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Bridging the gap between modellers and model users, why does this gap exist and what can we do about it?

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Abstract: Many impact assessment (IA) models focus on effects of policy measures on environment and ecology. There are various examples of sophisticated IA models and models that are actually used in the policy making process. However, in many cases, there is still is a gap between the actual and potential use of these models in IA. Why is this so and what can be improved about this? The LIAISE project (www.liaise-noe.eu) is initiated to investigate just this. The hypothesis is that in many cases model use is not successful, because there is a gap between the two communities of IA researchers and IA practitioners. This gap is created by the fact that IA researchers are interested in new approaches and innovations, whereas IA practitioners need tools which are easy to use and give transparent, understandable results. In this paper we discuss the first results of interviews with policymakers, on national as European level on how tools are being used in daily practice and on what research questions we need to get answered. We will describe the first version of the RM-IAT, the reference model for impact assessment tools, which proposes a standardized way to describe models and tools. We will introduce the LIAISE Front Office and Back Office toolbox, where tools are presented in such a way to the users of the toolbox, that the users are able to make a better choice of which model to use, and by doing so, are able to use models with more success. Some tools will actually be made available in the Back Office. We can conclude that tool use in the European countries depends on the context in which they are used: it depends on the tool, it depends on the user, it depends for what purpose the tool is used.

Keywords: Impact Assessment, Models and tools, Science-policy interface, Usability

1 Introduction

1.1 A history lesson on Framework Programme projects

Impact Assessment (IA) is a formalised and knowledge based process during the preparation of new policies. It intends to collect evidence on the likely impacts and thereby minimize unwanted side-effects and maximize the benefits to society. It is a requirement in all OECD countries, however, the scope and methods vary

considerably. More and more countries extend their IA requirements from formerly economic analysis only to a comprehensive consideration of all dimensions of sustainable development (i.e. people, planet, profit) [e.g. Jacob et al. 2011, forthcoming]. Studies on the actual implementation of IA has revealed a number of difficulties, including potential tensions with the existing institutional context [e.g. Hertin et al. 2010]. Despite of this, the prediction of expected impacts of new legislation on the different dimensions of sustainable development is a challenging task. The modelling of policies and their impacts has become a widespread practice in many countries and policy domains. For example in economic, fiscal, employment or climate policies computer models play a vital role in the assessment of policies. However, such models focus most often on the intended and direct impacts of policies. With the broadening of the scope of IA requirements on the aspects of Sustainable Development, with the demand to assess trade-offs, side effects, international and long term impacts, modelling becomes increasingly complicated.
In recent years, a number of impact assessment (IA) models have been developed that focus on effects of policy measures on environment. However, their actual application in policy preparation falls short to meet the expectations [Turnpenny et al. 2009].

The European Commission, amongst many other policy and regulating bodies, has invested heavily in research on how IA operates in practice. Although this has furnished a good overall understanding, we identified a need to systematise this research, draw in other contributions, and identify broader lessons and future directions, specifically with respect to the use of tools. For example, to what extent is sustainable development the organising focus of all these activities and how well are these activities implemented in practice? What challenges does IA face in seeking to deliver these goals? What is known about the selection and utilisation of different IA tools by the different stakeholders in the IA process?

In this paper, we will describe the LIAISE approach to tackle this problem and some initial results.

1.2 The LIAISE approach

The LIAISE network of excellence (www.liaise-noe.eu) is designed to identify the causes for non-use of IA tools and bridge the gaps between science and policy. The hypothesis is that in many cases model use is not successful, because there is a mismatch between the requirements and methods used by the two communities of IA researchers and IA practitioners [Adelle, 2011]. The context in which scientific inquiry and the development of tools occurs is quite different from the context of policy making. Researchers are interested in innovation of methods and models, while policy makers need reliable tools. The reference for researchers are their disciplinary peers, while policy makers are referring to their policy domain and the policy problems. Researchers may tend to bridge missing data and empirical observation with assumptions, while policy makers need transparency on missing data. The logic of researchers results in an extensive and detailed description of the methods for their peers and in technical language, while policy makers are in need of reports focusing on the results and in non-technical language in order to be able to communicate in other policy domains, the hierarchies and in the general public.
The political process follows a different logic than the scientific inquiry. In the political process, many actors are involved. The definition of problems, goals and preferred interests are constantly challenged according to the interests of actors involved. This takes often place under considerable time pressure. The scientific process is geared towards rationality, it tends to seek the ‘best’ solution for a given problem.

