

# Critical Evaluation of Scenarios for Spatial Planning and Regional Development

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## Abstract

Scenarios are widely used to provide a picture of possible and plausible futures to inform decision-making. This paper focuses on two different approaches applied to develop future spatial scenarios. The first is the European wide ESPON 3.2 project, which we classify as a scenario with an outcome-bounded approach. The second is the Austrian ÖROK project alternatively categorized as a scenario with a process-orientated approach. The first approach has advantages such as for formulating quantitative simulations and comparing different options like alternative policies. The strength of the second approach is the wide participation and engagement of involved agents. Participation enables a number of benefits such as stimulating broad thinking about the future; a wider perspective on complex issues, bridging the gap between different agents; facilitating collaboration and consensus building; increasing the acceptance of scenarios amongst end users etc. The prospective strengths and weaknesses of the two approaches are summarized, by use of the scenario evaluative criteria designed by Hulme and Dessai (2008).

**Key words:** Spatial planning, regional development, scenarios, ESPON, ÖROK, evaluation

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## 1.0 Introduction

The only thing we can be certain about is uncertainty. What changes an area, a region, or a location is likely to undergo in the future is full of uncertainty. How these changes will look is dependent on a complex interaction of decisions made by multiple actors. A well-known and frequently used method for planning for and understanding changes in the future is scenario planning. Scenarios are developed to inform decision-making under uncertainty, providing descriptions of possible future situations (Parson et al, 2007). Their intention is to provoke the imagination, limit inconsistencies, create a unified language, structure common thoughts, and enable decision-making (Godet, 2000, p. 8). The objective of scenarios is not to forecast or predict future developments, but to imagine a variety of

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possible and plausible futures (Penker & Wytrzens, 2005, p. 178). If the future can be realized, planners and decision makers are then able to purposefully intervene and be ready for whatever future happens (Penker & Wytrzens, 2005).

Within the scope of scenario planning there are different approaches to derive an understanding of potential future developments. In this paper we look at two different scenario approaches that have been applied for spatial planning and regional development within Europe. The first is the European regional development scenario project, conducted by the European Spatial Planning Observation Network (ESPON). The second is the Austrian National Spatial Planning Advisory Board (ÖROK) scenario project for spatial planning and regional development.

It must be noted that information contained in this article relating to the ESPON 3.2 project was taken largely from the final ESPON report and the ESPON website. Conversely, two of the authors of this article, Hiess and Penker were members of the ÖROK project team. Therefore a greater understanding of the ÖROK process may be reflected in this work.

The ESPON scenario approach was strongly based around the integration of two European policy goals, cohesion and competitiveness. Furthermore the ESPON approach was not a participatory process. The ÖROK scenario development method used a participative approach calling on the input of multiple stakeholders and involved open scenario development options, that is, scenarios not constrained to existing policies. Another way to contrast these two scenarios is that the ESPON approach involved an output-focused scenario whereas the ÖROK was a more process-focused scenario. In the later part of this paper we discuss the individual strengths and weaknesses of these different approaches to scenario development. To summarize the relative merits of the two processes, evaluative criteria designed by Hulme and Dessai (2008) are applied.

At this stage it must be clarified that the authors do not believe that the two approaches (process oriented and product oriented) should be or are necessarily, mutually exclusive. Scenario development may rather be viewed on a continuum with the different focuses (process and product) falling at each extreme. Scenario development may therefore be characterized by different blends of process and product focus.

## **2.0 The ESPON Project 3.2**

### **2.1 Objective**

The objective of the ESPON scenario was to explore the future evolutions of the territories of the European Union and the overall spatial structure of the ESPON space. In order to create a proactive scenario for 2030 based on current policy goals, specifically cohesion and competition.

## **2.2 Timeframe, steps and organisation of scenario process**

The ESPON project began in 2006 and continued through to the publishing of the final report in May 2007 (IGEAT- ULB et al., 2007). The scenarios were developed, in the first instance, from the generation of thematic scenario bases. This involved the development of two or more policy scenarios across nine themes representing the current state of knowledge. These themes included demography, economy, energy, transport, governance, enlargement, climate change, rural development and socio-cultural evolutions. Input from these themes was predominantly qualitative and represented existing knowledge such as current trends and situations, basic future forecasts, existing policies, and main driving forces influencing developments in each thematic field. This knowledge was collected in order to gain a better understanding of past and present dynamics.

Two or more policy scenarios were then elaborated for each theme. Each scenario incorporated not only the relevant EU policy, but also its territorial impacts. Over thirty scenarios were developed in total.

