



# Monitoring and Evaluation Methodology for the EU Lead Market Initiative A Concept Development Final Report

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# **Monitoring and Evaluation Methodology for the EU Lead Market Initiative**

A Concept Development

**Final Report**

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# 1 Introduction: context and objectives

## *Context*

The Lead Market Initiative (LMI) for Europe was launched by the European Commission following the EU's 2006 broad based Innovation Strategy. The 2006 Aho-report presented the concept of lead markets (Aho et al. 2006). It recommended the development of innovation-friendly markets in a more targeted way by creating conditions to bring innovative products and services quicker to the market. This shall support emerging markets in Europe with a view to give European producers a leading edge in global markets and thus to support the emergence of **Lead Markets** in Europe.

The Lead Market Initiative (LMI) is a combination of policies, mainly public procurement, standards, other legislation and complementary actions. It was adopted on December 21st 2007 ("A lead market initiative for Europe" - COM(2007)860 (21.12.2007). Six markets offering strong potentials and which could improve economic benefits have been identified. The LMI calls for urgent and coordinated action along six ambitious action plans, with a timeline of 3-5 years. Action plans consist of a tailored policy mix of demand-side policy measures in the fields of legislation, standardisation and labelling, public procurement and complementary activities (mainly through CIP and FP7). The Competitiveness Council (mainly composed of the Ministers for European Affairs, Industry and Research from the Member States) of May 2008 endorsed the concept and expressed their strong interest and commitment to exploit synergies in the use of existing national and regional instruments or actions in order to create the right framework to foster lead markets.

## *Aims of this concept*

The **aim** of this small scale-study is to **develop an evaluation concept for the Lead Market Initiative** of the EU. This concept is meant to be used **for interim evaluations and preparation for final evaluations of the LMI**. The LMI is a novel policy instruments, the first attempt to create Lead Markets, and it applies a complex mix of instruments. Therefore, the concept necessarily has a dual ambition: **summative** (to inform about progress, impact and effectiveness) and **formative** (to support learning and adaptation). In fact, given the novelty and the short term requirements for a first interim evaluation in 2 years time, the formative elements need to be especially strong. Therefore, we also need to look at the 'how' and deliver insights that help all those public and private actors involved to adjust and improve the instrument and their reaction towards it. This also may involve interaction between evaluators, market experts and stakeholders more generally.

As the Lead Market concept faces the challenge of defining markets and measuring market and innovation developments, there are a set of specific objectives of this concept:

- How to define the 6 lead markets in terms of data collection?
- Which indicators need to be identified?
- What are suitable data sources to collect quantitative and qualitative data?
- A concise overview of the relevant literature and lessons learned.
- A suggestion as to the implementation of the evaluation concept itself.

This concept is based on a very small scale study. It provides guidelines and a basic evaluation framework and defines evaluation questions and types of indicators to be used for the different markets. It is not intended to be immediately applicable without further refinement, especially as regards concrete application of indicators to define market potential.

### *Challenges*

The Lead Markets Initiative as an innovation policy tool poses a range of **specific challenges for an evaluation concept**:

- We do not have many empirical examples for the deliberate creation of lead markets in their literal sense. The literature review will show that there are of course examples of Lead Markets, but not many attempts to set up a set of distinct policies to create those markets. On the other hand, there are a set of examples for **market transformation**, but those are not designed as Lead Markets to spill over to global markets and to spur international demand favouring domestic producers, but are driven by domestic economic and societal goals (mainly eco-efficiency).
- The LMI is applied for six very different markets. Therefore, the concept needs to be able to capture this heterogeneity in order to allow comparative analyses, but has to be flexible in order to take special characteristics of the specific markets into account. This also implies that the concept needs to get a sound understanding of the market situation, the technological trajectories and diffusion patterns, and the incentive structures of the key actor groups involved at the beginning of the initiatives, to best assess the difference the LMI makes.
- The LMI applies a deliberate **mixture of instruments**. Therefore, it is important to design evaluation approaches that are applicable for the
  - **measure mix**: It will try to assess the interplay of measures within the selected areas
  - **individual measures**: It will enable assessment at the level of the three major building blocks regulation, public procurement and standardisation
- The LMI is a complex **European instrument**. Given the importance of the national level as for purchasing power (public procurement), the organisation of European standardisation processes relying on input from the Member States, the implementation of regulations at the Member State level and a set of further market conditions (supply and demand side), and the split responsibility also at the various levels (e.g. different DGs responsible) this European instrument will only work through a **sound and effective coordination between the EU level and the national level and within these levels**, both for the concept design and for its implementation.
- The evaluation concept needs to enable the **measurement of impact on three levels**, the actor arena that shapes the market conditions, the multitude of policy and market actors themselves (changes in behaviour, awareness etc.) and the development in the markets.

Finally, the evaluation concept needs to cover a three dimensional space:

1) **Evaluation dimensions:** As any evaluation this concept needs to be able to capture three evaluation criteria<sup>1</sup>

- a) rationale / appropriateness of the measure / policy
- b) implementation efficiency/effectiveness (which includes transition management), and
- c) impact (which is the sum of effects in terms of output, outcome and additionalities and includes the longer term perspectives)

2) The **Instrument dimensions:** the evaluation criteria must be applied for various instruments and the instrument mix

- a) overall mix of instruments
- b) public procurement
- c) standardisations and standards
- d) legislation
- e) Complementary actions

3) The market dimension: this evaluation matrix out of 1) and 2) above must finally be applied not only to the overall approach, but also to the individual markets

### *Structure of the concept report*

The concept paper is organised as follows: The **subsequent section 2** summarises relevant **literature** on market transformation policies and on Lead Market developments. The aim is to derive lessons as for the conditions under which lead markets develop and to see what kinds of instruments have worked. The focus of this literature review is to learn for the evaluation concept, to understand the drivers and barriers for lead markets and how others have tried to measure market development and impact of supporting policies. In **section 3**, we develop the **quantitative indicators** to delineate the markets and to demonstrate market developments and wider impact over time. The section will also comment on the data sources and databases best suited for this. **Section 4** develops the **evaluation concept** comprising the classical dimensions of appropriateness (are the right things done?), implementation/co-ordination (are things done rightly?) and effectiveness (what are the impacts?). This section also contains a last chapter with additional specific evaluation questions for three out of the six markets. A last **section 5** suggests two **models to implement the evaluation**, one formulating minimum requirements, a second one being more thorough and ambitious.

The concept was developed within the Inno-Grips project, an early version of this concept had been discussed in a workshop organised within the InnoAppraisal project in December 2008.<sup>2</sup> We are **grateful** to all participants from within the Commission and especially to a group of **external experts** who have provided us with very valuable feedback and suggestions.<sup>3</sup> Of course the authors of this concept are responsible for the content and any shortcomings.

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<sup>1</sup> For some basic considerations on the purposes and conduct of evaluation see among many Miles / Cunningham 2006, Fahrenkrog et al. 2002

<sup>2</sup> Both projects belong to the family of ProInno Europe projects (<http://www.proinno-europe.eu/>).

<sup>3</sup> The experts were from academia: Carter Bloch (Dansk Center for Forskningsanalyse, DK), Bernhard Dachs (Seibersdorf, A), Klaus Rennings (ZEW, D); from the OECD (Michael Keenan, also MIOIR/MBS) and from national policy: Caroline Mischler (F), Graham Boyd (UK), Jari Romanainen (Fi).



## 2 Literature review

The purpose of this literature review is not to give a comprehensive overview on all lead market literature. Rather the purpose is to draw lessons for the evaluation concept of the LMI. There is no literature on the deliberate creation of lead markets, but lessons for our study can be derived on three grounds. The chapter

- 1) discusses the concept of lead markets and how lead markets are defined
- 2) illustrates what determines and influences lead markets
- 3) draws lessons from the *evaluation* of demand oriented concepts to transform markets, which are the most advanced demand oriented policy-mix approaches we know.

### 2.1 Definition of Lead Markets

Beise and Cleff (2004) define lead markets as “regional markets with specific attributes that increase the probability that a locally preferred innovation design becomes internationally successful as well” (p.455). Lead markets are according to Bartlett and Ghoshal (1990) “the markets that provide the stimuli for most global products and process of a multinational company” (p.243). The Commission defines lead markets as the market “where an innovation is first widely used that later becomes successful internationally regardless of where that innovation was invented” (European Commission, 2006).

A key tenet of lead market studies is that the adoption of a particular innovation is not explained by its technical merit alone but also by the ability of countries to influence the adoption decision of other countries (Beise, 2004). At an early phase different countries will present different innovation designs for a given problem based on national conditions and the regulatory context. However, the global success of a technology will depend on a particular country’s lead or leverage effect, which allows it to spread and become dominant over initially preferred alternative designs in lag markets. Thus the design with the highest lead market advantage has the best chance of being successful on a global scale.

The lead market is often not the country where the innovation was invented or where the technology used for it was mainly developed (Beise and Cleff, 2004). For instance the fax machine eventually became a success in Japan, but a similar technology (telex) was adopted in many countries before that. Similarly, despite mobile cellular communication being invented in the 1940s in the US, the technology has eventually taken off in the Nordic countries, particularly in Sweden and Finland (Beise, 2004).

One of the foreseen advantages of lead markets is that firms within the lead market country will obtain eventually a technological lead, become global market leaders and attain sustainable international competitiveness, allowing greater competition and lower prices for users. Finally, lead markets would become attractive investment locations for multinational firms (European Commission, 2006).

## 2.2 Factors characterising lead markets

There are many economic and policy factors contributing to the emergence of lead markets. Beise (2004), partly drawing on Porter (1990) suggests a series of country-specific conditions that increase the chances of a country becoming a lead market.

Firstly, national conditions can trigger lower prices of nationally preferred innovation designs vis-à-vis the designs preferred in other countries (**price advantage**). Price reductions can originate due to cost reductions caused by dynamic and static efficiencies and economies of scale that accrue due to market size and market growth. Price advantages can also be achieved from anticipatory factor prices, namely the factor price differential between the lead market and other countries (e.g. petrol in fuel-efficient cars<sup>4</sup>) and the price differential of goods complementary to the innovation design. Factor price increases in other countries will eventually encourage the adoption of the innovation in lag markets.

Secondly, an anticipation of the needs at a global level and the development of innovation designs that could meet these needs provides an advantage for worldwide diffusion (**demand advantage**). Certain local conditions may explain that users in a particular country are able to early on anticipate the benefits of innovation designs that later on become preferable in most countries (see also Meyer-Krahmer 2004). These conditions can be demographical, environmental or related to higher per capita income, factors that explain the early adoption of particular designs that are later adopted on a global scale<sup>5</sup>. Porter (1990) mentions a certain local circumstances related to geography, climate, natural resource availability, etc. driving the emergence of certain innovation designs (e.g. America's vast road network, or specific demands for Japanese air conditioning due to the particular weather conditions and the specific homes' characteristics).

A third factor is the presence of conditions that increase the perceived benefit of an innovation for users in other countries or that increase the transfer abroad of national demand conditions (**transfer advantage**). Once an innovation is adopted in a given country, demonstration effects can increase the perceived benefit of this innovation in other countries by increasing awareness of the innovation design or lowering uncertainty about the adoption of the new product or process. These demonstration effects are the more likely the more the country has the reputation of having sophisticated users. Some often cited examples are Japanese sophisticated demand of cameras and writing instruments, British advantage in gardening tools, American leadership in popular entertainment, among other examples (Porter 1990). Sophisticated and demanding buyers put pressure on local firms to meet high standards in terms of product quality, features, and service. The presence of demanding buyers would encourage firms to improve and move into newer and more advanced activities over time, thus sustaining competitive advantage. Finally, multinational companies can act as strong transfer mechanisms through the activities of their foreign subsidiaries. Strongly related to this is the tendency of domestic manufacturers to incorporate foreign market preferences

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<sup>4</sup> Higher fuel prices in Europe are determinant in the more successful adoption of fuel-efficient passenger cars in Germany vis-à-vis US and Japan (Jacob et al, 2005). Europe, while trying to reduce pollutants, was more interested in increasing fuel efficiency than US or Japan. This and the specific European context induced specific innovations such as diesel technology. In the US however, the diesel engine clashed with environmental preferences as they generated up to three times more emissions than gasoline engines.

<sup>5</sup> The technology for liquid crystal displays (LCD) was originated as early as the 1960s in US and European universities as well as electronics and chemical companies that develop liquid crystals and plasma for displays. However the US and Europe did not find a suitable market for these applications, and military applications were found to be inappropriate. In Japan, however, the need for better displays of Japanese characters gave a suitable market for these applications (Kawamoto, 2002).

during the development of innovations increases the likelihood of a country becoming a lead market (**export advantage**).

Finally, a higher degree of competition between domestic companies may help discover superior designs (**market structure advantage**). Domestic rivalry helps build awareness of the industry, educate consumers and can also enhance foreign demand (Porter, 1990), especially if competition in the market is international. A market characterised by a high level of competition thus is more likely to give rise to a design that is the best possible design not only domestically but also internationally. Higher domestic competition is more likely to reveal latent and more demanding preferences (European Commission, 2006).

Beise (2004) studied the lead market factors in Nordic countries in relation to the case of mobile telephony. A globally dominant design, GSM within digital cellular telephony, dominates internationally since the end of 1990s and two companies, Ericsson of Sweden and Nokia of Finland, came to dominate the mobile cellular telephony equipment market in infrastructure and hand-phones respectively. The Nordic countries offered a mass market for mobile telephony, large mobile networks and lowered operating cost due to subsidies and other features (price advantage). The Nordic countries also appear to have a large demand for communication, possibly due to the low population density in these countries. GSM also possessed important transfer advantages such as the international roaming and its non-proprietary status. The presence of competing mobile telephone service providers in Sweden and Finland and the export orientation of Nordic countries also played a vital role in the success of mobile cellular systems

#### *Some differentiation in environmental markets*

Jacob et al (2005) note that in the case of environmental technologies there are additional factors at work, due to the particular context in which environmental innovations are developed. This is illustrative for understanding the meaning of policy and regulatory framework (and thus for an evaluation concept for the LMI), as technical environmental innovations tend to be ascribed to governmental (or NGO) activities and they are stimulated by promotional measures or political intervention in the market. Because of high entry or switching costs and long term return on investments, it is argued that policy measures are even indispensable to stimulate certain innovations and to support their diffusion<sup>6</sup>. Hence beyond advantages related to prices, demand, transferability and export infrastructure, environmental regulation and further support measures are key factors for environmental lead markets. Another differentiating factor of environmental innovations – making them prone to lead market developments – is that they provide solutions to environmental problems that are generally encountered worldwide, thus they are more likely to be adopted in global markets (Jacob et al, 2005).

