



European
Research Area

EUROPEAN POLICY BRIEF



Innovation futures in Europe

A foresight exercise on emerging patterns of innovation.
Visions, scenarios and implications for policy and practice

September 2011

INTRODUCTION

The **INFU** project addresses newly emerging innovation patterns. Several new ways of organising innovation activities such as “open innovation”, “community innovation” or “soft innovation” are currently emerging in economy and society. While these have been discussed intensively in recent years, there is little systematic exploration of their potential for different sectors and areas and the implications for economy and society. For the first time, a foresight project is conducted to analyse and discuss the emergence and diffusion of new innovation patterns and their implications for European policy.

Based on a scanning of weak signals in the first phase of the project a set of innovation visions have been developed which describe how innovation may be organised in the future. These new forms of innovation have been discussed and assessed by conducting interviews, launching an online survey, organising expert panels and workshops across Europe.

Based on a set of key factors which significantly influence the likely development of the various new forms of innovation in the second phase of the project five scenarios have been developed which describe long term development paths of future innovation landscapes. Outcomes of the scenarios development process will be presented in this policy brief.

In the next and final phase of the INFU project implications for European policy will be discussed and elaborated.

KEY OBSERVATIONS

Nine key factors influencing the future European innovation landscapes

The key factors are based on different sources of information that are the result of the previous efforts of the INFU project:

- 78 “signals of change”. These weak signals were identified through a review of academic literature on innovation and by scanning various media such as newspapers, magazines and the Internet. The aim was to identify newly emerging apparent and visible innovation patterns, which have not yet reached the mainstream and may have disruptive impacts for industry, economy, and society in the future.
- 19 visions of new innovation patterns (“innovation visions”). These visions were elaborated from the signals by means of “signal amplification” (a process in which the signals are radicalised or generalised). Each vision describes how one or several similar signals could indicate a change in the process of creating, developing and disseminating innovations in the future.
- 9 consolidated visions (“nodes of change”) which are clusters of similar visions: Clarity, novelty, impact, desirability, and likelihood of these visions were evaluated in an online survey and discussed in detail with experts from industry and academia. This led to the identification of clusters of similar visions which were elaborated in mini-panels by self-organised expert groups.

The key factors were identified and selected in a collective and participative process. At the heart of this process was a key factor workshop involving both key participants from the mini-panels and further external innovation experts from all over Europe. During the workshop, visions and mini-panel findings were re-contextualised: Innovation patterns were placed within their economic and societal context, in particular by relating them to mega-trends such as environmental threats, demographic change, and globalisation. In addition, environmental scanning and mega-trend analysis was done followed by a feedback loop with the workshop participants.

Overall, nine Key Factors (KF) were identified. They relate to three levels:

- The **macro level** of the global context with the KFs:
 - “Global Innovation Centres”,
 - “Welfare and Growth Paradigm”, and
 - “Impact of Resource Scarcity and Environmental Problems”
- The **meso level** of the European societal context with the KFs:
 - “Societies’ Innovation Capability”,
 - “Peoples’ Involvement”,
 - “Mediators of Innovation”, and
 - “Sustainability and System Thinking”
- The **micro level** of specific aspects of innovation processes with the KFs:
 - “Crossover Innovation” and
 - “Innovation Facilitating Technologies”

