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Executive Summary

The purpose of the SWITCH-ON Market Analysis Framework (MAF) is to **provide developers with guidelines and supplementary resources to support the analysis of new and existing markets** for SWITCH-ON products and services. **The framework will equip developers with the necessary tools to critically evaluate the potential of identified markets** for their products and services and will set the foundations for the development of an appropriate market entry strategy.

The MAF is designed as a binomial framework. Part I—*Exploration and review of the markets for SWITCH-ON products and services*—is directed at defining and gathering information about the relevant market for SWITCH-ON and the respective sub-markets for the products being developed within the project. In this first part, the market for SWITCH-ON is defined as “Water Information Products and Services.” Part II of the MAF—*Tools for the collection and assessment of target market data*—is concerned with selecting key target groups and conducting a product-specific exercise of data gathering and examination. This second phase includes activities that will lead to the identification of the target groups for each product, their profiling via market research and the assessment of opportunities for profit creation.

The primary forms of input used to assemble the MAF included the following:

- **Product Factsheets, D4.1, D4.2**

These documents provided an accessible overview of the products and their stage of development. Furthermore, this helped identify gaps in knowledge as well as necessary areas of support.

- **Internal Consortium Survey**

The results of an internal consortium survey facilitated the identification of the most relevant and up-to-date literature, case studies, best practices and important actors in the open-data business scene. This served as the starting point for an extended literature review and facilitated communication with experts recognised by the consortium.

- **Literature review**

This exercise was primarily focused on gathering information about the political, economic, legal, social, technological and environmental setups that influence the markets relevant to SWITCH-ON. Furthermore, it is supplemented by a review of literature on traditional tools for strategic analysis, market intelligence and market research as well as business strategy development and marketing management. Together with the results of the internal survey, this element provided the literary resources for a compilation of guidelines to help product developers identify and exploit business opportunities.

- **First exchanges with experts and potential end-users**

An initial exchange with representatives of different market segments in the form of knowledge brokering activities and focus groups took place. In addition to increasing awareness and understanding about SWITCH-ON, this exchange served to gather some preliminary insights on and specific ideas about the needs and wants of potential customers of several SWITCH-ON products and services.

This deliverable deals with the creation of a structure for the MAF as described above (a two-part guideline document) and the completion of Part I (exploration and review of relevant markets). The completion of Part II (product-specific market analysis) will take place, according to plan, under Task 5.2 of the SWITCH-ON project.



1 Introduction to the SWITCH-ON Market Analysis Framework

1.1 Purpose

The purpose of the SWITCH-ON Market Analysis Framework (MAF) is to provide its user (not only SWITCH-ON product developers but potentially also organisations beyond the project) with the ability to make successful business decisions. Within SWITCH-ON, it will help product developers assess the attractiveness of key markets and devise ways to commercialise their knowledge products and services.

The MAF was designed to enhance the capacity of the product development team to recognise and capitalise on opportunities by offering an easy-to-use, step-wise approach for the collection and analysis of key market and macro-environmental information. The MAF will facilitate the surveillance and understanding of external conditions (e.g., economic, social, political) that drive market opportunities and threats to competitiveness. It will also guide the user towards a careful selection of customer groups and the identification of competitors. By endowing the SWITCH-ON developers with a compilation of guidelines and strategic analysis tools, the MAF will aid in the identification of relevant user groups and their information needs, elucidating potential matches between the customers' needs and the value proposition of the SWITCH-ON products. Ultimately, this toolbox will allow its user to evaluate a market's level of attractiveness and set the foundations for the development of an appropriate market entry strategy.

1.2 How to use the framework

This document is divided into four main chapters that make up the two parts of the MAF (as shown in **Error! Reference source not found.**). Chapter 2—*Market Definition*—delineates the market for the SWITCH-ON project and breaks it into sub-markets based on a redefined categorisation of the SWITCH-ON products and services.¹ Chapter 3—*Market Intelligence*—gathers information about the external environment in which an organisation entering the formerly defined sub-markets would operate. These first two chapters integrate Part I of the MAF—*Exploration and review of the markets for SWITCH-ON products and services*—which is intended to provide a general overview of the relevant sub-markets from the perspective of the overall project and the product categories. This is designed to be aligned with the objectives of Task 5.1 and feed directly into Task 5.2.