The following step was to combine the developed scenarios into four integrated policy scenarios. These included a baseline scenario (where trends and policy was held constant), a competition based scenario, a cohesion based scenario and an 'optimal' role back scenario. This was achieved with the aid of quantitative models, predominantly MASST (MAcro Economic Sectoral, Social and Territorial-future regional economic growth) and KTEN (Know Trans-European Networks- future transport flows). This involved translating the qualitative assumptions gathered in the first step to quantitative terms to use as data for the models.

Four wild cards to test the integrated scenarios for resilience were also part of the scenario development process. The whole process was the outcome of literature reviews, creative thinking, and workshops together with the use of data base information and model calculations. The scenario study incorporated knowledge and information from more than 30 other ESPON studies, using national research institutions across Europe.

## **2.3 Results**

The developed scenarios were not generated to predict a likely future, but rather to explore the logical extremes of the two policy variants. The scenarios should also identify the territorial extent of sectoral policies. Below are summaries of the developed scenarios taken directly from the ESPON 3.2 Summary report (ESPON, 2007):

(1) *Baseline Scenario for 2030*

*A remarkable concentration of activity has occurred in the metropolitan areas of the central economic area, the Pentagon, but also in less central regions (mainly capital cities and other European engines). As a result, the Pentagon has extended outwards along main transport corridors in the direction of major metropolitan areas like Barcelona and Madrid, Rome, Glasgow, Copenhagen, Stockholm and Oslo, Berlin and Warsaw, Prague, Vienna and Budapest. At the same time, various areas are at risk of economic decline. The marginalisation of some rural areas has continued unabated. In some areas, the number of available jobs has plummeted. In others, population ageing and even depopulation have reached critical levels. Globalisation has impacted many industrial regions with low or intermediate technologies. The most severely affected areas are located in central and eastern Europe. External immigration has continued, with immigrants settling mainly in large metropolitan areas, including central and eastern European cities. The areas with a high potential for tourism and retirement have specific geographical attributes (coastal, lake and mountain regions), while ageing areas are mainly found in remote rural regions without specific attractiveness. Various regions especially in southern Europe are subject to the impacts of natural hazards, mostly due to climate change.*

(2) *Competitiveness-oriented scenario for 2030*

*The attraction and polarisation potential of metropolitan areas is particularly strong and activities are concentrated in the traditional Pentagon. Only very few metropolitan areas beyond it are able to generate significant attraction and polarisation effects. The area of concentration of flows and activities is much more limited than it would be following current trends. It covers only parts of the traditional Pentagon, although it also extends out along a few major corridors, to reach Vienna and Copenhagen. The risk of rural marginalisation is much more intense than with current trends. The areas at risk of industrial decline are more numerous and the intensity of risk is also higher. External immigration flows are particularly intense. The areas with high potential for tourism and retirement are similar to current trends, but the areas with severe population ageing, generally in remote rural regions, are more extended. Impacts of natural hazards (drought, fires, and floods) are more intense than expected by current trends.*

(3) *Cohesion-oriented scenario for 2030*

*The image of the European main territorial structure reveals a more diffused pattern as far as the attraction and polarization potentials of metropolitan areas are concerned. Urban settlements are characterized by greater polycentricity, stretching over larger swathes of the European territory than in the trend scenario. In contrast to the trend scenario, several well-performing integrated zones have*

emerged outside the Pentagon, also in more peripheral areas. The Pentagon has grown and includes a larger number of cities outside this area. The number of areas at risk of marginalization and of declining activities is comparable to the trend scenario, but their size is reduced and intensity lower. The areas with high potential for tourism and retirement as well as those with severe population ageing remain similar. The impacts of natural hazards (drought, fires, and floods) are much lower than expected with respect to the current trends.

The scenarios were summarized in images as can be viewed by the example given in figure 1 , below:

