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KT FORCE
knowledge as a value

ASSESSING THE INNOVATION STATE OF YOUR REGION

THE KTFORCE METHODOLOGY

FUNDING

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EXECUTIVE SUMMARY

The KTForce INTERREG IVC project involves, at its core, the benchmarking and investigation of best practices in knowledge transfer policies and practices at regional level. Ultimately, the objective is improving the European innovation environment.

This booklet summarises the main methodologies and processes used to achieve the outputs during the lifetime of the project. The project focuses on three components within knowledge transfer and seeks to assess and benchmark these within an innovation and regional development context. KTForce looks at how we can enhance university-industry relations, how we can improve technology licensing and what the optimum conditions for creating spin-offs and increasing entrepreneurial activity are.

This methodology booklet gives a concise overview of the main elements of the project including a PERT diagram, identifying key indicators in establishing a baseline or scenario zero concept. It gives a sense of how, by using Total Factor Productivity (TFP), we can create optimum conditions for future scenarios. In considering both the practices and policies relevant to Knowledge Transfer, the process for practice selection and implementation is illustrated and the analysis used for policy benchmarking and recommendations is shown.

More in depth information and documentation is available on the project website and individually from any of the project partners on a country specific basis or on the overall project.

WHAT IS THE KTFORCE PROJECT?

KTForce is a project supported by the INTERREG IVC Capitalisation Programme, under the 4th call for proposals, and co-financed by the European Regional Development Fund (ERDF). The aim of the INTERREG IVC programme is to improve the effectiveness of regional development policies in the area of innovation and knowledge economy. This is achieved through the exchange, sharing and transfer of policy experience, knowledge and good practices between European regional and local authorities.

BRIEF SUMMARY OF KTFORCE

The idea to submit a project to INTERREG IVC emerged in 2008 when several European entities decided to make a joint effort to contribute to a more collaborative and aligned environment capable of harmonising at a European level. Knowledge Transfer (KT) is recognised by the European Union (EU) as a key tool for fostering innovation and competitiveness across Europe. In line with this strategy, KTForce aims to benchmark both innovation policies and Knowledge Transfer practices in the partner regions. This will lead to a set of strategic recommendations for the future design of innovation policies and the implementation of KT practices that can make European regions more dynamic and competitive.

The project involves 11 partners from 6 regions, covering "modest and moderate innovator" regions (Lithuania, Portugal and Romania) and "innovation follower and leader" regions (France, Germany and Ireland) [Source: Innovation Scoreboard 2010]. This will enable less advanced regions to benefit and learn from more advanced regions, and in turn improve the overall policy context in Knowledge Transfer and innovation. Political entities and operational organisations from across all partner regions worked together discussing top-down and bottom-up approaches on how to increase the efficiency of Knowledge Transfer policies and how this could benefit future policy design.

To achieve its objectives, KTForce focused on **3 Knowledge Transfer areas: Technology Licensing**, **Spin-off creation & Entrepreneurship** and **University-Industry relations**. First, a mapping of practices and policies was performed in the 3 KT areas. In parallel, the partners worked on the definition of a scenario zero for each region. Then, future scenarios for each region were defined while a 5M analysis* was elaborated to support the selection of the pratices for implementation. Finally, a benchmarking of the policies mapped was performed so that a set of recommendations for policy design can be defined.

* Detailed on page 14

IN PRACTICE, KTFORCE PROPOSES TO:

- map existing policies and practices for Knowledge Transfer;

- define the actual needs of the regions by creating present "Where are we?" and future scenarios "Where do we want to be";

