TIPS

TRANSPORT R&D
FOR INNOVATION

WWW.TRANSPORT-TIPS.EU

Iakovos Delioglanis, Heike Fischer, Regina Hüttner, Lena Ohlig, Petra Püchner

Exploitation of project results from publicly funded transport projects

A handbook for practitioners from policy and project level

European Commission

Steinbeis-Edition

Iakovos Delioglanis, Heike Fischer, Regina Hüttner, Lena Ohlig, Petra Püchner

Exploitation of project results from publicly funded transport projects

A handbook for practitioners from policy and project level

– Recommendations for policy makers and project partners

– Dos and Don'ts – Role models for successful exploitation

– Capacity building and awareness raising measures for exploitation

– TIPS Exploitation Toolbox

– Good practices

European Commission

Imprint

Steinbeis is an international service provider in entrepreneurial knowledge and technology transfer. The Steinbeis Transfer Network is made up of about 1,000 enterprises. Specialized in chosen areas, Steinbeis Enterprises' portfolio of services covers research and development; consulting and expert reports as well as training and employee development for every sector of technology and management. Steinbeis Enterprises are frequently based at research institutions, especially universities, which are constituting the Network's primary sources of expertise. The Steinbeis Network comprises around 6,000 experts committed to practical transfer between academia and industry. Founded in 1971, the Steinbeis-Stiftung is the umbrella organization of the Steinbeis Transfer Network. It is headquartered in Stuttgart, Germany.

Table of contents

Preface of the European Commission

Valuable results achieved in publicly funded research projects in all domains, including transport, don't always find their way to being translated into market products or services. Indeed, using and disseminating the knowledge generated in a project beyond the lifetime of the project itself can be hindered by a multitude of obstacles – lack of potential not typically being one of them.

Horizon 2020 addresses major societal challenges, including transport, aiming to maximise the competitiveness impact of research and innovation and to raise the level of excellence in the research base. The seven-year programme – the main funding instrument to implement the Europe 2020 Innovation Union flagship initiative – is designed to broaden access for participants through major simplification, new financial instruments and new opportunities for SMEs. It brings together all existing research and innovation funding, providing support in a seamless way from idea to market.

How can the impacts of research and enable new ideas, concepts, production processes, services and products originating from research projects be maximised and make it to the market?

Through a range of specifically designed activities, the TIPS project provided a valuable contribution to addressing this issue from the standpoint of both policy makers and project beneficiaries.

Carlo Corposanto
Policy Officer
European Commission – DG Research & Innovation, Unit H.1 Strategy

Introduction

"A publicly funded project is generally not finished at the end of the project itself. Further work, efforts and money are often needed to reach a final 'product'. This step is easier to implement if good work has been done on results before and during the project, involving all the appropriate actors. The coordinator or the exploitation manager must take care of this task and keep all the partners focused. The TIPS project has opened the eyes of those involved to key issues and has offered them a methodology to learn from."

A participant of the TIPS project's pilot activities

The TIPS project, a Seventh Framework Research Programme funded support action aimed to develop and pilot measures and support tools to help other publicly funded transport projects to succeed in reaching their final target group and achieving innovation development. All measures and tools were undertaken to pursue the goal of "opening the eyes" and "guiding" project partners through to a structured process of successful exploitation.

During the TIPS implementation period (October 2012 until September 2014), the economic crisis throughout Europe was – and still is – a major issue in forcing industry to become ever more competitive. In addition, during this period the 7th Framework Programme of the European Commission came to an end and the new successor programme "Horizon 2020" was created and came into being under the prefix and pressure of having to really ensure the successful exploitation of funded projects, especially in terms of commercial exploitation outputs.

From a TIPS perspective, the new funding programme H2020 is certainly heading in the right direction with its new funding instruments including the SME instrument and the research and innovation actions. Insisting proposers better address exploitation issues such as measures taken to maximise their impact and installing an innovation management system, is similarly a move in the right direction.

Nevertheless, TIPS is convinced that further steps both in terms of funding programme development and providing support to the consortia of projects currently funded can be taken to further improve exploitation achievements.

In addition, it should be ensured for the future that exploitation is not just understood in a narrow sense – meaning only commercially oriented exploitation. It is still crucial that Europe perceives exploitation as a way of achieving more benefits environmentally, communally, socially, safely, in a standardised way instead of thinking only about marketable products.

The TIPS booklet **"Handbook for practitioners from policy and project level"** addresses important stakeholders when it comes to publicly funded transport projects. These include policy makers and publicly funded project partners and consortia.

Policy makers are provided with recommendations for putting even greater emphasis on exploitation in terms of issues to already be respected at the stage of developing funding programmes as well as a set of enabling tools to be delivered to project partners and consortia.

Project partners and consortia from publicly funded projects are provided with dos and don`ts, role models and good practices guiding them all the way from project development to project finalisation.

About the TIPS project

Title	Enhancing the capacity of EU transport projects to transform research results into innovative products and services
Type	Support Action
Programme	FP7-TRANSPORT (GA No 314455)
Duration	24 months (1/10/2013 – 30/9/2014)
Website	http://www.transport-tips.eu

TIPS aims and objectives

The **TIPS** project was a support action funded by the European Commission under the Seventh Framework Programme (FP7). It ran from 1 October 2012 until 30 September 2014. The vision of the TIPS project was to produce better innovation in the transport sector. It did so by enhancing the capacity of EU funded FP projects in the field of transport to help them in transforming research results into products and services.

The transport sector faces major challenges. Demand in transport will grow by 50% for passengers and 80% for freight (EU 2000–2030).[1] At the same time the call for energy savings, renewable resources and less CO_2 is adding additional pressure. Transport is a main source for achieving economic sustainability and growth, but the sector needs to be pro-active and take more innovative solutions to the market faster. A lot of funding goes into transport Research and Technology Development (RTD), but results do not ultimately seem to reach the market.

---

1 POSMETRANS (2008-2011), EU-funded project, Policy measures for innovation in transport sector with special focus on small and medium-sized enterprises

How can this situation be improved? Possible solutions include:

- A successful set of **capacity and awareness building measures** for transport project partners to help them succeed in innovation development from research projects

- A **tool box for detecting the innovation potential of project results** that provides ongoing support to transport project partners

- A list of **dos and don'ts for transport project partners as well as for policy makers**

- **Success stories** proving that publicly funded transport projects can really result in innovation.
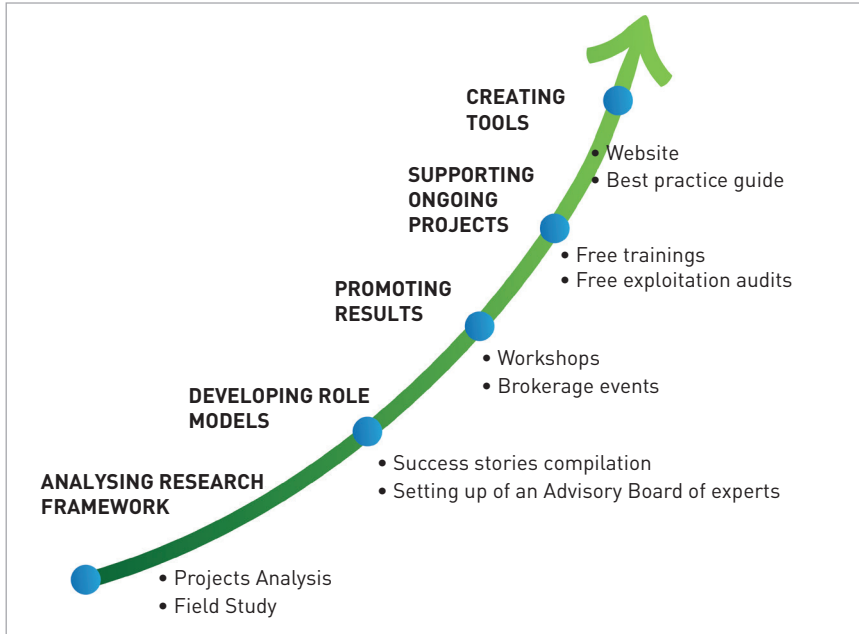
Thus, the project had the following five key objectives:

- Analysing the research framework of finished and ongoing national and EU funded projects;

- Developing best practice guidelines and innovation methodologies;

- Promoting the exploitation of research and development (R&D) results and market uptake of innovative products and services to transport project partners;

- Supporting completed and ongoing EU funded research projects to develop sound action plans for the use and dissemination of results;

- Creating a supportive project environment and tools that are sustainable.