Scenario construction

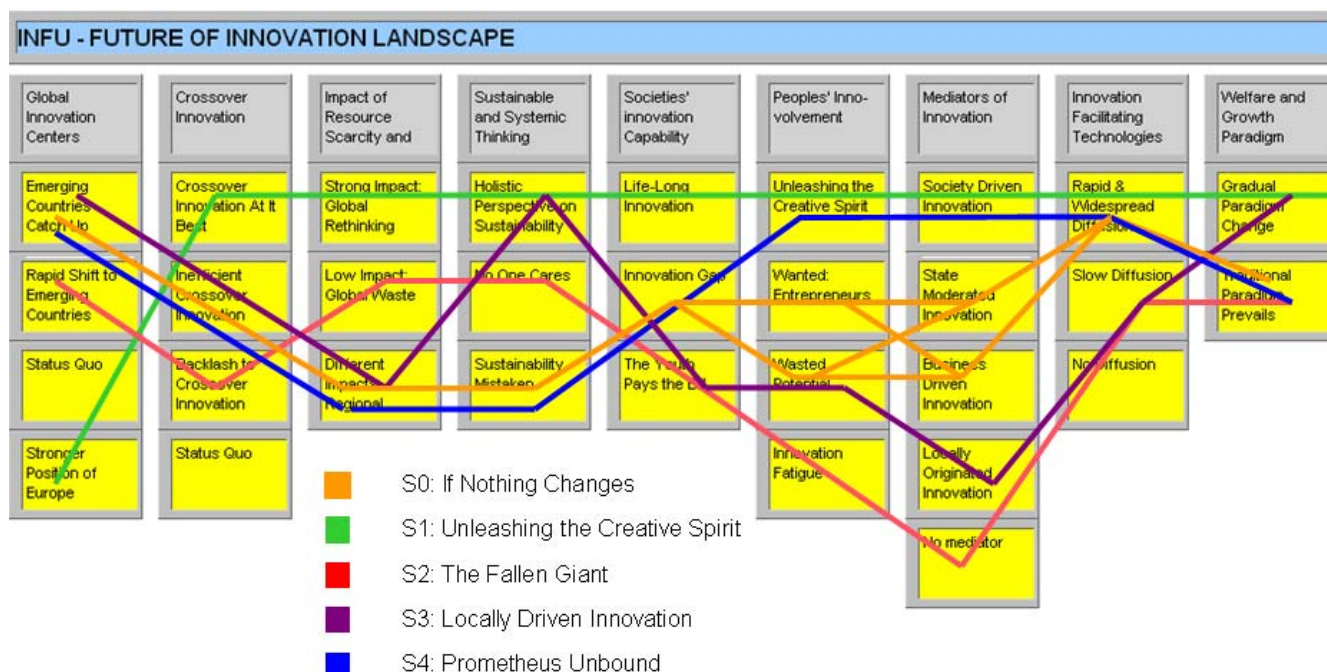
The main step in the construction of the scenarios was a workshop involving the INFU consortium team. During this workshop, the team identified and sketched a portfolio of scenarios for future European innovations landscapes based on the main uncertainties in the evolution of innovation in Europe. Scenario construction was supported by a specific scenario software which supports the search for sets of projections with high overall consistency ("projection bundles").

Five scenarios were identified by combining different projections of the nine key factors with the aim to build coherent and plausible pictures of the future. These scenarios capture very different future options for the European innovation landscape.

As a time horizon, the project team selected 2025, a year which is close enough to the present to make the scenarios relevant for today's decision making yet remains far enough in the future to make major changes in innovation patterns imaginable and even probable.

The different future projections of these key factors systematically map relevant and possible alternative developments of the framework conditions for innovation and they include also new promising concepts of innovation. The illustration below shows the scenarios in the so-called "morphological box". The headers list key factor names, the boxes below give the names of the respective projections. Lines connecting the projections belong to a specific scenario.

The five scenarios: Combing different key factor projections



In the following the five scenarios are briefly introduced:

Scenario 0: If Nothing Changes

The baseline, or reference, scenario shows an almost unaltered future as regards present structures and present innovation patterns. The challenges resulting from an ageing and shrinking population, global competition, environmental issues and resource scarcity are inadequately met. Ultimately, muddling-through politics lead to decline. In the global innovation race, the European Union falls behind.

This scenario is based on the assumption that key factors remain virtually unchanged. As there are major conflicts and interactions between these factors, the project team considered the scenario to be little likely and providing little insight. It is used here as a backdrop for the other scenarios.

Scenario 1: Unleashing the Creative Spirit. Europe's Innovative Societies

By 2025, the European Union has become energised by a new spirit of creativity and has turned into the world's innovation centre. The EU is a main global innovation hotspot offering excellent research conditions and providing the world with sustainable innovations, helping it to cope with the grand challenges of our times. European societies have become a highly valued source for new product and services ideas, but above all for social innovation. In addition, sustainable business and consumption patterns have become the norm – economic growth and social welfare are no longer exclusively defined in monetary values.

In this scenario **new forms of innovation** such as waste-based innovation, open source innovation models, and the organisation of innovation camps involving many different people for a certain time will flourish.

What are possible **positive and negative impacts**? On the positive side one may expect that European societies benefit from high educational standards. Social and environmental aspects are considered and all relevant stakeholders are fully integrated into innovation processes. In addition, social welfare is on an exceptionally high level and researchers have access to superb research conditions and excellently equipped research infrastructures. Favourable framework conditions for entrepreneurs. Very low administrative barriers and widespread presence of private and public innovation spaces exists there as well.