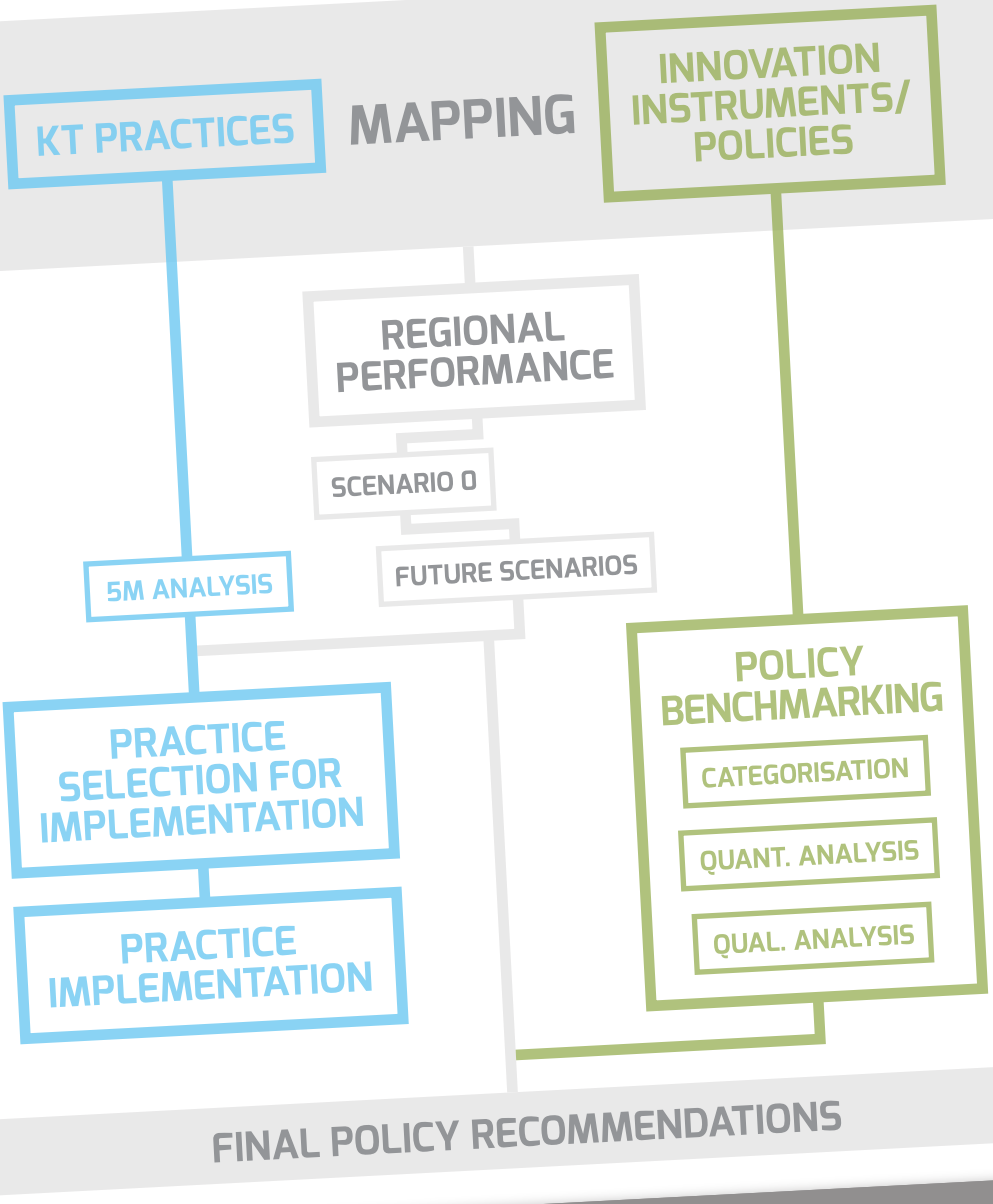
- benchmarking and measure the impact innovation policies have on Knowledge Transfer practices and the type of policies that would need to be developed to meet the challenges and needs of the regions;

- define a roadmap and implementation plan for future policy design and development of practices.

The main expected result is the improvement of local and regional innovation policies focusing on Knowledge Transfer, as well as the transfer of best practices, both at operational and political levels. Completed by the development of an implementation plan of selected policies in each partner region and presented via an interactive database webtool, the results planned by KTForce aim to have a strong impact on the definition of innovation policies focusing on Knowledge Transfer in Europe.