Based on sound fieldwork, TIPS analysed exploitation practices in finished RTD projects, extracting exploitation approaches and good practices. Partners involved in highly innovative transport RTD projects received individual help to improve their capability to exploit the R&D results they had achieved during the projects, in such a way that they could gain competitive advantages and improved market shares. Road, rail, maritime and air as well as intermodal transport were covered.

TIPS methodology and steps

To achieve its objectives, TIPS delivered a methodological approach building on the following steps:

CREATING TOOLS
- Website
- Best practice guide

SUPPORTING ONGOING PROJECTS
- Free trainings
- Free exploitation audits

PROMOTING RESULTS
- Workshops
- Brokerage events

DEVELOPING ROLE MODELS
- Success stories compilation
- Setting up of an Advisory Board of experts

ANALYSING RESEARCH FRAMEWORK
- Projects Analysis
- Field Study

An analysis of the research framework of finished and ongoing R&D projects and the exploitation of their results was carried out, in order to identify obstacles and key issues for successful exploitation and develop best practice guidelines and innovation methodologies for different transport modes.

Based on a thorough **field study**, TIPS aimed to understand the innovation and exploitation processes of transport R&D projects in the different transportation modes better. Approximately 450 transport RTD projects (at both EU and national level) as well as Support Actions funded within the Seventh Framework Programme were identified and were invited to participate in a survey. One third of those invited participated in the survey. The answers provided form the impact chains and success stories used in the brochure.

A number of "awareness increasing measures" (including workshops and information stands) and "networking activities" (including brokerage events) were organised throughout Europe, targeting small and medium-sized enterprises (SME), public organisations, large companies and research organisations involved in transport-related projects under various FP7 themes (e.g. FP7-Transport, FP7-ICT, FP7-SME, FP7-Energy, etc.). In summary, the following activities were organised:

(a) **Seven workshops** to support the overall learning process of the transport project partners, showing them how R&D results can be exploited and the market uptake of innovative products and services. The workshops were carried out between July 2013 and September 2014 in Brussels (Belgium), Budapest (Hungary), Ljubljana (Slovenia), Potsdam (Germany), Rome (Italy) and Thessaloniki (Greece).

(b) **Two information stands** offering comprehensive information on transforming research results into innovative products and services. The information stands were set up during two key international events, namely the ICT 2013 event in Vilnius (Lithuania) and the Transport Research Arena 2014 (TRA2014) conference in Paris (France).

(c) **Three brokerage – or matching – events** where representatives of companies and universities as well as clusters and research organisations had the opportunity to promote their expertise and/or innovative solutions, investigate new collaborations and search for new technological achievements or make and/or receive technology offers:

   a. **Logistics-B2Match (6 - 7 June 2013, Munich, Germany)** – a brokerage event for logistics, mobility and IT taking place during the international trade fair "Transport Logistic". In total, **47 participants** attended the event, representing **10 EU countries**, and participating in **113 bilateral meetings.** Further information: http://www.b2match.eu/logistics2013

   b. **Infrastructure, Telematics and Navigation – ITN2013 (26 September 2013, Turin, Italy)** – the brokerage event was organised in the framework of "ITN – Infrastructures and Technologies for the Smart City", the expo-conference that presented digital infrastructures for future Smart

Cities, Open Government and technologies and solutions for Smart Mobility, from satellite navigation to info mobility. In total, **68 participants** representing **8 European countries** participated in **221 bilateral meetings.** Further information: http://www.b2match.eu/itn2013

c. **Partnering event @ Transport Research Arena 2014 (14 - 17 April 2014, Paris, France)** – for the first time, a brokerage event was organised at the Transport Research Arena conference, adding a new dimension to the conference. **140 participants** from **31 countries all around the world** took the opportunity to promote their profiles on an online platform before the event. **242 bilateral meetings** were carried out in a dedicated meeting space at the conference. Further information: www.b2match.eu/tra2014

In order to provide more **in depth support to transport project partners**, two Training Academies were carried out, focusing on topics including Intellectual Property Rights (IPR) management, business plan development, technology transfer and standardisation. The Training Academies took place in Prague, Czech Republic (November 2013) and in Lyon, France (February 2014). In total, 64 participants representing 54 EU-funded projects received individual support and were engaged in practical exercises on the development of exploitation plans during the two Training Academies.

The **TIPS Exploitation Toolbox** was developed to better facilitate the detection of exploitation potential of project results. Individual support to just-completed and on-going EU funded research projects to develop sound action plans towards the market uptake of innovative products and services through applying the TIPS Exploitation Toolbox was delivered. More than 50 organisations throughout Europe have received individual support.

TIPS project partners

Experienced partners, both in fieldwork and impact analysis as well as in innovation and exploitation strategies, collaborated in TIPS. The TIPS project ensured a good geographic coverage of the EU:

- Coordinator:
  - Steinbeis-Europa-Zentrum der Steinbeis Innovation gGmbH, Germany
- Project partners:
  - Association Soph.i.a. Consulting, Italy
  - ICCR-Foundation – Gemeinnützige Privatstiftung, Austria
  - Bay Zoltan Alkalmazott Kutatasi Kozhasznu Nonprofit Kft, Hungary
  - Institut Jožef Stefan, Slovenia
  - Ursit Ood, Bulgaria
  - Technologické centrum Akademie Ved eské republiky, Czech Republic
  - Q-Plan International Advisors Ltd., Greece
  - ALMA Consulting Group SAS, France

TIPS Advisory Board experts

An Advisory Board of 11 recognised experts from the transport sector worked closely with the TIPS partners and supported their efforts to enhance the capacity of EU funded transport projects to be a source of innovation, helping them transform their research results into innovative products and services.

The Advisory Board members represent a good geographical coverage of EU countries. The Advisory Board brought together experts from all modes of transport – air, water, rail, road and intermodal – as well as from different types of organisations, such as academia, research organisations, public institutions and industry.

The Members of the TIPS Advisory Board were:

- **Jean-François Boisson**, International Cooperation Manager at Pôle Pégase, France (http://www.pole-pegase.com)

- **Daniel L. Cadet**, Director for External Technical Affairs at ALSTOM Transport, France (http://www.transport.alstom.com)

- **David Doerr**, Scientific Officer and Programme Manager at TÜV Rheinland Consulting GmbH, Germany (http://www.de.tuv.com)

- **Professor Francesco Filippi**, from the Research Centre for Transport and Logistics (CTL), "La Sapienza" University of Rome, Italy (http://www.uniroma1.it)

- **Stefano Mainero**, CEO, Founder of EPN Consulting Limited, UK (http://www.EPNconsulting.eu)

- **Josef Mikulik**, Member of the Institute Council at Transport Research Centre, Czech Republic (http://www.cdv.cz)

- **Professor Chris Nash**, Research Professor at the Institute for Transport Studies, University of Leeds, UK (http://www.its.leeds.ac.uk)

- **Dr. Stratos Papadimitriou**, Professor of Transportation Systems at Department of Maritime Studies, University of Piraeus, Greece (http://www.unipi.gr)

- **Claus Seibt**, Programme Director Sustainable Transport at Wuppertal Institute for Climate, Environment and Energy, Germany (http://www.wupperinst.org)

- **Peter Wolters**, Secretary General at European Intermodal Association (EIA), Belgium (http://www.eia-ngo.com)

- **Eleni Zacharaki**, Special Adviser (Transport) at the Hellenic Ministry of Competitiveness, Development, Infrastructure, Transport and Networks, Greece (http://www.yme.gov.gr)

TIPS website

The project website will be available at least until the end of 2015, delivering downloadable material such as the publicly available TIPS project deliverables and information about upcoming transport related events including conferences, exhibitions and workshops that might be of interest to stakeholders operating in the transport research sector, news, useful links and funding opportunities.

