The SETRIS project has received funding from *the European Union's Horizon 2020 research and innovation programme* under grant agreement No 653739

Strengthening European Transport Research & Innovation Strategies

SETRIS PROJECT

DELIVERABLE REPORT

Document identifier:	**SETRIS – D3.5**
Due Date of Delivery to EC	**M8 – 31st December 2015**
Actual Date of Delivery to EC	**7/3/2016**
Title:	**Waterborne research evaluation methodology definition report**
Dissemination level:	**PU**
Work package:	**WP 3**
Lead Beneficiary:	**SEA Europe**
Other Beneficiaries	**TNO**
Document status:	**Final**
Document link:	**n/a**

SETRIS Project coordinated by:

The SETRIS project consortium consists of:

No	Name	Short Name	Country
1	Newcastle University	UNEW	UK
2	European Conference of Transport Research Institutes	ECTRI	Belgium
3	AVL List GmbH	AVL	Austria
4	BMT Group Limited	BMT	United Kingdom
5	Centro National de Competencia en Logistica Integral	CNC-LOGISTICA	Spain
6	The European Earth Friendly Logistics Association AISBL	CO-TREE	Belgium
7	Stichting Dutch Institute for Advanced Logistics	DINALOG	Netherlands
8	German Aerospace Center	DLR	Germany
9	Forum des Laboratoires Nationaux Europeens de Recherche Routiere	FEHRL	Belgium
10	Fraunhofer-Gesellschaft zur Forderung der angewandten Forschung e.v	Fraunhofer IML	Germany
11	Instytut Logistyki I Magazynowania	ILiM	Poland
12	Promotion of Operational Links with Integrated Services	POLIS	Belgium
13	Ships & Maritime Equipment Association of Europe	SEA EU	Belgium
14	Union Internationale des Chemins de fer	UIC	France
15	Union Internationale des Transports Publics	UITP	Belgium
16	The Association of the European Rail Industry	UNIFE	Belgium
17	Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek	TNO	Netherlands
18	European Organisation for the Safety of Air Navigation	EUROCONTROL	Belgium

Document History:

Version	*Date*	*Modification reason*	*Modified by*
1	18/12/15	• Document initiated	Cliff Funnell, SEA Europe
1.1	22/12/15	• Added scope	David Griffiths, BMT
1.2	23/12/15	• Continued drafting	Cliff Funnell, SEA Europe
Final	7/3/16	• Formatted document finalised	Cliff Funnell, SEA Europe Belinda Fairbairn, UNEW

Table of Contents:

INTRODUCTION

1.1 EXISTING APPROACHES

An assessment[1], or evaluation, can generally be defined as "a judgment of an intervention according to its results, impacts and needs that it aims to satisfy" (European Commission 2002). Many different evaluation theories and methodologies exist and have been put into practice. Therefore we will try to avoid "reinventing the wheel", but base our assessment methodology on well-established evaluation methods that have already proven their viability.

The methodology presented below while considering core methodologies dominant over the last three decades (e.g., see Brockhoff, 1982; Julian *et al*., 1995; Berg, 2000; Ojanen and Vuola, 2003 and Kolk et al., 2012) it primarily builds upon three approaches to evaluation of RTD programs well accepted in the impact assessment communities of practice:

- The evaluation principles and practices of the European Commission, as endorsed by the EU's Better Regulation Guidelines and the corresponding toolbox (specifically the parts on monitoring and ex-post evaluation) (European Commission 2015)
- The evaluation of the European Technology Platforms (ETPs) carried out by IDEA consult in 2008 (IDEA Consult 2008)
- Chiesa, V. and Frattini, F. (2009), *Evaluation and Performance Measurement of Research and Development: Techniques and Perspectives for Multi-level Analysis*, chapter 6 on Technology Platforms

WHY EVALUATE?

There are two main rationales for evaluation: 1) Learning, and 2) Accountability (OECD 2001). Evaluating for the purpose of learning has the objective to understand what has worked well and what hasn't in the past. It enables evaluators to learn from past experiences so that they can adjust future behaviour and therewith improve future performance. Evaluation for the purpose of accountability is more backward-looking and has the objective to check whether resources have been committed in a justifiable manner. The evaluation of the WATERBORNE R&D&I programme focuses primarily on the first rationale, as its main objective is to update and improve the existing RDI programme of the maritime sector.

1.2 THE OBJECT OF THE EVALUATION

Before starting an evaluation we need to establish what the actual object of the evaluation is; in other words "what should be evaluated?". The strategic priorities and related activities of the Waterborne RDI programme are set out in a number of documents. The VISION2025 document

[1] Please note that we use the terms "assessment" and "evaluation" interchangeably here.

defines a medium and long-term vision of where the maritime industry wants to stand in 2025. Previously in 2011 the Waterborne Technology Platform (TP) published an updated Strategic Research Agenda (SRA) and Implementation Plan. Moreover, in the same year Waterborne TP issued a Declaration which outlines how the waterborne community intends to contribute to the achievement of the Europe 2020 objective of “smart, sustainable and inclusive growth”.

As point of reference for the assessment, the Strategic Research Agenda and the Implementation Plan of 2011 will be used, as they constitute the main body of the Waterborne RDI programme.

SCOPE OF EVALUATION

SCOPE OF ASSESSMENT OR EVALUATION

2.1 WATERBORNE TRANSPORT, INCL. GREEN SHIPPING

The WATERBORNE Technology Platform is an initiative that came forth from the Maritime Industries Forum (MIF) and its R&D committee in 2005 and is making significant efforts to regularly update R&D strategy for European competitiveness, innovation and the meeting of regulations.

In the area of Sustainable Waterborne Transport, WATERBORNE has identified the following priorities:

- Assuring security of supply
- Increasing the energy efficiency of ships and vessels
- Minimising the environmental impact of ships and vessels
- Building safer ships and vessels
- Increasing competitiveness
- Recruiting and retaining a skilled workforce
- Developing advanced waterborne infrastructure including e-maritime solutions

In order achieve the "Europe 2020" objective of smart, sustainable and inclusive growth and to address the dual challenges of societal and economic progress, WATERBORNE has issued a declaration on the aims of research and innovation:

- we will deliver more extensive, integrated, efficient and sustainable waterborne transport systems and infrastructure
- we will provide increased support for the emerging offshore food, energy and minerals sectors
- we will reduce our impact on the environment
- we will play an important role in delivering a more competitive and sustainable low carbon economy
- we will continue to prioritise safety and security within the Waterborne community

The Waterborne medium and long term Vision is carried by three pillars, as follows:

- Safe, Sustainable and Efficient Waterborne Transport
- A Competitive European Waterborne Industry
- Managing and facilitating the growth in transport volumes and the changes in trade patterns

Within SETRIS, the focus will be on the following specific targets and innovation challenges:

Safe, Sustainable and Efficient Waterborne Transport

Safety & security

Target: Serious ship accidents in EU waters and by European vessels globally will be extremely remote.