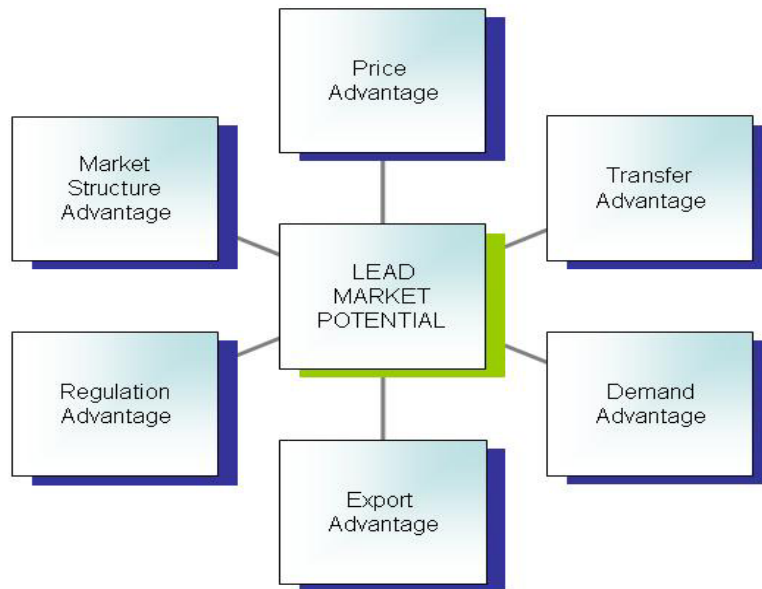
Since the innovation and the diffusion of environmental innovations is stimulated and supported by policies, it is relevant to enquiry on the circumstances around the adoption and diffusion of policy measures. The more countries are able to set the trend for international regulations through their own regulations, the more likely innovations developed to meet

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<sup>6</sup> Particularly the role of NGOs proved instrumental in the emergence of a lead market for the use of natural gases (HCs) as alternative to CFCs in domestic refrigerators in Germany. Greenpeace Germany started to work with a small producer, in collaboration with a university institute, to develop a prototype of a refrigerator that employed HCs. Big manufacturers resisted at first but eventually adopted this technology (e.g. Bosch-Siemens) at home but also at their foreign production sites. HCs are now the dominant chemical for refrigerators in Northern Europe.

those regulations at home are demanded abroad. For this reason Beise and Rennings (2005) extend the lead market model in the case of environmental innovations to include the role of regulation. A country has a regulation advantage if the legal framework allows companies to plan on a mid- and long-term scale and at the same time exerts pressure on firms to come up with innovative ideas (Rennings and Smidt, 2008).

**Figure 1: Summary of lead market factors**



**Source: Beise (2004), Beise and Rennings (2005)**

*Policy diffusion as one element of lead market development*

Jacob et al extend the economic lead markets model to understand policy innovations. They argue that some of the lead market factors can be applied also as hypothesis for the international diffusion of environmental policy innovations. For instance the demand for environmental standards in a particular country can act anticipating a global trend. Consumers considering environmental problems in certain countries may legitimise certain policies that are subsequently diffused to other countries, e.g. nature and animal protection policies. Multinational enterprises have also a key influence in the international harmonisation of standards. Transfer advantage can also take place by means of demonstrating the political, technical and economic practicability of policy measures. In this context, some countries (e.g. Scandinavian countries) have proven to be pioneers or trend-setters in environmental policies, their solutions being systematically adopted by other countries. Jänicke (2005) argues that pioneer countries in environmental policies are those with a high domestic capacity for environmental policy-making, encompassing institutional, economic and informational framework conditions as well as a relative strength of the green advocacy coalition.

Competition (advantage) can also take place in relation to competing policy measures, for instance in regulatory regimes within federal structures. Jänicke (2005) considers that regulatory competition in the field of environmental protection can contribute to create first-mover advantages for national economies. Finally, efficiency criteria in the adoption of policy innovations can be related to price advantages in the diffusion of policy measures.

Policy diffusion takes place by means of policy learning, via supranational institutions, organisations, or expert-networks. Jacob et al (2005) establish a relation between the innovation and diffusion of environmental policies and the innovation and diffusion of technologies. Indeed, there are several main diffusion scenarios. Firstly, an environmental policy innovation in a particular country can lead to a technological innovation which diffuses if the policy innovation also diffuses (e.g. catalytic converter technology in cars). In a second scenario, environmental technologies induce a political innovation, the diffusion of which stimulates the diffusion of the technology (e.g. wind energy in Denmark). Alternatively, the national policy induced technological innovation diffusion may encourage the diffusion of the policy innovation. A technological dominance scenario can also occur whereby the diffusion of an innovation in environmental technology leads to political support nationally and internationally (e.g. combined heat and power in industry).

The causal direction is therefore ambiguous: technological innovations may be induced by environmental policies and technological innovations may lead to the advancement of environmental policy. Further, innovation effects cannot be attributed to a single policy instrument. Different regulatory designs may be even in competition with each other. In any case, we must not neglect the policy diffusion dimension of the lead market development and of the LMI in particular<sup>7</sup>.

All the above are consideration made in the literature on environmental policy or technologies. This should not indicate that those areas are radically different when it comes to lead market considerations, it simply reflects the focus in the literature. However, this focus at the same time is an indicator for one important pre-condition for lead market: in general, the initiatives are linked to or driven by societal needs that are widely shared, they do not start off with the economic rationale, but the societal rationale

### **2.3 What have we learnt from empirical studies?**

The lead market literature has mainly engaged with the identification of existing lead markets, the likelihood of a lead market in particular product or technology markets and the lead market potential of countries. The literature does not shed much light however on the issue of assessing and monitoring an intervention directed at creating lead markets (see below for the assessment of some demand oriented policy elements, mainly public technology procurement).

To assess the existence of lead markets and the countries most likely to become lead markets the literature analyses lead market advantages for each country. Beise (2004) argues that the identification of a lead market can be done by means of gathering data on diffusion curves of an innovation in several countries. Jacob et al. (2005) take a slightly different approach and assess functional changes: in order to demonstrate the dominance of Denmark in wind energy technology, they determine the penetration rate of wind energy use, and the use of wind energy as share of total electricity production. Establishing whether a lead market exists is sometimes not straightforward, as Rennings and Smidt (2008) argue for the case of coal-fired power plant technology, with overlapping diffusion curves and different countries presenting different lead market advantages.

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<sup>7</sup> For instance Jacob et al (2005) note the legal and regulatory barriers for the adoption of CFCs alternatives in domestic refrigerators in the US. The risk of accidents due to higher flammability of HCs is a source of concern due to potential financial claims and product liability insurance costs. US refrigerators are larger and have automatic rather than manual defrost systems, leading to higher safety requirements. It is also more difficult to meet the mandatory US energy-efficient standards with HC technology.

Clearly, this is only possible as a post-hoc analysis of already established product types (see boxes at the end of this section). For totally new innovation ideas, the challenge is to assess whether lead markets are possible in particular product markets and what country has the highest potential to become the lead market (Beise, 2004). A lead market may not emerge in all cases. The likelihood will depend on the degree of variety of market conditions. In situations where preferences in different countries are too different or too similar, lead markets may not occur and several designs may co-exist without one becoming a lead market. Lead markets are more likely to emerge in industries where the internationalisation mechanisms are strong enough to compensate differences in preferences from country to country (Beise, 2004).

### *Lead market potential of countries*

It is not the major purpose of the LMI evaluation concept to re-evaluate if the chosen markets have a lead market potential. Still, it is an important starting point for an evaluation to get an impression of how large the potential in the various markets is and consequently if the lead market initiative itself has contributed to realise it. We follow Beise and Cleff (2004) here, who quantify the lead market potential of countries for particular innovation projects of the truck division of DaimlerChrysler<sup>8</sup>, i.e. they assess the potential of countries to leverage a national innovation success internationally.

As outlined above, there is not one but a range of lead market factors, and they are mainly relative and not absolute variables. A key challenge is to identify quantitative or qualitative indicators that could act as proxies of the lead market components and for which data is available or can be made available. Appropriate data along those indicators for the lead market factors and their components would then have to be collected for each country.

Some lead market factors are easier to quantify than others. For instance, **transfer advantages** are problematic to quantify. Apart from the reach of multinational firms (which can be defined and described by direct investment data), issues such as reputation can only be assessed by polling experts. One potential proxy could be the number of memberships or chair functions in international standardisation committees<sup>9</sup>. For the **demand effect**, trends on demand in the relevant markets in the different countries are needed, whereby 'relevant' signals that markets are defined functionally rather than for product categories: innovations may fulfil a certain function and compete as radical innovation on established product markets. Estimation of **cost reduction** potential can be approximated by market size and learning curve potentials, but the anticipatory price effect of new designs in the end market is more difficult and costly to measure. In relation to the measurement of **export advantage**, export shares and the export import ratios of products that relate to the innovations can be an indication if the relevant product or technology can be captured with existing trade statistics. For the **market structure advantage**, indicators to measure the intensity of competition could be used such as concentration ratios, entry barriers or the share of new companies in the market.

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<sup>8</sup> They identify potential lead markets for two ongoing innovation projects for the truck division of Daimler Chrysler in Germany (in the electronics development section). The two projects were the development of a remote diagnosis system (RDS) for modern trucks, and the development of a system that automates a standard truck or lorry (AGV).

<sup>9</sup> See Blind 2008 on the laser market [http://www.optischetechnologien.de/fileadmin/MEDIENDATENBANK/BILDUNG/Hochschule/3\\_v1\\_Blind\\_Standards.pdf](http://www.optischetechnologien.de/fileadmin/MEDIENDATENBANK/BILDUNG/Hochschule/3_v1_Blind_Standards.pdf)

Further to quantifying the lead market potential, Beise and Cleff (2004) reduce the 34 variables into two main components for each lead market advantage, or a matrix of 10 components. Aggregation of different factors into one index to obtain a ranking then poses the problem of how to weight each lead market factor in the total lead market potential index, as each may be of different importance to the lead market potential. There is no theoretical or empirical indication available to establish the weight of each factor. Testing the weights of each lead market factor requires collecting a sufficient number of ex post lead market cases. Beise and Cleff (2004) obtained values of 12 countries (out of 44 countries analysed) using the arithmetic mean of all factor values per country.

#### *Assessment or monitoring of the likely emergence of lead markets*

In relation to the assessment or monitoring of the likely emergence of lead markets, Jacob et al (2005) carry out in-depth studies of cases of emerging environmental technologies, namely photovoltaic, fuel cells for mobile and stationary applications, technologies for the reduction of diesel emissions, technologies for the substitution of paper and the recycling of paper, paints with a reduced content of solvents. In these cases it was still not clear where the lead markets are. The analysis is based on the regulatory framework and the activities of companies in the countries that are the more likely ones to become lead markets. A comparison of the in-depth case studies is done subsequently to determine which policy measures and other factors facilitate the emergence of lead markets.

**The country specific factors** found to be relevant in most cases included: flexible and innovation friendly policy style, level of economic performance, intensity of competition and integration into the world market. A further, obvious key factor is also the international dimension of the environmental problem. Public agencies and multinational firms also play a prominent role for the establishment of lead markets in the cases analysed, together with other actors such as NGOs and international organisations. In terms of specific policy measures, flexible regulation and linkages between technological and policy innovation appear to be key factors. The policies that were considered more supportive of lead markets were those that allowed a variety of innovation designs, demonstration effects for other countries as well as transferability to other countries. In relation to the first aspect, it is important to avoid favouring a specific single technology in an early stage of the policy process, rather policy makers “should define problems to be solved and assess technological pathways” (Jacob, 2005; p. 248).

In environmental innovations it is important that supporting policies diffuse as well as supported technologies. Thus regulations that are likely to generate lead markets for environmental innovations do not only need to be innovation friendly but should also be easily transferable to other countries – or attractive for other countries. A broad and flexible policy mix, rather than a focus on a single measure, is also needed in order to allow diversity in the development of innovations and to level out the shortcomings of single measures. In this policy mix, Rennings and Smidt (2008) argue that a combination of push and pull policies is necessary in order to establish a lead market position. Furthermore, the policy mix will have to change for each stage of the development of innovations, R&D policy being more important in early stages and support for diffusion in later stages of development, while R&D support is needed for the next generation of technologies (Walz 2007).

## 2.4 Lessons from evaluations of technological procurement and demand side management

In terms of *evaluation* of demand oriented policy measures, the literature is very thin. As said above, there are no explicit, systematic attempts to create lead markets through a policy mix evaluated. Most of what we find is in the area of 'public technology procurement' and 'demand side management' centred on public procurement. There were a range of activities around market transformation, most prominently the Swedish Market Transformation Programmes (Neji 1998; Suvilehto/ Överholm 1998) and demand side management programmes organised via the International Energy Agency (Westling 1996, 2000), but also followed up in some country activities. In a nutshell, those programmes tried to change the demand (and *subsequently* supply) in the markets for energy consuming products towards innovative, energy efficient products.

In contrast to the Commission Lead Market Initiatives the market transformation programmes and the demand side management programme (DMP) were geared towards very specific range of concrete products that are chosen for very specific functional performance reasons. The policy was clearly focused on the societal goal (eco-efficiency), with economic effects and the locus of those economic effects (and subsequent spill-overs) being of secondary importance.

The demand side management and market transformation programmes were designed as an interactive exercise of user groups (public and private) and suppliers. The major instrument was co-operative procurement bundling private and public demand designed to realise economy of scale for the producers, accompanied by a whole range of further concrete demand measures geared towards the actual end user directly. Those additional demand measures encompassed information and transparency campaigns (all kinds of media), market transparency, support for marketing, labelling and performance standards, active mobilisation of suppliers to support measures, limited demand subsidies for buyers of first lots (to accelerate the learning curve, scale effect and achieve early demonstration effects) and as needed training of users (Suvilehto/Överholm 1998).

In Sweden, those transformation programmes were monitored intensively by the two implementing agencies NUTEK and later on STEM, and monitoring was feeding back to re-engineer the approach (de facto formative evaluations, NUTEK 1994; Lund et. al. 1996; Neji 1998).

The evaluations had in fact three pillars with the following variables (Neji 1998,p. 2, Suvilehto / Överholm 1998):

### 1) Changes in actor's behaviours:

*Companies*: changes in market commitment, such as entry of new firms, development of new models, changes in product lines, R&D, pricing, standardisation;

*Retailers*: number of dealers, changes in stocking patterns, development of new retail channels and patterns;

*Consumers*: awareness of products, willingness to pay.

*Methods to be used*: interviews, consumer billing records, consumer surveys.

### 2) Market development:

changes in product mix, market share, price (with a differentiation for diffusion of existing technologies with price reduction and the introduction of innovations beginning with a price



increase with reduction over time), standards (adoption of those more suitable to the eco-efficiency goal), changes in infrastructure associated to it, technology development  
*Methods to be used: interviews, market surveys, site visits, sales reports, product catalogues*

### 3) Technology development

Innovation and product performance (e.g. increased energy efficiency across the market, increased life time, spill-over effects in complementing or competing technologies), accelerated introduction and diffusion<sup>10</sup> non-energy benefits, operating costs etc.).

Those various indicators and methods mentioned above were used to measure the impact of the various market transformation programmes. Importantly, they were applied differently for different technologies and transformation programmes. But all evaluations used a combination of them and all applied time series. The various evaluations overall claimed considerable success for the transformation programmes, at the same time highlighting the time lag between measures and effects, thus under-estimating the overall effect of the measure.

The self-evaluation of the IEA demand side management programmes also gives some indication as to the evaluation challenge when transforming markets (Westling 2000, p. 14-15):

- Are the various supporting activities built upon sufficient knowledge of current and future demand patterns (who uses for what purpose)?
- Is the support for the selected products (in LMI terms: range of products, functionalities) long term, sustainable and high level in all participating countries (the DSM was implemented in a range of IEA countries)?
- Are accompanying measures in place or supported, as all procurement activity need a thorough check for accompanying activities, mainly on the demand side, such as marketing, awareness building or training (see also Neji 1998).
- Does the concept link up to up-stream, R&D performing actors - if needed – and how would bottlenecks there be taken care of?