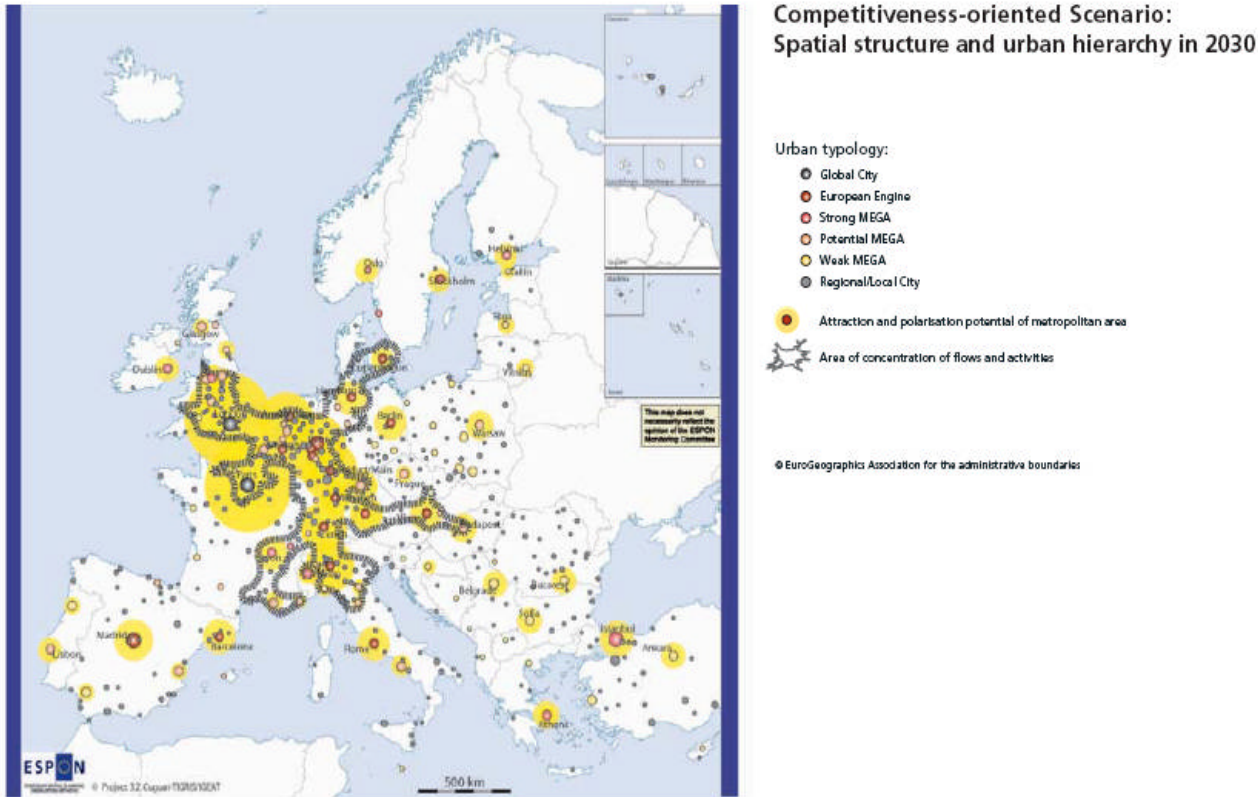


Figure 1: Competitiveness-Oriented Scenario – Final image 2030 (ESPON, 2007)

**2.4 Lessons to be drawn from the scenarios and policy recommendations**

The developed scenarios reveal insightful effects of both policy variants (competitiveness and cohesion) and highlight that unchanged current policies are not enough to meet the challenges of the future. The scenarios also show that Europe has the potential to evolve in distinctly different directions. Challenges facing the spatial structure of Europe include: increasing external competition from abroad, growth in mobility, urbanisation of rural areas in metropolitan regions and adaptation to

climate change. Land use planning will be essential to ensure quality of life and aesthetic natural landscapes.

The interrelation of sectoral and territorial policies must be considered when dealing with European spatial policies. That is, an awareness of the territorial impacts of sectoral policies is required at all levels of administration.

### **3.0 The ÖROK Scenario**

#### **3.1 Objective**

The objective of the ÖROK scenario was the generation of spatial development scenarios for Austria in the European context in 2030. These scenarios should help to frame thematic and spatial strategies for the Austrian provincial states, cities and municipalities, and federal concepts and strategies (e.g. the sustainability strategy). In particular, the scenarios are expected to form a crucial foundation for ÖROK's task to develop the new "Austrian Spatial Development Concept for 2011". The ÖROK project addressed the following questions: "What changes is an area, a region, or a location (in Austria) likely to undergo until 2030; what is the assessment of the changes from the perspective of spatial policy goals and how could- and should- spatial policy respond?"

#### **3.2 Timeframe, steps and organisation of scenario process**

The project began in the beginning of 2007 and continued until May 2009. The project is planned to continue into the future with periodic monitoring. The scenario process was organized in several steps (see also figure 1):

- 1) The scenario project team (external experts commissioned by the ÖROK with the scenario project) and a dedicated ÖROK working group (a group of representatives of the nine Austrian government authorities) defined and selected spatially relevant themes, for the thematic/sectoral scenarios that were to be developed.