Innovation Challenges: Effective designs, systems, procedures and techniques are to be developed to increase the level and reliability of the ship system's performance with the goal of a "zero accident" record in order to deliver

- Effective means to avoid accidents
- Robust ships and reliable equipment
- Improved survival in extreme conditions (ice, freak waves, etc.)
- Competent crew, ship management and shore operations

Target: Security will be checked and safeguarded along the entire transport chain without creating extra bureaucracy, cost, congestion or delays.

Innovation Challenge: Strategies, methods and procedures for safeguarding security along the waterborne transport chain (port to port) that do not reduce (waterborne) traffic efficiency, will have to be outlined and developed. Such strategies, methods and procedures should consider inter-modal transport chain's needs.

Environment Sustainability

Target: In 2025, the environmental impacts of air and water emissions will be reduced drastically. Efficient and economic techniques will be available for onboard treatment of liquids and solid waste.

The pollution impact of maritime accidents will be reduced to a minimum.

New environmentally friendly techniques are implemented for dredging of polluted sediments.

Innovation Challenges: A 'zero emission' approach, notably on substances like SOx, NOx, CO2, PM and VOCs. is an enormous technological challenge. Reducing one pollutant may well have a negative effect on other pollutants, while no single option will be suitable for all types of ships. Economically viable processes, systems and equipment have to be developed under a holistic approach, ensuring a balanced long-term solution. Clean propulsion systems and economic retrofit-packages for existing ships are to be developed, as well as non-fossil based propulsion solutions for economic application on large ships.

In ship design and development of ship systems, know how gained by research must be systematically applied for minimising operational polluting discharges into water. The development of more efficient and economic processes and environmentally friendly on-board systems for treatment and disposal of liquid and solid wastes, including ballast water decontamination, would strongly support their rapid adoption.

Strategies and technologies for dredging water- and seaways with contaminated sludge have to be developed.

More effective and practicable processes and techniques for effective treatment of polluted sediments in rivers, harbour basins and the seabed must be made available.

Efficiency

Targets: In 2025, seamless monitoring, identification, communication and vessel traffic management systems will be operational around Europe to improve the coordination and efficiency of operations.

Innovation Challenges: Efficient data models and algorithms, especially for high risk/dense traffic areas as well as for port approaches and port call preparation, are to be developed and tested.

Optimal and easy to handle man-machine and communication interfaces for complex integrated traffic management systems must be available.

It has to be ensured that information systems are integrated across inter modal boundaries.

Target: In 2025, the cost for sustainable, safe and secure waterborne transport will continue to be clearly lower than other transport modes.

Innovation Challenges: The efficiency of all elements in the waterborne transport chain has to be continuously improved, optimised and missing technologies must be developed, with the goal of maintaining a cost level of approx. 20% (or less) compared to road transport.

Target: Short sea shipping is fully acting as an alternative transport mode in the supply chain.

Innovation Challenges: Fully integrated European supply chain systems are to be developed and optimised with a systems approach, addressing the combination of the different transport modes in terms of costs, reliability, safety, environmental friendliness, ease of choice, integration, security and market demand.

A Competitive European Waterborne Industry

Transport and Operations

Targets: In 2025, European deep-sea shipping will still be the leader in maritime transport. European short sea shipping and inland waterway transport will be the favourite choice and the backbone of many existing and new logistic transport chains.

Innovation Challenges: Under the conditions of a level playing field, notably also including strict global application of international regulations like those on safety and environment (IMO), EU ship-owners will benefit from innovative, highly efficient ships, equipment and systems, capable to comply with the highest international standards and regulatory requirements. Close coordination between the EU ship-owners, shipyards and suppliers in the development of such capability will offer a strong basis for competing globally.

Short sea and inland waterway transport operations will be supported by newly developed advanced ships and equipment and, where appropriate, be fully integrated with easily accessible inter-modal interfaces.

Target: In 2025, Europe's ship and boat builders as well as the marine equipment manufacturers will work at the world's highest productivity level and will command the shortest lead and delivery times as important elements to defend their competitiveness in a global market.

Innovation Challenge: Strategies, methods, tools and processes in design and production have to be continuously improved, using the latest R&D results, which will enhance the ability to deliver high quality and high performance products and supporting services, with the aim of reducing the overall delivery time of a new build vessel by at least 20%.

To reduce the manpower for design and production preparation works by 50% and to increase the productivity of ships and equipment production by 30%.

Target: Inland waterway transport will be regarded as an efficient, modern, high tech mode.

Innovation Challenge: Multipurpose vessel types and modular concepts in inland waterborne transport have to be developed. Focus on equipment for flexible integrated solutions for D2D-transport chains.

Infrastructure, Ports and Dredging

Target: In 2025, European ports are on the leading edge in the use of innovative cargo handling systems and overall efficiency.

Innovation Challenge: New techniques for faster cargo handling have to be developed to maximise port throughput within given infrastructure constraints. This will require also the development of logistics planning tools.

Target: The European dredging industry will remain the world's leading technology provider and operator, offering the most advanced and environment friendly dredging methods.

Innovation Challenge: The necessary equipment, technologies and ships will have to be developed, with the goal to hold 90% of the free world market of dredging activities.

Dredging technology must be improved to minimise impact on the marine and aquatic environment. The knowledge regarding level, extent and duration of suspended sediment concentrations caused by natural events and commercial fishing has to be enhanced through research, relative to those caused by dredging activity. The understanding of the effects of estuarial dispersion or disposal methods will have to be enhanced through long term field trials and measurement. This is essential for enhancing infrastructure planning processes.

Target: EU companies are world leaders in advanced rapid and low cost site investigation methods.

Innovation Challenge: Remote sensing and airborne site characterization and measurement technology and interpretation techniques must be improved, better methods of in situ measurement of density and strength in seabed soils must be found.

Managing and facilitating the growth in transport volumes and the changes in trade patterns

Target: Technology tools to cope with trade growth and changed patterns

Innovation Challenge: The necessary data and support models will have to be developed.

Ports, terminals and hinterland connections – not only in Europe - must be subject to adequate and broad based planning and permission procedures for timely construction and availability, also in

context with the growth of ship sizes. Visions and scenarios will have to be developed as an ongoing exercise on innovative ships, cargo handling, landside transports to feed data and support models.