Finally, the technology procurement studies within the Innovation Systems and European Integration (ISE) study in the late 1990s (Edquist, Hommen, Tsipouri 2000a) drew some policy lessons. Those are not evaluative in nature, but point towards important dimensions to be considered also for the evaluation of a Lead Market approach with public procurement at its core (Edquist, Hommen, Tsipouri 2000b): Are procurers and other decision makers provided with the incentives and the legal pre-requisites to establish contacts with suppliers in order to learn about the technological possibilities? Do they develop the technological competencies needed to make innovation decisions well informed? Further, Edquist et al point towards the fact that innovation environments are very different between countries and highlight that public agencies and producers in ‘immature environments’ are much less able and likely to conduct innovation procurement. An evaluation concept for a European initiative must therefore take those country differences in the way procurement and the setting of standards and norms are organised into account.

There are limits to the transferability of those approaches and lessons, of course. While the LMI will have to adopt similar principles in terms of impact levels and principle methods, there is one clear difference: all the examples mentioned above concentrated on a limited number of clearly specified products. Thus they could be traced on the basis of established trade and marketing statistics. The concrete area for innovation to be triggered was defined,

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<sup>10</sup> In fact the most important benefit of the Swedish programme has been the acceleration of the innovation cycle by 5 to 7 years (Neji 1998, p. 4).

often specifying concrete products, and the programme was about diffusion of those innovations and further improvements along similar lines. In contrast, the LMI concept targets 'broad market segments' and thus the effects and the direction of the effects in terms of technologies are much less clearly defined. Therefore, the LMI must be able to monitor technologies that serve the same or improved functions within the lead markets, but may be radical innovations or come from other economic areas. One of the greatest challenges therefore is to find indicators that are able to cover new actors, new technologies, new products in the selected markets.

What the evaluations of those programmes teach us, however, is the importance of the interplay of dimensions (market, actors, technology) and the multiple impact (economic, societal). The evaluations invested much in the measurement of the societal effect (energy values, life cycle, ripple effects to other related areas). They defined success factors for the programmes that the mix of instruments was tailored towards the specific product and its performance context. This meant, for example, to take into consideration the degree of novelty of an innovation and thus the need to build awareness, show demonstrators, train users etc.

#### *The Assessment of the impacts of standards*

In the last few years, the issue of regulatory impact assessment (RIA) has become very attractive, in particular among European policy-makers. In contrast to the longer tradition of impact assessment of public activities in research and development (see the overview of tools in Fahrenkrog et al. (2002) and Ruegg and Feller (2003)), regulatory impact assessment is a policy evaluation mechanism which has a long tradition only in the USA (OECD 1999). The growing interest in RIA in other countries, especially in Europe, reflects inter-related developments emerging over the past few years (OECD 2003). First, within a framework of tighter governmental budgets and stronger international competition, policy-makers involved in regulatory policies are being held more accountable for the significant economic resources, as well as the political capital invested in regulatory management systems now established in most OECD countries. Second, there is a growing interest in exploring how regulatory policies can be more evidence-based and supported by empirical findings. More evidence-based approaches to the assessment of regulatory quality allow a review of the effectiveness of policy tools used in practice, a review of their performance, and an improvement of the design and implementation of future policies.

Regarding the impact assessment of standards, two separate traditions of impact assessment have to be considered. Although we can observe a long tradition especially of ex post evaluation of R&D programmes (Fahrenkrog et al. 2002; Ruegg, Feller 2003), the evaluation of standardisation processes or standards themselves is a rather rare and only recent phenomenon in the United States (Tassey 2003), where standard impact assessment is part of RTD evaluation, because of the assumption that standards are part of the technological infrastructure, which is provided by public institutions (e.g. the National Institute for Standards and Technology (NIST)).

The main reason for the general lack of experience and activity in other countries is due to the fact that most standardisation processes in other countries are mainly driven by industry initiatives, which are neither ordered nor funded by public institutions. Therefore, there is no legitimisation from the public perspective to conduct impact assessments, since the formal standardisation bodies have just a mediator or platform function (i.e., they do not actually develop standards; this is done by the members of the respective working groups in charge). Consequently, a performance assessment in the sense of an ex post impact assessment should

only concentrate on the correct performance of the standardisation process, but not on the performance of the standards themselves. However, companies active in both informal industry consortia and formal standardisation bodies may try to assess the impacts of their activities both ex ante and ex post, to increase the efficiency of their resources spent and their strategies developed. In several European countries, like Germany, we have observed a strong decline in participation in, and of resources spent on, standardisation activities since the 1990s (e.g. perceived by national standards development organisations). This may be an indication of a – at least perceived – restricted positive impact of standardisation activities.

However, the impacts of European standards gain in relevance especially if they are integrated into the regulatory framework via the New Approach, which links them to European framework directives. Despite the establishment of the New Approach more than 20 years ago, European standards did not receive the necessary attention in the area of (regulatory) impact assessment. This misrepresentation is confirmed by the neglect of methodologies to assess the impacts of standards in the RTD Evaluation Toolbox published by Fahrenkrog et al. (2002)

Three different studies applying different methodologies to assess the impacts of ICT standards can be found in Blind (2006b). The comparison of the three methodological approaches reveals a very complementary relation between them. Table 1 summarises the findings and include some further options not covered in the three exercises. However, the strong complementarity among the approaches calls in general for a comprehensive approach, which combines different methodologies to assess the impacts of standards.

**Table 1: Options of Methodologies to Assess the Impacts of ICT Standards**

	Case Study at Company Level	Survey	Econometric Study
Degree of exactness	quantitative or qualitative	qualitative	quantitative
Impact dimensions	cost turnover profit	company-specific market-related social	growth trade market concentration
Types of standards	proprietary consortia formal	proprietary consortia formal	formal

### 3 The definition of the six markets

The delineation of markets for Lead Markets rests on two pillars. First, more traditionally, we can derive existing indicators and proxies for the definition of the six lead markets according to the corresponding industrial sectors or product classifications. This poses the challenge that the defined six lead markets do not nicely correspond to the established classifications such as the European industry classification NACE, which requires the development of new and rather differentiated approaches.

The second pillar is a definition of the market and its suppliers through the demanders and other actors associated with the underlying societal need. By definition, lead markets are about innovations to satisfy certain societal needs. The technological or procedural solutions may be developed by actors that are located in other market segments than those we would expect based on traditional, backward looking classifications. Therefore, the traditional approach needs to be open to dynamic changes.

We suggest, as a principle rule across all markets, for the delineation of the markets to include a survey (adapted to the specific conditions in the lead market areas) of demanders (e.g. public procurers). To identify the buyers is rather straightforward, as they are directly linked to the (societal) need defined in the lead market. In addition, using key word searchers the procurement database TED can be scanned in order to identify public procurers and at the same time the winning companies in related bids (TED contains for some tenders the name of the successful firm only).<sup>11</sup>

#### 3.1 eHealth

In the eHealth Taskforce report 2007 (p. 10) composed in preparation for the Lead Market Initiative, the eHealth market is defined as comprising following four interrelated major categories of applications:

1. Clinical information systems
  - a) Specialised tools for health professionals within care institutions (e.g., hospitals). Examples are Radiology Information Systems, Nursing Information Systems, Medical Imaging, Computer Assisted Diagnosis, Surgery Training and Planning Systems.
  - b) Tools for primary care and/or for outside the care institutions such as general practitioner and pharmacy information systems.
2. Telemedicine and homecare, personalised health systems and services, such as disease management services, remote patient monitoring (e.g. at home), tele-consultation, tele-care, tele-medicine, and tele-radiology.
3. Integrated regional/national health information networks and distributed electronic health record systems and associated services such as e-prescriptions or e-referrals.
4. Secondary usage non-clinical systems
  - a) Systems for health education and health promotion of patients/citizens such as health portals or online health information services.
  - b) Specialised systems for researchers and public health data collection and analysis such as bio- statistical programs for infectious diseases, drug development, and outcomes analysis.
  - c) Support systems such as supply chain management, scheduling systems, billing systems administrative and management systems, which support clinical processes but

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<sup>11</sup> For the analysis of impact, such a procurement analysis would be desirable on a global scale as well, however, we lack a database beyond Europe comparable to TED

are not used directly by patients or healthcare professionals. eHealth can thus be said to cover the interaction between patients and health-service providers, institution-to-institution transmission of data, or peer-to-peer communication between patients and/or health professionals; it can also include health information networks, electronic health records, telemedicine services, and personal wear-able and portable communicable systems for monitoring and supporting patients.

The total health sector in the European Union (EU) employs almost 10% of the total workforce and corresponds to almost 9% of gross domestic product (GDP). Due to demographic changes and increasing demand for health services, health spending is rising faster than GDP and it is estimated to reach 16% of GDP by 2020 in OECD countries (Source: PriceWaterhouseCoopers study, HealthCast 2020:Creating a Sustainable Future, 2006). The eHealth industry in the EU 15 was estimated to be worth close to €20 billion in 2006 (Health Information Network Europe (HINE) report 2006 – European eHealth forecast). This figure covers all four areas mentioned above including the ICT infrastructure of organisations belonging to health delivery system, but not the ICT systems and services of the wellness sector.

The components of the eHealth lead markets **cannot be identified** and quantified by making use of the European industry sector classification **NACE**, the product classification **PRODCOM** or the **Harmonised System of the trade statistics**. Regarding the market volume the volumes of public procurement - being responsible for a large share of the four eHealth sectors - above the EU threshold (137 KEURO for central government, 211 KEURO for other authorities) and reported in TED **can be identified by combining a search based on the Common Procurement Vocabulary CPV and keywords**. Besides a rough estimate of the absolute volumes, changes in the volumes can be traced. Furthermore, the **winners of public tenders** can be identified, which are likely to be rather competitive companies in the industry.

On the side of **technology development**, searches in **the European patent applications** databases using again a combination of classification based searches applying the International Patent Classification IPC and keywords describing the four components of eHealth will allow an identification of the technological capacity in Europe differentiated by Member States and even key players in industry and public research. In addition, the related international world-wide situation can be assessed even by relying on the total applications at the European Patent Office. However, it has to be noted that **the publication delay** of applications of 18 month, makes the identification of the development today almost impossible and allows only extrapolations. In addition, several of the mentioned aspects in the four eHealth sections are more **service-related**. Here, it has to be checked whether the brands of these innovative services are often protected by **trademarks** registered at national, but also the European Trademark Office OHIM. Again, a combination of classification and keyword searches allows to identify the situation before the initiation of the LMI and the actual development. Here, the time gap is on average only 6 months. Again, the development of **registrations from companies outside Europe** allows the identification of the relative position of Europe and possible changes during the implementation of the LMI. Furthermore, the main actors in industry can be determined, especially **SMEs** more often using trademark registrations than applying for patents. Since market, trade and employment data cannot be determined by making use of official European statistics, the results of identifying key players in industry and services from the public procurement processes, the patent applications and the trademark registrations can be used to **set up a panel of companies to be surveyed**

during the implementation of the LMI. Although these are only the top companies, their development is crucial for the success of the LMI in this sector.

### **3.2 Sustainable construction**

According to the Report of the Taskforce on Sustainable Construction composed in preparation of the LMI sustainable construction is defined as “a dynamic of developers of new solutions, investors, the construction industry, professional services, industry suppliers and other relevant parties towards achieving sustainable development, taking into consideration environmental, socio-economic and cultural issues.” In order to achieve this general objective, the following activities are necessary, like the design and management of buildings and constructed assets, incl. choice of materials and building performance as well as interaction with urban and economic development and management. As market drivers are identified (a) the rational use of natural resources (energy, water and materials), and (b) the user’s convenience and welfare (accessibility, safety & security, indoor air quality, etc.).

The market segments related to sustainable construction are the following (p. 4-5)

- 1 The residential market
  - 1.1 Renovation will integrate new components and prefabricated products which can be installed and used rapidly.
  - 1.2 Accessibility and flexibility will be significantly improved in dwellings throughout their life cycle for all types of users and ages
  - 1.3 There would be an increased emphasis on energy efficiency, environmental, water, health and safety issues in the selection of materials and structural components.
  - 1.4 The passive house concept will be more and more widespread even in warm climate conditions, as well as the integration of renewable energies.
  - 1.5 Building management systems would enable occupants to control a greater variety of functions for a better comfort (ventilation, air filtration, temperature, lighting, etc.). ICT will facilitate remote supervision and control of appliances, equipment and security systems.
  - 1.6 There would be a growing demand for improving the access to affordable and decent homes and for a more harmonious urban and social mix.
- 2 The non-residential market
  - 2.1 The requirements for improved energy efficiency and the integration of renewable energies would influence both the building structure and its utilities.
  - 2.2 Indoor air quality would be considered as a factor affecting comfort and work efficiency. This will require meeting different needs in terms of heating, cooling, ventilation, lighting and acoustic levels.
  - 2.3 Business premises will more often be occupied by fast growing and changing organisations which will require business-related facility services. Requirements for adaptability and divisibility of the premises will stimulate the development of new structural and system technological solutions, which will be facilitated by the expansion of the wireless data transmission.
- 3 The infrastructure market
  - 3.1 Investment will be assessed on a more strategic approach towards the long term functional characteristics of the infrastructure and the associated life-cycle costs.

All the segments of this lead market encompasses the whole value chain in the construction sector from the ‘physical delivery of a construction asset’ into a ‘culture of services’ and

wants to satisfy in addition a Life Cycle-oriented approach. Consequently, we face severe problems in delineating also this lead market.

The whole construction market in EU-27 employed 13.2 million persons in 2004 (source: Eurostat) representing 7.3% of the total employment and 10% of GDP (see Taskforce Report p. 7). These figures relate to the new construction and renovation of buildings and civil engineering on-site, e.g. they do not cover the manufacturing industry and the downstream services related to construction. The direct employment in the construction materials and building product industry is about additional 2.5 million jobs. Coming back to the division of the lead market, the residential sector represents 46% of the total EU production, the non-residential sector 31% and civil engineering 23%.

Since the lead market sustainable construction is a specific section of the whole construction market and encompasses the whole value chain starting from construction materials, the construction sector itself and numerous value adding services, a **traditional approach of delineating the market by recurring on economic statistics and sector classifications does not work** like in the case of eHealth lead market. Again, public procurement represents a significant share of the construction sector. Consequently, the information reported in the **public procurement database TED** can be used to assess the market volume of sustainable construction conducted by the public sector by combining a search approach based on the **public procurement vocabulary CPV and keywords describing sustainable construction**. In the dimension of technology development, **patent applications** covering the above segments of construction can be identified via the International Patent Classification. The subgroup of sustainable construction patents can be identified by a sophisticated key word analysis. In addition, **trademark registrations** in the construction sector including related services can be used to identify existing, but especially new companies, but also products and services, which focus on sustainability, by applying sophisticated keyword analyses and consecutive registration specific analyses.

Based on these database sources a sample of leading edge companies can be identified and surveyed in order to determine their economic development and the relevance of the LMI.

### 3.3 Protective Textiles

According to the report “Accelerating the Development of the Protective Textiles Market in Europe” by the Taskforce on Protective Textiles, “the market for intelligent personal protective clothing and equipment (PPE) comprises clothing and other often textile-based systems and accessories whose main function is to protect the user”, being defence personnel and military forces engaged in wars or in terrorist attacks, emergency services exposed to health and safety risks, or labour forces active in hospitals or manufacturing environments e.g. exposed to emissions of bacterial contamination. The report highlights that in addition to the manufacturing of the products, a significant part of economic value creation in this market is related to services e.g. focusing on professional maintenance and care of the products being necessary for their effectiveness.