The decreasing competitiveness of European companies that fail to open their processes to external innovation sources and stick to non-sustainable manufacturing is a possible negative effect of this scenario. The potential abuse of freely available content and widespread creative commons licenses are others.

Scenario 2: The Exhausted Giant. European Innovation Fatigue

Demographic ageing, inadequate policy responses, high competitive pressure from other extremely innovative world regions, and a certain "innovation fatigue" of its population cause the European Union to lose most of its innovation capacity by 2025. Faced with this situation, policymakers and entrepreneurs stick to obsolete models of growth and welfare, education and innovation. The few remaining

innovation activities are exclusively business-driven and not embedded in systemic approaches to sustainable development. Automated innovation and “no-innovation”, two **innovation visions** which have been discussed in the previous work packages become more important in this scenario context.

A high competitive strength of globally operating European companies that relocated R&D departments and other critical business units to “emerging” countries such as Asian and Latin American regions at an early stage can be considered as a **positive impact** of this scenario. However, i) deterioration of Europe’s economic situation and declining welfare spending, ii) lack of appropriate framework conditions and opportunities for young creative people (who leave the European Union in ever greater numbers), iii) gloomy outlook for researchers, teachers, and professional coaches as research budgets shrink, and iv) unfavourable conditions for citizens with ideas for social innovations who face a risk-averse social environment reluctant to innovate are on the **negative side** of this scenario.

Scenario 3: Locally-Driven Innovation

In 2025, Europe’s innovation landscape has changed significantly. Cities, agglomerations, and regional governments have replaced European or national bodies as the most important mediators and facilitators of innovation. They made up for the lack of national and EU guidance and the entrepreneurs’ growing reluctance to innovate. Thanks to local citizen initiatives, Europe’s innovation capacity has returned to a high level while companies play only a moderate role for pushing innovations. In 2025, innovation is realised and organised at the local micro level and provides solutions mainly, but not only, for urban challenges.

City-driven systemic innovation and social experimentation are **innovation visions** which in particular will become mainstream under this scenario.

Local governments and local communities have more decision-making freedom and are able to design their innovation strategy based on local needs and conditions. In addition, affected citizens profit from effective working solutions and social cohesion improvements due to high degree of collaboration between citizens. Successful social innovation projects provide new stimuli to other cities and regions with similar problems. These are all **positive impacts** we can think about when debating this future. Unfavourable frameworks for supporter of a centrally organised European-wide innovation strategy or common innovation landscape are amongst others **problematic aspects** of this scenario, such as the risk of partly inefficient duplication of efforts or the inability to realize large-scale projects.

Scenario 4: Prometheus Unbound: Innovations for Innovation’s Sake

Europe has set the course for innovation and competitiveness. All major actors – from commerce, politics, and society as such – collaborate to open and streamline innovation processes, overhaul rigid administrative systems and promote innovation at every level, financially and by providing good framework conditions. Europeans are highly motivated to contribute ideas. However, since innovations

are guided mostly by an economic rationale, environmental problems are not addressed in a comprehensive and effective manner. Moreover, parts of the population drop out of this fast-paced lifestyle.

The widely diffusion of open source models, the organisation of innovation camps and laboratory stores are all **new forms of innovation** (innovation visions) which are particularly relevant in the context of this scenario.

Which **positive impacts** are related to this vision: We can think about increasing business opportunities and sales potential for European companies with high innovation rates. In addition, innovative people, in particular of younger generations, may find excellent conditions for sharing and develop ideas.

Regarding **negative effects**, firstly, there is increasing business risks for small and medium-sized companies with insufficient capacities for generating high numbers of innovative products and services in the merciless and high-speed innovation race. Secondly, those who are not willing or able to follow the omnipresent innovation pressure are increasingly suspended and society may drift apart. And thirdly, more and more negative environmental impacts can be expected due to shorter product cycles and as the wasting of resources continues and awareness of CO₂ emissions remains insufficient.

Limitations and scope of scenarios

Scenarios are not forecasts. They do not describe “the future”, rather, they depict consistent and plausible images of possible futures, of alternative future situations and the development path towards them: “This is how it could happen”. They are based on a coherent and internally consistent set of assumptions about key relationships and driving forces. Which of these alternatives will be realised remains uncertain.

Possibly, elements of all scenarios could materialise, perhaps to different degrees, or radically new aspects, i.e. elements of the future situation, will arise, such as new developments and trends, unpredictable innovations, impacts of disruptive events: “Something else entirely could happen.” Thus, scenarios are not primarily intended to answer questions but their aim is to raise questions and to tell conceivable “stories” to inspire thinking about and debates on the future.