Chapter 4—*Market Segmentation*—outlines the first and key step towards the analysis of the market potential for the individual products. In this section the product developers will find guidance in the tasks of identifying relevant customer groups and selecting the ones they will address (target groups) based on their corporate objectives and their strategic interests. The identification of relevant customer groups is supported by the research conducted in Part I of the MAF. Finally, Chapter 5—*Market Analysis*—consists of a set of tools and structured guidelines that will be used by product developers to respond to the key questions of a market analysis exercise. The structure of this chapter is designed to provide a step-wise approach for the evaluation of business potential and set the foundations for the design of advanced business plans and market entry strategies. These two chapters integrate Part II of the MAF—*Identifying the market potential for SWITCH-ON products*—which through the contribution and participation of the SWITCH-ON product developers will provide

¹ In the project's inception the 14 SWITCH-ON products and services were divided into 5 categories. The redefined categorisation was built with the consent of the product developers to facilitate the organisation and execution of the market analysis tasks.



useful insights on the commercialisation potential of their products. This is aligned with the objectives of Task 5.2 and feeds into Task 5.4.

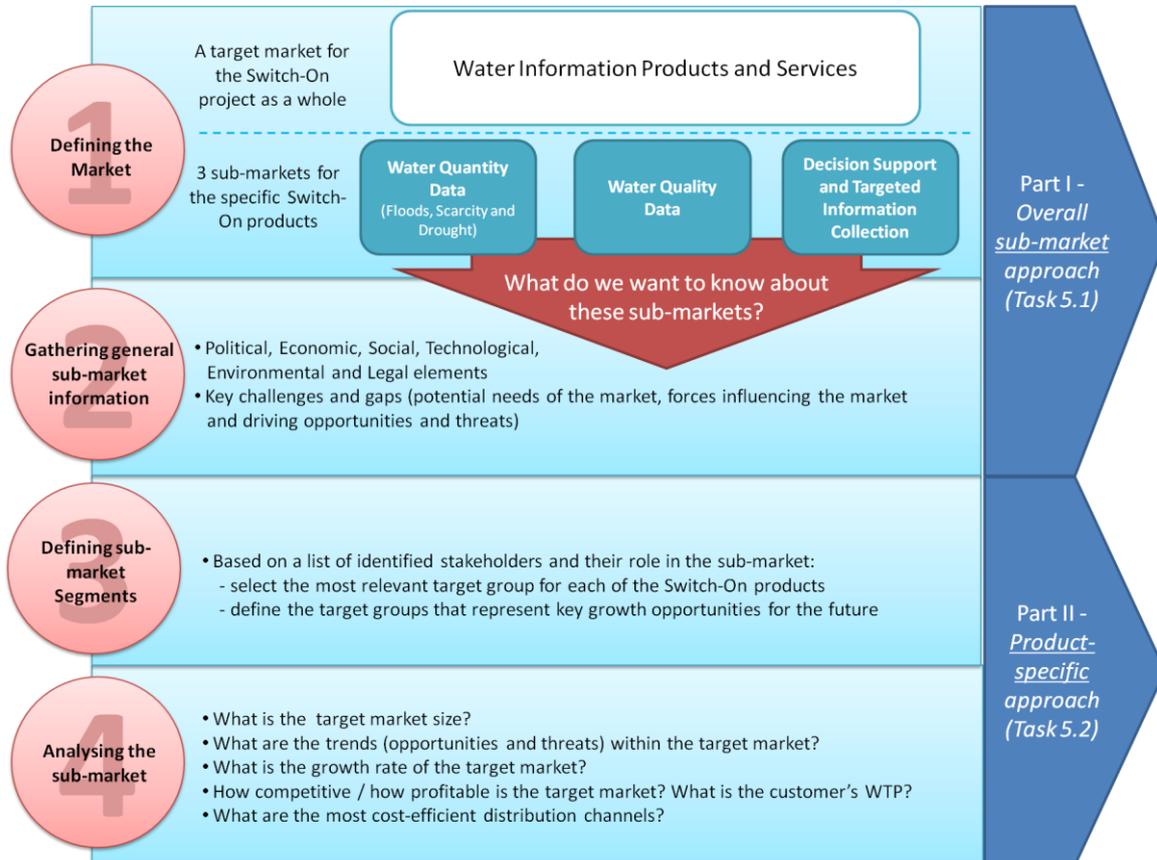


Figure 1: Breakdown of the SWITCH-ON Market Analysis Framework: How to read this document.