According to Euratext ([www.euratex.org](http://www.euratex.org)) the responsible industry confederation, the size of the EU market for PPE products is approximately 8 billion euros. Around 200,000 jobs are directly or indirectly related to the PPE European industry. The turnover of services related to PPE in the EU is estimated at 1.5-2 billion euros realised by 35.000 to 40.000 employees. The future market growth is supposed to be more than 3.5% per year, whereas the extra-EU

market will even grow faster opening opportunities to increase EU exports up to 50% in some specific export markets.

In addition, potential spill overs to non-wearable interior textiles (for buildings or transport vehicles) and consumer products (such as garments for sports, outdoor wear or fashion) is mentioned, but not quantified.

The market for PPE **cannot** be delineated by traditional international statistical classifications, like **NACE or the Harmonised System of the export statistics**. The reported figures are generated by Euratext. However, for an objective evaluation of the LMI in this market, it cannot be relied of market figures of the concerned industry confederation. Regarding the market volume the volumes of public procurement - being responsible for a large share of the PPE - above a certain threshold and reported in **TED** can be identified by combining a search based on the **Common Procurement Vocabulary CPV and keywords**. Besides a rough estimate of the absolute volumes, changes in the volumes can be traced. Furthermore, the **winners of public tenders** can be identified, which are likely to be rather competitive companies in the industry. On the side of technology development, searches in the **European patent applications** (database using again a combination of classification based searches applying the International Patent Classification IPC and keywords describing the “protective” dimension of PPE will allow an identification of the technological capacity in Europe differentiated by Member States and even key players in industry and public research. In addition, the related international world-wide situation can be assessed even by relying on the applications at the **European Patent Office**. However, it has to be noted that the publication delay of applications of 18 month, makes the identification of the development today almost impossible and allows only extrapolations. Furthermore, new textiles are often protected by trademarks registered at national, hut also the **European Trademark Office OHIM**. Again, a combination of classification and keyword searches allows us to identify the situation before the initiation of the LMI and the actual development. Here, the time gap is only six months after the end of the previous year. Again, the development of registrations from companies outside Europe allows the identification of the relative position of Europe and possible changes during the implementation of the LMI. Furthermore, the main actors in industry can be determined, especially SMEs more often using trademark registrations than applying for patents. In addition, the **foundation of new companies in the textile market** in general has to be screened and the subgroup of those active in the production and distribution of PPE and related services has to be identified. Since market, trade and employment data cannot be determined by making use of official European statistics, the results of identifying key players in industry from the public procurement processes, the patent applications, the trademark registrations and the foundation of new companies can be used to set up a **panel of companies** to be surveyed during the implementation of the LMI. Although these are only the top companies, their development is crucial for the success of the LMI.

### **3.4 Bio-based products: innovative use of renewable raw materials**

According to the report of the Taskforce on Bio-based Products (p. 1-2) composed in preparation of the LMI bio-based products refer “to non-food products derived from biomass (plants, algae, crops, trees, marine organisms and biological waste from households, animals and food production). Bio-based products may range from high-value added fine chemicals such as pharmaceuticals, cosmetics, food additives, etc., to high volume materials such as general bio-polymers or chemical feedstocks. The concept excludes traditional bio- based products, such as pulp and paper, and wood products, and bio-mass as an energy source.”



In order to provide an overview, the definition encompasses the following market segments (p. 2), for which market analyses have been performed (see Annex of the Taskforce Report):

Fibre based materials (i.e. for construction sector or car industry);

- Bio-plastics and other bio-polymers;
- Surfactants;
- Bio-solvents;
- Bio-lubricants;
- Ethanol and other chemicals and chemical building blocks;
- Pharmaceutical products incl. vaccines;
- Enzymes;
- Cosmetics.

As already conceded in the Taskforce Report, the markets for bio-based products are difficult to estimate. The maximum potential of markets where bio-based products can substitute products based on other raw materials is feasible to estimate. However, the possibilities to estimate markets for new bio-based products are quite limited as in most cases of new completely new markets.

In 2005 bio-based products accounted for 7 percent of global sales and \$ 77 billion in value within the chemical sector, with the EU industry accounting for approximately 30% of this value (See the recent IPTS “Bio4EU” study published by JRC. <http://bio4eu.jrc.es>). This value is equivalent to the labour input of around 120.000 employees.

In contrast to the previous lead markets, the **share of public procurement in total demand is significantly lower** in all of the above listed subsegments. This means that for this market, the market delineation has to be based on the **traditional market demarcation** of the above listed segments related to the NACE. Furthermore, assumptions about the share of bio-based products have to be made like McKinsey & Company did in a study starting with 7% in 2005 and forecasting 10% in 2010 and 20% in 2020. However, these shares have to be differentiated according to the above segments as the rather heterogeneous situation presented in Table on page 3 of the Task Force Report makes obvious.

Regarding the technology demarcation, the **International Patent Classification IPC** combined with a keyword search allows to determine both the absolute number of patent applications by European companies and the relative share of bio-based related inventions in the above market segments can be determined. Furthermore, the world reference can be calculated in order to identify the relative competitiveness. The same approach can be applied by making use of the **trademark** applications. Finally, the company foundations have to be identified in the above market segments. The **sample of companies** identified by the various approaches has to be surveyed in order to identify their turnover, the share of bio-based products and the relevance of the instruments of the LMI.

### **3.5 Recycling: proper and effective waste management**

Since economies grow in general – despite current recessions – further and natural resources are facing increasing shortages, effective and efficient energy, but also waste management becomes a more crucial challenge. Identifying and implementing sustainable patterns of consumption and production are crucial for a sustainable development – not only in terms of energy but in terms of all resources we consume and dispose. According to the report of the Taskforce recycling (p. 1) plays an underpinning role by:

- reducing waste going to disposal
- reducing consumption of natural resources
- improving energy efficiency

According to the Report "Eco-industry, its size, employment, perspectives and barriers to growth in an enlarged EU" published in 2006 by DG Environment and produced by Ernst&Young, the eco-industries sector in the EU has a turnover of around € 227 billion, corresponding to 2.2% of EU GDP. This includes waste treatment (€ 52 billion) and recycling (€ 24 billion). In general, environmental protection expenditures as defined and reported in Eurostat's New Cronos Database were used as the primary source for approximating the turnover from a demand-side perspective. Environmental protection expenditures are defined as "the money spent on all purposeful activities directly aimed at the prevention, reduction and elimination of pollution or nuisances resulting from the production processes or consumption of goods and services. Excluded are activities that, while beneficial to the environment, primarily satisfy technical needs or health and safety requirements." (Source: The Industry Data Collection Handbook). **Environmental protection expenditures are reported** by each member state and cover mainly the sectors related to pollution management activities: air pollution control, waste water, treatment, solid waste management, remediation and clean up of soil and groundwater, noise and vibration control, environmental research & development, public environmental administration, private environmental management and nature protection.

Given their definition, environmental protection expenditures are not relevant and do not exist for resource management activities except for the nature protection sector. Other source data were therefore used to approximate the turnover of the corresponding sectors. For recycled materials NACE code 37 is appropriate. Consequently, **this lead market can rely on economic data available for the NACE code 38.3** and the **environmental protection expenditures** e. g. for waste management. In addition, to the economic delineation of the market for recycling and waste management, the **public procurement database** provides relevant information about the public activities in recycling and waste management. On the technological dimension, the **International Patent Classification** combined with **keyword searches** will provide additional information on specific companies applying patents in this lead market. the same is possible for **trademark** applications. Furthermore, **company foundations** may be another source to construct a sample of companies for a **survey** on their general development and the relevance of the LMI.

### **3.6 Renewable energy: CO2-neutral energy sources**

For this lead market no task force report is available. However, the lead market renewable energy refers "to energy that can be derived from regenerative energy sources like wind, solar, biomass, biodegradable waste or feedstock, geothermal, wave, tidal and hydropower" (Source: [http://ec.europa.eu/enterprise/leadmarket/renewable\\_energies.htm](http://ec.europa.eu/enterprise/leadmarket/renewable_energies.htm)).

According to more precise definition in the European Commission DG Environment report from 2006 "Eco-industry, its size, employment, perspectives and barriers to growth in an enlarged EU" (p. 17), renewable energy is "the production of equipment, technology or specific materials, or design, construction, installation, management or provision of other services for the generation, collection or transmission of energy from renewable sources, including biomass, solar, wind, tidal, or geothermal sources."

According to the internet page, the European renewable energy sector has currently an annual € 20 billion turnover and provides jobs to app. 300.000 people (Source: [http://ec.europa.eu/enterprise/leadmarket/renewable\\_energies.htm](http://ec.europa.eu/enterprise/leadmarket/renewable_energies.htm)). In the DG Environment report published in 2006, renewable energy production realises €6.1 billion (p. 15), whereas according to its trade association, the European renewable energy industry has global turnover of €10 billion (p. 22).

In contrast to the recycling lead market, renewable energy expenditures are not reported in the environmental protection expenditures, but also no NACE code corresponds to the renewable energy sector so far. Consequently, we **have to rely again on the public procurement data reported in TED**, which contains still a high number of public procurement processes, despite the progressing privatisation in this sector. Again, from the technology perspective **patent applications** can be used to identify the trends in the development of renewable energy technologies. **Trademark registrations** are indicators not only for the suppliers of innovative renewable energy technologies, but also of related new services. Finally, **company foundations** in this sector have also to be identified. In summary, these sources have to be used to construct a sample for a survey addressing the development of the leading edge companies in this lead market and the relevance of the LMI..

### 3.7 Summary

In order to provide an overview of the indicators to delineate the six lead markets, the following table summarises the results of the analyses of the previous sections and indicates the level of effort one would have to undertake to get the corresponding data.

**Table 2: Overview of indicators to delineate the lead markets**

Lead Market	Indicators (dimensions; sources, effort: * low; ** medium; *** high)
eHealth	Patent applications (volumes/companies) (EPA, European Patent Office; **) Trademark registration (volumes/companies) (OHIM, Office of Harmonization for the Internal Market; **) Foundation of companies (volumes/companies) (Statistical offices of Member States; **) Public procurement (volumes/ winning companies) (TED; **) Survey among the above identified companies (free to choose) (own survey***)
Sustainable construction	Patent applications (volumes/companies) (EPA; **) <sup>12</sup> Trademark registration (volumes/companies) (OHIM; **) Foundation of companies (volumes/companies) (Statistical offices of Member States; **) Public procurement (volumes/ winning companies) (TED; **) Survey among the above identified companies (free to choose) (own survey; ***)
Protective textiles	Patent applications (volumes/companies) (EPA; **) Trademark registration (volumes/companies) (OHIM; **) Foundation of companies (volumes/companies) (Statistical offices of Member States; **)

<sup>12</sup> A useful entry point on nanomaterials, as a global indicator relating to various of the markets, are patent studies done by the OECD, such as <http://www.oecd.org/dataoecd/6/9/38780655.pdf>

	<p>Public procurement (volumes/ winning companies) (TED; **)</p> <p>Survey among the above identified companies (free to choose) (own survey; ***)</p>
Bio-based products	<p>Patent applications (volumes/companies) (EPA; **)</p> <p>Trademark registration (volumes/companies) (OHIM; **)</p> <p>Foundation of companies (volumes/companies) (Statistical offices of Member States; **)</p> <p>NACE codes of the identified segments (volumes of turnover, export, employment) (Eurostat; *)</p> <p>Survey among the above identified companies (also to identify the turnover shares of bio-based products, which allows a rough estimation of total volumes in connection with NACE-based statistics (free to choose) (own survey; ***)</p>
Recycling	<p>Patent applications (volumes/companies) (EPA; **)</p> <p>Trademark registration (volumes/companies) (OHIM; *)</p> <p>Foundation of companies (volumes/companies) (Statistical offices of Member States; **)</p> <p>NACE code 37 for turnover, export, employment (Eurostat; *)</p> <p>Environmental protection expenditure (Eurostat; *)</p> <p>Public procurement (volumes/ winning companies) (TED; **)</p> <p>Survey among the above identified companies (free to choose) (own survey; ***)</p>
Renewable energy	<p>Patent applications (volumes/companies) (EPA; **)</p> <p>Trademark registration (volumes/companies) (OHIM; **)</p> <p>Foundation of companies (volumes/companies) (Statistical offices of Member States; **)</p> <p>Public procurement (volumes/ winning companies) (TED; **)</p> <p>Survey among the above identified companies (free to choose) (own survey; ***)</p>

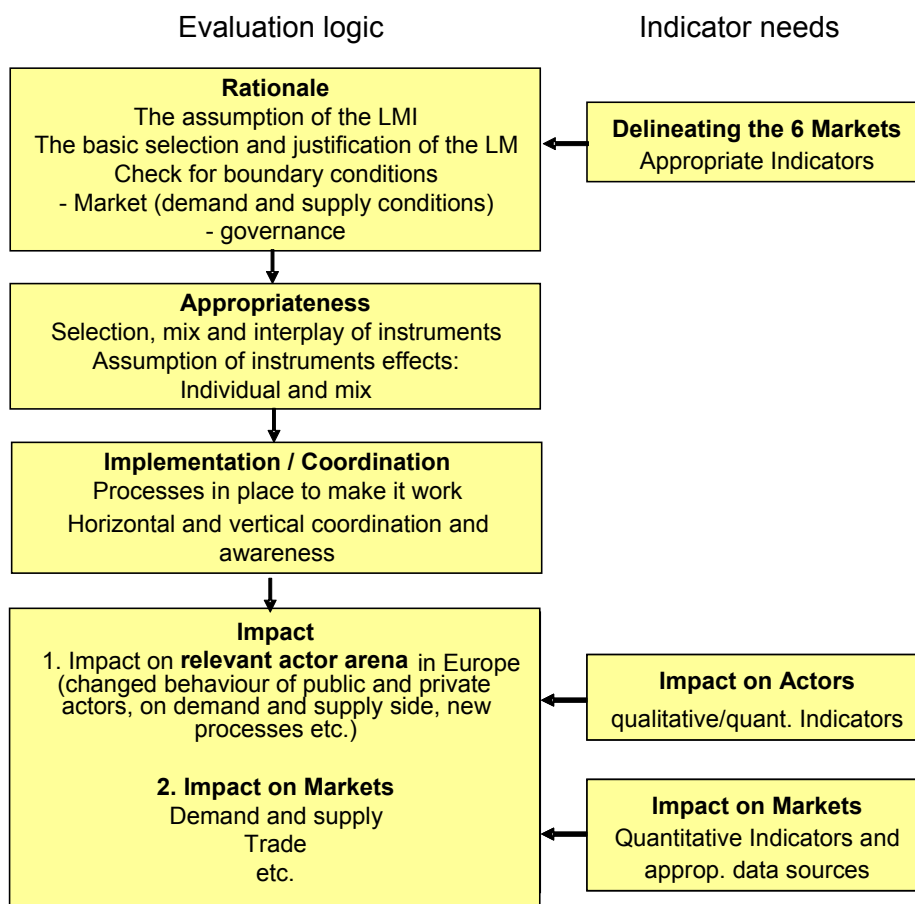
## 4 The Evaluation Concept

### 4.1 Introduction

An overall evaluation has to start with the general framing and rationale. This goes beyond simple indicators, for the concept needs to be formative: besides giving information on the development of markets it must inspire policy-makers and other stakeholders to learn and adjust. As a starting point the evaluation must commence with some basic questions on the overall basic **rationale**. This overall rationale includes the choice of the markets and thus it will build on the delineation indicators as defined above. The evaluation framework then covers aspects of **appropriateness** (are the right things proposed? is the scale right?), **implementation** (are the things done rightly) and **effectiveness/impact**. For the latter, we will use impact indicators, both qualitative and quantitative (as defined above). The below figure provides a graphical presentation of the key evaluation dimensions.