Target: The increased use of unitised cargoes will offer much enhanced streamlined transport operations, avoiding congestion and delays in supply chains. European short sea shipping and inland waterways transport will cater for around 50% of regional trade as well as for the feeding between main and smaller ports, thus alleviating pressure on longer haul road and rail capacity.

Innovation Challenge: Ships, terminals and facilities will have to be developed, which are specifically designed and/or adapted to ensure efficiency of the waterborne transport by short turnaround of ships in ports and a high degree of automation of berthing and cargo handling.

Target: Advanced logistic chain management systems and operational tools will be available, facilitating very fast sea land inter-change.

Innovation Challenge: Integrated ICT (Information and Communication Technologies) and ITS (Intelligent Transport Solutions) will have to be developed, to enable much more efficient planning, booking, simulation, routing and control of cargo along the different transport modes as well as other services supporting efficiency, safety and security.

A modern network of inland ports and seaports must be established, to offer the European and Global manufacturers and trade the necessary and reliable operational and information services as required for efficient and economic transport of goods.

2.2 BLUE GROWTH

The Waterborne TP Blue Growth Working Group was set up in order to take advantage of the blue economy, and have identified the following three of six challenges that need to be overcome, and reflect the scope of the SRIA to be developed:

- Challenge 1 - Technologies and engineering for seaborne and subsea activities. The platform must be economically and environmentally sustainable, clean, safe, reliable, maintainable and self-sufficient (energy, fresh water, waste management ...). At the same time, it must be able to deploy, recover, drive, and maintain a lot of equipment and tools required to work at and under the sea.

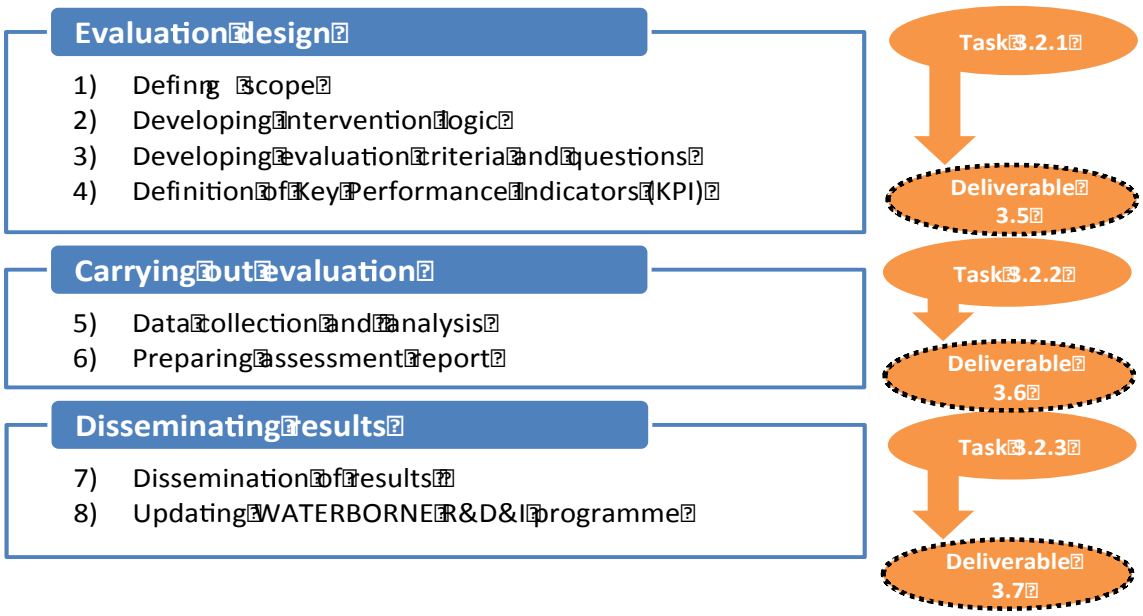
- Challenge 2 - Smart and adaptive materials and structures. These materials and structures are needed to improve the vessel or offshore platform's ability to operate in ever-changing environments and conditions.

- Challenge 3 – Specialized ships. The new activities at sea brings forward the need for new vessels concepts, and more particularly specialised ships able to service these new activities, in heavy and harsh conditions e.g. in the arctic regions. These vessels could be: installation and maintenance vessels for renewable energy conversion, offshore platform deployment vessels, specialised vessels for aquaculture, etc.

PROPOSED EVALUATION METHODOLOGY

Evaluations usually consist of the following three phases (see also Figure 1 below): Evaluation design, carrying out the evaluation and the dissemination of evaluation results. The tasks and deliverables envisaged in the Programme of Work correspond to these three phases. In the following each step of the proposed evaluation approach is described.

Figure 1. Steps in the evaluation process



3.1 EVALUATION DESIGN

During the evaluation design phase the methodological approach of the assessment is defined. Careful evaluation design is important, as it is the basis on which the whole evaluation exercise relies (European Commission 2015). If the evaluation design is not carried out with due care, the added value and reliability of the whole evaluation exercise can be undermined. The following section describes which steps should be taken during the evaluation design phase in order to come to a sound methodological approach for the assessment of the Waterborne RDI programme.

3.1.1 Defining the scope

The following should be clarified before the start of the assessment:

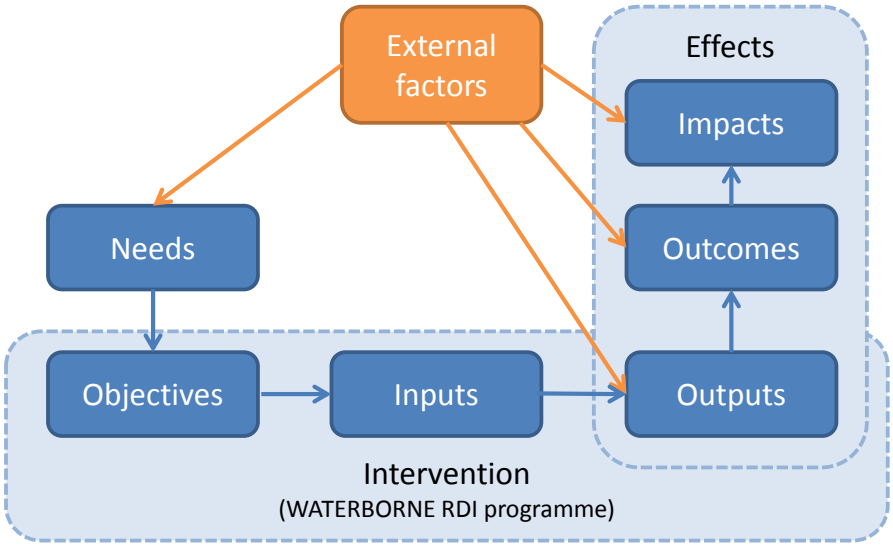
- The activities to be examined (e.g. which research projects)
- The time period to be examined
- The geographical coverage of the evaluation

Given the task at hand attention should be paid especially to the first point. The Programme of Work stipulates that overall performance of the Waterborne RDI programme should be assessed, as well as individual research activities and projects. Hence, before starting the evaluation it should be agreed upon by the partners which exact activities (e.g. which projects) are expected to be evaluated.