Developers and other partners should keep in mind that the MAF is meant to support and guide the identification of business opportunities and the entry into new markets. It cannot, however, guarantee success—there is not one “golden formula” for this as there are many internal and external factors at play.

1.3 Roles and responsibilities

The role of WP5 is not to complete the entire market analysis for each individual product but rather to facilitate an integrated toolkit for market analysis (Task 5.1) and later accompany and support each developer throughout the process of using this toolkit (Task 5.2). The reasoning behind this is twofold. First, this approach is much more sustainable since the developers will learn how to use these tools and will be able to assess new markets even after the completion of the SWITCH-ON project—i.e., WP5 will help to disseminate knowledge about certain tools useful for market analysis. Secondly, as experts of their products and of the main interests of their companies, the developers possess key detailed information and are thus the best suited to conduct those exercises, which focus on the individual products (i.e., mainly Part II of this framework). Thus, the partners in WP5 cannot conduct the market research without the active involvement of the developers.



Part I – Exploration and review of the markets for SWITCH-ON products and services

2 Market Definition

One of the initial steps when developing a business idea into an actual product is a conscious exercise of specifying the boundaries of the market to be addressed and the need(s) to be satisfied. Defining the market entails outlining the “set of actual and potential buyers” who “share a particular need or want that can be satisfied through exchange relationships” (Kotler and Armstrong 2013). Nevertheless, it is common for such an exercise to be overlooked (Abell and Hammond 1979). According to Nenonen and Storbacka, relying on a loose or incomplete market definition can result in businesses being defined haphazardly instead of being carefully and purposefully designed (Nenonen and Storbacka 2013). In the context of the MAF, the purpose of doing this is to frame the subsequent market intelligence activities so that they can be conducted in the most effective manner. Ultimately, this should allow for a more in-depth market analysis and facilitate the detection of risks inherent to business development.

2.1 Definition of the overall market for the SWITCH-ON project

Depending on its focus, market definition can be conducted from the perspective of the end-users (bottom-up or demand side) or from that of the product developers (top-down or supply side). The former outlines the market on the basis of customer needs and usage patterns, while the latter does so based on the capabilities of the organisation that supplies the product or service (Day 1981).

In the case of SWITCH-ON, market definition was undertaken by the authors using an integrated approach inspired by the aforementioned ideas proposed by Day (1981). First, the market for SWITCH-ON as a whole was defined from the demand side. Based on the fact that SWITCH-ON is a commissioned research project, the project consortium and its objectives were articulated based on the necessities of the EU for innovative applications of digital information for the water sector. This results in the market for SWITCH-ON being defined as the market for “Water Information Products and Services.”

2.2 Definition of sub-markets

On the other hand, the sub-markets into which the market for SWITCH-ON was divided were defined based on a new categorisation of the SWITCH-ON products and services. This new categorisation groups the SWITCH-ON products on the basis of their nature and value proposition, thus, from the supply side. The resulting three sub-markets were defined here as: “Water Quantity Data,” “Water Quality Data” and “Decision Support and Targeted Information Collection.” The authors reviewed detailed information on each of the SWITCH-ON products and services and distributed them across the three sub-markets. The resulting distribution was consulted with the product developers to ensure its appropriateness. Figure 2 below shows how the products were allocated across sub-markets.