Figure 2 shows the overall logic of the evaluation concept and the needs for clear indicator.

**Figure 2: The evaluation logic and indicator needs**



### 4.2 Overall Rationale

The overall rationale of the Lead Market approach itself is the starting point for the evaluation. The evaluation does not question the basic rationale for Lead Market concepts; the LMI

follows a set of specific high level recommendations as for example put forward by the Aho Report (Aho et al. 2006). However, the evaluation has to begin by understanding the baseline conditions and what potential was foreseen for changing these in the design of the LMI (in effect the specific rationale for the intervention). The effectiveness of the initiative itself must be set in a context of the potential the markets chosen had for lead market development and the appropriateness of the combination of instruments selected to achieve that development.

As for the rationales for the markets, the concept starts with the broad criteria for Lead Markets put forward by the Commission (EU COM 2007 p3); those criteria can be checked through a set of evaluation questions:

- Driven by societal demand instead of technology push
  - What is the market *potential* in those markets that would satisfy the societal need?
  - What are the barriers for demand (public and private) to realise: Are these only on the demand side, or also on technology side? *previous consultations, interviews, firm panel, procurement panels?: information on barriers for diffusion*
  - Within demand conditions: did the concept and its implementation capture all the relevant ones (e.g. acceptance of new technology, awareness about the skills needed to use it, complementary, spectrum of motivations of all stakeholders etc.)?
- Strategic societal and economic interest
  - Can we demonstrate high level of societal interest and relevance: See *consultation, policy papers, market analysis*
- Added value of prospective, concerted and targeted, but flexible policy instruments:
  - See appropriateness below
- Broad market segment and 'No picking of winners'
  - Does the concept successfully avoid specifying the technology / product too narrowly, is innovation competition guaranteed? *Check legislation text, procurement tender texts across Europe (functional specification), standardisation*

Next to the criteria set out in the LMI, the evaluation has to test these criteria against those defined in the Lead Market literature (see also literature review). We summarise here the key factors that underpin the established definition of Lead Market as discussed in section 2 (Meyer-Krahmer 2004, Porter 1990, Jacob / Jänicke 2003; Beise et al. 2003), and we **add a set of key evaluation questions** along those dimensions:

- High tendency for a (quick) acceptance of innovations (demand advantage, transfer advantage):
  - Is the LMI focused on areas with a track record or future potential for quick diffusion in Europe?
  - Has the LMI and its instruments contributed to a better innovation culture in the public and private sphere and thus to quicker diffusion?

- Critical mass of demand (within Europe *and* potentially abroad)
  - What is the critical mass of demand in the markets?
  - How fragmented are the markets at the beginning of the initiative?
  - Does the LMI contribute to creating uniform, bigger and harmonised markets across Europe by enabling bundled demand and economies of scale (leading to price advantage)?
- Good framework conditions for rapid learning and adaptation processes for suppliers
  - Are the market characterised by suppliers and supply chains with a high level of innovation activity and adaptability?
  - Does the LMI contribute to a better innovation capability and readiness with suppliers?
  - Is there a significant level of competition?
- Pioneering regulations
  - Does the LMI provide for regulations that are demanding and forward looking and give example for other countries (transfer advantage)?
- Adequate technological and productive competence in the entire valued added chain and supporting services:
  - In the six markets, does the production structure in Europe have already a relative advantage?
  - Does the LMI through spurring demand and improving regulation contribute to an improved production structure?
- Specific, innovation-driving problem pressure (or high significance of clear political goals)<sup>13</sup>
  - Are preferences, habits, and long term societal goals outside Europe sufficiently similar or converging (demand advantage)?
- High per capita income and/or low price elasticity
  - Has Europe in the areas chosen a history of quick adoption, if so, where? This criterion is of a special importance for radical innovations with a significant hike in the entry cost?

The evaluation needs to discuss **for all six markets** how these conditions are met or can be created through the LMI itself. Any apparent deviation from those characteristics in the Markets chosen should then be investigated further. The purpose of this discussion is to assess how realistic the assumptions to create a Lead Market in the first place have been.

For a given innovation being stimulated by the LMI, there will be issues of positioning and timing within the innovation cycle. For example a radical innovation during the lifetime of the LMI might mainly be going through successive generations of improvement in the light of user feedback, emphasising perhaps the Complementary Actions for innovation support and the pull-through aspects of Public Procurement. On the other hand where the innovation is more incremental and the main challenge is diffusion it is likely that there will be a greater

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<sup>13</sup> As outlined in the literature review, Beise et al. (2003) show that the probability to release innovation dynamics into the market increases when policy goals are set and pursued that are forward-looking and ambitious on a world-wide scale. The call to support innovations which have worldwide market potential naturally raises the question whether the state can recognise such innovations and trends (Beise 2001, p. 255), whether it can 'back the right horse'. The connection to global trends, to global problem pressure is a fundamental condition here.

emphasis on measures for Regulation and Standards. The evaluation will need to be configured appropriately.

### **4.3 Appropriateness**

In a second step, the evaluation needs to test the assumption on the appropriateness of the instruments used. Does the mix of policy instruments used support the creation of a Lead Market as defined above? Again, the starting point must be the claims the LMI concept itself posts:

“The added-value of the initiative is about developing a prospective, concerted and focused approach of regulatory and other policy instruments. In the identified markets, a single policy measure could not succeed in removing major barriers that block the emergence of strong demand. The barriers identified are such that only a combination/ coordination of different public measures and incentives can make a difference. As a result, the cost of bringing new products or services onto the market will be reduced, market access is improved and aggregation of demand is catalysed. The cost of public coordination efforts undertaken in a specific LMI is justified if it compensated by such market gains” (EU COM: <http://ec.europa.eu/enterprise/leadmarket/leadmarket.htm>).

The evaluation needs to ask how appropriate those instruments were in the selected six markets. Again, in choosing public procurement, standards/norms, other legislation and Complementary actions the concept is very close to the Aho Report recommendations for a policy mix to create Led Markets (Aho et al.2006, p. 6).

#### **4.3.1 Overall orchestration of the instrument mix**

In a variety of areas the concept of “policy mix” has been gaining ground, based upon the observation that policies and their instruments interact with each other, creating on the one hand the potential for synergies and on the other the need to avoid where possible policies which offset the benefit of each other (for example a fiscal incentive has less impact if the overall level of taxation is reduced).

There are also consequences for evaluation. For LMI the main challenge is that the individual initiatives may be the responsibility of different actors, responding to different governance structures. Evaluating them independently may neglect the potential for detecting the interactive effects described above. In the realm of innovation policy the normal way in which this issue is addressed is to carry out system level evaluations which look at the effectiveness of the instruments synchronously and with a view to detecting systemic failures, for example of linkage. Thus, we would look at the overall policy mix just as well as the (necessary) changes of governance structures themselves.

When looking at empirical analyses of lead markets or market transformation, one example is the mix of demand and supply side measures being applied. The evaluation concept therefore needs to ask:

- Are demand measures enough, are the bottlenecks for a certain technology also of a technological nature? If so, what is done to overcome them? Equally, are there any second generation issues to be at the forefront of the transition of the future market?

The following sections list the concrete questions to ask in order to understand the potential of the specific instruments to deliver. For each question we hint at the major data needed or method to be applied in italics.



### 4.3.2 Public procurement

- Does public procurement (in the relevant markets) across Europe reflect and translate a societal need, is there a clear link of the procurement specification to the underlying need? (*analysis of tender text and check with consultation process documents, articulated demand*)
- Is there evidence of innovative firms failing to find first user customers on a sufficient scale in the market in Europe? (*supplier survey*)
- Is there evidence that individual markets in Europe are below the level of critical mass required to provide suitable launch conditions for an innovation? (*supplier survey, comparison to suppliers in larger markets, diffusion patterns analysis*)
- What is the level of public procurement in the existing market segment and what is the market share of public procurement in Europe? (*supplier survey (share of public and private buyers), analysis of public procurement data bases*)
- How clearly defined are the barriers for public procurement to demand the innovative solutions in the markets and how well are those bottlenecks addressed? (*interviews with procurers, comparison to objectives in the various initiatives*)
- How big is the potential for catalytic procurement, how different are private and public needs? (*supplier survey, expert interview with business federations and public buyers*)
- If the procurement is catalytic: have the barriers been defined that have hindered the private market to grow quicker? If so, can those barriers be addressed through public procurement? (*supplier survey, interview of key buyers*),
- Have public procurers the capacity and the interest to focus their activities on innovative products and services? (*interviews with public procurers, ethnographic studies of procurer networks*)

### 4.3.3 Standards<sup>14</sup>

Are the proposed European standards adequate...

- for pre-structuring the regulatory framework and increasing its flexibility towards new technologies and innovation relevant for the promotion of lead markets? (*analysis of the drafts of the standards, interviews with stakeholders involved in the standardisation process and companies potentially adopting the standards*)
- for exploiting economies of scale and therefore rapid cost reductions? (*analysis of the drafts of the standards, interviews with stakeholders involved in the standardisation process and companies potentially adopting the standards*)
- for levelling the playing field, which fosters competition in the lead markets? (*analysis of the drafts of the standards, interviews with stakeholders involved in the standardisation process and companies potentially adopting the standards*)
- for generating positive network effects leading to a significant installed base of users in the lead market, which can be transferred to the international level? (*analysis of the drafts of the standards, interviews with stakeholders involved in the standardisation process and companies potentially adopting the standards, collection and analysis of adoption of standards, e.g. by interviews with European, but also international standardisation bodies on sales figures*)
- in open infrastructures (e.g. telecommunication and other network industries) complements of innovative applications and services? (*analysis of the drafts of the standards, interviews with stakeholders involved in the standardisation process and companies potentially adopting the standards*)

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<sup>14</sup> The criteria draw on Blind 2006a

- for transferring domestic (i.e. European) technical specifications to international technical specifications? (*analysis of the drafts of the standards, interviews with stakeholders involved in the standardisation process, international standardisation bodies and companies potentially adopting the standards*)
- for codified consensus between providers and lead users of new technologies? (*analysis of the drafts of the standards, interviews with stakeholders involved in the standardisation process and companies potentially implementing standards*)
- for being used in public procurement to promote innovation and lead markets? (*analysis of the tender documents regarding links to standards, interviews with public procurement organisations*)
- as being complements to governmental regulations? (*analysis of the drafts of the standards regarding links to regulations, interviews with stakeholders involved in the standardisation process, including regulatory bodies*)

#### 4.3.4 Legislation

- What barriers in terms of legislation have been identified? (*analysis of Community Innovation Surveys; interviews and surveys among companies and other relevant stakeholders active in the lead markets*)
- Are there pioneering regulations in place that put innovative pressures on demand and/or supply? (*interviews and surveys among companies and other relevant stakeholders active in the lead markets*)
- Does the regulatory framework allow risk taking, or even promote it? (*surveys among companies and other relevant stakeholders including the demand side (incl. public procurers) active in the lead markets*)
- Are the proposed legislations generating incentives and opportunities for companies to invest in R&D and to introduce new products and services? (*analysis of legislations, interviews and surveys among companies and other relevant stakeholders active in the lead markets*)
- Do the proposed regulations produce additional development, compliance, labour and material costs for the companies? (*analysis of legislations, interviews and surveys among companies and other relevant stakeholders active in the lead markets*)
- Do the proposed regulations and the related market approval procedures increase the time to market for innovative products? (*analysis of legislations, interviews and surveys among companies and other relevant stakeholders active in the lead markets, analysis of approval procedures of regulatory bodies responsible for the market access and surveillance and interviews with responsible officers*)
- Do regulations reduce the risks and insecurities for innovative companies? (*analysis of legislations, interviews and surveys among companies and other relevant stakeholders active in the lead markets, interviews with insurance companies*)
- Do regulations allow the demand side especially the public procurers to request innovative products and services from the supply side? (*analysis of legislations, interviews and surveys among companies and other relevant stakeholders, but also public, but also private procurers active in the lead markets*)
- Do regulations reduce the risks and insecurities for pioneering users? (*analysis of legislations, interviews and surveys among companies and other relevant stakeholders active in the lead markets, interviews with insurance companies*)
- Have the regulations the chance to be implemented outside Europe? (*analysis of legislations, interviews and surveys among companies and other relevant stakeholders active in the lead markets, interviews with regulatory bodies abroad, analysis of regulations abroad*)

### 4.3.5 Complementary actions

Issues here concern the extent to which the complementary actions form part of an effective policy mix with the other LMI actions:

- To what extent are the actions in business support and supply-side innovation policy (e.g. funding, advice, networking support, cluster formation) linked to the demand-side policies, for example:
  - Are procurers and regulators present in the governance of larger R&D or innovation initiatives? (*policy process analysis, interviews with key stakeholders and actors of R&D initiatives*);
  - Do skills strategies for the sector anticipate the demands based on current and future societal needs and subsequent future emerging markets? (*interviews with federations, professional bodies, key customers, NGOs as adequate*);
- Have processes been in place to detect potential further demand side barriers that hinder potential demand to realise (such as a general low awareness of the innovation and its benefits, lack of skills, lack of complementarity in infrastructure or equipment)?; (*Interview with key public procurers and private buyers / users, analysis of existing market research in the area (on needs, expectations, barriers), interviews with suppliers about changing user requirements*).

## 4.4 Implementation

In this dimension, the evaluation concept will examine the process of implementing the chosen instruments and coordinating this implementation, horizontally (across different DGs), vertically (between policy levels) and finally between all stakeholder groups at those levels. In other words, this step analysis the management of transition towards action that is conducive to develop the lead market.