3.1.2 Developing intervention logic

After the scope of the evaluation has been defined, an intervention logic will be developed. The intervention logic is a key component of every evaluation (European Commission 2015). It provides a justification of the actions taken by outlining "a conceptual link from an intervention's inputs to the production of its outputs and outcomes and, subsequently, to its impacts on society and the economy" (European Commission 2004). It helps the evaluators to understand through which intermediary steps an intervention reaches its impact. A basic model of an intervention logic is provided in Figure 2 and an explanation of its key components in Box 1.

Figure 2. The intervention logic (based on European Commission 2015)



Box 1. Key components of the intervention logic (based on European Commission 2013)

Inputs are the financial, human, material, organisational or regulatory means needed for the implementation of an intervention.

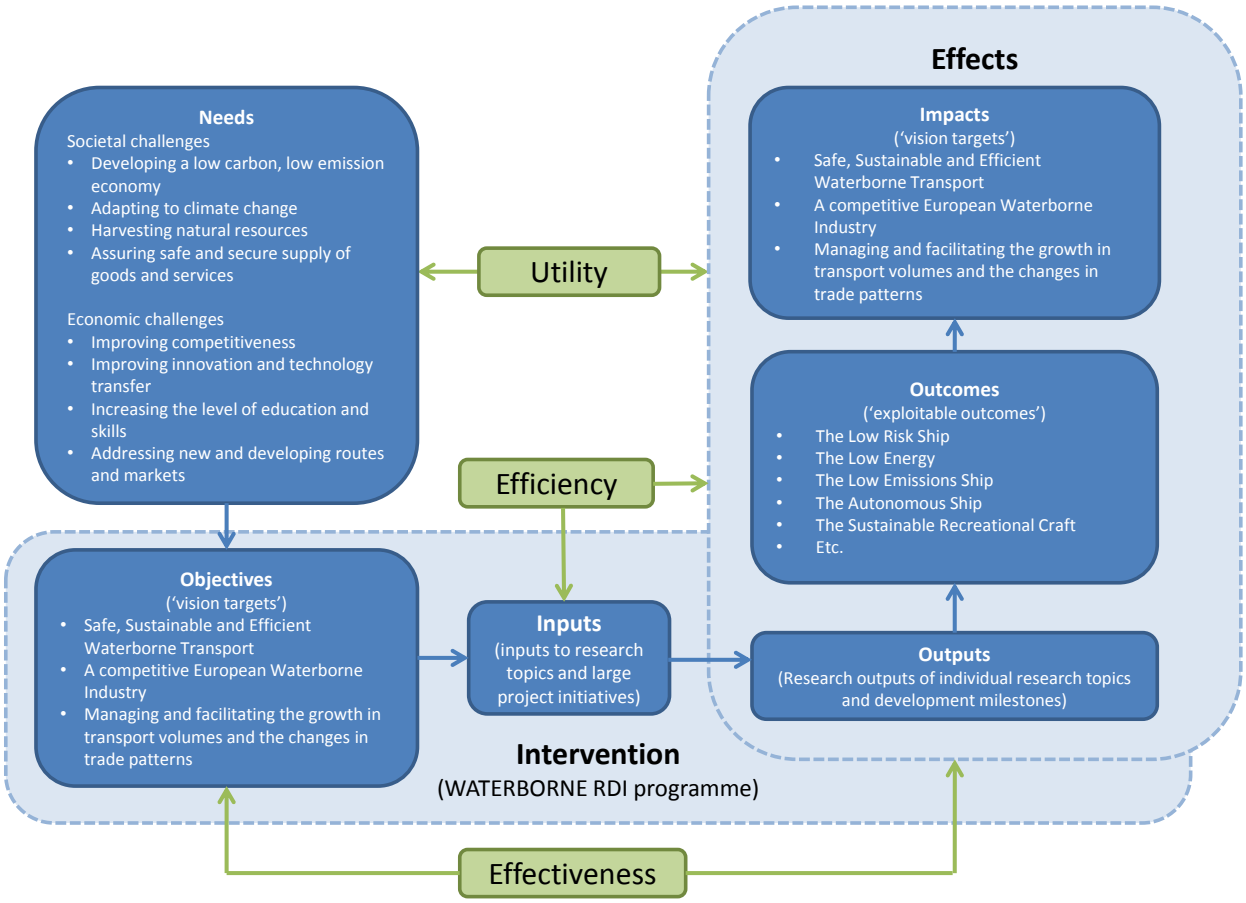
Outputs are what is directly produced or supplied through an intervention. They often relate to the expected deliverables of the intervention.

Outcomes capture the immediate changes in a situation. They are generally have a clear link with the intervention, but are influenced by external factors as well.

Impacts broadly define the changes over a longer period of time. They are strongly influenced by external factors. Impacts often relate to the general objectives of an intervention.

The Waterborne Implementation Plan outlines in detail through which steps the sector's RDI programme is assumed to generate the desired impacts. When mapping the Implementation Plan's components onto the concept of the intervention logic, the following conceptual framework emerges.

Figure 3. Proposed intervention logic (to be verified through expert consultation)



3.1.3 Developing evaluation criteria

In order to be able to assess the performance of the Waterborne RDI programme, a number of evaluation criteria and corresponding evaluation questions need to be defined (European Commission 2015). This step is essential in order to obtain clarity on the merits against which the Waterborne RDI programme should be evaluated. Evaluation criteria can differ widely and should reflect the unique characteristics and aims of the intervention at hand. Some commonly used evaluation criteria are for example relevance, effectiveness, or efficiency (European Commission 2015; IDEA Consult 2008).

For the assessment at hand we propose the evaluation criteria and questions presented in the table below.

Table 1. Proposed evaluation criteria and questions (to be discussed and adjusted through expert consultation)

Evaluation criteria	General evaluation question	Specific evaluation questions
Effectiveness	Did the intervention lead to the desired effects?	• Were the envisaged goals of the programme achieved? • Do projects under the programme generally achieve their goals?
Efficiency	Were the costs involved justified, given the effects which have been achieved?	• Where the resources devoted to the research programme justified, given its results? • Can the programme be organized more efficiently?
Utility	To what extent do the obtained research results correspond to the needs of the sector?	• To what extent are the obtained research results applied in practice? Do they lead to new business opportunities? Do they promote the commercial success of the sector? • Do industry leaders see the research result as relevant for the sector? • How can the utility of research activities to the sector be further improved?