McIntosh et al. [2007] confirm that there is sufficient knowledge on the application of a tool by the development team themself, but how a tool has been used by other research groups or policymakers/non-scientific users is in many cases under

exposed, undocumented or even neglected. This leaves the issue of usability by groups other than the developers unresolved.

To overcome these problems, LIAISE develops approaches to 1) describe models (and more broadly scientific expertise) in a standardised way 2) to develop an understanding of the policy process and the needs for scientific knowledge and 3) to develop formats for a lively interaction between the different communities in order to overcome the current gaps on tool use and usability.

2 Methods

We did the most comprehensive survey yet of user needs and expectations with regard to Impact Assessment (IA) systems and tools in 17 European countries. Data was collected through documentary analysis and interviews with c. 120 people who steer IA at a strategic level. Previous surveys of this kind have been either narrower in focus [e.g. Hertin et al. 2006] or conducted in less depth (e.g. EVIA, 2008). None have focused on the experience and insights of those people at national level who determine the strategic direction of IA.

Two approaches were used to gather data. First a desk-based analysis of relevant IA literature and documents (IA reports, draft and final legal texts, policy documents by the ministry and relevant publications by external stakeholders) provided a broad picture of how IA is conducted in each country. This information was compiled in a standardised template or fiche which focused on several aspects of the IA systems, including: the design and use of the IA system, the quality of IA, its role in the policy making process and issues surrounding tool use. Second, a series of 10-15 interviews were conducted in each country with those people who at a strategic level champion, oversee, guide, audit or write guidance for IA processes. A set of standardised questions was used to conduct these interviews.

The main tools used in IA across the different countries are simple tools such as checklists and questionnaires, Cost Benefit Analysis (CBA) and administrative burden Assessments such as Cost-Effectiveness Analysis and the Standard Cost Model (SCM). Examples of other tools which are advocated and/or used less frequently include scenarios, Multi-Criteria Analysis, and computer models. The majority of the Guidance documents at least mention tools and some Guidance documents give in-depth instructions and/or worked examples.

Although there is some guidance in a number countries on which tool to use and when, in general tool use is flexible. Qualitative methods such as Multi-Criteria Analysis are only advocated in a few countries. This is despite the fact that qualitative analysis is commonplace in IAs. In practice quantification is less common than the IA guidelines would suggest and when it is done it is often incomplete or inadequate. This contributes to the mistrust felt by many policy officials towards quantitative tools. Tools can also be used in analysis preceding or in parallel with the IA, with the results feeding into the analysis later on. These tools are often used by consultants in commissioned reports, which require resources as the tools can be quite complex and the results hard to interpret.

LIAISE has been set up to cover all aspects of what is needed to successfully develop, select and use models in Impact Assessments. The study on user needs and expectations provide valuable starting points to improve tools, tool use and the selection of tools.

The aspects which are covered in LIAISE are:

1. Get a better understanding of research needs related to IA
2. Provide better description of tools and scientific expertise in order to improve selection and use of tools (RM-IAT, section 2.1)
3. Develop a toolbox to facilitate the selection of tools (Front Office Toolbox, section 2.2.1)

4. Provide a back office of relevant tools and data which can actually be used in Impact Assessments (Back Office Toolbox, section 2.2.2).
5. Test the interaction with stakeholders (policy officers, IA practitioners, scientists, modellers) in the LIAISE test cases, where we investigate how the process of doing an IA works in practice and what can be learned from this, regarding tool use and selection of tools, including communication of the results to the stakeholders (Test cases, section 2.3).

We will elaborate on aspects no. 2-5, followed by a listing of the initial results of the LIAISE project in section 3.

2.1 RM-IAT

There is a high probability that an unreliable, non-robust, poorly tested or incorrect tool which lacks clear descriptions and/or documentation will produce unreliable or incorrect information for an IA. While we cannot judge the technical quality and soundness of a tool without studying a tool in detail, a common reference frame and guidance document on how tools should be described and documented, could assist in better use and selection of tools.

Following best practices in software engineering, we developed a reference model for Impact Assessment Tools (RM-IAT). A reference model can be seen as a meta model that is used to collect for each tool sufficient information about its suitability for application, including sufficient documentation for possible users to know what they can expect from its use [Vallecillo 2001]. To be useful, this reference model will include a clear description of problems to be solved, and the concerns of the stakeholders who need to see the problem get solved.

The aims and objectives of the RM-IAT are twofold. The RM-IAT is developed to safeguard (a) minimum quality assurance for the description and selection of IA tools with respect to testing, modelling approaches, documentation, calibration sets, input data sets etc. and to collect (b) information on behalf of the possible users (the stakeholders in the IA process) with respect to objectives and characteristics of IA tools, input and output data, sort of studies that can be performed, required investments to apply the tool, etc. This could be regarded as the meta information part of the RM-IAT. It will improve the project in its communication, efficiency, education and training.