- 2) Nine experts (expert groups) were commissioned to write nine thematic "Future briefings" for the different themes that were defined in (1): institutional change, population, society/consumption habits, economy, energy, transport/mobility, agriculture and forestry, tourism and environment. The future briefings were based on a retrospective view on the developments in the last 25 years. Two to four consistent thematic scenarios for 2030 were defined for each of the nine future briefings in a transparent and traceable way (based on trends, prognoses studies, driving forces and their possible ways of development). Furthermore, mega trends and wild cards were proposed by each of the nine experts (groups). The scenarios were predominantly qualitative except in areas such as transport and

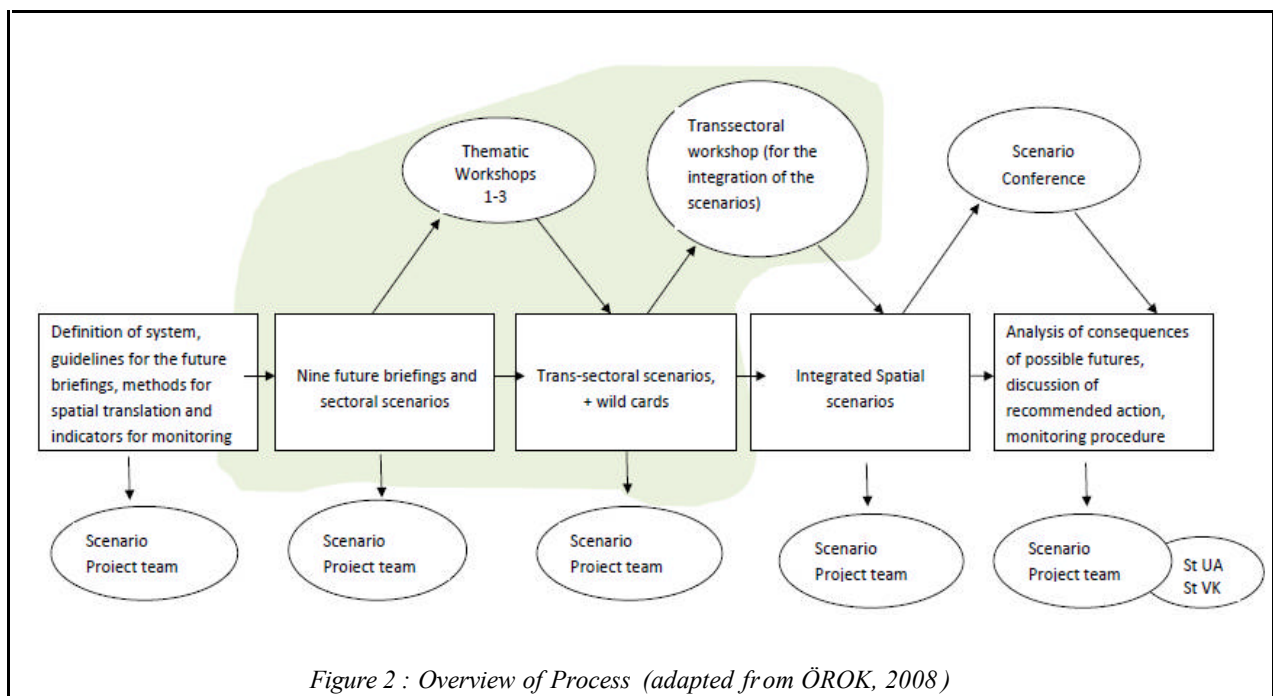
demography where quantitative data was available. Modeling was not part of the scenario development process.

3) The future briefings, as drafted by the thematic experts, were presented and discussed in three workshops with an expert audience. The expert audience involved experts such as planners, scientists, members of farmer organisations and the chamber of commerce.

4) Based on the workshop discussion, the thematic scenarios were adapted and completed

5) The scenario team integrated the nine future briefings (each containing two to four thematic sectoral scenarios) into four consistent integrated scenarios. Therefore each integrated scenario covered a number of thematic strands. A further workshop was held to discuss these integrated scenarios and their spatial implications. The integrated spatial scenarios - further refined based on the contribution of the discussions - were presented at a two day conference with broad public participation. This step also involved defining indicators for a monitoring system to anticipate long-term future developments relating to policy discourse among experts.

The results of this first phase were published in the ÖROK Schriftenreihe (ÖROK, 2008).



### 3.3 Participatory elements

The process involved a number of participatory elements. The first were a series of three workshops that focused on the nine future briefings and the 2-4 thematic/sectoral scenarios per topic. Broken

down, that means that three future briefings were discussed at each workshop. These three workshops involved an expert auditory using the “world café” facilitation method involving 50 to 60 experts. A fourth workshop involving broader public involvement was used to gain feedback on the integrated scenarios in which 90 experts participated.