The intervention logic and evaluation criteria will be verified through informal consultations with experts. Possible experts that could be consulted are representatives of Waterborne TP and maritime experts from the project partners (e.g. maritime consultants and researchers from TNO's maritime research group).

3.1.4 Definition of Key Performance Indicators (KPI)

Key performance indicators can be a very useful tool to measure the performance of a certain intervention (Chiesa and Frattini 2009). Experiences in the public and private sector have shown that they often serve as important incentives for improvement. At the same time it is very challenging to design indicators that truly reflect desirable effects (more information on the limitations of indicators in Box 2).

Box 2. The limitations of indicators

When using indicators two limitations should be kept in mind: Firstly, most indicators are only a proxy of the actual situation they intend to measure. For

example patents are often used as a proxy to measure innovation. However, there are many situations in which patent activity does not reflect innovation, as for example in the context of open innovation. It should therefore be kept in mind that a high score on a KPI does not necessarily mean that the desired outcome has been achieved (United States General Accounting Office 1997). This brings us to the second limitation of indicators. Indicators cannot tell us whether there is a causal relationship between inputs and effects (outputs, outcomes and impacts), as the latter are influenced by many other factors as well. The further away an effect is from the original input, the harder it is to establish a causal relationship. For example while it is generally possible to establish causality between inputs and outputs, this is more difficult with outcomes, and often impossible with impacts. Hence, indicators cannot establish whether the desired effect was actually caused by an intervention (United States General Accounting Office 1997). To establish causality a sound methodological framework is needed, which conceptually links inputs, outputs, outcomes and impacts. This is why we employ an intervention logic.

Designing meaningful KPIs requires on the one hand know-how of evaluation techniques and data sources, and on the other hand an in-depth understanding of the maritime sector. The KPI development will therefore be informed by consultation with experts from the sector. Possible experts that could be consulted are again representatives of Waterborne TP and maritime experts from the project partners (e.g. maritime consultants and researchers from TNO's maritime research group). Some first ideas for KPIs are presented in the table below. It should be noted that the final selection of indicators is subject to data availability.

Table 2. First ideas for Key Performance Indicators

Input indicators	Output indicators	Outcome indicator	Impact indicator
• Total budget dedicated to RDI programme (differentiated between public and private funding) • Total number of FTEs administering the RDI programme	• Number of publications • Number of patents • Number of science-industry cooperations • Number of research outputs and milestones envisaged in Implementation Plan realised	• Commercial revenues from newly introduced innovative products • Percentage of companies aware of Waterborne RDI programme • Percentage of companies perceiving RDI programme as useful	Pillar 1: • Decrease in serious accidents • Reduction in emission of pollutants • Cost level compared to road transport Pillar 2: • Market share of European companies in waterborne transport

Input indicators	Output indicators	Outcome indicator	Impact indicator
		• Number of 'exploitable outcomes' realized (as perceived by industry leaders)	• Market share in different market segments (high tech vessels, recreational crafts, offshore platforms) • Productivity in maritime sector Pillar 3 • ??

For each of the mentioned indicator, a number of things need to be clarified, preferably in close dialogue with the consulted experts:

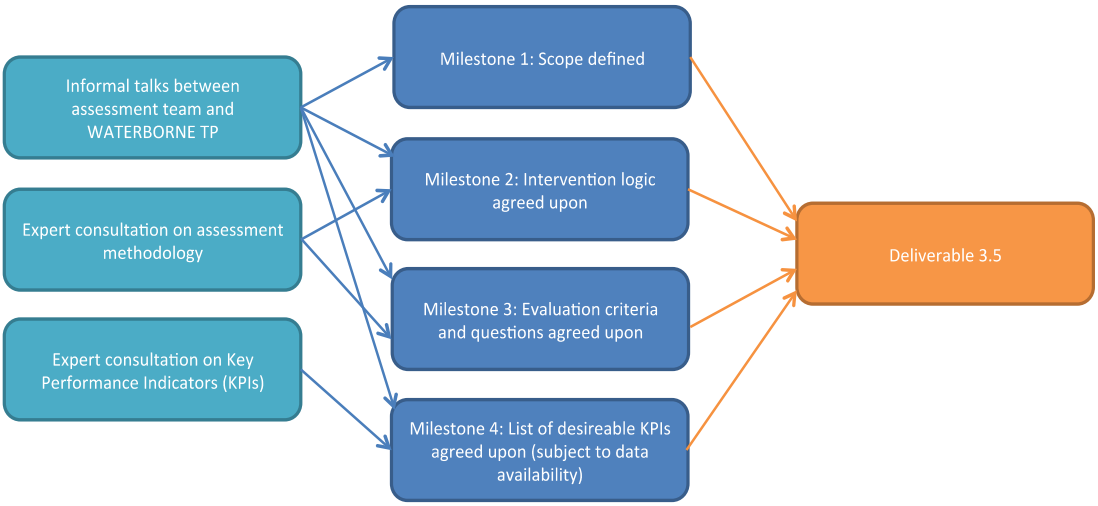
- The complete definition of the indicator, including the unit of measurement
- What the indicator intends to measure, i.e. how it relates to the intervention logic and the evaluation criteria
- How the data for the indicator should be collected
- In which intervals the data should be collected

Past experiences from projects dealing and working with indicators have shown that less is more. It is tempting to define a large numbers of indicators to try to measure every possible effect. However, this bears the risk that not enough time or resources are available for the conceptual design of the indicators and the actual data collection. Having a large number of indicators can thus seriously jeopardise data quality. Experience shows that focusing on a small, but well-defined number of indicators yields much better results.

It should be noted that the above mentioned indicators only assess the performance of the overall RDI programme and not of single research activities. As the individual research projects differ significantly it is not clear if it is possible (and desirable) to develop uniform KPIs, as projects might not be comparable. A decentralized approach, that allows each project to identify lessons and potential for improvement individually, complemented by best practice sharing between projects, might be more suitable. How the performance of individual projects could be assessed must be further discussed with the Waterborne stakeholders.

At the end of the evaluation design phase, Deliverable 3.2.1 will be drafted. The Deliverable will summarise the evaluation design with regard to: scope, the intervention logic, the evaluation criteria and questions and the identified KPIs. How the different information sources will feed into milestones, which in turn provide the basis for D3.2.1 is depicted in Figure 4. below.