The website domain is http://www.transport-tips.eu

Section 1: Recommendations for policy makers and project partners

The following recommendations target the groups:

- **Organisations involved/interested in the broader field of transport** for setting up future publicly funded projects or for enhancing the exploitation potential of their project results; as well as

- **Transport policy stakeholders** for improved programme setting to allow for and stimulate successful exploitation of research and innovation projects.

The recommendations are based on the TIPS project findings and outcomes of the following activities:

- SWOT analysis of EU funded projects in the field of transport

- Training Academies and one-to-one support services offered by the project consortium

- The identified good practices

SWOT analysis of EU funded projects

An analysis of the strengths, weaknesses, opportunities, and threats (SWOT) of 20 projects funded by the Framework Programme – identified by a dedicated selection process – was carried out during the TIPS Advisory Board meeting on 17 June 2014 with 10 experts from the transport sector. It became evident that projects are **strong in exploitation**, if they …

… in terms of RTD topics

… are based on the needs of target users

… involve a complete innovation cycle from research to market

… create a competitive advantage and bring return on investment

… provide a broad scenario of potential project outputs

… are matching RTD with policy priorities at both national and EU level

… address possible threats of public perception on the technology or sector

… have the possibility to adapt according to new technology developments during their lifespan

… in terms of implementation issues

… cover all steps of the innovation cycle during the duration of the project

… design and implement a broad spectrum of exploitation, dissemination and communication actions towards all stakeholders during the entire duration of the project, and not just at the end of the project

… in terms of management issues

… have the necessary knowledge and experience for a coherent Intellectual Property Rights (IPR) management

… foresee the coordination of exploitation activities even after the project ended.

RECOMMENDATIONS FOR PROJECT PARTNERS

TIPS partners' experience gained during the training and coaching on exploitation activities

During the two three-day Training Academies held in Prague and Lyon including a one-to-one coaching of 51 FP7 funded project partners, it became evident that projects need specific tools and a structured and continuous process guiding them from the first day of the project until after the project is completed:

1. Research and innovation projects need an Exploitation Toolbox including SWOT analysis and research result monitoring

2. Project partners either from research or industry need to improve their know-how on relevant issues such as Intellectual Property Rights, the market potential for their R&D results, funding and financing facilities to bring research to the market and support initiatives to find potential partners for further development of R&D results

3. An ongoing, established and moderated process involving and supporting all project partners in identifying the real potential of each project result as an integral part of project management is crucial

4. Target-oriented exploitation does not happen by coincidence: One specific project partner needs to be assigned to lead this process being supported potentially also by external specialists in e.g. IPR, market studies, business planning

5. Research and Development is based on a clear and specific request from the market/end-users

RECOMMENDATIONS FOR POLICY MAKERS

Identified good practices

In a defined process involving stakeholders and experts from different transport modes, criteria for good practice cases in successful exploitation of research results were identified. Based on these, around 80 projects were interviewed/examined and categorised.

The following **general findings** surprised the experts and project partners:

a) There was no significant difference with regard to success factors among the different transport modes. The patterns for successful exploitation are independent of the sector, although of course target groups, stakeholders and markets are quite different

b) The main differences are related to the nature of the research:

 1. For technology driven research with identifiable tangible research results such as prototypes, technologies, patents etc.

 2. For policy driven research with intangible research results such as knowledge, research papers and methodologies

c) The success criteria for exploitation in transport research can be compared to and applied to any other sector as the principles are alike

d) The most common exploitation route is to use the derived knowledge for further research, often enough in EU research projects with similar partnerships, with the objective of investigating additional topics or adding new features.

The following **findings especially for industry and technology driven projects** were gathered:

Projects with high research impact deliver validated technologies, systems or products and services, which are tested (during the project) and implemented (after the project) by industry partners or other end-users in the project.

Also from other studies about exploitation, e.g. SME research projects (e.g. MaP-Eer-SME – FP7-RTD-245419, CSA project, www.mapeer-sme.eu) it became evident that the simple participation of SME or industry in a research project does not imply a successful exploitation. Only 20% of the analysed SME research projects lead to a direct exploitation!

Thus, additional factors for success were identified in TIPS:

1. The project consortium should ideally cover the entire value chain, but at least those end-users/industries that have a high exploitation interest in the project research results

2. The testing and validation of research findings, possibly even the demonstration must be an integral part of the funded project as it supports the direct implementation of the new technology/system, process etc. in companies that are partners in the project. Thus, it must take place under real life conditions

3. The definition of the manufacturing process of the product/technology/system must be part of the project

4. If necessary, training of end-users to use the new technology should be part of the project

5. If standardisation/harmonisation is a key for market entry, the start of the standardisation process must be part of the funded project

6. If a wide variety of stakeholders from society and policy is needed for market entry, intense communication and regular dialogues with all stakeholders are an intrinsic part of the project

RECOMMENDATIONS FOR PROJECT PARTNERS

The following **findings especially for policy driven projects** were gathered:

On regional, national and European level, quite a few projects have a high relevance for policy. Their objectives differ and can be categorised for example as

- strategic projects to develop new concepts
- projects related to standardisation or harmonisation
- projects for monitoring and evaluation

The success factors for these projects are:

1. The projects must be based on a clear demand from the policy side, whereby policy includes not only public administration of cities, communities, regions or at national/European level but also associations, civil society groups etc.

2. The projects must be carried out in close cooperation and intensive communication with the demand side, which should have a clear interest and mandate to make use of the result and start the implementation process during the project life time (testing and piloting or as use in strategic policy papers etc.)

3. The projects should involve all relevant stakeholder groups

4. An implementation plan/roadmap/action plan etc. for the further steps after the project implementation are mandatory

RECOMMENDATIONS FOR PROJECT PARTNERS

Policy measures can do a lot to support research projects in integrating methods and work packages that follow these success factors, by creating the relevant framework conditions:

1. Research projects must target a specified market need/end-user interest

    a. Either through market research or better,

    b. By integrating highly interested end-users into the project's activities, who are also able to support market entry

2. An exploitation strategy is mandatory for all involved partners, especially industry or end user partners and must include a strategy/roadmap to transfer knowledge/technology to industry and end users outside of the consortium

3. Funding of Research and Innovation activities should not stop at Technology Readiness Level[2] (TRL) 3 ("Experimental proof of concept") but:

   – Include a high TRL mandatory demonstration part or

   – Give the possibility to add demonstration after reaching specific milestones (= budget allocation on hold depending on milestones – example: German Federal Ministry of Education and Research (BMBF) funding for innovation: project financing is connected with milestones)

4. Enable (= allow time and funding for):

   a. Projects to include the training of end users as part of the project

   b. Systemic coordination/communication of interests among stakeholders as part of the project

   c. The start of a standardisation and /or harmonisation process

5. Enable partners to upgrade/adjust their research framework to address new technology developments not foreseen at the start of the project

6. Train Policy Officers (PO) to improve reporting on exploitation/revise the template for PO's assessment report

7. Within the Work Programme: clearly define policy objectives, expected impact, special conditions for the partnership (include business/market expertise, involve end users, etc.)

8. Project evaluation: couple technology and business experts in the panel; give the right weight to "impact" criterion; duly assess the plan for exploitation.

RECOMMENDATIONS FOR POLICY MAKERS

---

2   Further information on Technology Readiness Levels: http://ec.europa.eu/research/participants/data/ref/h2020/wp/2014_2015/annexes/h2020-wp1415-annex-g-trl_en.pdf

In addition, a basic principle to respect when talking about exploitation of research results is that **in the transport sector, the innovation cycle is quite long.** There are three main reasons for this:

1. **The long life of assets:** Road vehicles tend to have a life of around 10 years, for rail, water and air the life span can reach up to 40 years, while the typical lives of transport infrastructure are even longer!