Beyond the workshops a two day conference involving 120 experts was held on the 29<sup>th</sup> and 30<sup>th</sup> of May 2008. The conference involved an open invitation from the ÖROK, addressed to “all decision makers“ in Spatial planning and Regional development (presentation of scenarios and discussion of recommendations/consequences to be drawn from the future images). Wide dissemination of the developed scenarios was considered an important aspect of the project. Maps and particularly imagery were chosen as the medium for dissemination to capture a wide audience. Figure 3 below gives an example of the imagery style used.

Six meetings of the scenario project core team and ten meetings involving the working group of the ÖROK were also a part of the scenario participatory process.

Peripheral Space 2030: outward migration and loss of public transport – peripheral areas are dying out.



Figure 3 : Scenario two "Overall Competition" (ÖROK, 2009)

### 3.4 Results

Four consistent integrated spatial scenarios (overall competition, overall growth, overall risk, overall security) were developed (see below, taken directly from ÖROK (2009)). These scenarios for 2030 are not the most likely, rather they are extreme scenarios (with the objective to create resilient policies that can cope also with changes in current development trends).

#### *(1) Scenario 2030 "Overall Growth"*

*The main driving forces of spatial development (economy, population, tourism, mobility and transport) are growing strongly. The increased demand for energy can be covered by improved energy efficiency and alternatives to fossil energy. This sharply reduces the emission of climate changing gases into the atmosphere. The smooth interaction between the state, market and civil society prevents the widening of disparities. Nonetheless, the pressure on space grows rapidly.*

#### *(2) Scenario 2030 "Overall Competition"*

*In this scenario as well, the main driving forces of spatial development (economy, population, tourism and transport) are growing strongly. The assumption is that the market will respond in time to scarcities and in this manner make it possible to avoid far-reaching energy and environmental crises. In contrast to the scenario "Overall Growth", the social and thus spatial disparities widen extremely. The pressure on space increases enormously in the growth zones, while other regions are confronted with out-migration and phenomena related to shrinking.*

#### *(3) Scenario 2030 "Overall Security"*

*The scenario "Overall Security" is characterized by moderate growth of most Driving Forces of spatial development (economy, population, tourism). In those regions that are advantageous for farming and forestry, the pressure increases due to higher demand for biomass energy. Heavy government regulation, extensive social security systems, restrictive in-migration prevent the growth of social disparities. Energy, climate and environmental policy are steered at the European and national level by tax and technology policy. Energy and fuel prices are high, but are compensated in part by improved energy efficiency. Nonetheless, the mobility costs benefit the agglomerations and the centers.*

#### *(4) Scenario 2030 "Overall Risk"*

*In this scenario, the assumption is that the development follows the structure in the scenario "Overall Competition", but that the market does not develop any mechanisms against sudden energy scarcity. Therefore, energy prices rise steeply and there are no fast acting countermeasures available. The*

*main Driving Forces of spatial development are high energy costs and high mobility costs. More densely built-up areas and a more intense exploitation of natural resources for energy uses (biomass, water, wind and sun) determine spatial development.*

The project did not finish with the delivery of four scenarios. After witnessing thematic hype around a number of driving forces during the duration of the project, the project team realized the importance of monitoring. The monitoring or observation of indicators to see changes in relevant driving forces was an outcome of this project in order to be better able to anticipate long-term future developments. Particularly those embedded in policy discourse among experts. Future meetings are planned to discuss and reflect on the scenarios, driving forces, future developments, and how to meet upcoming challenges, etc (for example in the form of a yearly thematic focused analysis, embedded in a discussion process with an expert audience). The broad discussion should help to increase the reliability and soundness of future expectations and also strengthen the awareness for spatial consequences of particular developments. The scenario project is therefore feeding into an ongoing process, the publications and scenarios are not considered as the end.

### **3.5 Lessons to be drawn from the scenarios and policy recommendations**

Beyond the developed scenarios the project also identified spatial developments of high relevance with both high and low probability, threats, opportunities and strategic challenges for spatial policies. Land scarcity was deemed to be of high relevance and probability in agglomerations, regional centers and rural areas, with strong out migration outside of agglomerations and central areas. The biggest threats identified were urban sprawl with car-orientated settlement structures, increasing spatial disparities, costly and non-ideal site development, over exploitation of natural resources, cultural segregation, instability in industrial sites, and a decline of basic services. Seven opportunities were identified including: Austria as a European hub, vibrant central areas with high environmental and security standards, development of biomass based supply chains, self sufficient energy regions, production site for green technology, summer tourism destination, and multifunctional small-scale spatial units with increased flexibility and adaptation capacity. Challenges were also identified for spatial policy and for relevant international and national sectoral policies. For example how can social and ecological standards be implemented in global trade regulations? For more detail see the ÖROK, 2009 report.