PERT DIAGRAM

KTFORCE PROJECT METHODOLOGY



HOW TO ESTABLISH A SCENARIO ZERO FOR YOUR REGION - KEY INDICATORS

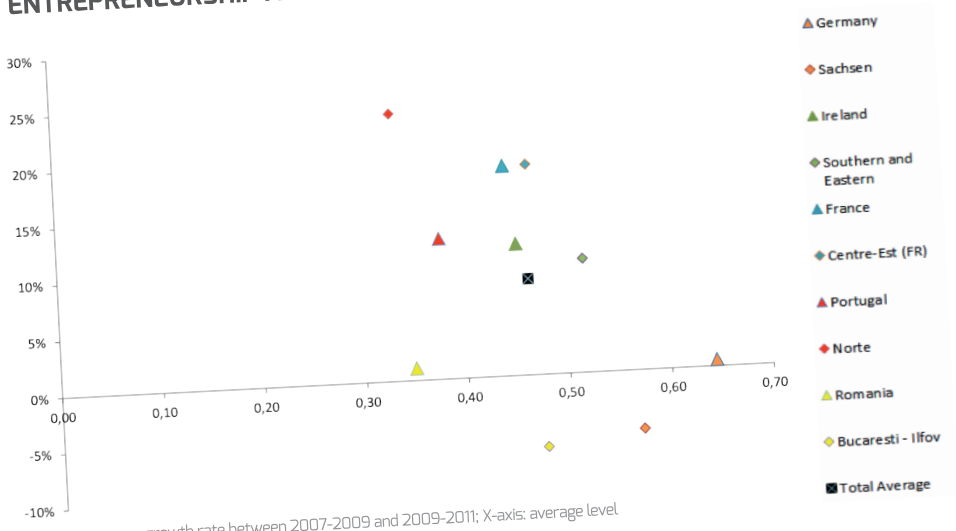
National and regional levels are key dimensions when it comes to the design and implementation of successful innovation policies. Thus, it is of utmost importance to have indicators that allow for performance comparison and monitoring trends. This section provides a comparative assessment of innovation-related performance indicators. From the outset, it should be noted that although regional analysis is crucial, there is less data available at a regional level than at a national level. Therefore, in the absence of appropriate regional indicators, national indicators were considered in some cases. Eurostat and the Regional Innovation Scoreboard 2012 have been used as the main data sources.

TECHNOLOGY LICENSING	SPIN-OFFS CREATION AND ENTREPRENEURSHIP	UNIVERSITY-INDUSTRY RELATIONS
1. Number of patents applied for at EPO, by year, into the Regional GDP in Purchasing Power Parity Euros;	**1.** Number of employed persons in the knowledge-intensive services sectors and Number of employed persons in the medium-high and high-tech manufacturing sectors into total workforce;	**1.** Population with tertiary education per 100 population aged 25-64;
2. Number of patents applied for at EPO, by year, per million of inhabitants;	**2.** High and medium high-technology manufacturing – Percentage of total employment;	**2.** Total SMEs innovation expenditure, excluding intramural and extramural R&D expenditures, into the total turnover for SMEs;
3. R&D expenditures in the business sector (BERD), by year, into Regional GDP, in national currency and current prices;	**3.** Knowledge-intensive services – Percentage of total employment;	**3.** SMEs introducing any new or significantly improved products or production processes (in-house innovations);
4. Business enterprise R&D expenditure (BERD) by economic activity – Percentage of GDP;	**4.** Sum of total turnover of new or significantly improved products either new to the market or new to the firm for Small Manufacturing Enterprises (SMEs) by total turnover for SMEs;	**4.** SMEs with innovation co-operation activities in total number of SMEs);
5. R&D expenditures in the government sector and the higher education sector in Regional GDP;	**5.** Total high-tech trade in million euro – Percentage of total exports.	**5.** Number of public-private co-authored research publications by total population;
6. R&D expenditures in the government sector and the higher education sector in GDP – Percentage of GDP.		**6.** Number of SMEs introducing new products or processes to market by total number of SMEs;
		7. Number of SMEs introducing new marketing and/or organisational innovations to market by total number of SMEs.

The analysis is based on the pool of indicators likely to be influenced by technology licensing, spin-off creation and entrepreneurship or University-industry relations associated practices.

The data between 2007-2009 and 2009-2011 were considered for each region or country, and a composite indicator for each Knowledge Transfer area related activities as well as a global composite indicator was defined in order to assess and compare the state of the countries/regions in terms of growth rate and level between each other.

COMPOSITE INDICATOR RELATED TO SPIN-OFF CREATION AND ENTREPRENEURSHIP ACTIVITIES



Y-axis: average growth rate between 2007-2009 and 2009-2011; X-axis: average level

The definition of the current scenarios and the insights deriving from the indicators analysis will also be taken into account in the design of the countries' future scenarios.

THE TOTAL FACTOR PRODUCTIVITY TO CREATE FUTURE SCENARIOS

To define future scenarios, the analysis focused on the influence of some indicators related with the 3 Knowledge Transfer areas on the evolution of the Total Factor Productivity (TFP), both by looking at all the partner's countries as a whole and country by country.