RECOMMENDATIONS FOR POLICY-MAKERS

Although implications for policy have not been elaborated in full detail at the current stage of the project, the different scenarios have different impacts on the European Research Area (ERA) and would require different policy actions:

Implications for ERA of scenario 1: Unleashing the Creative Spirit. Europe's Innovative Societies

- Researchers find excellent conditions for career development and mobility.
- High amount of world-class research infrastructures.
- High degree of academic research and high availability of high-skilled researchers at universities.
- International research cooperation is on a relatively high level – high degree of knowledge sharing and very low barriers of knowledge transfer.
- Increased efficiency of public research due to close cooperation in science and technology development.

Implications for ERA of scenario 2: The Exhausted Giant. European Innovation Fatigue

- Transnational activities and policies are on a relatively low level – innovation programmes solely take place on a national level, thus further decreasing global innovation competitiveness of Europe.
- Insufficient cooperation of public research with companies due to silo thinking and off shoring of private R&D.
- The attractiveness of research conditions declines – high skilled researchers and scientists favour more innovative world regions.
- Publicly supported research programs hardly exist – research infrastructures and capacities become obsolete.

Implications for ERA of scenario 3: Locally-Driven Innovation

- The main reason of ERA, overcome fragmentation which is assumed to prevent Europe from fulfilling its research and innovation potential, might, in a retro perspective, be regarded as misleading if local innovation activities lead to new solutions, also in respond to major global challenges.
- Higher importance of local activities, policies and programmes (instruments) within the ERA.
- Less importance of Framework Programme and other funding programs on European level.
- A reduction of legal and practical barriers for researchers, innovators and companies still remains its high priority.

Implications for ERA of scenario 4: Prometheus Unbound: Innovations for Innovation's Sake

- Single European Innovation Area.
- High improvement of the mobility of researchers.
- Comprehensive European programs to ensure coherence and focus of educational, research and developmental activities.
- Framework conditions for innovations are harmonised at highest level.

RESEARCH PARAMETERS

Objectives of the research

While there is much research investigating specific forms of innovation such as open innovation, network innovation or social innovation there has been little systematic exploration of possible future innovation landscapes and their implications.

INFU explores new patterns and structures of innovation, their potential for different sectors and its implications for economy and society. An analysis and assessment of different innovation patterns allows the design of policies and measures in order to benefit from the potential challenges arising from these changes.

In order to address these needs, the INFU project pursues the following objectives:

- scanning of weak signals indicating changing innovation patterns with a potentially disruptive impact for European S&T in the long run,
 - systematic exploration of relevant and plausible future innovation landscapes through participative scenario building,
 - assessment of scenario implications for the content of academic and industrial research, and key policy goals such as sustainability,
 - deriving strategic options and guidelines for European research policy and relevant multipliers,
 - initiation of an interdisciplinary, boundary-spanning stakeholder and expert debate on new innovation patterns.
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Methodology

The project combines various foresight methods (weak signal scanning, expert panels, scenario development, scenario assessment) and builds on the existing academic literature on new innovation patterns.

The INFU dialogue starts by identifying emerging signals of change in current innovation patterns and then progresses by increasingly integrating diverse perspectives and knowledge sources towards consolidated innovation futures scripts. These bottom-up visions are then confronted with different possible socio-economic framework conditions and global mega-trends to finally synthesize consistent scenarios, which integrate micro, meso and macro elements of possible innovation futures with particular emphasis on changes in the nature and content of research. Finally, policy strategy options are developed to prepare for the identified changes in innovation patterns.

PROJECT IDENTITY

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Consortium	<ul style="list-style-type: none"> • Philine Warnke, Fraunhofer Institute for Systems and Innovation Research, Germany • Francois Jegou, Strategic Design Scenarios, Belgium • Vanessa Watkins, Z_punkt The Foresight Company, Germany
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Website	www.innovation-futures.org
Further reading	<ul style="list-style-type: none"> • Stamm, B. von, Trifilova, A. (2009) (Eds.): The Future of Innovation, Gower, Surrey. • De Jong, J., Vanhaverbeke, W., Kalvet, T., Chesbrough, H. (2008): Policies for Open Innovation: Theory, Framework and Cases, Research project funded by VISION Era-Net, Helsinki.
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