## **4.0 Discussion**

### **4.1 The ESPON 3.2 project: scenario as a product**

The ESPON policy approach to scenario development can be described as product-oriented, that is, the content of the scenario was the goal. This approach may be deemed as a “scenario as a product”, being different from “scenarios as processes” (O’Neill et al, 2008). A product-oriented perspective assumes that the scenarios developed have their own lives, separate from the processes that generated them and that they can serve multiple, but not necessarily specified purposes (O’Neill et al, 2008). The ESPON project was bounded to an outcome based on policy.

Future studies bounded by scenarios as the outcome, may tend to focus more strongly on the technical aspect of scenarios. The use of quantitative modeling is valuable in that it allows for the simulation of different scenario alternatives, that is, input (such as driving forces) can be changed to demonstrate different outcomes. A large amount of technical information may be effectively communicated through use of models (Alcamo et al, 1996).

A scenario approach bounded by an outcome is beneficial for analyzing or testing policy options. A policy-focused scenario for example may enhance understanding of future and integrative implications of specific policies investigated. The two policy scenarios of the ESPON project re-emphasized that cohesion and competitiveness can be contradicting policies and identified these clashes. The ESPON scenarios also provided insight that many territorial goals cannot be realized without investments in non-territorial policies such as education, research and innovation.

Policy plays an important role in future spatial developments, as an example, the European Union is involved in a number of policies that significantly affect territorial spatial development, such as the European Transport Policy, the Common Agricultural Policy and administering of the Structural Funds (Dammers & Evers, 2008). However not all future developments (e.g. economic, socio-cultural and environmental change) in society are the direct outcome of policy intervention. In the context of future spatial planning and regional development there are many driving forces at play (political, technological, socioeconomic etc). Therefore basing scenario development on a bounded outcome such as policy may be constraining when seeking answers to bigger pictures, such as what spatial challenges are likely in the future for a given region.

The ESPON project used existing information from studies spanning across Europe, rather than involving a participative process. This approach may have excluded the potential for bridging gaps between the scientific community and businesses, interest groups etc; limited communication, dialogue, and collaboration between scientists and stakeholders; and restricted transparency. Therefore

despite perhaps developing good scientific scenarios for the future the process may have limited relevance and desire for up-take by end-users. Figure 4 below visualizes the lack of communication and integration of agents in product oriented scenarios.

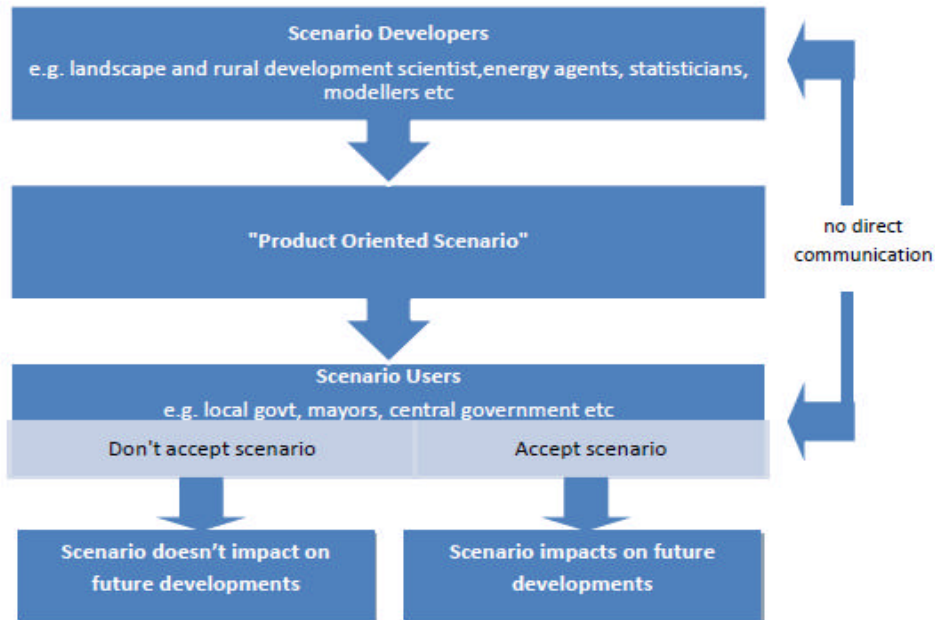


Figure 4 Lack of stakeholder and user integration, with an outcome bounded approach

As previously mentioned future studies bounded by scenarios as the outcome, may tend to focus on the technical aspect of scenarios, this may occur at the expense of excluding social elements. For example the focus may be on the models and data, rather than stimulating proactive thinking about the future amongst relevant agents. A small part of the scientific community may be incentivized to generate novel and technical developments in scenarios (Garb et al, 2008). The more complex and technical a scenario is, the smaller the audience that can interpret them. Scenarios involve the relying of trust in different methods across disciplinary boundaries, due to different levels of knowledge (Volkery et al, 2008). There will always be limitations in the use of models to represent real life conditions, such as transferring qualitative data into quantitative models (Volkery et al, 2008).