Figure 4. Flow of information in evaluation design phase



Moreover, D3.5 will outline how the assessment will be carried out practical terms, e.g. which methods will be used and which milestones are envisaged (this information is presented in this document in section 3.2).

3.2 CARRYING OUT THE EVALUATION

3.2.1 Data collection and analysis

After the methodological foundation for the assessment has been established, the collection of data and its analysis can start. To enhance the reliability and objectivity of evaluation results a 'triangulation approach' should be applied as far as possible (see Box 3).

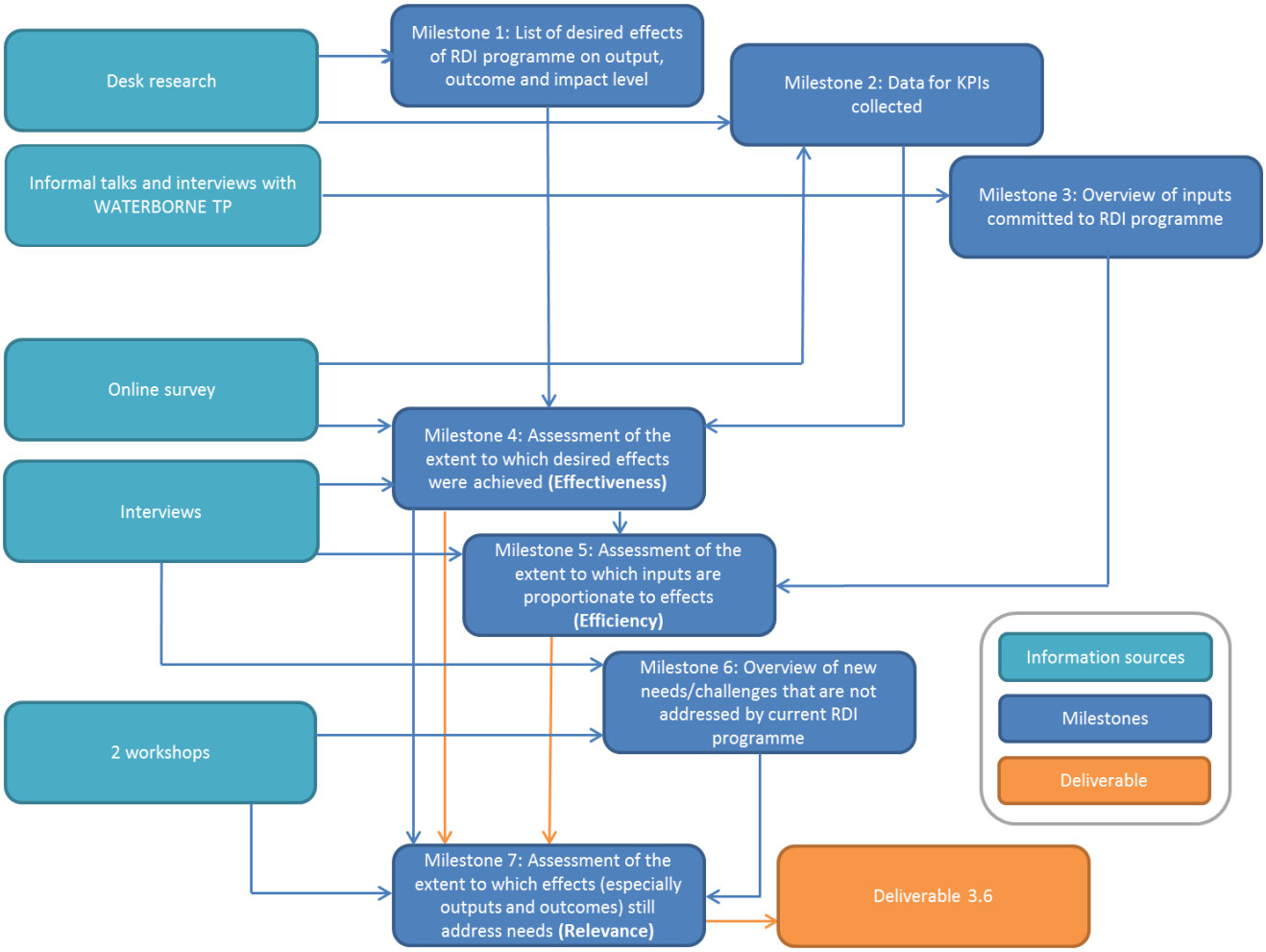
Box 3. Triangulation to enhance the reliability and objectivity of evaluation results

Triangulation entails that data is obtained from different sources and through different methods. The Commission's Evaluation Guidelines state: "If several unrelated sources point to the same direction, this increases confidence that the findings are robust" (European Commission 2013). This means that it is for example not advisable to base an evaluation purely on stakeholder views. Instead information and arguments from one source should be cross-checked with information from other sources or information obtained through other methods. Especially quantitative data, for example obtained through modelling, can provide a false sense of security. Hence such data should be "complemented with and double-checked against qualitative information from other sources (interviews, etc.)" (European Commission 2013).

There are numerous methods used for data collection and analysis; each of them having their distinct advantages and disadvantages. The methods used most frequently in the context of evaluation are: Desk research (e.g. literature review), interviews, surveys, workshops/focus groups, SWOT analysis, case studies, cost-benefit analysis, statistical analysis (e.g. regression), modelling, sensitivity analysis, benchmarking, and indicator construction.

We propose to use a combination of different information sources, including desk research, interviews, workshops and an online survey. To structure the assessment different milestones are defined. Milestones can be seen as necessary sub-steps to reach the desired outcome, which is in this case a judgement on the effectiveness, efficiency and utility of the Waterborne RDI programme. Figure 5 below outlines the envisaged flow of information throughout the assessment process. It shows how the information from the different data sources will feed into the milestones, and how the milestones lead in turn to the overall assessment, which is summarised in Deliverable 3.6.

Figure 5. Flow of information during evaluation



It should be noted that the actual assessment process and the data sources to be used will depend on the final evaluation design.

The following section describes how the different data sources will be used.

3.2.1.1 Desk research

Desk research will primarily be used to obtain an overview of the desired effects that the RDI programme was intended to have. This information is readily available in the Vision 2025 document, the 2011 Strategic Research Agenda (SRA) and 2011 Implementation Plan. Moreover, desk research will be used to gather data as input for the KPIs. Information on some possible KPIs, for example those relating to market shares or RDI activities in the sector, is probably publicly available. Possible sources are for example Eurostat, the OECD, or publicly available market surveys.