### 4.4.1 Overall orchestration of the instrument mix

- Are the measures on a scale appropriate to the size of the market? (*Assessment of the size of the group actually reached or mobilised (through individual measures) and the overall market potential and actor arena. Tracing number and relative importance of participants in the various initiatives*)
- Are the time scales of societal need / problems on the one hand and transition mechanisms and market creation on the other hand congruent?
- Are the relevant policymakers/procurers/regulators aware of what is required of them under the LMI and are incentive structures adapting? (*Set of interviews across Europe, or procurer survey*)
- Are policies being designed with consistency in terms of content and timing? (*Policy document analysis*)
- Are the LMI areas being given priority within the potential support programmes and actions? (*Document analysis and key policy maker interviews*)
- Are businesses in the market aware of the LMI and its actions? (*Supply survey*)

- Assess the horizontal and vertical (Member States) coordination and awareness (*Interview programme with key policy makers at both levels*)
- Assess how different measures at different levels have been coordinated with each other (*Interview programme with key policy makers at both levels, plus document analysis (contradictions, redundancies)*)
- Assess the commitment of industry and other relevant stakeholders (*supply survey, interviews with federations, key suppliers and key private demanders*)

#### 4.4.2 Public Procurement

- Is the initiative fostering the existence of:
  - Best practice groups
  - Training of procurement professionals in innovation practice
  - Exchange and application of guidelines on procurement for innovation
  - Launch of pilot projects and dissemination of findings from the pilots  
(*Document analysis and expert interviews to trace existence and relative importance, procurer survey*)
- To what extent are innovation oriented procurement practices being applied in these markets:
  - Initial technical dialogues
  - Foresight with potential suppliers to create roadmaps and alert procurers to new types of solutions and suppliers and non-conventional suppliers to new opportunities
  - Functional or standards based specifications
  - Use of Most Economically Advantageous Tender (MEAT) assessment criteria for tenders  
(*Text analysis of TED tender documents, procure survey, participating observation of network meetings etc.*)
- In all of the above has the proportion of calls using these approaches increased? (*Text analysis of TED, tender documents, ideally over time*)
- Are there efforts in place to aggregate demand between member states authorities in order to create larger pull-through effect? (*Procurer survey, TED analysis (joined tenders), interviews with networks*)

#### 4.4.3 Standards

- Have the required standards been developed and published? (*Survey of standards published by European and national standards bodies*)
- Have the stakeholders relevant for the success of the lead market development participated in the standardisation process? (*Analysis of the composition of the responsible technical committees*)
- Is the state of the art in science and technology and innovative inputs, incl. IPR, integrated in the standards in order to promote the development of the lead markets? (*Analysis of standards published regarding the references to science, technology and IPR*)
- Do the contents of the standards reflect the innovation and lead market promoting effects of standards? (*Analysis of standards published and interviews with stakeholders able to promote the lead market development*)
- Are the standards coordinated with the regulatory framework in order to promote the development of lead markets? (*Analysis of standards regarding references to regulations and vice versa*)

- Are the contents of the standards adequate for being referenced in public procurement processes in order to promote innovation and the development of lead markets? (*Analysis of procurement documents regarding links to standards and interviews with public procurers*)
- Are the European standards transferred to the international standards? (*Survey of international standardisation processes and related international standards*)
- Are the standards implemented by the companies being drivers for the development of lead markets? (*Analysis of sales figures of standards of European and national standardisation bodies and survey among companies potentially implementing the standards*)
- Are the standards also implemented by the demand side and the relevant public institutions? (*Survey among public institutions including procurement organisations*)
- Are the standards implemented by companies and organisations outside Europe? (*Survey among companies abroad potentially Multinational Enterprises*)

#### 4.4.4 Legislation<sup>15</sup>

- Have the required regulations been developed and released? (*Analysis of regulations published at the European and national level*)
- Have the stakeholders relevant for the success of the lead market development participated in the consultation process before the final publication? (*Analysis of the processes incl. stakeholder involvement leading to the regulations*)
- Is the state of the art in science and technology been taken into account in the regulations in order to promote the development of the lead markets (i.e. enough flexibility or incentives in the sense of the Porter hypothesis? (*Analysis of the regulation documents*))
- Do the contents of the regulations reflect the innovation and lead market promoting effects of regulations? (*Analysis of companies having to comply with the regulations*)
- Are the regulations coordinated with the stock of existing standards and the standards under development in order to promote the development of lead markets? (*Analysis of regulation and standards documents*)
- Are the contents of the standards adequate for being referenced in public procurement processes in order to promote innovation and lead markets? (*Survey among public procurement documents and interviews with public procurers*)
- Are the European regulations transferred to regulations in countries outside the EU? (*Analysis of regulation processes and regulation published in countries being major trading partners with the EU*)
- Are the regulations implemented by companies and organisations outside Europe? (*Survey among companies being located abroad being exporters to Europe and Multinational Enterprises*)

#### 4.4.5 Complementary actions

- Do R&D and innovation support programmes have explicit coordination mechanisms with demand-side measures? (*Policy expert interviews, perception interviews with firms*)
- Are innovative firms in the sector constrained by the supply of technology support? (*Supply survey*)
- Do cluster policies aim to link to the LMI actions? (*Document analysis of cluster policies, expert interviews*)

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<sup>15</sup> This draws on Blind et al. 2004.

- Are competition policies fostering the emergence of lead markets? (*Interviews with competition policy-makers and market experts*)
- Are Green Procurement policies taking note of the lead market aspects? (*Interview with officers at EU and national level responsible for green procurement*)

## 4.5 Impact

### 4.5.1 Introduction: complexity of the impact dimension

As regards impact, there are three important premises. First, we must make sure that we attribute correctly, i.e. that we capture causality and attribution. We cannot assume that market developments are automatically triggered by the LMI measures.

Second, we must differentiate the levels of impact, as there are at least three levels of impact that the concept needs to cover:

- the **actor arena** shaping the market conditions (intermediary actors), i.e. procurers, standard setting bodies and norm setting actors and other regulative bodies in the multi-level setting
- the **reactions of market actors** to improved market conditions and demand signals
- the **market development itself**.

Third, concerning the timescale, given the novelty of the approach, we may not assume to see any significant market development after two years. However, for the first two dimensions, behaviour, attitudes, awareness of intermediary and market actors and adaptation of governance processes.

To measure **impact on markets (in the medium and long term)**, the evaluation concept faces the challenge:

- to define and **delineate these markets** in terms of indicators (how to define the 6 lead markets in terms of data collection) and
- to define **indicators for the market development itself** (absolute numbers of sales, shares, international trade, patents etc.) and to define **the appropriate data sources to collect the data**. Further, it will have to be able to detect weak and early signals.

### 4.5.2 Measuring market impact: indicators and data sources

As the concept covers Lead Markets, indicators will – in principle – have to capture early, weak signals, thus we may need to go beyond turnover and export statistics, and include investment data, patent data, trademark data, company foundation data and data related to the implementation of the policy instruments, like public procurement data (CVP data), regulation data taken from the TRIS database, and data from standards data bases.

Table 3 below lists the set of indicators that are needed to trace market impact for the six markets. It includes both input and output indicators.

**Table 3: Overview of Impact Indicators for the Six Markets**

Market	Impact Dimension	Indicators (Sources, effort: * low; ** medium; *** high))
eHealth	Economic growth Employment International competitiveness Innovation Diffusion of eHealth Health of population Productivity in the health sector	Change in value added and turnover (Own survey; ***) Change in employment (Own survey; ***) Foundations of new companies (Statistical offices of Member States; ***) Exports and imports (Own survey, ***) Research and development (Own survey, FPs, ***) Patent applications (EPO, **) Trademark registrations (OHIM, **) Use of ICT in health ( <a href="http://www.ehealth-indicators.eu">http://www.ehealth-indicators.eu</a> : Use of Computers in European GP practices ; Access to the Internet in European GP practices ; Access to broadband in European EU practices; Storage of administrative patient data in European GP practices; GPs storing any individual patient data; Storage of medical patient data in European GP practices; GPs storing any individual patient data; Computer in consultation room; Using a Computer to show patients any health-related information during consulting routinely; Availability of a Decision Support Software (DSS); Utilisation of DSS routinely access to electronic systems of other health actors: GPs; Access to electronic systems of other health actors: Specialists practices; Access to electronic systems of other health actors: Hospitals; Access to electronic systems of other health actors: Health authorities; Access to electronic systems of other health actors: Insurance Companies; Purposes of electronic patient data transfer; GPs receiving lab results electronically routinely; GPs exchanging administrative data with reimbursers routinely; GPs exchanging administrative data with other care providers routinely; GPs exchanging medical data with other care providers routinely; ePrescribing by GPs in Europe; Telemonitoring by GPs in Europe;.Cross-border medical data exchange ba GPs in Europe; Readiness_Use Gap: Computer availability vs. administrative patient data storage; Readiness_Use Gap: Internet connection vs. transfer of laboratory results; Readiness_Use Gap: Internet connection vs. transfer of admin data to reimbursers; Readiness_Use Gap: Internet connection vs. transfer of medical data to other carers; Expenditure for health (Eurostat, *) Life expectancy (Eurostat, *) Standardised death rates (Eurostat, *)
Sustainable construction	Economic growth Employment International competitiveness Innovation Diffusion of sustainable construction Savings in construction materials	Change in value added and turnover (Own survey; ***) Change in employment (Own survey; ***) Foundations of new companies (Statistical offices of Member States; ***) Exports and imports (Own survey, ***) Research and development (Own survey, FPs, ***) Patent applications (EPO, **) Trademark registrations (OHIM, **) Electricity consumption by households (Eurostat; **)

	Energy savings	Final energy consumption by households (Eurostat, *) Other sustainability indicators (Own survey, ***)
Protective Textiles	Economic growth Employment International competitiveness Innovation Health of population, especially labour force	Change in value added and turnover (Own survey; ***) Change in employment (Own survey; ***) Foundations of new companies (Statistical offices of Member States; ***) Exports and imports (Own survey, ***) Research and development (Own survey, FPs, ***) Patent applications (EPO, **) Trademark registrations (OHIM, **) Injuries: workplace (Eurostat, *)
Bio-based products	Economic growth Employment International competitiveness Innovation Savings of non-renewable or natural resources	Change in value added and turnover (Own survey; ***) Change in employment (Own survey; ***) Foundations of new companies (Statistical offices of Member States; ***) Exports and imports (Own survey, ***) Research and development (Own survey, FPs, ***) Patent applications (EPO, **) Trademark registrations (OHIM, **) Share of bio-based resources in the different sectors (Own survey, ***)
Recycling	Economic growth Employment International competitiveness Innovation Savings of non-renewable or natural resources	Change in value added and turnover (Eurostat; *) Change in employment (Eurostat; *) Foundations of new companies (Statistical offices of Member States; ***) Exports and imports (Eurostat, *) Research and development (Eurostat, *; FPs, ***) Patent applications (EPO, **) Trademark registrations (OHIM, **) Municipal waste generated (Eurostat, *)
Renewable energy	Economic growth Employment International competitiveness Innovation Savings of non-renewable or natural energy resources	Change in value added and turnover (Own survey; ***) Change in employment (Own survey; ***) Foundations of new companies (Statistical offices of Member States; ***) Exports and imports (Own survey, ***) Research and development (Own survey, FPs, ***) Patent applications (EPO, **) Trademark registrations (OHIM, **) Effects of innovation on material and energy efficiency (Eurostat, *) Final energy consumption by sector (European Environmental Agency EEA, *) Primary energy consumption by fuel (European Environmental Agency EEA, *) Renewable electricity (European Environmental Agency EEA, *) Renewable primary energy consumption (European Environmental Agency EEA, *) Total energy intensity (European Environmental Agency EEA, *)

In order to monitor the development of the six lead markets by easy accessible economic data, the following NACE codes could be used to construct rather rough indicators.



## **eHealth**

- 86 Human health activities (86.1 Hospital activities, 86.2 Medical and dental practice activities, 86.9 Other human health activities)

## **Sustainable construction**

- 41 Construction of buildings

## **Functional textiles**

- 13 Manufacture of textiles

## **Bio-based products**

- 21.1 Manufacture of basic pharmaceutical products
- 22.2 Manufacture of plastics products

## **Recycling**

- 38.3 Materials recovery

## **Renewable energy**

- 35.11 Production of electricity

In addition, for some lead markets indicators are available for the international comparison. In the following we list – for sake of illustration – those that are at this point readily available in the various markets, for some markets more investigation in the actual evaluation would be needed.

## **Internationally comparable indicators (for all six lead markets)**

- Patents (WIPO)
- Trademarks (WIPO)

## **eHealth**

- OECD Health Indicators

## **Recycling**

- Municipal Waste (kg/capita) (OECD)
- Recycling (% of glass and paper recycled) (OECD)
- Hazardous Waste (kg/capita) (OECD)
- Nuclear Waste (kg/capita) (OECD)

## **Renewable energy**

- Energy Consumption (tonnes of oil equivalent/capita) (OECD)
- Energy Efficiency (tonnes of oil equivalent/\$1000 U.S. GDP) (OECD)
- OECD KEY ENVIRONMENTAL INDICATORS

## **Sustainable construction**

- This would need discussion with market experts

## **Protective textiles**

- This would need discussion with market experts

## **Bio-based products**

- This would need discussion with market experts

### **4.5.3 Overall orchestration of the instrument mix**

It is very difficult to assess the impact of orchestration independently of the sum of the impacts of individual measures. However, to ensure policy learning an assessment will need to be made of the cross-impacts of the policies. To some extent this can be done at a

conceptual level but the result will need to be validated by the actors involved with the core question being:

- To firms in the market (*survey*): Did you find that policy actions on regulation, standards, procurement and other measures taken together offered greater or lesser benefits than if you encountered the same policies in isolation?
- To those implementing the measures (*policy maker interviews*)- did you find that the impact of your measures was increased, decreased or unaffected by simultaneous activity in the other domains?
- Is competition in the market more based on innovation and differentiation than previously? (*supply surveys, key demanders (survey or interviews)*)

#### 4.5.4 Public Procurement

- Did procurement induce additional R&D expenditure? (*survey, interviews suppliers, key market actors, key R&D performers*)
- Did procurement provide incentives for innovations to be made that would not otherwise have reached the market? (*interview with key innovating suppliers*)
- Are the companies able to apply the products/services/knowledge gained in other markets beyond the initial procurement? Public elsewhere? Private sector? (*interview / survey with successful bidders of public tenders*)
- Has procurement fostered the diffusion of innovations? (*Diffusion analysis, supply survey: certain patterns of diffusion through public and private?*)
- Did procurement foster competition among potential suppliers? (*supplier survey, interviews*)
- Did the procurement actions succeed in aggregating markets across borders such that the innovations were not over-specialised on specific national needs? (*Analysis of tender texts, suppliers survey, procurer survey*)
- Did the innovations enhance the efficiency and effectiveness of the public services that acquired them? (*interviews, case studies: proof for cost – benefit analysis, life cycle calculations, interviews with groups using the public service*)
- Are innovative SMEs obtaining a higher share of contracts? (*comparison of SME winning in bids or involved as sub-contractors compared to other sectors and over time (data hard to obtain), backed up by interviews with procurers and leading suppliers*)

#### 4.5.5 Standards

- Did the standards increase companies' investment in research and development, e.g. by providing flexible framework conditions? (*interviews and surveys among suppliers*)
- Did the standards increase the success of investments in research and development? (*interviews and surveys among suppliers and research organisations*)
- Did standards promote the diffusion of new technologies, e.g. via network externalities in the information and communication technologies? (*interviews and surveys among suppliers including companies implementing the standards*)
- Did standards improve the productivity of companies? (*interviews and surveys among suppliers*)
- Did standards foster the value chains in the lead markets, e.g. regarding efficiency enhancing outsourcing or by providing the platform for downstream markets? (*interviews and surveys among suppliers and relating companies in the supply chain*)

- Did standards foster the competition intensity in the lead market? (*interviews and surveys among suppliers including their intermediate customers and end users, analysis of available economic data on market strictures, like concentration indices*)
- Did standards promote the international competitiveness of the companies, e.g. also by promoting European standards worldwide? (*interviews and surveys among suppliers and analysis of the international diffusion of the European standards*)
- Did standards strengthen the private demand for innovative products? (*interviews and surveys among public procurers and companies implementing products based on the new standards*)
- Did standards promote the innovation diffusing effect of public procurement? (*interviews and surveys among public procurers*)

#### **4.5.6 Regulation**

- Did the regulation provide additional incentives for investment in research and development? (*interviews and surveys among suppliers and research organisations*)
- Did the regulations promote the realisation of the single market and therefore the competition and consecutive pressure being innovative? (*interviews and surveys among suppliers*)
- Are the regulations flexible enough for innovation activities of companies? (*interviews and surveys among suppliers*)
- Did regulations promote the international competitiveness of the companies, e.g. by the so-called Porter effect? (*interviews and surveys among suppliers*)
- Did regulations strengthen the private demand for innovative products, e.g.. by increasing legal security? (*interviews and surveys among suppliers and companies implementing products based on the new standards*)
  - Did regulation promote the innovation diffusing effect of public procurement, e.g. by referencing regulations in public procurement processes? (*interviews and surveys among public procurers*)

#### **4.5.7 Complementary actions**

- Were the complementary actions successful in enhancing the effectiveness of the demand-side policies? (*interviews with responsible policy-makers, and policy addressees (depending on the measure)*)
- Were the complementary policies successful in their own terms in stimulating or supporting innovation? (*interviews with responsible policy-makers, and policy addressees (depending on the measure, the depth and breadth of this analysis depending on the relative importance of the complementary measures)*)

#### **4.6 Evaluating specific markets – additional questions for three test markets**

The evaluation concept and questions outlined above give the general framework that has to be applied for all markets. However, based on the concrete objectives and action plans for the individual markets, there will be specific analytical questions to ask for the various markets. We have captured part of this already when discussing the different impact indicators and data sources for the 6 markets in above. In the following, we illustrate the evaluation questions for three out of the six markets along the four instruments and based on the concrete actions planned with those instruments in the three markets.