The second aim is more from a software/technical viewpoint. The RM-IAT will integrate aspects related to requirements for engineering, development, distribution, interoperability, platform and technology independence and portability of IA tools. It will support developers and users in the improvement and improved use of the tools by things such as common terms (glossary, vocabularies), standards, basic guidelines regarding software improvement and quality control.

2.2 Toolbox

The toolbox is a main focus of LIAISE, as it will be where IA users directly interact with the information and tools that support them in conducting their impact assessments. If we compare the toolbox with a car, the **Front Office** represents the user interface and displays, the steering wheel and gear shift and suchlike, as the user or driver communicates his selections, directions and preferences through these. The **Back Office**, using the same analogy, represents the engine and all technologies that propel and steer the car, provide the readings for the indicators and visual interfaces that enable the user (driver) to get from point A to B.

Based on the selections made by a user in the Front Office, a selection of tools that fit the criteria is displayed and a more detailed view of the tool description, related experts and documents, previous applications of the tool and input/output data

requirements (including units and standards) are displayed in the front office. If tools or data are present in the Back Office, there will be a link to the back office presentation or visualization environment, through a standardised **graphical user interface** (GUI). For other tools, either download options or links to the tool providers and related experts will be provided.

2.2.1 Front Office Toolbox

The ultimate goal of the LIAISE toolbox is to improve the accessibility of models and other relevant knowledge within the IA process. It does so by providing meta-description of models and other relevant knowledge, informing the user about what a model is actually doing and how it works. Such meta-information facilitates the selection of models for the purposes of a specific policy proposal. Furthermore, this information should allow the user to judge whether and how different models can be combined.

The meta-descriptions of models have been developed following the RM-IAT. The first version of the LIAISE Toolbox contains in total 85 descriptions of models. For the different categories against which models are described, taxonomies have been developed: e.g. for Impact Areas, Modelling Techniques, Policy Areas and Policy Instruments. The models can be identified by means of faceted search strings: by applying multiple filters on the taxonomies, to narrow down the selection to those fulfilling the requirements of a specific IA. In addition to this, a free text search is available and can be combined with the faceted search.

The Toolbox not only entails the descriptions of models. It also represents and structures the IA process by breaking it up into different IA activities which have to be undertaken throughout the process, and by linking it to different Impact Areas which should be taken into consideration. It also provides taxonomies for the different Jurisdictions and Policy Areas in which Impact Assessment takes place, as well as Policy Instruments which are to be assessed. The appropriateness and the use of IA knowledge depend on the context – and such keywords should help describe the context in which a specific IA takes place.

Finally, the Toolbox has the ambition to provide support and services not only regarding model selection, but throughout all steps of the process. This is why it also includes

- A database with contact details for IA Experts,
- A database with examples of Good Practices of Impact Assessment,
- Background information on the Impact Areas,
- Background information about generic methods which can be used in Impact Assessment,
- Background information about the requirements for IA in a wide range of countries.

All databases can be searched by faceted as well as full-text search, while the background information is included as html text.

2.2.2 Back Office Toolbox

In an IA context, the LIAISE back office presents the framework in which users can interact with tools, browse and/or visualise data and exemplary model output (tables, maps, reports), or convert and transform output of tools into formats for instance required by other tools to conduct different steps in an IA. In addition to that, the back office implements the more detailed information on data needs and linking possibilities based on inputs and outputs of models. It will be obvious that this claim can only be regarded as true if models and data which are part of the Back Office meet a certain standard of completeness, when looking at the information which has been provided by the model owner. An important role here is again the RM-IAT, which sets the LIAISE standard on what is needed to know

about models to make them available in a controlled environment, such as the Back Office.

Only those models which meet a certain model description standard (based on the RM-IAT) will be included into the back Office. The criteria for this will be developed in the project and will be based on user feedback from different stakeholders in focus (user) groups and modellers.

2.3 The LIAISE test cases

One of the key activities of LIAISE is to develop a process through which IA researchers can interact more effectively with IA practitioners. We are doing this by applying IA tools in a number of concrete policy 'Test Cases'. LIAISE's test cases comprise of six cases varying from EU level, national and regional level within an EU member state and one in in China. The specific objectives of test cases are to:

- Establish a more realistic understanding of the requirements of policymakers;
- Establish operating procedures and contacts for future researcher-policymaker interactions;
- Learn how different tools may be used in practice, hence improving existing IA tools;
- Facilitate conceptual learning and rethinking of the science-policy interface between policy makers and researchers in the field of IA tools.