3.2.1.2 Informal talks and interviews with Waterborne TP

Interaction with Waterborne TP will be especially useful to comprise an overview of the inputs (monetary and non-monetary) that have been dedicated to the development and implementation of the RDI programme.

3.2.1.3 Online survey

We propose to carry out an online survey to inform the assessment. One among experts from the waterborne sector (managers in companies, experts from industry associations, etc.), and a second one with parties directly involved in the research projects carried out under the Waterborne RDI programme.

Table 3. Set-up of two online surveys

Respondents	Experts from the waterborne sector	Parties involved in research projects (companies, scientists, policy officials, etc.)
Objective	To establish whether the RDI programme in general achieves its objectives and generate added value	To establish whether individual projects under the RDI programme achieve their objectives and generate added value

Type of questions	• Are you aware of the RDI programme?
	• Do you think the RDI programme has had a positive influence on the development of the European waterborne sector?
	• To what extent has the RDI programme contributed to achievement of the following objectives/targets?
	  ○ Objective/target 1
	  ○ Objective/target 2
	  ○ Etc.
	• Has the RDI programme contributed to the delivery of the following 'exploitable outcomes'?
	  ○ The Low Risk Ship
	  ○ The Low Energy
	  ○ The Low Emissions Ship
	  ○ The Autonomous Ship
	  ○ The Sustainable Recreational Craft
		• Did the research project produce the expected results in your opinion?
		• Did you use some of the research results in your organisation?
		• Did the research results lead to a commercial profit in your organisation?
		• How would you rate the added value of the research outputs? (1 to 5)
		• Was the project organized efficiently in your opinion?
		• What were the main success factors in the project?
		• What the main barriers and bottlenecks?

	○ Etc. • Do you think that the resources devoted to the RDI programme are proportionate given its effects? • Do you think the priorities of the RDI programme are still relevant to the needs and challenges of the sector today?	

3.2.1.4 Interviews

To complement the quantitative information obtained through the online survey with more qualitative in-depth insights, we propose to carry out a number of interviews (circa 20 to 25). Again interviews will be held with experts from the waterborne sector and parties directly involved in research projects. The questions will be similar to those used in the online survey, but provide more room for differentiation (for example by asking what the key difficulties are and what could be improved). The interviews with sector experts will also be used to obtain a first feeling whether there are any new needs or challenges that are not (yet) addressed by the Waterborne RDI programme.

3.2.1.5 Workshops

As envisaged in the Programme of Work three workshops with experts from the maritime sector and the scientific community will be carried out. One workshop will be dedicated to Waterborne Transport issues, one workshop will focus on Waterborne Blue Growth issues, whilst a third will focus on Green Shipping issues. The objective of the workshops will be to establish whether there are any new needs or challenges that are not (yet) addressed by the Waterborne RDI programme.

3.2.2 Preparing the assessment report

The findings of the data collection and analysis will be synthesized in the assessment report, which constitutes at the same time Deliverable 3.6. The report will provide answers to the evaluation questions and present the results of the KPI assessment.

3.3 DISSEMINATING RESULTS

Dissemination activities are crucial to ensure that evaluation results actually have an impact (European Commission 2015; OECD 2001). If they are neglected, there is a risk that evaluation results ”end up on the shelf” without being looked at again. The following section outlines how we intend to ensure that the results of the assessment actually have an impact.

3.3.1 Dissemination of results

Deliverable 3.6 should be uploaded on the website of the European Waterborne community (www.maritime-rdi.eu). The uploaded document should be accompanied by a news article which describes the main findings of the assessment and invites stakeholders to provide their input on how the Waterborne RDI programme should be updated. The link to the news article and assessment report should also be disseminated as widely as possible to stakeholders in the maritime sector. For this purpose existing mailing lists of Waterborne TP could be used as a starting point. Moreover, the results will be presented orally by different project members at suitable occasions, such as networking events, conferences, stakeholder meetings, etc.

3.3.2 Updating the Waterborne RDI programme

The main impact of the assessment will be the updating of the Waterborne RDI programme. Together with the results of the MESA project, the assessment will serve as a basis to identify gaps in the current programme and ways to fill them. Two workshops will be held to establish how the current RDI programme should be updated. A possible workshop agenda is presented in Box 4.

Box 4. Draft workshop agenda

1. Welcome
2. Presentation of the general results of the assessment and the MESA project
3. Presentation of key insights on the utility of the RDI programme: Does the programme still fully address the needs and challenges in the European Waterborne sector?
4. Discussion in a number of break-out sessions (each break-out session could focus one vision target, or on one major research area)
5. Reporting back in plenary session
6. Conclusion by chair

The findings of the workshop will be distilled in a document that proposes concrete options for updating the maritime RDI programme.

ANNEXES

Table 1: List of FP7 Research Projects related to Waterborne Transportation & Interoperability

Project Acronym	Project Title	Website
AMASS	Autonomous maritime surveillance system	http://www.amass-project.eu/amassproject/
ARIADNA	Maritime assisted volumetric navigation system	http://www.ariadna-fp7.eu/
CASCADe	Model-based Cooperative and Adaptive Ship-based Context Aware Design	http://cordis.europa.eu/projects/index.cfm?fuseaction=app.details&REF=106310
CONTAIN	Container Security Advanced Information Networking	http://containproject.com/
ECCONET	Effects of Climate Change On the inland waterway and other transport NETworks	http://ecconet.eu/
EcoHubs	**E**nvironmentally **co**herent measures and interventions to debottleneck **HUBS** of the multimodal network favoured by seamless flow of goods	http://www.hubways.eu http://www.transport-research.info/web/projects/project_details.cfm?ID=45365
e-Compliance	Integration and co-operation of regulatory compliance in the maritime domain	http://www.e-compliance-project.eu
EfficienSea 2	Efficient, Safe and Sustainable Traffic at Sea	http://efficiensea2.org/#/
e-Freight	European e-Freight Capabilities for Co-modal Transport	http://www.efreightproject.eu/
EU CISE 2020	EUropean test bed for the maritime Common Information Sharing Environment in the 2020 perspective	http://cordis.europa.eu/project/rcn/192603_en.html
EURIDICE	EURopean **I**nter-**Di**sciplinary research on **I**ntelligent **C**argo for **E**fficient, safe and environment-friendly logistics	http://www.euridice-project.eu/
FAROS	Human Factors in Risk-Based Design Methodology	http://www.faros-project.eu
GREEN EFFORTS	Green and Effective Operations at	http://www.green-efforts.eu/