**For one of the markets, recycling**, we have also added the methodology and data source in italics to **illustrate specific dimensions for the individual markets**.

#### 4.6.1 Protective textiles – some specific evaluation questions

Table 4: specific evaluation questions for protective textiles market

	<b>Rationale / appropriateness</b>	<b>Implementation</b>	<b>Impact</b>
<b>Overall approach, mix</b> (this is in addition to the Action Plan measures)	Is supply side structure (inter-sectoral, inter-disciplinary cooperation) sufficient for constant improvement and next generation?	Has the LMI integrated accompanying services into the implementation, defining additional advantages to build on?	In addition to the market development impact based on the indicator and survey proposed:  Has the market become more innovation and competition driven ?  Have the actions taken influenced specific context conditions of the defence area (defence procurement, established networks, traditionally more nationally closed markets).
<b>Procurement</b>	Has there been sufficient consultation, sufficient involvement of public procurers in overall design process?	Have procurement networks, awareness measures and internet platforms been set up?  Have there been coordination with national procurement network initiatives (e.g. PIANO in NL)  Have there been provisions within public procurement activities to link up with potential private lead users?	Are procurers across Europe more aware of benefit in proc. innovation? Are procurers more aware of the functionalities of innovative PPE? Have tender texts changed significantly (functional specification, value for money, variants, link to leading edge standards as minimum requirements etc.) Is there increased and upgraded procurement activity also in services related to PPE? Have similar public services across countries coordinated and bundled their demand Are SMEs among the winners, any increase in their share ? SME involvement in supply chains? Has the share of leading edge protective textile products in public procurement increased significantly? Are the products purchased increasingly leading edge?
<b>Standards</b>	Is a stronger involvement of SMEs, in particular from the textile industry, in the development of standards in the area of protective textiles adequate to promote the lead market?	Have standard setting bodies started to upgrade their standards, to demand more leading edge? Are Workshop Agreements more common? Have informal standards for innovative products and services in this lead market been developed and used?	Are EU standards becoming international standards? Have voluntary certifications become more common, and are users better aware?

	Are the acceleration of the standardisation process and the facilitation of informed choices by purchasers and users adequate to promote the lead market?		
<b>Legislation</b>	Are the proposed standards adequate for enhancing coherence in the implementation and enforcement of Community technical legislation laying down essential safety user requirements, in particular in the area of personal protective equipment? Does the EU health and safety regulation have an impact on the innovativeness of the PPE	Any evidence on the enforced implementation of existing legislation (safety regulation, IPR) across Europe?	Are the European regulations been accepted outside the EU? Have producers in Europe made use of improved design registration (link to WIPO)?
<b>Complementary Actions</b>	Is there sufficient knowledge on producer bottleneck and user-producer bottlenecks in interim stage? Overall consultation and set up: user involvement sufficient?	Any support of producer-user interaction ? Has any activity taken place (awareness, marketing, general communication) to pre-actively influence extra-European markets and their readiness to open up and adopt European products? Are trade impediments identified and diminished (WTO/Doha, bilateral)? Has a discourse platform / online information portal for all stakeholders been set up? IF so: online-user survey (producer and user discourse) Has implementation and uptake of FP 7 priority been adequate, do research topics match the needs? Has there been sufficient coordination with Member States (cluster policies) Any considerable activity to improve image of PPR sector with investors?	Is there greater awareness as for need for PPE, greater willingness to pay leading edge premium across Europe? What share of stakeholders are better informed about opportunities, both supply and demand side? Through what channels? Does RTD funding system provide enough support for next generation? Have MS supported clusters? Have financing opportunities been improved, has there been a piloting of innovation platforms?

Methods to be used (and questions above to be allocated accordingly)

In addition to the quantitative market / technology impact assessment based on the indicators proposed:

- Survey: company panel (see market delineation textiles for a definition of the panel), including defence suppliers
- User surveys? Building on existing primary data on safety and risk awareness
- Interviews with key stakeholders and promoters at EU and national level, both civil and defence
- Text analysis of PVC tender texts
- Telephone interviews with key procurers at national and local level
- Legislation and standardisation analysis: screening relevant work and safety regulation and product standards in European countries to check for upgrading and convergence and to create harmonised conditions

#### 4.6.2 Bio-based products – some specific evaluation questions

Table 5: specific evaluation questions for the bio-based products market

	<b>Rationale / appropriateness</b>	<b>Implementation</b>	<b>Impact</b>
<b>Overall approach, mix</b>	<p>Is there enough clarity as to which factors limit the demand (bottleneck for demand) vs. demand <i>as</i> a bottleneck for the market development?</p> <p>Did the concept ensure that improved demand is met with sufficient leading edge supply within Europe?</p>	<p>How effective is the complex horizontal (inter-service) and vertical (EU – MS) coordination. Is their sufficient networking and representation, sufficient transparency regarding the breadth of legislation and measures?</p>	<p>Is there enough awareness and action in all services involved?</p> <p>Have bio-based products been considered in action of the various DGs?</p> <p>Do national policy makers share the need for coordination of their activities ?</p>
<b>Procurement</b>	<p>Is there any need or use for co-operative or catalytic procurement?</p> <p>Has strategic bundling of procurement been considered? Are there any forward commitments considered to send signals to industry?</p>	<p>Have procurement networks, awareness measures and internet platforms been set up?</p> <p>Have there been coordination with national procurement network initiatives (e.g. PIANO in NL)</p> <p>Have there been provisions within public procurement activities to link up with potential private lead users?</p>	<p>Are procurers across Europe more aware of benefit in procuring innovation?</p> <p>Is there sufficient uptake of training and do skills improve?</p> <p>Have tender texts changed significantly (functional specification, value for money, variants, link to leading edge standards as minimum requirements etc.)</p> <p>Have similar public services across countries coordinated and bundled their demand</p> <p>Are SMEs among the winners, any increase in their share ? SME involvement in supply chains?</p> <p>Are bio-based products a priority in Green Procurement Action plans?</p> <p>Has the share of bio-based products in public procurement increased significantly? Are the products purchased increasingly leading edge?</p>
<b>Standards</b>	<p>Are standard setting and labelling. adequate for promoting aggregate demand for bio-based products?</p>	<p>All key stakeholders involved in standards, labelling?</p> <p>Have consultations on potential future standards and labels taken into account the existing national standards and labels and those outside Europe?</p> <p>Have standards/labels for specific bio-based products been established possibly promoted by a mandate to CEN?</p>	<p>Are the standards that are in the pipeline or developed leading edge, does Europe create a demand advantage over competitors?</p> <p>Are standards and labels promoting the demand for bio-based products within and outside Europe?</p>



<b>Legislation</b>	Are regulations adequate to promote the development of bio-based product markets?	How effective does horizontal and vertical coordination for legislation work?	Is legislation across DGs and across MS more bio-based friendly, is there a significant shift towards bio-based in legislation text?
<b>Complementary Action</b>	Are supply side factors considered broadly enough, is awareness and access to finance the only bottlenecks?	What kinds of information campaign activities have been implemented? Is the target group definition co-ordinated between the various services? Is the target group “SME” sufficient? Is awareness analysis done before the campaign? Has the built-up of pilot plants gone forward? What are the potential impediments?	Has the level of awareness among European SME, large companies and consumers on benefit of bio-based products grown?  Have potential lead users (low price elasticity) been made aware to build up scale from the high price end?  Have concrete consultations about demonstrators started? Is there an upsurge of plants?

Methods to be used (and questions above to be allocated accordingly)

In addition to the quantitative impact assessment based on the indicators proposed:

- Survey: company panel (definition according to bio-based market definition), including defence suppliers
- Consumer surveys / market research
- Interviews with key stakeholders and promoters at EU and national level
- Text analysis of PVC tender texts
- Telephone interviews with key procurers at national and local level
- Legislation and standardisation analysis: screening relevant national labelling and regulation for convergence, check for EU level methods.

### 4.6.3 Recycling – some specific evaluation questions

Note: the recycling action plan and Task Force document is less specified than bio-based products and PPE, the specific evaluation questions thus are very general. Note: the recycling action plan and Task Force document is less specified than bio-based products and PPE, the specific evaluation questions thus are very general

Table 6: specific evaluation questions for the recycling market

	<b>Rationale / appropriateness</b>	<b>Implementation</b>	<b>Impact</b>
<b>Overall approach, mix</b>	Does the measure mix meet the needs of the overall LMI, have consultations included demand appropriately? <i>M: Interviews with key stakeholder at EU and national level, private and policies</i>	Are all measures, supply and demand, implemented in a transparent manner, with cross-referencing as needed? <i>M: Interviews with key stakeholder at EU and national level, private and policies</i>	
<b>Procurement</b>	Is relying on a follow through of the green procurement communication enough, without tackling additional bottlenecks? <i>M: Case studies or at least interviews with procurers and suppliers across Europe (green procurement communication not leading edge enough, more about diffusion?)</i>	Have procurement networks, awareness measures and internet platforms been set up, and the more daring nature of LMI as compared to green procurement made explicit? Has there been coordination with national procurement network initiatives Have there been provisions within public procurement activities to link up with potential private lead users? <i>Document analysis and interviews with key actors in procurement networks, major procurers</i> <i>Survey supplier company panel and procurer panel</i>	How high is the level of awareness on the communication? Analysis of diffusion of eco-criteria and targets in tender texts <i>Procurer survey.</i> Are performance requirements part of the tender routine across Europe? <i>Document analysis of tenders in the area (TED), ideally compared to a point in time 5 years ago to see development of relative importance of performance requirements, variants etc.</i>
<b>Standards</b>	Are international recycling and waste standards, e. g. for dynamic performance requirements for recycling processes, or efficient use of natural resources. developed together with international organisations adequate to promote the lead market? <i>Analysis of standardisation processes at the European and international level; interviews</i>	Has relevant standard work been performed and / or a working group at CEN been established and are new dynamic performance requirements in place? <i>Analysis of standards published</i>  Is there effective coordination with bio-based lead market initiative (at EU level)?	Are existing standards tested and improved, and new ones developed? Are these changes leading edge in a global perspective? <i>Interviews and surveys among companies</i> Have the standards performance enhancing impacts? <i>Interviews and surveys among companies</i> Does the EU wide verification system for recycling technologies promote competition leading to an

	<p><i>with involved stakeholders</i></p> <p>Is an EU wide Verification Systems for environmental technologies, with an inclusion of recycling technologies and processes adequate for the promotion of the recycling lead market?.</p> <p><i>Interviews of organisations possible running the Verification Systems and companies making use of the system</i></p>	<p><i>Interviews with stakeholders</i></p> <p>Has a legislative proposal for an EU wide verification system been developed and implemented by the member states?.</p> <p><i>Analysis of the establishment and diffusion of the system based on interviews and document analysis</i></p>	<p>improved international competitiveness? <i>Interviews and surveys among companies, in the long run analysis of the economic data, e. g. trade statistics</i></p>
<b>Legislation</b>	<p>Do the envisaged changes of the Thematic Strategy and the WEEE Directive meet the needs and address the bottlenecks in the sector (consultation) ?</p> <p><i>Interviews with companies and other organisations potentially concerned</i></p>	<p>Have changes in the Thematic Strategy and the WEEE Directive been implemented? <i>Survey among the regulations of the Member States</i></p>	<p>Are the definitions of waste criteria clarified and communicated? <i>Interviews and survey among addressed companies and organisations</i></p> <p>Do stakeholder see improved international trade possibilities following the action on “trade aspects” ?</p> <p><i>Interviews and survey among addressed companies and organisations</i></p>
<b>Complementary Action</b>	<p>Is financing of research the major bottleneck, are other bottlenecks missed?</p> <p><i>Survey companies, consumer and market research (to understand acceptance and ask for further needs/bottlenecks)</i></p>	<p>Is recycling sufficiently covered in national and EU research programmes? Is the CIP sufficient for demonstrators in recycling?</p> <p><i>Expert interviews in academia and corporate research (and / or company survey)</i></p> <p>Has there been consultation with Member States and other stakeholders on the changes of State Aid rules for eco-innovation?</p> <p><i>Expert interviews at national level, policy makers and legislators even</i></p> <p>Have the learning and information tools been established? Do they link up to the standardisation and procurement actors? Do they include information about preferences and regulations in other areas of the world?</p> <p><i>Expert interviews at EU level, national level, policy makers</i></p> <p><i>Awareness check in procurer and supply survey</i></p>	<p>Has the general awareness of domestic and foreign recycling markets and management practices increased?</p> <p>Do European actors learn about export options and dominant design options?</p> <p><i>Export data, supplier surveys</i></p> <p>Are there significant more funds available for related research and development activities?</p> <p><i>Analysis of relative RTD funding for the area at EU (next FP work programme) and national level</i></p> <p>Do Member States implement their new options (eco innovation state-aid)?</p> <p><i>Legislation analysis, policy maker interview</i></p> <p>Has trade intensified, did market shares of European actors in the target regions mentioned increase?</p> <p><i>Trade statistics for key innovative products, supplier survey</i></p> <p>Have European products become global trend-setters, has knowledge on European products spread?</p> <p><i>Export statistics, analysis of specialist market literature and market research reports.</i></p>

Methods to be used (and questions above to be allocated accordingly)

In addition to the quantitative impact assessment based on the indicators proposed:

- Survey: company panel (see market delineation for a definition of the panel)
- Consumer surveys / market research
- Interviews with key stakeholders and promoters at EU and national level
- Text analysis of PVC tender texts
- Telephone interviews with key procurers at national and local level /in this market this seems less appropriate, almost no action foreseen here)
- Legislation and standardisation analysis: national regulation analysis (compliance), telephone interviews with members of standardisation bodies.

## 5 Implementing the Evaluation

In this final chapter we develop some ideas as to an implementation design of an evaluation. It presents the various logical steps with which the LMI unfolds its effects (Logic chart, section 5.1), defines a principle evaluation design (5.2) and finally distinguishes two models following two budgetary options (5.3).

