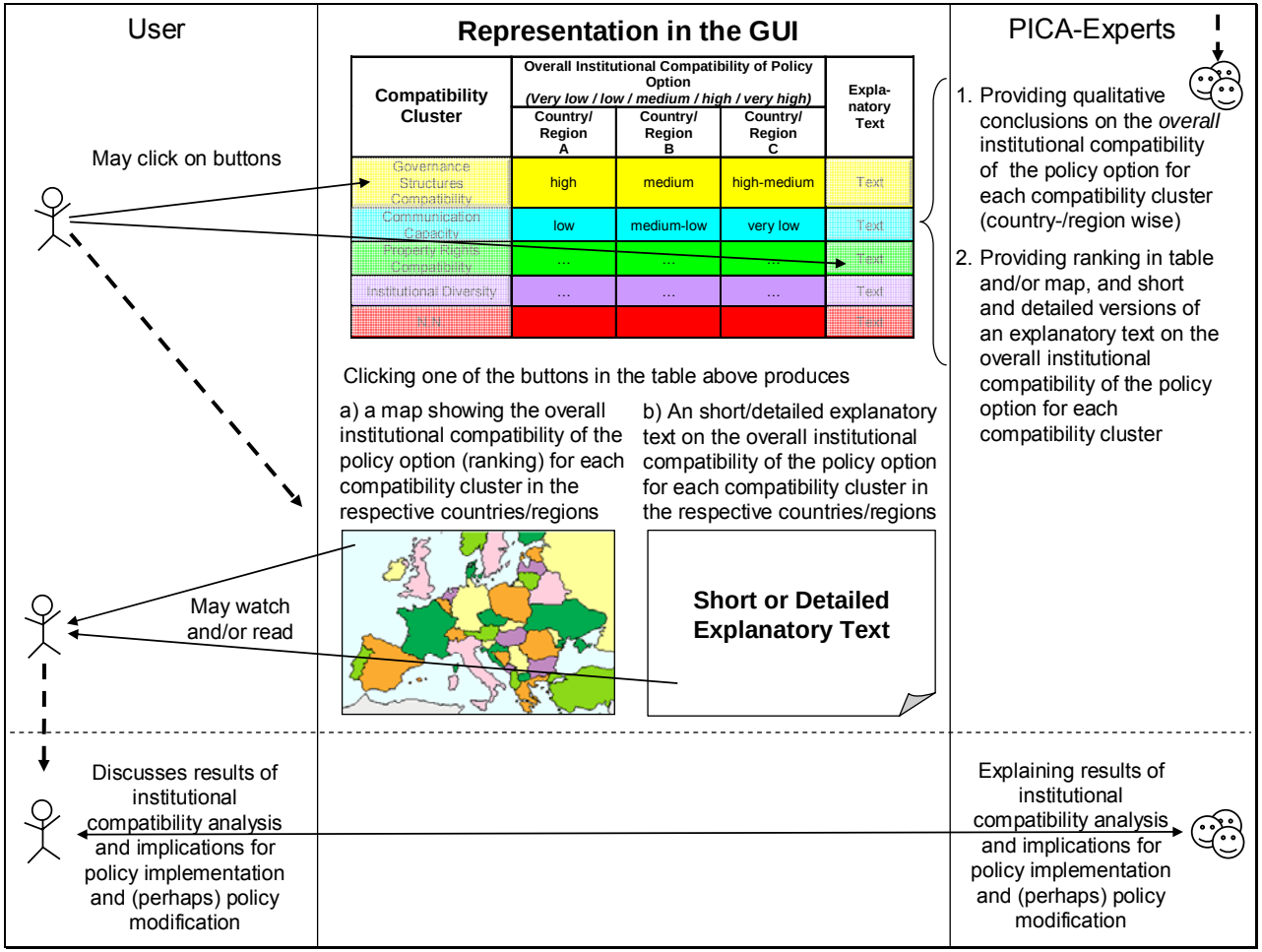

User
Representation in the GUI
PICA-Experts
Decides on favoured indicator(s)
a)
Activating fully operational institutional indicator (green) starts "indicator calculator" and produces
1) a table containing the indicator values for respective countries, regions, etc.
Description of Indicator
Indicator Values
Country/ Region A
Country/ Region B
Country/ Region C
…
β =
X
Y
Z
…
May watch
2) If applicable, a map showing the indicator values for respective countries, regions, etc.
Provide (Prototype 3) and update content, together with WP2, WP3, WP4, and WP5, e.g.,
- integrate data bases in S-IF
- relate data bases to output styles (table, map)
b)
Initiates operationalising of institutional indicator
Description of Indicator
Indicator Values
Country/ Region A
Country/ Region B
Country/ Region C
…
γ =
X
Y
Z
…
May watch
Interacting with WP4 and WP5:
• Integrating (external) data base in S-IF (if possible)
• Accessing data base outside S-IF, feeding in indicator values; providing tables/maps
• Accessing other indicators calculated by S-IF or model outputs, e.g., FSSIM, etc.; providing tables/maps


User
Representation in the GUI
PICA-Experts
c)
Initiates data generation
Summary of qualitative assessment, perhaps country-/ or region wise
Description of Indicator
Indicator Values
Country/ Region A
Country/ Region B
Country/ Region C
…
Д =
X
Y
Z
…
May watch
1. Carrying out data generation, e.g., qualitative assessment with/without external experts/stakeholders
2. Providing summary of qualitative assessment and/or table and/or map; interacting with WP5
B – High level of opportunism
Д
β
β =
L
K
B
C – …
ξ
Summary of qualitative assessment
Z – Strong bargaining power of farmers' organisations
ф
σ
Φ =
W
Q
E
σ =
D
H
A
Compiling all indicator values and qualitative assessments for each CIA of the adapted list identified in PICA step2



Crucial Institutional Aspect	Evaluated Indicators	Overall extent/relevance of CIA (Very low / low / medium / high / very high)			
		Country/ Region A	Country/ Region B	Country/ Region C	…
High level of opportunism	Д ; β	high	medium	very high	…