The manner in which scenarios are disseminated may also represent whether the focus of the scenario was the outcome or the process. The final images developed for the ESPON project, are rather visually cumbersome (see figure 1 above). They do not appear as if they were developed with broad stakeholder engagement in mind. Shell (one of the early corporate users of scenarios and whose scenario practice is continuously evolving) has a strong focus on dissemination efforts to help bridge the gap between scenario planners and operational executives (scenario users). The scenario developers acknowledge that they have a more academic focus and that their work can be separated from the reality of business (Garb et al, 2008).

A sophisticated and critical audience will look beyond the surface of developed scenarios and will want to see comprehensive in-depth research and logical analysis (Wright et al, 2009). Therefore it is also important and relevant to use hard scenario development tools alongside soft ones in both the content and dissemination of scenarios, which the ESPON project definitely did.

#### **4.2 The ÖROK scenario: a process oriented approach, not bounded by an outcome**

The process adopted to develop the ÖROK scenarios was considered to be as important if not more so than the actual scenario outcome (ÖROK, 2008). This approach may be categorized as a scenario with a process oriented perspective (O'Neill et al, 2008). A significant decision regarding the process was to involve a participatory approach involving multiple stakeholders. Having multiple stakeholders engaged in and learning from the process, is in itself valuable.

Involving numerous stakeholders representing different areas of knowledge and expertise in the scenario process, can provide a broader view on complex uncertain problems, develop new revelational insights and can help better address policy concerns (Volkery et al, 2008). Scenario development is a complex process involving the development of a broad bundle of possible and plausible futures. Therefore, the wider the knowledge base the more encompassing the scenarios can be. The involvement of a wide mix of stakeholders may also remedy biases toward a focus on particular strategic objectives at the expense of others, for example focusing on economic factors whilst ignoring social factors. Furthermore involving a wide group of stakeholders in the process also helps to enhance the credibility and acceptance of scenarios among potential target groups, making them more transparent (Volkery et al, 2008). Figure 5 below illustrates the integration of stakeholders in process focused scenarios.

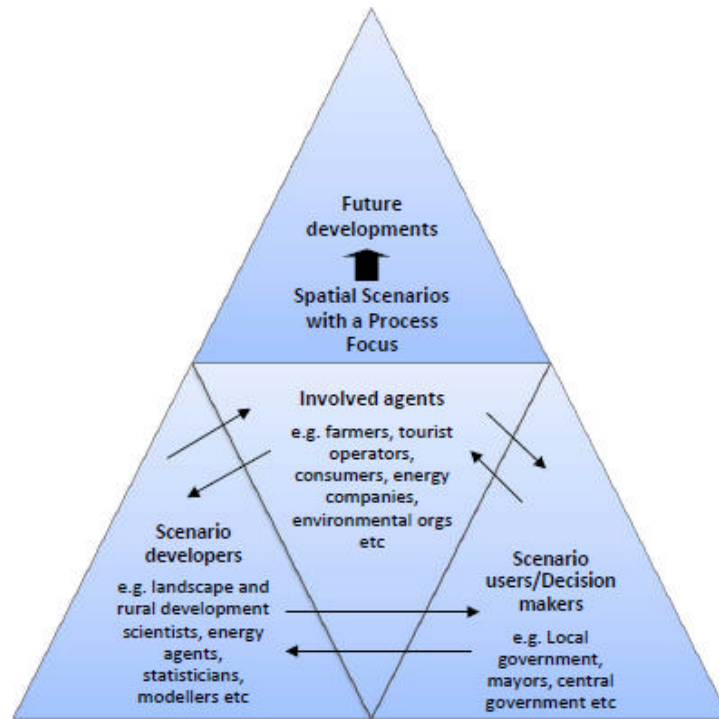


Figure 5 Integration of Experts, Stakeholders and Decision Makers in Scenarios with a Focus on Process