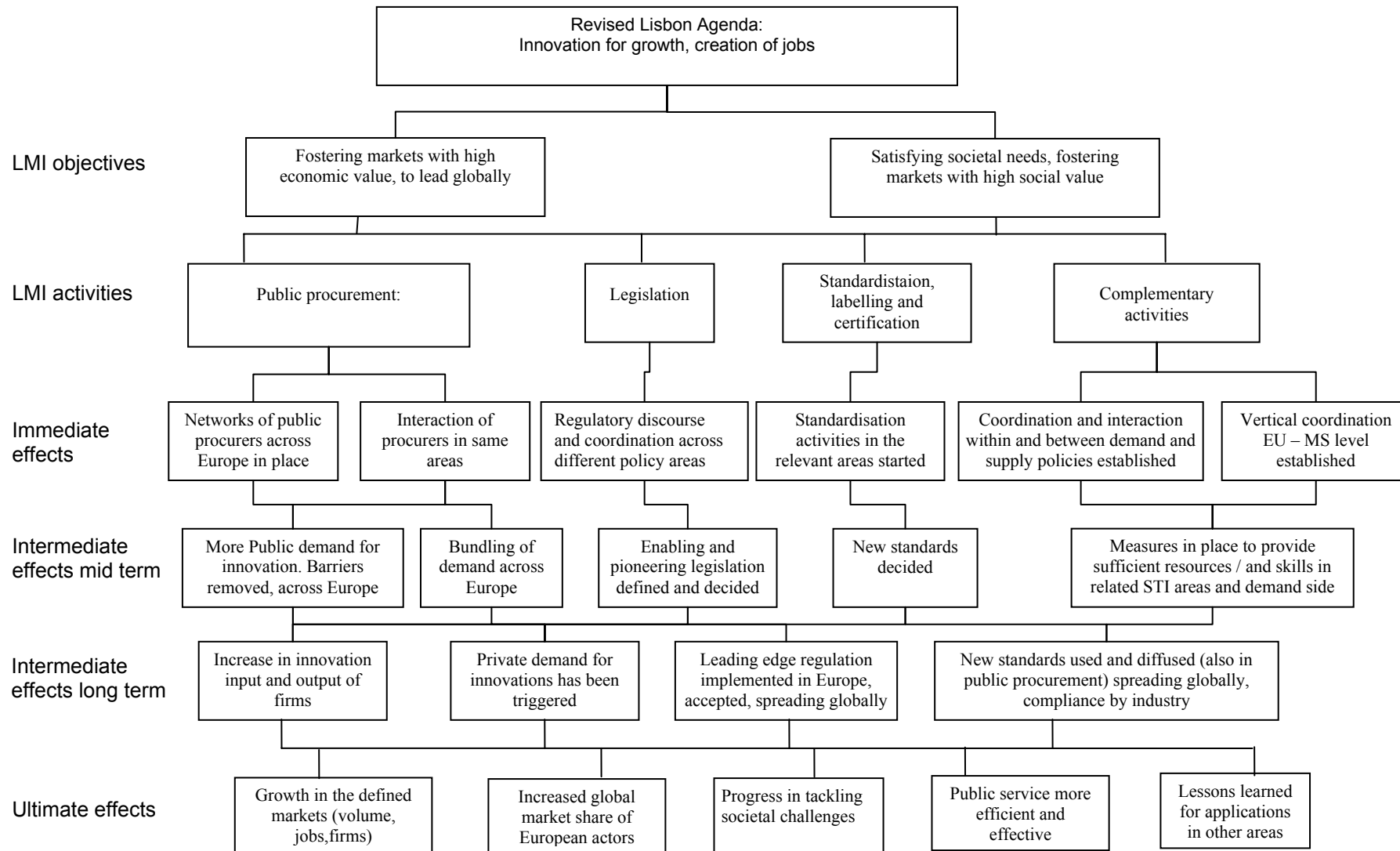
### 5.1 A Logic Chart for LMI

Logic charts are a useful tool both for the design of an evaluation and as a means of assessing the coherence of a programme. Here a basic logic chart is presented in the first context. (Figure 3). This links higher and Programme objectives to the actions taken and the effects. Effects are spread over time, *immediate* being those manifested while the programme/project is under way, *intermediate* those which are evident at the end of the programme/project (sometimes called outputs) and *ultimate* those which are manifested some time after completion (sometimes called outcomes). Logic charts have three roles in evaluations:

- 1) to set out objectives, actions and impacts in a hierarchical structure as a guide to the effects that can reasonably be expected;
- 2) To check the logical consistency of a programme – that is to say whether the actions can in any circumstances achieve the desired effects; and
- 3) To form an agreed basis for evaluation between evaluators on the one hand and those commissioning the evaluation or those being evaluated on the other.

Figure 3 emphasises the need for a phased nature to the evaluation, whereby different phase follow the different stages of effects. During a first phase of implementation it is likely that only immediate and some intermediate effects will be detectable. At the same time, this is the phase in which most formative support is needed. Hence, a plan should be put in place for a more retrospective assessment of LMI, say 5 years from now. This is not budgeted here. Before that time the evaluation can establish the baseline in the chosen markets, assess how well the activities are progressing and what effects they are having, and can produce informed projections about the likelihood of the outcomes being achieved. At the same time it can act as an instrument of learning, feeding back to the initiative and offering the possibility of mid-course corrections and a basis for the design of extensions or follow-ups.

**Figure 3: Logic Chart for LMI**



## 5.2 Basic Evaluation Implementation Design

In moving to implementation it needs to be recognised that the evaluation of the LMI faces two major challenges: First, we deal with six different markets, but one overall rationale and approach, and second, we have at least three different organising principles for the design of an evaluation approach. The three key dimensions are:

- i) Markets
- ii) Policies
- iii) Data sources or methods of evaluation

For example, since patent analysis is one of the methods proposed to be used for all markets and in both delineation and market impact, then a case could be made for a single work package of the evaluation to be concerned with all patent analyses.

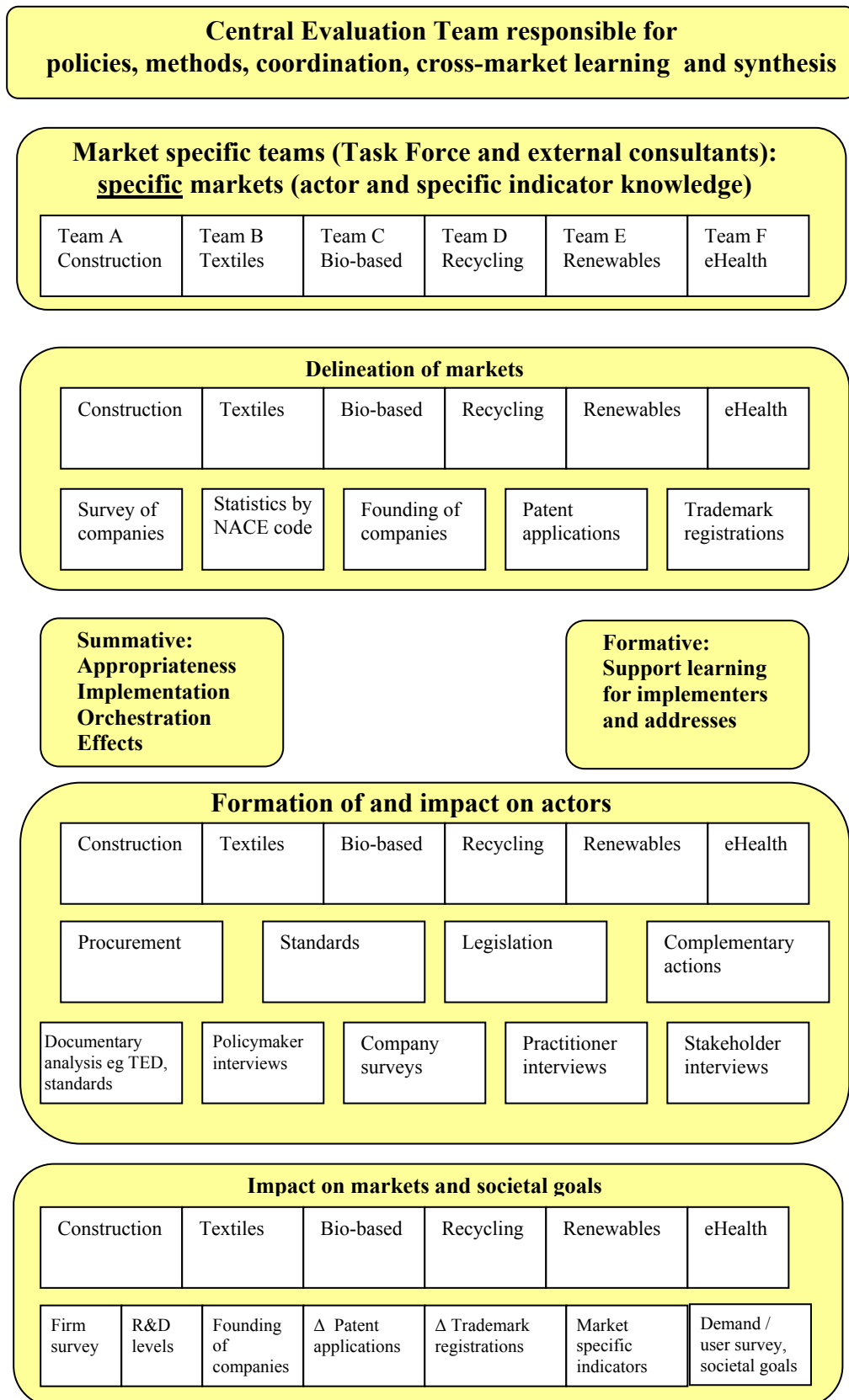
Further, against this background, three evaluation steps have to be performed in order to be able to evaluate the LMI along the logic chart presented above: (1) market delineation, (2) formation of and impact on actors and (3) impact on markets.

To cope with these challenges and to conduct evaluation of a novel instrument in six diverse markets, the basic idea is to have a **matrix structure**. As the six markets are so complex and indeed very different in the actor representation and in the ways they can be delineated and economic developments can be measured, it is essential to have six specialised **market teams (MT)** with a sound background in those markets and related technologies. The six market teams would in principle be responsible for a **delineation of the markets**, of identifying the **actors**, and of defining the **indicator** with which market developments can be traced. Ideally, external consultants would be linked with the EU Market Task Forces who would deliver regular monitoring data. The MTs would not necessarily have to be familiar with specialised evaluation methodologies nor have initial in-depth knowledge of all the relevant policy measures, key is their market expertise.

At the same time, the evaluation must follow a common overall approach and be guided by sound standards and methods of evaluation in innovation policy. Therefore, the evaluation, in both approaches, must be led by a **horizontal evaluation team (HET)**. This horizontal team would be responsible for guiding the analysis of the individual **policies, the governance and contextual issues** and provide the **methodological toolbox for the evaluation**. The latter includes knowledge on formative practices (workshops, interviews, etc.) as well as specialised methods such as tailored evaluation surveys and patent analysis. The HET would work closely with the MT to bring the methodological knowledge and the actor/technology/market knowledge together. The horizontal team would be comprised of academic and consultancy experts in innovation evaluation and could be supported by an **evaluation committee** comprised of one representative of each market task force and key Commission units. This committee would be a locus of trans-market learning and exchange along the whole evaluation exercise.

Figure 4 summarises the activities which would comprise the evaluation following the evaluation concept presented in Section 4.1.

**Figure 4 Evaluation Structure**





### 5.3 Two models following two budgetary options

To complete this report we set out two options for the implementation of the LMI monitoring and evaluation concept set out above, one would be a slim, minimal approach, the other one a more comprehensive, longer approach. Without giving a fixed budgetary guideline, we suggest that in principle, for the novel LMI, evaluation resources should be substantial. The organisation, scope and ambition for the evaluation is, naturally, very different for the two evaluation approaches.

#### 5.3.1 A slim version: formation and preparing future impact analysis

In the less ambitious, slim version to evaluate the LMI one would have the focus on the first half of the logic chart and on the upper part of Figure 4. This means it would look at immediate and intermediate effects at actor and market level. The slim version would not be able to look at long term or ultimate effects and would thus mainly support the set up and first phases of the LMI. It would, however, also try to define impact measures for a later, more ambitious evaluation. The duration for this slim version should still be at least 2 years, as below this time frame the evaluation only could support the formation of the whole initiative, much less impact even on actors.

After discussion with the Commission, our working assumption for the slim version is **25 working months**. The duration for this slim version should still be at least 2 years, as below this time frame the evaluation only could support the formation of the whole initiative, much less impact even on actors.

We further assume that even in the slim version we cover all 6 markets – as alternatively one could design a more in-depth evaluation for 1 or 2 pilot markets. We would allocate 8 working months the overall design of key methods, survey and interview questionnaires, conducting key methods horizontally across the markets and synthesizing the results, all of which to be performed by the horizontal evaluation team. This would leave 15 working months for the specific activities in the individual markets or 2,5 months for each market.

Table 7 shows the working steps, the timing and the working months needed for the slim version of the evaluation.

**Table 7: Illustration of a work plan for the basic evaluation implementation design**

	Who (lead)	Labour (pm <sup>#</sup> )	Duration (time months)
Concrete work plan and set up of working procedures for overall coordination, set up and management of evaluation committee	HET*	2	1-3
Definition of markets using indicators proposed as well as definition of actor space (delineation of markets) Definition of market impact indicators and analysis of status quo T <sub>0</sub> (in preparation of future studies) Definition of monitoring data to be collected along the way	MT** / HET (to support key methods, e.g. patent analysis etc.)	6	1-6
Design of small scale procurer and company telephone survey	HET	1	5-8
Tailoring of surveys to market idiosyncrasies	MTs	1,5	
Expert interviews and participation in implementation events (all levels, including standardisation and regulation experts, as needed, three phases, ethnographic)	HET / MT	6	2-4, 10-12, 18-22
Conducting small scale procurer and industry telephone survey	HET / MT	3	8-14
6 Market workshops	MT / HET	2,5	14-18
Final workshop	HET / MT	1	20
Synthesis and Reporting	HET / MT	2	20, 24
Sum		25	

\* HET = Horizontal Evaluation Team, \*\* specialised Market Teams, <sup>#</sup> pm = person months

### 5.3.2 The ambitious approach: analysing impact

A more ambitious, broad version to evaluate the LMI would conduct the full programme as outlined in Figure 4. The time frame of this version would be **4 years**, allowing some preliminary analysis of longer term and ultimate impacts in our logic chart, even if we must concede that many of the effects are of a much longer time frame. Thus, even this version would not be able to cover these long term market and societal impacts full scale. For the more comprehensive version we assume **84 working months**.

Table 8 illustrates the working steps, the timing and the working months needed for the slim version of the evaluation.

**Table 8: Illustration of a work plan for the broad evaluation implementation design**

	<b>Who (lead)</b>	<b>Labour (pm<sup>#</sup>)</b>	<b>Duration (time months)</b>
Concrete work plan and set up of working procedures for overall coordination, set up and management of evaluation committee	HET*	4	1-4
Definition of markets using indicators proposed as well as definition of actor space (delineation of markets) Definition of market impact indicators and analysis of status quo T <sub>0</sub> (using all indicators as needed) Definition of monitoring data to be collected along the way	MT** / HET (to support key methods, e.g. patent analysis etc.)	6	1-9
Design of pilot procurer and company telephone survey	HET	2	5-6
Tailoring of surveys to market idiosyncrasies	MTs	3	
Expert interviews and participation in implementation events (all levels, including standardisation and regulation experts, as needed, three phases)	HET / MT	15	4 phases (over 4 years)
Conducting pilot procurer and industry telephone survey	MT / HET	6	6-8
Conducting large scale firm and procurer / user survey	MT / HET	12	14-22
Market impact analysis based on indicators defined earlier	MT	12	24-28, 36-48
12 Market workshops	MT / HET	6	14-18, 36-42
Final Conference	HET / MT	3	44
Market reports, 3 interim, draft final, final	MT / HET	12	12, 24, 36, 43, 48
Synthesis reporting, 3 interim, draft final, final	HET	4	12, 24, 36, 43, 48
<b>Sum</b>		<b>85</b>	

\* HET = Horizontal Evaluation Team, \*\* specialised Market Teams, <sup>#</sup> pm = person months

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