2. **Institutional complexity:** Typically, transport services and infrastructures are supplied by different organisations, whilst the whole industry is overseen by regulators with a strong concern for safety that makes them tend to be conservative. As an example of these complexities, the new European Train Control System requires equipment to be fitted to both trains and infrastructure, and can only replace existing signalling systems when all trains have been fitted. As a result, many European countries are looking at implementation plans lasting many decades.

3. **Transport systems tend to be networks rather than freestanding routes:** New vehicles need to be able to run anywhere on the existing infrastructure and share it with other existing vehicles. This considerably slows down innovation, particularly in the rail sector, where issues such as compatibility with existing tracks, signalling and electrification equipment play an important role.

This fact of an extremely long innovation cycle might lead to the impression that – especially in the transport sector research and innovation projects – exploitation does not take place or only to a small extent. Thus, **the TIPS consortium proposes the following actions:**

> 1. Request a BUSINESS PLAN and/or an estimation of potential markets and their market potential of newly developed products/services/processes at the end of the project. This will help consortia focus on the final exploitable results and provide policy makers with an idea on exploitation activities planned after the project's end
>
> **>>**

2. Differences between EXPLOITATION and DISSEMINATION should be better understood by project partners (e.g. through joint seminars with other consortia) and requested by the European Commission (EC) according to the project's characteristics. Thus, it could be useful to also train public project officers to better understand the exploitation potential of projects (e.g. trainings with the TIPS Exploitation Toolbox, change templates for PO's assessment report)

3. Provide more support in terms of exploitation (project individual IP workshops, capacity building etc.) would be useful – not just at the end, but **at the very beginning of the project,** in order to allow partners to start and prove exploitation

4. Change wording in work programmes: provide more guidelines on the possible ways to guarantee exploitation (e.g. through a dedicated budget, end users' representation)

RECOMMENDATIONS FOR POLICY MAKERS

Last but not least, the patency and the **interaction between different funding programmes** from different policy maker agencies and schemes within the same policy making body but also between different bodies play an important role. Thus the TIPS recommendations are:

1. Make better use of complementary funding instruments (SME instrument/Risk sharing facility instrument/equity funds capacity with the European Investment Bank (EIB) and the European Investment Fund (EIF))

2. Build a strategy of organised, complementary and integrated funding for research and deployment with the Structural Funds

RECOMMENDATIONS FOR POLICY MAKERS

Section 2: Dos and Don'ts – Role models for successful exploitation

Throughout the TIPS project, an ongoing analysis of impact factors on how and why publicly funded transport projects managed to either successfully or unsuccessfully exploit their research results was carried out with the stakeholders from European projects: The section below shows the final summary of all lessons learned, especially during the 2 TIPS Advisory Board meetings, the 7 awareness workshops throughout Europe, the 2 information stands in Lithuania during the ICT conference 2013 (ICT for Mobility) and during the Transport Research Arena Conference 2014 (France) and last but not least the two Training Academies in France and the Czech Republic.

The lessons are formulated as

- **"dos/role models"** = activities/conditions that tend to be fruitful/supportive for a successful project exploitation, and

- **"don'ts"** = activities/conditions that tend to be negative for a successful project exploitation.

They shall act as guidelines for turning research results into marketable products, services or processes. The dos and don'ts are ordered either in terms of a SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis or in terms of intended project outcome. Surprisingly, the TIPS consortium together with the Advisory Board identified that there are **no specificities in a specific transport mode** (air, road, rail, water, intermodal) that lead to different dos/don'ts or role models.

TIPS formulates the following dos and don'ts…

… in terms of the SWOT analysis:

What, and at which stage of the research cycle, can we do to make better use of the results from research projects and to increase the impact of transport research and innovation? TIPS uses the terms SWOT to gain an easy understanding of what is considered a "do" or a "don't":

Dos	S	STRENGTHS	Project **internal** conditions beneficiary to a successful exploitation of the project results
Don'ts	W	WEAKNESSES	Project **internal** conditions **NOT** beneficiary to a successful exploitation of the project results
Dos	O	OPPORTUNITIES	Project **external** conditions beneficiary to launch a product
Don'ts	T	THREATS	Project **external** conditions **NOT** beneficiary to launch a product

In summary:

STRENGTHS = Dos	WEAKNESSES = Don'ts
+ Involvement of end-users in R&D activities	– Poor definition of background IPR
+ Dissemination to relevant stakeholders	– Gap between research and policy objectives
+ Agreement on future exploitation	– Gap between market needs and project objectives and outputs
+ Well balanced consortium	– Inefficiency of consortium formation
+ Experience in collaborative projects	– 'Re-invent the wheel'
+ Positive coordination	– Research activities 'too slow' to meet market opportunities
+ Commitment to bring product to market	– Lack of networking
	– Imbalance between available resources and objectives

OPPORTUNITIES = Dos	THREATS = Don'ts
+ Change in market conditions	– Lack of usage of standards
+ Access to venture capital	– Lack of clarity when things go wrong with cooperation
+ The roadmap for the long term vision matches with short term benefits on the route to achieve the vision	– Societal acceptance
	– Competing technologies
+ Policy framework – new policies can create new opportunities by shaping the market	– Lack of sustainability in research (in terms of continuity of research projects)
	– Policy framework
+ National support	– Change in market conditions
+ Involvement of large industries	

The following tables describe in more detail the positive/negative impact factors showing also the relevance for the project's lifetime:

STRENGTHS

	Impact Factor	Description	Relevance for project's lifetime
STRENGTHS	Previous experience in EU funded projects	Being experienced in participation/coordination of transnational funding projects might help to avoid making the same mistakes again (e.g. in terms of working together in a technical sense but also in a social sense)	At the proposal stage At the beginning of the project During the project At the end of the project
	Previous experience in national projects	Research is sometimes carried out at national level prior to the EU level	At the proposal stage At the beginning of the project During the project At the end of the project
	Complete innovation life-cycle in a project	Project length should allow for completion of the entire project life-cycle	Important to foresee this at the proposal stage
	Good IPR and confidentiality management	Good management of access rights to project results is a strength	Must be in place at the proposal stage

>>

STRENGTHS	Funding must cover all necessary R&D activities	Especially in R&D oriented funding schemes (Research and Innovation actions, STREPS, IPs, etc. and ERCs that allow for real research)	At the proposal stage At the beginning of the project During the project At the end of the project
	Dissemination to relevant industrial stakeholders	Dissemination in industrial magazines, presentations at industrial fairs	At the beginning of the project During the project At the end of the project
	Research must cover the full spectrum of stakeholders	Research should meet the needs of all target users – from industry and from institutions	Mainly during project implementation
	Competitiveness	Competitive advantage, developing recommendations for standards	A the beginning of the project During the project
	RoI – Return on Investment	Research results in a product or service at the end of the project	At the beginning of the project During the project At the end of the project
	Complete scenario of project outputs	Increases the exploitation potential of the project	At the beginning of the project During the project At the end of the project
	Policy impact	Having an impact on public policy is a potential strength of the projects	At the end of the project
	European transport area	Contributing to the harmonisation of national transport policies	At the end of the project
	Positive coordination of project activities	The effective and professional coordination of the project is a main factor for its success	During the project
	Continued coordination after project end	The project coordinator should continue to keep this role even after the project has ended in order to link the partners in further activities	At the end of the project
	Exploitation commitment	Commitment by a group of partners to bring the results to the market	After the project

WEAKNESSES

	Impact Factor	Description	Relevance for project's lifetime
WEAKNESSES	Inefficiency of consortium formation	Structure doesn't fit with objective of the project	Beginning, implementation and outputs
	Gap between market needs and project objectives and outputs	Usually research products have a demonstration dimension but they are not able to cope with market and societal needs	At the end of the project
	Type of output	It is a weakness if at the final stages of a project life-cycle and ONLY documentation material can be produced	Proposal writing stage During the project At the end of the project
	Gap between research and policy objectives	No user-oriented or market-oriented proposals	Proposal writing stage During the project At the end of the project
	Imbalance between available resources and objectives	It is a weakness if the available resources cannot achieve the project results	Proposal writing stage At the beginning of the project During the project
	Poor definition of background IPR	Wrong IPR framework management	Proposal writing stage Consortium agreement drawing up phase