In order to consolidate the test case framework, a set of ‘support modules’ has been developed which flexibly guide testing through a series of practical instructions. The nine support modules follow generic steps in IA process and are grouped into four implementation phases:

- Formulation Phase;
- Scoping and Planning Phase;
- Instrumental Phase;
- Conceptual Learning Phase.

Although support modules are presented as a step-wise process, they are intended to be applied flexibility in individual test cases. Sometimes some of the steps overlap or are given more attention than others. Test cases are carried out by teams of LIAISE researchers and include both technical modellers and social scientists. The social scientists play the role of ‘knowledge brokers’ attempting to facilitate interaction between the technical modellers and policy makers. They also perform a monitoring and evaluation role from the interaction process.

In the test cases we are improving tools for inclusion in the Back Office. The test cases are also initiated to learn about the process of IA, how tools are part of this process and how researchers and their tools can interact with policymakers. The challenge for modellers is of course to translate policy questions into input for their models. Only then can be expected that there is at least a chance that the models provide the desired outcomes. For that it is vital to open up a dialogue with the policymakers before an IA study (or any other study in which a model is used) is performed [see also Díez and McIntosh 2009].

3 First results and conclusions

Based on the experiences and progress made in the first stages of LIAISE, we can present some results and already draw some conclusions.

3.1 User needs and expectations with regards to IA tools

The way IAs are executed differs in the 17 countries which have been studied. The systems themselves, their underlying purposes and the tools they use vary widely

both within and between the 17 countries. Many different factors affect the way they are structured and their functioning. These include the availability of resources (skills, time and data with which to conduct an IA) as well as the steps that have been taken to establish of quality control mechanisms and institutions. Although many countries have sought to learn from one another and international bodies such as the OECD, there is still no one dominant approach to undertaking IA that is firmly institutionalised in all countries. Rather, each country employs IA in a distinctive way which fits its prevailing political and policy context. It is important therefore not to 'de-contextualise' IA, especially when seeking to define and extend 'best practices' or increase the use of IA tools, such as cost benefit analysis, scenarios or formal computer-based models.

On the whole, the use of IA tools in practice is highly differentiated both between the main tool types (simpler tools tend to be more popular than more sophisticated ones) and amongst individual IA systems (tool use is generally higher amongst the older EU Member States than the newer ones).

In general, user needs with respect to IA tools defy simple generalisations, in other words, there is no silver bullet regarding the question what is needed to improve tools and to make them more user-friendly. Pending a fuller analysis later in the project, it seems that user needs tend to be specific to particular tools and/or IA systems. Instead of 'saturating' them with information on tools, this pattern of use calls for a more targeted and 'smarter' deployment of existing as well as improved tools; one which is sensitive to the prevailing context in each country. For the least enthusiastic adopters, it may be 'smarter' to focus on making the case for IA tools, whereas more enthusiastic adopters seem to want more detailed information on specific (types of) tools. Test cases constitute a potentially important method to understand these contextual conditions (and thus couple supply to demand), a task which will eventually be addressed. At the same time, LIAISE should devote resources to understanding the other assessment venues in which IA tools are, or could in the future be used.

3.2 Better description of tools as part of the Front Office Toolbox functionality

We have not yet been able to verify if better description of tools will lead to a better selection of tools and as a result, better use of tools. As stated before, the current Front Office Toolbox only holds 80 models and tools, with only a subset of the possible information as described in the RM-IAT description. The only way in which we can really assess the success of the RM-IAT and the Front Office Toolbox is by testing it out amongst the several anticipated user groups. We did this by using the technique of focus groups. This is a technique which is particular useful when researchers seek to discover participants' meaning and ways of understanding [Lunt 1996]. This testing is taking place at the time of the writing of this paper, and no definite conclusion can be drawn yet. However, it is clear that the concept is seen as interesting and useful, but that the way the information is offered to the users should be more tailored to the needs of the specific user groups (ranging from modeller to policy maker).

3.3 Back office of relevant tools

Since we are currently in the process of improving tools for inclusion in the Back Office, it is very relevant to check what we do against the current needs of the policymakers or consultants who will use the tools in the practice of IA. Although the LIAISE project is regarded as relevant by the policymakers, it is not an easy task to organise a setting in which an exchange of information leads to identifying concrete requirements for improvements of tools. We must avoid that we fall back in doing "business as usual".

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