Cooperation is necessary to deal with almost any future scenario, therefore bringing in multiple experts to come up with future scenarios may begin a process of cooperation, or at least seed the idea (Volkery et al, 2008). Dialogue between stakeholders allows the bridging of gaps between the scientific community, businesses, interest groups and citizens, providing a reality check on assumptions (Welp et al, 2006). Stakeholders by participating in the scenario process gain an understanding of what's involved in their development and have an opportunity for input into the developed scenarios. Wide stakeholder engagement also offers opportunities for networking and valuable insights into the behavioral patterns and strategies of colleagues and competitors (Penker et al, 2005). Participation can help address complexity and uncertainty and to foster social learning (Madlener et al, 2007). The ÖROK project involved decision makers in public administration and planning experts thus could help to bridge the gaps between sectoral policies and plans. These networks, where a consensus is reached on needed policy action often have substantial influence on policy-makers (Garb et al, 2008).

Despite the known benefits of the participatory approach to scenario development, it is not necessarily without weaknesses. We are still in the early stages of knowing how to run effective participatory processes (Volkery et al, 2008). Scenarios developed are dependent on or bounded by the individuals involved (EEA, 2001 ; Penker et al, 2005). Some individuals may dominate the process with their

views, therefore delivering results that are neither representative nor legitimized by a democratic process (Penker et al, 2005). Furthermore it can be hard to draw in a large group of actors/agents (Madlener et al 2007; Penker et al 2005).

Participatory scenario development is obviously easier on a national level than say the European level, as stakeholder values, norms and corresponding perspectives are less complex than on a greater regional level (Volkery et al, 2008). Particularly when scenarios are developed to represent a large scale and involve heterogeneous groups, wide engagement in the process becomes almost infeasible (Parson, 2008)

Scenarios are often viewed as being developed or shaped by scientists and taken up or not by decision makers i.e. a divide between scenario developers and scenario users (Garb et al, 2008). User engagement is typically judged as essential for effective use of scenarios (Van der Heijden, 2006). A more careful attention to audiences (and engagement of them) can increase understanding amongst decision makers and improve developer-user relations (Garb et al, 2008). The ÖROK project involved integration of decision makers through a parallel process and integrated them into all stages of the project. Thus, the final ÖROK report was influenced and modified by the involved decision makers. Therefore care must be taken to ensure that the integrity of scenarios is not compromised at the expense of engaging decision makers.

The dissemination of scenarios, particularly to those not involved in their development is not typically emphasized in scenario work (Garb et al, 2008). The ÖROK project made an effort to create images reflecting the scenarios in an easily grasped form, for a wider engagement of dissemination. The way this was done was with strong imagery (see Figure 2 above). This is not an undisputed task as scenarios are based on a great deal of information and complexity and simplification always implies loss of information.

### **4.3 Scenario Evaluation**

If we return to the overarching objective of scenarios, which is not to forecast or predict future developments, but to imagine a variety of possible and plausible futures then both scenario processes can be viewed as successful. However to evaluate the scenarios with more scrutiny, then more elements need considering. Hulme and Dessai (2008), apply three criteria to evaluate scenarios. These include: predictive success (has the future turned out as envisaged?), decision success (have 'good' decisions been made subsequently?) and learning success (have scenarios been engaging and enabled learning?). If we apply these criteria to the two scenario processes outlined in this article. Then we find that the first criterion may be achieved both by scenarios with an output focus and scenarios with a process focus. The second factor may be achieved also via both types of scenario process. However

having wide stakeholder involvement means a greater transparency, better acceptance and wider audience of the scenario, which may lead to better decisions being made. The third factor is most likely to be achieved by process-focused scenarios, where stakeholder engagement and learning are a focus. Without a focus on the process, scenarios may lack the potential to engage with a wide audience, during and after the scenario development process.

## **5 Conclusions**

We have outlined the difference between scenarios i) with a process oriented approach and ii) scenarios with an outcome bounded approach. We have advocated that the strength of the process-focused approach is its wide engagement of involved agents and the structured discourse on the future by stakeholders and experts.

On the other hand a participative approach may not always be feasible, for example when covering a wide geographical scale and involving strongly heterogeneous actors. Furthermore, we cannot disregard the benefits of scenarios as products. Their ability to compare different options such as policies and simulate distinct potential outcomes is invaluable. As already mentioned the authors do not believe that the two approaches discussed are necessarily mutually exclusive. Scenario development could in general benefit from some focus given to both the product and the process. With an appropriate blend decided depending on the scenario being developed.

Application of the evaluative criteria of Hume and Dessai (2008) highlights a perhaps under valued aspect of scenarios - have scenarios been engaging and enabled learning? This question reminds us that a very important aspect of scenarios is that they provide an opportunity for involved agents to spend time and share thoughts that inevitably lead to the shaping of future developments.

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