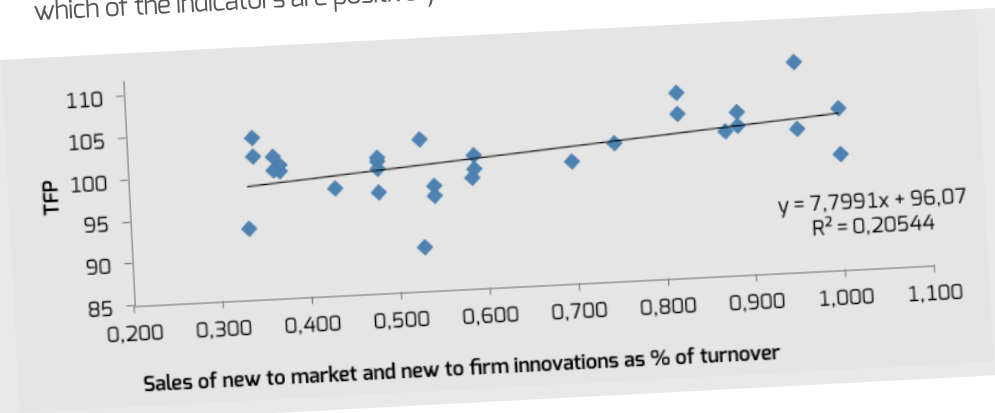
Firstly, indicators were selected according to their relevance regarding the 3 Knowledge Transfer areas focused by the project: technology licensing, entrepreneurship and spin-off creation, university-industry relations. These indicators were selected from a wide series of indicators available for the 6 partner countries, at national level from European databases. These indicators were selected to match as much as possible the indicators selected for the design of the scenario 0.

INDICATORS SELECTED FOR THEIR RELEVANCE IN THE 3 KT AREAS:

TECHNOLOGY LICENSING	SPIN-OFFS CREATION AND ENTREPRENEURSHIP	UNIVERSITY-INDUSTRY RELATIONS
1. PCT patents applications per billion GDP;	**1.** Sales of new to market and new to firm innovations as % of turnover	**1.** Non-R&D innovation expenditures as % of turnover;
2. PCT patent applications in societal challenges per billion GDP (in PPS€) (climate change mitigation; health);	**2.** Knowledge-intensive services exports as % total service exports;	**2.** Venture capital (early stage, expansion and replacement) as % of GDP;
3. Public R&D expenditures as % of GDP;	**3.** Medium and high-tech product exports as % total product exports;	**3.** SMEs introducing product or process innovations as % of SMEs;
4. New doctorate graduates (ISCED 6) per 1000 population aged 25-34;	**4.** Medium and high-tech product exports as % total product exports;	**4.** Non-R&D innovation expenditures as % of turnover;
5. International scientific co-publications per million population;	**5.** Employment in knowledge-intensive activities (manufacturing and services) as % of total employment.	**5.** SMEs introducing marketing or organisational innovations as % of SMEs;
6. Scientific publications among the top 10% most cited publications worldwide as % of total scientific. publications of the country		**6.** SMEs innovating in-house as % of SMEs;
		7. Innovative SMEs collaborating with others as % of SMEs.

Full information about the indicators selected can be found in the KTForce website under "documents" (www.ktforce.eu/documents-view).

Secondly, TFP was regressed using econometric techniques on each of the chosen indicators, enabling to analyse the relation between the indicator and TFP. The data covers the years 2006 to 2010, capturing each country's evolution over time. However, our aim is not to explain the TFP, but rather to check the nature (positive or negative) and degree of correlation between the indicators and TFP, using a basic econometric analysis in order to understand which of the indicators are positively associated with the TFP.



The third step was to translate the TFP data in a chart for each indicator. The vertical axis (y-axis) represents the TFP, and the horizontal axis (x-axis) the value of the indicator between 2006 and 2010. On each chart (example above), the slope of the regression line indicates the effect of the indicator on the TFP. If the slope is positive (the line goes up from the bottom-left corner to the top-right corner of the chart), it means that it has a positive effect on TFP; if it is negative (the line goes down from the top-left corner to the bottom-right corner of the chart), it indicates a negative effect on the TFP; if the line is horizontal (or almost horizontal), the indicator has few or no influence on TFP.