	Terminals and in Ports	
i-Cargo	Intelligent Cargo in Efficient and Sustainable Global Logistics Operations	http://i-cargo.eu
INCASS	Inspection Capabilities for Enhanced Ship Safety	http://www.incass.eu
INTEGRITY	Intermodal Global Door-to-door Container Supply Chain Visibility	http://www.integrity-supplychain.eu/
Logistics for Life	Logistics Industry coalition of Long-term ICT based Freight Transport Efficiency	http://www.logistics4life.eu/
MOVE IT	Modernisation of Vessels for Inland waterway freight Transport	http://www.moveit-fp7.eu/
MUNIN	Maritime Unmanned Navigation Through Intelligence in Networks	http://www.unmanned-ship.org/munin/
NAVTRONIC	Navigational System for Efficient Transport System	http://www.navtronic-project.eu/
NEWS	Development of a Next generation European Inland Waterway Ship and logistics system	http://www.news-fp7.eu/
OPERAMAR	An Interoperable Approach to European Union Maritime Security Management	http://cordis.europa.eu/project/rcn/86254_en.html
PROPS	Promotional Platform for Short Sea Shipping and Intermodality	http://www.props-sss.eu/
RISING	RIS Services for Improving the Integration of Inland Waterway Transports into Intermodal Chains	http://www.rising.eu/web/guest/home
SEABILLA	Sea Border Surveillance	http://www.seabilla.eu
SEAHORSE	Safety Enhancements in transport by Achieving Human Orientated Resilient Shipping Environment	http://www.seahorseproject.eu
SECTRONIC	Security System for Maritime Infrastructures, Ports and Coastal Zones	http://www.sectronic.eu/
SKEMA	Sustainable Knowledge Platform for the European Maritime and Logistics Industry	http://www.skematransport.eu/ http://www.eskema.eu/defaultinfo.aspx?topicid=85&index=6

SMART-CM	SMART Container Chain Management	http://www.smart-cm.eu/
SUPPORT	Security UPgrade for PORTs	http://www.support-project.eu/
TARGETS	Targeted Advanced Research for Global Efficiency of Transportation Shipping	http://www.targets-project.eu/
TRITON	Trusted Vessel Information from Trusted On-board Instrumentation	http://tritonproject.eu/project.php
SHOPERA	Energy Efficient Safe SHip OPERAtion	http://shopera.org/

Table 2: List of FP7 Research Projects related to Blue Growth

Project Acronym	**Project Title**	Website
H2Ocean	Development of a wind-wave power open-sea platform equipped for hydrogen generation with support for multiple users of energy	http://www.h2ocean-project.eu/
LEANWIND	Logistic Efficiencies And Naval architecture for Wind Installations with Novel Developments	http://www.leanwind.eu
MERMAID	Innovative Multi-purpose off-shore platforms: planning, Design and operation	http://www.mermaidproject.eu/
NEXOS	Next generation, Cost-effective, Compact, Multifunctional Web Enabled Ocean Sensor Systems Empowering Marine, Maritime and Fisheries Management	http://www.nexosproject.eu/
TROPOS	Modular Multi-Use Deep Water Offshore Platform Harnessing And Servicing Mediterranean, Subtropical And Tropical Marine And Maritime Resources	http://www.troposplatform.eu/

Table 3: List of FP7 Research Projects related to Green Shipping

Project Acronym	**Project Title**	Website
AQUO	Achieve QUieter Oceans by shipping noise footprint reduction	http://cordis.europa.eu/project/rcn/104629_en.html
BYEFOULING	Low-toxic cost-efficient environment-friendly antifouling materials	http://www.sintef.no/projectweb/byefouling/
JOULES	Joint Operation for Ultra Low Emission Shipping	http://www.joules-project.eu
LEAF	Low Emission Anti-Fouling coatings based on the novel discovered post settlement penetration triggered antifouling	http://leaf-antifouling.eu/
SEAFRONT	Synergistic Fouling Control Technologies	http://seafront-project.eu/
TEFLES	Technologies and Scenarios For Low Emissions Shipping	http://tefles.eu

SOURCES

Berg, Pekka and Mikko Leinonen, Virpi Leivo, Jussi Pihlajamaa (2000), *Assessment of quality and maturity level of R&D*, in International Journal of Production Economics Volume 78, Issue 1, 1 July 2002, Pages 29–35

Brockhoff, Klaus (1982), *The measurement of goal attainment of governmental R&D support*, in Research Policy 12 (1983) 171-182

Chiesa, Vittorio and Federico Frattini (2009), *Evaluation and Performance Measurement of Research and Development: Techniques and Perspectives for Multi-level Analysis*

European Commission (2015), *Better Regulation Guidelines*, http://ec.europa.eu/smart-regulation/guidelines/toc_guide_en.htm

European Commission (2013), *Public consultation on Commission Guidelines for Evaluation*, http://ec.europa.eu/smart-regulation/evaluation/docs/20131111_guidelines_pc_part_i_ii_clean.pdf

European Commission (2004), *Evaluating EU Activities – A practical guide for the Commission services*, http://ec.europa.eu/smart-regulation/evaluation/docs/eval_activities_en.pdf

European Commission (2002), Evaluation Standards, http://ec.europa.eu/smart-regulation/evaluation/docs/standards_c_2002_5267_final_en.pdf

IDEA Consult (2008), *Evaluation of the European Technology Platforms (ETPs)*, ftp://ftp.cordis.europa.eu/pub/etp/docs/evaluation-etps_en.pdf

Julian, David and Ann Jones, Diana Deyo (1995), *Open Systems Evaluation and the Logic Model: Program Planning and Evaluation Tools*, in Evaluation and Program Planning. Vol. 18. No. 4. pp. 333 341

Kolk, Michaël and Phil Kyte, Frederik van Oene and Jeroen Jacobs (2012), *Innovation: measuring it to manage it*

Ojanen, Ville and Olli Vuola (2003), *Categorizing the Measures and Evaluation Methods of R&D Performance – A State-of-the-art Review on R&D Performance Analysis*

OECD (2001), *Evaluation Feedback for Effective Learning and Accountability*, http://www.oecd.org/dac/evaluation/2667326.pdf

United States General Accounting Office (1997), *Measuring Performance – Strength and Limitations of Research Indicators*, http://www.gao.gov/assets/160/155826.pdf

Waterborne Technology Platform (2012), *Vision 2025*, http://www.waterborne-tp.org/index.php/documents

Waterborne Technology Platform (2011), *Strategic Research Agenda*, http://www.waterborne-tp.org/index.php/documents

Waterborne Technology Platform (2011), *Implementation Plan*, http://www.waterborne-tp.org/index.php/documents

Waterborne Technology Platform (2011), *Waterborne Declaration*, http://www.waterborne-tp.org/index.php/documents