Strong bargaining power of farmers' organisations	Φ ; σ	low	low	very low	…
…	ξ	…	…	…	…

Compatibility Cluster	CIA	Overall extent/relevance of CIA (Very low / low / medium / high / very high)		
		Country/ Region A	Country/ Region B	Country/ Region C
Governance Structures Compatibility	High level of opportunism	high	medium	very high
Governance Structures Compatibility	…	…	…	…
Communication Capacity	Strong bargaining power of farmers' organisations	low	low	very low
Property Rights Compatibility	…	…	…	…
Property Rights Compatibility	…	…	…	…
Institutional Diversity	…	…	…	…
Institutional Diversity	…	…	…	…
N.N.				


User
Representation in the GUI
PICA-Experts
Compatibility Cluster
Overall Institutional Compatibility of Policy Option
(Very low / low / medium / high / very high)
Country/ Region A
Country/ Region B
Country/ Region C
Expla-natory Text
Governance Structures Compatibility
high
medium
high-medium
Text
Communication Capacity
low
medium-low
very low
Text
Property Rights Compatibility
...
...
...
Text
Institutional Diversity
...
...
...
Text
...
Text
May click on buttons
1. Providing qualitative conclusions on the overall institutional compatibility of the policy option for each compatibility cluster (country-/region wise)
2. Providing ranking in table and/or map, and short and detailed versions of an explanatory text on the overall institutional compatibility of the policy option for each compatibility cluster
Clicking one of the buttons in the table above produces
a) a map showing the overall institutional compatibility of the policy option (ranking) for each compatibility cluster in the respective countries/regions
b) An short/detailed explanatory text on the overall institutional compatibility of the policy option for each compatibility cluster in the respective countries/regions
Short or Detailed Explanatory Text
May watch and/or read
Discusses results of institutional compatibility analysis and implications for policy implementation and (perhaps) policy modification
Explaining results of institutional compatibility analysis and implications for policy implementation and (perhaps) policy modification