In a fourth step, only the indicators which presented a positive influence on TFP were retained (meaning that the indicators presenting a negative or neutral influence on TFP were set aside). From these indicators, a comparison study was done between the slope inclination between the indicators that influenced positively TFP in order to rank which indicator had a higher effect on TFP, and which would be a good strategy to consider for future practices and policies.

This analysis was done using the R^2 measure (i.e., the coefficient of determination, which ranges from 0 to 1), obtained through econometric techniques, which indicates how well data points fit a statistical model and thus how much TFP is related to the indicator. Since R^2 provides a measure of how well-observed outcomes are replicated by the model, as the proportion of total variation of outcomes explained by the model, the higher the R^2 is, the higher the influence of the indicator on TFP is.

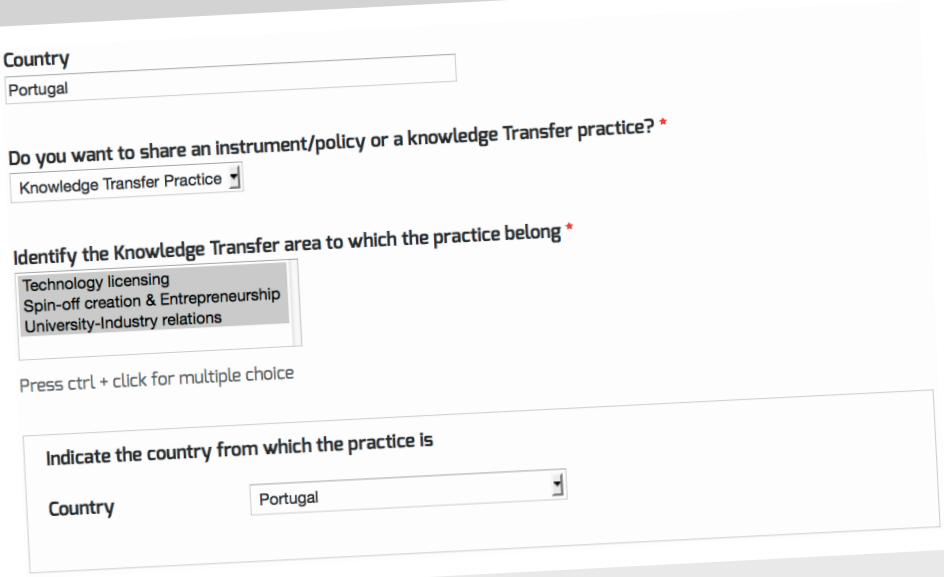
In order to establish how much each indicator positively influences TFP compared with the others, a percentage has been calculated. This enabled to establish a ranking of the indicators that most influenced TFP thereby highlighting which Knowledge Transfer area each region should invest more in.

KTFORCE	INDICATOR	R^2	RATE OF INFLUENCE CONSIDERING THE OTHER INDICATORS
Entrepreneurship & Spin-off creation	Sales of new to market and new to firm innovations as % of turnover	0,21	51%
University-Industry Relations	Non-R&D innovation expenditures as % of turnover	0,15	37%
Entrepreneurship & Spin-off creation	Knowledge-intensive services exports as % total service exports	0,029	7%
University-Industry Relations	Venture capital (early stage, expansion and replacement) as % of GDP	0,021	5%

PRACTICE SELECTION AND IMPLEMENTATION

In line with the project´s objective, the 11 KTForce partners performed a mapping of the Knowledge Transfer practices implemented, ongoing or over, within their organisations.

The partners selected a set of relevant practices that had been implemented within their organisations in the 3 Knowledge Transfer areas: Technology Licensing, Spin-off creation & Entrepreneurship and University-Industry relations. An online questionnaire was specifically created for this task, gathering a set of key questions that would be relevant for the partners to select the practices that they would like to implement within their organisations.



According to the actual innovation context and the future insights (scenario 0 and future scenario) of their region, and supported by the 5M methodology, each partner acting at operational level selected a set of practices that they would like to implement.

The 5M methodology sets on rates of the practices between 1 and 5 according to 5 dimensions. This assessment methodology is based on the 6M methodology created by Ishikawa. For the purpose of KTForce, the 5M methodology is aimed at easing the evaluation of each practice.