OPPORTUNITIES

	Impact Factor	Description	Relevance for project's lifetime
OPPORTUNITIES	Role of large industry in projects	In most sectors SME, end users and citizens depend on large industry. Large industry involvement as an important stakeholder can be advantageous	Prior to the project beginning
	Shared industrial values in R&D	Involve all stakeholders along the chain to achieve optimal use of existing infrastructure, vehicles etc.	Prior to the project beginning
	Experience FP4, 5 etc. (and, in future) Horizon 2020	Past focus: Systems Present focus: Services Future: Sharing (data, infrastructure)	Prior to the project beginning
	Relation between R&D and legislation	R&D evidence to adapt legislation	During and after the R&D project
	Openness towards sharing results	Potential new services outside of the consortium	During and after the R&D project
	Horizontal & multi sectorial approach	More opportunities between modes, systems, last mile etc.	During and after the R&D project

THREATS

	Impact Factor	Description	Relevance for project's lifetime
THREATS	Public perception	Missing societal acceptance (e.g. driverless trains)	Mostly at the beginning and at the end of the project
	Technology	Competing technologies, sudden changes in technology	Whole lifecycle of the project
	Ownership/ organisational management	Intellectual Property Rights situation not clearly defined and mediated within the consortium	Mostly at the end of the project
	Micro-economy	Financing possibilities, tax systems, access to venture capital, fuel prices	Mostly at the beginning and after the end of the project
	Policy framework	Administration/legislation issues, changes in the direction of policy, priorities (e.g.: safety, security), sudden political changes, lack of interoperability, standardisation	At the beginning and at the end of the project

... in terms of intended project outcomes:

In addition to the above shown dos and don'ts, the characteristics of "role models" presented below aim to be something of a "cook book" for a project which is successful in terms of exploitation. They can act as guidelines for future projects in any transport mode. According to the outcome that a project wants to achieve, the role models have to be divided in two types:

Outcome type 1: Describes projects with the aim of **commercial/marketable benefits and resulting revenues.** For such outcomes, exploitation means to make use and derive commercial/marketable benefits of something (marketable products); a project managed to create revenues for at least one single project result.

Outcome type 2: Projects include results such as **general benefits, environmental, communal, social benefits as well as benefits in terms of safety or standardisation.** For such outcomes, exploitation means to make use and derive general benefits/environmental, communal, social benefits/benefits in terms of safety/standardisation/etc. of something instead of thinking about marketable products.

Characteristics of Role Models for Type 1 & Type 2

CHARACTERISTIC OF ROLE MODEL FOR TYPE 1 -TARGETING COMMERCIAL OUTCOMES-	CHARACTERISTIC OF ROLE MODEL FOR TYPE 2 -TARGETING MORE GENERAL BENEFITS-

Characteristics at the proposal writing stage:
 	
– Broad consortium (ideally the project consortium should contain players from all relevant segments of the value chain – or at least include some mechanism(s) to ensure that the interests/needs of critical actors are adequately considered in the development of marketable products/services)
 	
– Consortium composition:
  – Relevant commercial/industrial partners
  – Relevant end-users
  – Marketing specialists
  – Researchers who are keen to see their ideas exploited
 	
– Some partners should have a reasonable stability of funding and operating conditions over time as the sources of finance should not be dependent over time on public research funding
 	
– Well-identified industrial partners in the consortium having their own research agenda converging with the objective of the project
 	
– Existence of clear research, development, innovation and exploitation objectives which are understood and accepted by all partners in the consortium
 	
– Identify the end-users first
 	
– Clarity with regard to IPR issues – already prior to the beginning of the project
 	
– Use Key Enabling Technologies for project implementation because of the long timeframe from project start to final product/service/process on the market.
	Characteristics at the proposal writing stage:
	
	– Consortium composition:
	  – Broad consortium
	  – Final user, i.e. the relevant public authority responsible for specific area, needs to be integrated from the start of the project and to be keen to apply the results
	  – Industry-Academia cooperation may be useful
	  – Transport policy specialists should be in the consortium
	  – Involvement of an expert team competent to assess public impacts. Clear identification of parameters of expected benefits and how they will be achieved
	  – Citizens and associations must be involved and some should be in the consortium
	  – Public authorities should be in the consortium
	  – Multidisciplinary consortium and interdisciplinary research is a must
	  – The consortium should be able to structure and facilitate engagements between academics, industrialists, public authorities and communities;
	
	– Clearly identify the beneficiaries (government, NGOs, authorities, etc.)
	
	– Addressing needs of a society: sustainability, pollution, public health, safety, security, equity, environment protection, climate change, global warming.

Characteristics during the project execution stage:

– Observance of specific requirements of users

– Adequate consideration of certification and standardisation issues. Where relevant, seek the support of national and European standardisation organisations

– Consideration of public procurement as a lever to support market penetration of products/services to be developed

– Seek funding for activities after the end of the project funding as early as possible

– Seek knowledge and learn from horizontal and other cross-sectorial/mode activities

– Engage in projects on issues that seem significant/that provide value for money

– Development of a compelling, persuasive demonstrator

– Give maximum publicity/dissemination of your results beyond the academic world (trade magazines, fairs, etc.)

– Incorporate end users who see developing the product as something they definitely want to do and who have the resources to do it, rather than ones who are just interested in knowing what is going on.

Characteristics after the project execution stage:

– Clear, realistic vision with respect to the time line for project results reaching the market

– Exploitation of cooperation between industry and research institutions

– A market plan is needed at an early stage (e.g. on the expected market success in competing with similar products)

– Clarify the process of project results reaching the market

– Position technologies in the technology trend road map and draw the windows of opportunities for this technology.

Characteristics during the project execution stage:

– Obtainment of political commitment from relevant decision-makers for the uptake and implementation of results/developments

– Industry-Academia cooperation useful for human resources development

– Establishment and continual further development of a network of relevant actors as a vehicle for wider dissemination of results and best practice

– Ensure that there is not the "not invented by me" problem

– Maximise dissemination and knowledge transfer of research results, seeking to create an open network of research results

– Get involved in certification and standardisation issues

– Public procurement needs to be addressed

– Technology transfer is a main issue.

Section 3: Capacity building and awareness raising measures for exploitation

TIPS has developed and implemented a set of **capacity building and awareness raising measures** for transport project partners to help them succeed in getting through to their final target group/market and/or innovation development out of publicly funded projects. The measures were offered to publicly funded transport project partners (mostly under FP7 but also under national programmes). These activities were offered free of charge and were made available to a varied target group (see below).

The activities consisted of information stands, workshops and Training Academies.
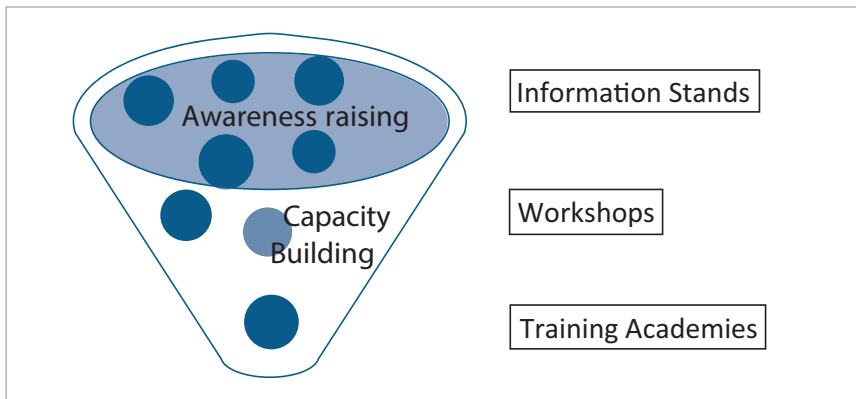
General awareness raising activities

Information Stands: Two information stands at international fairs relevant to transport were hosted in Lithuania and France – in total, more than 350 interested parties visited the TIPS stands. The information stands offered comprehensive information on how to transform research results into innovative products and services. The main success of the TIPS partners was to disseminate and discuss the term "exploitation"!