THE 5M ASSESSMENT OF EACH PRACTICE CONSIDERED THE FOLLOWING FEATURES:

1. MONEY NEEDED TO IMPLEMENT THE PRACTICE

1: 0 k€ (no cash, only efforts)

3: 50 k€

5: >= 100 k€

2. MAN OR HUMAN RESOURCES NEEDED TO IMPLEMENT THE PRACTICE

1: 1 part time person

3: 1 full time person

5: >= 3 full time persons or external HR

3. MANAGEMENT STRUCTURE REQUIRED TO IMPLEMENT THE PRACTICE

1: no consensus needed, can be done alone

3: consensus to be built inside a small community

5: consensus to be built with a large community including external stakeholders

4. METHODS NEEDED TO IMPLEMENT THE PRACTICE (COMPLEXITY & TIME)

1: easy, < 1 month

3: average difficult, 6 months

5: need experts, > 1 year

5. MATERIAL NEEDED TO IMPLEMENT THE PRACTICE (INFRASTRUCTURE & LOGISTICS)

1: no need

3: average infrastructure or means.

5: large infrastructure or means.

IMPLEMENTATION OF THE PRACTICES

The partners, namely the "operational" partners, selected at least one practice from another partner to be implemented within their own organisations.

In order to proceed to the follow-up of the implementation of such a practice, a "transfer guide" was developed, supporting the implementation process in 5 steps.

THE PRACTICE IMPLEMENTATION PROCESS IS COMPOSED OF 5 DISTINCT PHASES:

Phase 1 – Planning: comprises general information about the region, the lead stakeholders and supporting stakeholders, and the policy scenario to be pursued and detailed information on the planning of the implementation.

Phase 2 – Transfer methodology

Phase 3 – Implementation

Phase 4 – Measurement

Phase 5 – Updating the plan

POLICY BENCHMARKING AND RECOMMENDATIONS

THE BENCHMARKING OF THE INNOVATION POLICIES OF THE 6 PARTNER REGIONS WAS ORGANISED IN 4 STEPS:

1. MAPPING OF THE POLICIES

Together with the mapping of the practices, the KTForce partners performed a mapping of the ongoing or finished innovation policies implemented within their regions or countries.

The mapping of the innovation policies in each country was done via an online questionnaire specifically created for this task. According to a set of criteria and keywords linked to the 3 specific Knowledge Transfer areas, the partners selected a set of relevant policies available in the ERAWATCH database - Platform on Research and Innovation policies and systems.

(http://erawatch.jrc.ec.europa.eu/erawatch/opencms/research_and_innovation)

2. CATEGORISATION OF THE POLICIES

The categorisation of the policies aims at including each collected policy within the 3 Knowledge Transfer areas that the project focuses on. If some policies cover 2 or 3 areas, the policy is included in both areas.

3. QUANTITATIVE ANALYSIS

The quantitative analysis of the policies has used a statistical method for creating a ranking of the policies. This ranking lists the "best" policies collected by the partners, using, in the calculation method, some key criteria that the partners estimate to have influence on the efficiency of a policy.

THE CRITERIA SELECTED AND ASSOCIATED WEIGHT WERE:

A. (Bearing in mind) the Total Factor Productivity - 45%

B. The policy connection to a specific practice mapped by the partners (yes/no) - 10%

C. The focus of the policy (transversal to 1, 2 or 3 KT areas) - 10%

D. The stability of the policy (long term or discontinued after first attempt) - 10%

E. The results/outputs are available (yes/no) - 10%

F. The focus on target groups (collaborative initiatives/individual initiatives) - 5%

G. The evaluation of the policy (evaluation ex-post or ex-ante) - 10%

4. QUALITATIVE ANALYSIS

The qualitative analysis of the policies aims at analysing the highest ranked policies resulting from the quantitative analysis in order to discuss the main aspects that make these policies so efficient, and understand how these good examples could potentially transfer or improve similar policies already existing in each partner region.

RECOMMENDATIONS FOR POLICY DESIGN

By considering the results of the qualitative analysis performed by each partner region, a set of recommendations will be released so that local or regional authorities can consider them with a view to improve the local and regional innovation policies and strategies.

These recommendations will be referred to in more detail in the regional implementation plans of each partner region, available on the KTForce website.

DISCOVER ALL THE **RESULTS** OF THE **PROJECT**, AS WELL AS OTHER USEFUL **DOCUMENTATION** ON THE **KTFORCE** WEBSITE:

WWW.KTFORCE.EU