> "It is true: One nearly loses sight that the importance of thinking about exploitation from an early stage until the end of the project is vital!"
>
> ***A visitor at a TIPS stand***

Workshops: 7 Workshops were held in Belgium, Greece, Hungary, Slovenia and Italy to support the overall learning process of publicly funded transport project partners, showing them how project results can be exploited and the market uptake of innovative products and services be organised.

They covered issues such as:

- Dos and don'ts: What are impacting factors for market-oriented exploitation

- Success factors and obstacles along the innovation line

- What is intellectual property (foreground) in one's project

- What are intellectual property rights (IPR) and what is their use?

- How does FP7 deal with IP and IPR

- How to manage IPR throughout the project – tools and procedures

- Funding possibilities for financing innovative products and services (FP, H2020, EIB, EIF etc.)

- Insights to the process of standardisation and how a publicly funded project can "affect" these

- Good practice presentation

"The participation in the TIPS workshop definitely changed the way I value the importance of thinking about the exploitation from the beginning of the project!"

A participant at a TIPS workshop

The contents of the workshops helped more than 140 participants to enhance their awareness on the importance of exploitation activities and get first insights in necessary topics such as IPR management and standardisation as well as get familiar with support tools guiding them on their way to successful exploitation.
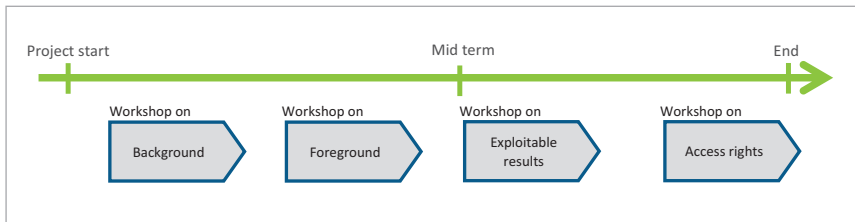

Figure: Exploitation relevant topics during project lifetime

TIPS strongly recommends to policy makers to provide exploitation workshops to all transport project consortia at the beginning and during the project`s lifetime as shown in the figure.

RECOMMENDATIONS FOR POLICY MAKERS

DOWNLOAD:
The agendas & material presented at the workshops is available online:
http://www.transport-tips.eu/events/&type=tipsevents&events=all

In-depth exploitation support activities

Training Academies: The TIPS partners carried out two Training Academies in France and the Czech Republic with a total of 56 participants representing 51 EU funded transport projects. They were designed to provide in-depth support to individual project partners during the three-day event and covered elements such as:

- Discussion rounds

- Good practice presentations

- Theory on exploitation relevant issues

- Practical exercise on exploitation

- Networking with similar projects

From a TIPS point of view it was important to ensure that the participants realise that exploitation is an ongoing and iterative process led by an Exploitation Manager, while involving all consortium partners, and an essential task during the entire project duration. A well planned exploitation process helps in getting the project results to the market. The process needs to take place throughout the entire life cycle of a publicly funded project and needs to constantly iterate the importance of Intellectual Property (IP) detection, ownership clarification, rights application and IP enforcement strategies. Even more important is the appointment of a specific person – other than the project coordinator – to take care of this process (e.g. an IP/exploitation manager).

The Training Academies were designed to provide in-depth support to individual project partners during the three-day event that consisted of various slots on the following topics:

- Success factors and obstacles for successful R&D exploitation: Presentation of TIPS findings and discussion with the audience

- Intellectual property rights: Understanding the whole process

IP Identification → IP Protection → IP Management → IP Enforcement → IP Exploitation

- FP7 requirements for your project's exploitation plan

- Risk assessment & overall IPR strategy and management of new knowledge delivered by the project

- How to identify your most promising project results

- Market analysis tools and assessment of the socio-economic aspects of the knowledge and technologies generated and the factors that influence their exploitation such as standardisation and regulatory aspects

- Business plan content and how to proceed

- Exploitation plan: Introduction to the TIPS exploitation template

- Financial support opportunities from FP7/H2020 to EIB/EIF

- Role of standards and normalisation in the exploitation of results.

In addition, **networking** through "speed dating" and "elevator pitches" presenting in max. 3 minutes each project to the other participants was content of the Training Academies. It helped a lot to gain insight on the content and approach to exploitation of similar transport funding projects.

"The participation in the Training Academy affected the way I think about the importance of exploitation and by providing useful documents and information also gave a good starting point for the future planning and identifying potentially successful project results and defining IP routes."

A participant at a TIPS Training Academy

TIPS strongly recommends to policy makers:

– To provide Training Academies to all project partners/consortia mid-term to end of the projects' lifetimes

– To mandatorily appoint exploitation and IPR managers within project consortia

– To enhance the exchange between funded transport projects dealing with the same topics

RECOMMENDATIONS FOR POLICY MAKERS

DOWNLOAD:

The agendas & material presented at the Training Academies is available online:
http://www.transport-tips.eu/pages/training_academies

Section 4: TIPS Exploitation Toolbox

Project exploitation is an issue that affects each project partner on an individual basis – meaning that each project partner will have to define its own exploitation routes for its own organisation but nevertheless in cooperation with the whole consortium. Thus each project partner (especially SMEs) as well as the complete consortium jointly needs to be guided during and after the end of the project to:

1. Identify the project results relevant to the individual project partners

2. Identify the match of each relevant project result to its own vision and product/ service portfolio

3. Be able to estimate the value of the project results for the actual project as well as for the individual project partner organisation

4. Estimate the technology readiness level and the steps to be taken until the product's/service's availability

5. Gain first insights into potential markets

6. Identify further financing demand to bridge the valley of death

7. Identify, take and monitor the right steps towards a successful exploitation including IP rights applications.

To support project partners and project consortia in this process, TIPS has developed an Exploitation Toolbox consisting of four modules:

Module 1: Result collection

Module 2: Identification of the interest in exploitation

Module 3: SWOT analysis of each relevant project result

Module 4: Project partner individual exploitation plan template

To facilitate usage, TIPS has decided to use Microsoft Word/Excel for its toolbox and not develop any proprietary software of its own. The toolbox thus consists of easy to handle and simple to use DOC/XLS files that are publicly available for download from http://www.transport-tips.eu/uploads/files/TIPS_Exploitation_Toolbox.zip.

Module 1: Result collection

The first step of the exploitation process aims to

- Identify the main project results
- Detect the most promising results from an exploitation point of view

The TIPS toolbox provides the following template as a starting point in the exploitation process – which nevertheless should regularly be replicated or revised throughout the project. At this stage project partners need to deal with the project's description of work (DoW) and with the work delivered so far in reality.

Figure: TIPS Exploitation Toolbox module 1

Module 2: Identification of the interest in exploitation

The second module reflects the interest in exploitation from a point of view of each individual project partner. This module requires that project partners individually have to go through each result and identify if they are really interested in the result in terms of their own organisation (their vision, their actual and their future product/service/process portfolio).

At this point in time, project partners have to also identify whether there is already a pre-defined dissemination level determined in the project's DoW.

Identification of Access Rights and Expected Exploitation Type

Exploitable Result(s)	Title of the Exploitable Result(s) [3]	Dissemination level [4]	Exploitation form [5]	Your Interest in the exploitable result(s) [6]	Did/does your organisation contribute to the generation of this result during the project's lifetime?	Negotiations with other project partners needed? [7]
Exploitable Result 1	Fill in	☒ Public ☒ Restricted ☒ Confidential ☒ Other	Fill in	Fill in	☒ Yes ☒ No ☒ Don't know	☒ Yes ☒ No ☒ Don't know
Exploitable Result 2	Fill in	☒ Public ☒ Restricted ☒ Confidential ☒ Other	Fill in	Fill in	☒ Yes ☒ No ☒ Don't know	☒ Yes ☒ No ☒ Don't know
Exploitable Result 3	Fill in	☒ Public ☒ Restricted ☒ Confidential ☒ Other	Fill in	Fill in	☒ Yes ☒ No ☒ Don't know	☒ Yes ☒ No ☒ Don't know
Exploitable Result 4	Fill in	☒ Public ☒ Restricted ☒ Confidential ☒ Other	Fill in	Fill in	☒ Yes ☒ No ☒ Don't know	☒ Yes ☒ No ☒ Don't know

Figure: TIPS Exploitation Toolbox module 2

The questions stimulate the project partners to initially start thinking about the intellectual property rights and their owners within the consortium: It should be considered whether the organisation did contribute/contributes to the generation of the respective exploitable result during the project's lifetime and whether negotia-

tions with other project partners are needed. Such questions are essential in order to identify any potential conflict of interest within the consortium, e.g. although the partner interested in a specific result has not contributed to the development of the project result, she/he might still be interested in exploiting it after the project's end. The tables lead ultimately to the first important discussions on the issue of "access rights" which must then have to be discussed within the consortium or at least with the respective partners interested in the result.

> "Surprisingly, I already benefited from the first tables where we had to identify the project results with exploitation potential. This can also be used in other areas, not only in EU financed projects."
>
> ***A user of the TIPS Exploitation Toolbox***

Module 3: SWOT analysis of each relevant project result

Since a SWOT analysis is a simple but yet useful decision-making tool, the TIPS consortium decided to implement this analysis in the TIPS Exploitation Toolbox. The classical version of a SWOT analysis has been adapted in accordance with the nature of the TIPS project.

	+ + + PROS + + +	- - - CONTRAS - - -
Internal Analysis of Exploitable Result(s)	STRENGTHS	WEAKNESSES
	→ **of the exploitable results**	
External Analysis of Exploitable Result(s)	OPPORTUNITIES	THREATS
	→ **of the exploitable results**	

Table: SWOT analysis for TIPS exploitation support

Ideally, the SWOT analysis should be done for each of the exploitable results the partners show interest in. For the internal strengths vs. weaknesses analysis, several categories should be considered: 1) Status quo of the technology, 2) Protection rights, 3) Product, process, service range. The TIPS Exploitation Toolbox provides an XLS-template for this step including manifold questions on these three issues. In

terms of technology development, it is important to identify the state of development achieved (proof of principle/proof of concept/prototype etc.) against progress of any competing technologies.

After finishing the internal SW-Analysis, the external opportunities vs. threats analysis should be completed (again, available as a separate Word file). Similarly, as before, several categories are enquired:

- Market: Size of potential market/type of customers

- Customers: Target group of products/services/processes

- Competitiveness: Competitors and competing business models

- Legal framework conditions including regulations/approvals/standards, measures to protecting knowledge: Patents, trademarks

- Finance: Capital requirement for commercialisation, return on investment, type of investors/partners sought

- Ecological framework conditions

- Other framework conditions

Module 4: Project partner individual exploitation plan template

The purpose of the TIPS exploitation plan template is to provide the partners carrying out the TIPS exploitation support with a Word template that enables them to summarise all information previously gathered and constantly updated during the project's evolvement. This plan is individual for each project partner in each project. Apart from that, information that is needed for the final EC project report can easily be extracted from these plans on a consortium level.

Table of contents

Figure: TIPS Exploitation Toolbox module 4

The TIPS Exploitation Toolbox can be used by project partners, project consortia as well as by funding agencies to detect and better understand the innovation potential of project results. The toolbox is largely self-explanatory and can thus be used by individual project partners/consortia themselves. Nevertheless, it is useful to combine the TIPS Exploitation Toolbox with Training Academies or individual project workshops throughout the whole project duration.

"The main benefit of the practical exercises and the Excel tables provided by the TIPS consortium is that they gave a good structure to organise thoughts regarding exploitation and to identify project results that may have real potential."

A user of the TIPS Exploitation Toolbox

TIPS strongly recommends to policy makers:

–   To provide all project partners/consortia with the toolbox

–   To provide project consortia with supporting consultancy (within/from outside projects) to ensure continued application throughout a projects duration – and after the project's end

DOWNLOAD:

The TIPS Exploitation Toolbox can be downloaded on:

http://www.transport-tips.eu/uploads/files/TIPS_Exploitation_Toolbox.zip

Section 5: Good practices

Good practice examples for a successful exploitation of project results: Success stories proving that publicly funded transport projects result in innovation creation

After quite an extensive list of Dos and Don'ts and tips on how to overcome barriers to exploitation, the following part should provide you with practical examples. How have other projects in the transport sector been successful in bringing their research and project results to the market? Which aspects have been proven to work? Read on and gain some insights!

Methodology for identifying the "good practices"

The good practices shown below are examples identified during the TIPS project. Based on fieldwork through an on-line survey, TIPS analysed successful exploitation in finished RTD projects. These exploitation approaches were then analysed together with the TIPS Advisory Board in order to identify best practice cases and role models. Out of these projects the "champions" were identified as they were matching most dos and don'ts formulated in the section above. Subsequently, interviews were carried out with these projects and they were questioned in more detail about their exploitation approach (e.g. information on the product(s), IPR management prior/during the project, the availability on the market, the use of the product(s) and success factors identified by themselves). Fourteen projects have been selected as good practice examples in general, irrespective of the transport mode. Of these fourteen, the following projects are presented here as examples:

2020 Interface – Tailoring of Tribological Interfaces for Clean and Energy-Efficient Diesel and Gasoline Power Trains

Transport Mode:	Intermodal
Results:	Radical innovation in diesel and gasoline power trains
Success factors:	Included end users from large and small industry; Included end users directly in the results development; Consortium including academia with strong interest in exploitation

In internal combustion engines, durability and friction control is currently delivered from a complex package of lubricant additives in a fully formulated engine oil. Through tribochemical interaction with the surface, these oil additives produce nano-structured composite, self-healing and smart tribofilms at the surface. The FP7 2020 INTERFACE project involved the design of the complete system: functional Diamond-Like Carbon („DLC") coating and future generation lubricant, to enable Europe's stretching targets in fuel economy and durability to be met. The objective of 2020 INTERFACE was to incorporate design strategies into optimising new coatings technology through an interdisciplinary integrated experimental and theoretical approach.

2020 INTERFACE brought together a consortium of universities, research institutes and leading multinational companies from eight EU countries, to deliver fast radical innovation in nano-science through to a full set of novel lubrication technology platforms, for commercial applications in diesel and gasoline power trains.

The following factors had an influence on the overall success of the project – before, during and after the project's lifespan:

- Including the end users of the technology Volvo Technology Cooperation and Lubrizol Limited into the project consortium. The end users are directly involved in the creation of the project results, giving valuable advice on the demands of the market. The direct involvement also creates a competitive advantage for the two companies, giving them access to knowledge of the academic partners' background and foreground.

- The academic partners showed great interest in the direct use of the research results and several academic articles were published as a result.

- The interest for cooperation in this field between the institutions existed before and after the project. The University of Leeds (lead partner) even offers several post-doctoral positions for research in the same field. Especially the research partners carried on with their studies in this field also after the project end.

Further information: http://2020interface.eu

VISION – Immersive interface technologies for life-cycle human-oriented activities in interactive aircraft-related virtual products

Transport Mode:	Air transport
Technology:	(a) light simulation in aircraft interiors, (b) body capturing, (c) interaction technologies
Results:	Simulation tools for pilot training or other applications
Success factors:	Based on a clear request from end-users in the aeronautics industry; Included strong end-user partners from industry in consortium; Demonstration and test of prototypes in real life included in project; Direct exploitation by industrial project partners – integration of new technology in their own processes and tools

VISION focused on certain aspects of Virtual Reality (VR) technology and aimed to specify and develop key interface features to improve the flexibility, performance and cost efficiency of human-oriented life cycle procedures, related to critical aircraft-related virtual products (e.g. virtual cabin, virtual assembly etc.). VISION followed an upstream research approach, in view of improving the underlying VR technologies, which were considered critical for the human-oriented life-cycle use of the future aircraft-related virtual products.

The technology development resulted in specific prototypes which were integrated in two common IT platforms. Specifically, the delivered results include:

- A visualisation module which includes a ray tracing library together with distributed rendering capabilities and global illumination functionalities. The specifications of this technology allow light designers and engineers to simulate light conditions in aircraft interiors with high fidelity.

- A marker-less body capturing technology which includes extensive machine learning libraries and results from acquisition tests that train computer algorithms. This technology is aiming in body motion capturing capabilities in industrial environment where current algorithms are lacking in robustness and performance when compared to marker-based systems.

- An interaction framework that provides a generic, platform-independent architecture for developing interaction techniques in a flexible and highly reusable manner.

- An advanced interaction metaphors repository that includes techniques specifically designed to address the early requirements of the project and follows a generic and platform-independent architecture of the interaction techniques.

The following factors contributed to the project's success:

- There was a specific need/request from the 'end-users' (i.e. aeronautics industry) to check the proof of concept of several virtual reality tools for the development of various simulation tools (e.g. for pilot training, development of various parts in the cockpit, etc.).

- The project partners had already established close collaboration with each other and thus there was both mutual trust and commitment to contribute to the foreseen research work, which resulted in a smooth project implementation.

- The consortium included two major industrial organisations, which are key actors in the field of air transport.

- All prototypes demonstrated and tested in real life installations (tramlines) operated by some of the consortium partners.

- The developed modules were demonstrated and tested in the end-users' actual simulation tools.

Each partner followed a different exploitation path based on its 'profile':

- The research partners, acting as consultants to the 'air transport industry', extended their knowledge and enhanced their expertise so provide better advice and support.

- The industrial partners incorporated the project results into their own 'production lines', while they wanted to further extend and broaden their research work. This high interest led to the preparation of the i-VISION project, which aims to develop several platform-independent physical prototypes for verifying various factors during design.

Further information: http://www.project-vision.eu

SAFERAIL – Development of novel inspection systems for railway wheel sets

Transport Mode:	Rail transport
Results:	Validated prototypes for two alternative systems of on-line and off-line inspection systems, three of the four proto-types have been indeed installed and are in use by the project partners' end-users and service providers
Success factors:	Clear need for inspection systems and training; Consor-tium covers entire value chain including train operators and technical service providers; Technology development was driven for all four prototypes by the SME partners; All prototypes tested in real life; End-users = train operators were trained how to use the inspection systems during project life time

The project's objective was to support the effort of the rail industry in achieving better safety standards by developing novel methodologies and techniques for the inspection of wheel sets. To minimise wheel set failures and damage caused by faulty wheel sets to the rail tracks and rolling stock, an on-line inspection system was developed, that will be placed at pre-chosen strategic points on the rail network tracks, for inspection of faults in wheels and axles of passing trains. If a fault is identified on a wheel set, the system will automatically alert the signalling engineers who will then decide what action to take for that particular train. An off-line inspection system of wheel sets was also developed in service for a more accurate and fast inspection of wheels for any surface breaking faults. The final prototypes were demonstrated and the end users (i.e. technical staff of the train operators) received training regarding the operation of the prototypes.

The following points were key to the success of the project:

▪ The consortium covers the entire 'value chain' active in safety and security aspects of the rail transport maximising the exchange of knowledge and experience, namely:

  – **train operators** (end-users) that face an actual problem during their operations, while they offered the opportunity to test the research results of the project on their (actual) networks

  – **technical service providers** bringing their expertise on wheel and inspection techniques and procedures

- **research institutions** (knowledge producers) capable of producing and extending scientific knowledge for the development of novel inspection systems

▪ All prototypes demonstrated and tested in real life installations (tramlines) operated by some of the consortium partners.

Given the background (i.e. interest) of the project partners, different exploitation approaches were followed. There are at least two cases where the technical service providers enriched their product portfolio based on the project research work and achievements, which are available on the market. The rail operations have incorporated the prototypes developed within the project as part of the maintenance system of the respective operator, enhancing the safety of their networks. The research partners' interest to further extend the knowledge gained through the project is evident through the projects that followed SAFERAIL and are using its results as a knowledge base.

Further information: http://www.saferail.net

DaCoTa – Road safety Data Collection, Transfer and Analysis

Transport Mode:	Road
Application:	Road safety data base/observatory
Results:	An example for policy application
Success factors:	Demand from EU policy and direct implementation by DG MOVE of project results; Close cooperation with DG MOVE during the project, as DG MOVE had high interest in the result

DaCoTa wanted to develop the ERSO (European Road Safety Observatory) framework and the protocols for the data and knowledge, while at the same time strengthening the wealth of information in the Observatory by gathering, consolidating and standardising the available road safety data and information, through the exploitation of all available sources. Project partners were mainly research organisations. The main outcome of the project is the DaCoTa "Road Safety Knowledge System", which operates in parallel with ERSO.

Several success factors before, during and after the event can be named:

- There was a specific request from the EC: to enhance and support the operation of the ERSO, started with the SafetyNet project (May 2004 – October 2008) and continued with DaCoTa.

- The core partners (half of the consortium) were involved in the preceding project (SafetyNet) under which the ERSO was set up.

- The 'nature' of the partners, i.e. being research organisations and institutions (either 'typical' university units or non-profit research centres and transport associations), they were/are acting as advisors on transport related issues.

- As the results of the project (both the data to be collected and the output tools for the data analysis to be developed) would be transferred to DG MOVE after the end of the project (as part of the ERSO), there was a very good collaboration with the respective unit from DG MOVE. This collaboration still remains and key partners from DaCoTa are still consulted.

- The interest and commitment of the partners kept the "DaCoTa Road Safety Knowledge System" operational in parallel with ERSO, while many partners (individually) are using the data and analyses to offer consultancy services.

The project practically responded to a specific need/request from the EC and was based on the legacy of the SafetyNet project. However, its outcome is actually used by the ERSO as well as most of its partners. The information and services (namely analysis of information regarding several aspects of road safety at European and/or national level e.g. "Road safety management profiles", "Basic Fact Sheets", etc.) are publicly available and accessible through the ERSO portal (www.erso.eu). In parallel, the same information is provided though the DaCoTa portal (http://safetyknowsys. swov.nl/index.html). Furthermore, most of the partners are research organisations and 'offer' similar consultancy services to local/regional/national authorities as well as any type of private/public organisations regarding road safety issues. For example, the Department of Transportation Planning and Engineering operates such a knowledge base through www.nrso.ntua.gr/index.php/eu-knowledge.html, while numerous scientific papers have been (and still are) produced based on the work under the project.

Further information: http://safetyknowsys.swov.nl/index.html

LAYSA – Multifunctional layers for safer aircraft composites structures

Transport Mode:	Air
Technologies:	Composite material, nanomaterials, fire-resistance etc.
Results:	Three demonstrators validating concept and manufacturing process, which leads to an improvement of already existing and in use composite materials for this application
Success factors:	Consortium of the whole value chain; High interest in improvement of existing materials by consortium partners; Development of material and the manufacturing process enables direct use of results in manufacturing

The aim of the project was to establish the scientific and technological basis for the development of a new multifunctional layer with ice/fire protection and health monitoring capacity to be integrated into composite structures. Within the project, three demonstrators have been manufactured to validate the concept and manufacturing process.

The project had 12 partners: raw material manufacturers for the composite industry, research organisations that would bring in the essential theoretical background, technology supplier to aircraft end-users and aeronautical end-users.

The project can be listed as a good practice due to the following points:

- The results of the project were clearly identified as well as their owner(s).

- Each partner was interested in certain project outcomes and therefore there was no 'conflict of interest'.

- LAYSA focused on the concept and manufacturing process. However, in order to produce the buckypapers that will be used at industrial level, an automatic production way has to be set-up. Therefore, two further research projects succeeded the work done under LAYSA and the key partners in LAYSA are involved in the new projects.

- Many of the partners, especially the technology providers, already had relevant systems on the 'market' and they used the concepts from LAYSA to enhance and improve their product portfolio.

This brochure is targeted at practitioners from the policy level and from the project level and concentrates on the successful exploitation of project results from publicly funded transport projects. Building upon the activities and experiences of the FP7 funded project TIPS, the booklet provides practical guidance on how to successfully exploit project results and gives an overview of the tools developed within TIPS to be used by European projects. Furthermore, good practices of successful exploitation within projects are presented.

http://www.transport-tips.eu