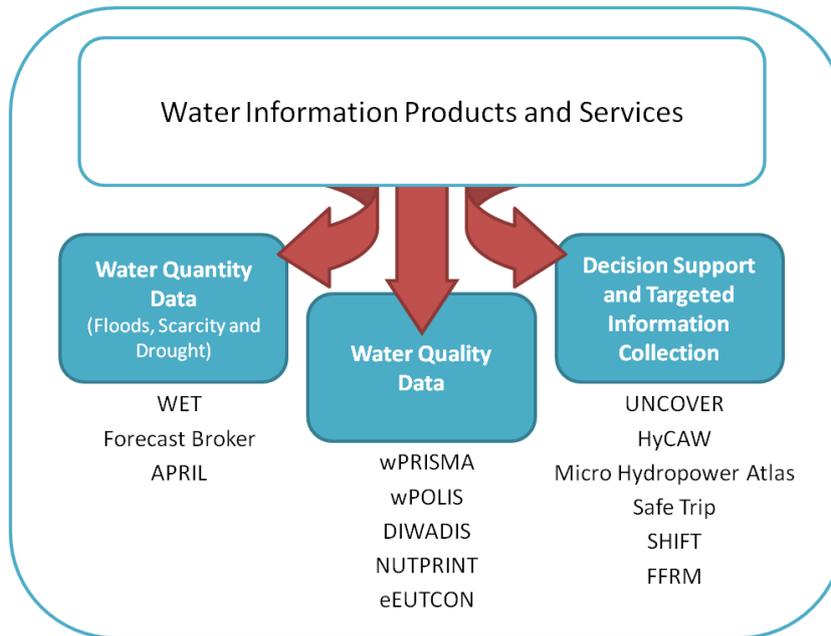


Figure 2: Market definition and distribution of the SWITCH-ON products and services per sub-market.

3 Market Intelligence

3.1 Exploration of the Market for Water Information Products and Services in the EU

The purpose of this section is to briefly assess the macro-environmental factors that influence the market for water information products and services in Europe using the PESTEL framework. The PESTEL framework (Figure 3) **Error! Reference source not found.** is a strategic analysis tool used to examine the key external conditions that surround an organisation and may influence its strategy development and decision-making. PESTEL scrutinises the *Political, Economic, Social, Technological, Environmental* and *Legal* elements that make up the external macro-environment (CIMA 2007). Within the analysis, these six elements are seen as potential drivers for changes in external conditions. In turn, these changes can result in opportunities and/or threats to organisations. Thus, the main objective of a PESTEL analysis is the identification of the current opportunities that the organisation could exploit and the threats that it should avoid. In addition, PESTEL can be used to develop a Strengths, Weaknesses, Opportunities and Threats (SWOT) Analysis (CIMA 2007), as it facilitates the detection of matches and gaps between the strengths and weaknesses of an organisation or product and the opportunities and threats present in the current environment.



Figure 3: Dimensions of the PESTEL framework

Figure 4 provides a summary of the PESTEL analysis developed for the market for water information products and services. The individual elements are described in detail in the following sections.



THE MARKET FOR WATER INFORMATION PRODUCTS AND SERVICES

POLITICAL

- **Blueprint to Safeguard Europe's Water Resources** and the **Resource Efficiency Roadmap** emphasised the political will to improve the quantity and quality of Europe's waters.
- The flagship initiative **Digital Agenda for Europe** supports the Europe 2020 growth strategy for a smart, sustainable and inclusive economy.
- The development of **data portals**, adoption of the **Open Data Charter**, and the release of the **Communication on a data driven economy** further underlines the political commitment to the DAE as well as the role of **Public Private Partnerships (PPPs)**.

LEGAL

- Water is one of the most regulated sectors in Europe. The **Water Framework Directive (WFD)** and the **Floods Directive (FD)** are the main pieces of legislation, with the **Bathing Water Directive, Drinking Water Directive, Urban Waste Water Directive, and Nitrates Directive** also regulating various aspects of water quality.
- Legislation for **Water Scarcity and Drought (WS&D)**; however, does not currently exist.
- Several pieces of legislation set standards for information and data, namely the **Public Sector Information Directive** and the **INSPIRE Directive**.

ECONOMIC

- The water and ICT sectors are extremely important for the **European economy** and **drivers of future growth**.
- **Increasing pressures on water resources** have severe implications in terms of **costs and damages**.
- The lingering effects of the recession **limit the economic capacity** of many national and local authorities to **manage water resources and cope with the consequences** of major events.

SOCIAL

- **Rapidly increasing expansion of urban area** may undermine natural defences, increase waste water and change the level, pattern, and structure of demand.
- The **attitudes of Europeans towards the environment and water resources** could change their (direct and indirect) **water consumption, demand for water information products and services, and support of public and private measures** to address water-related concerns.
- **Energy, agriculture, and industry** place significant pressure on water resources via **high abstraction levels and the emission of pollutants**, highlighting the need for information products and services.

TECHNOLOGICAL

- The water sector is characterised by a **fragmentation of solutions** and **lack of interoperability** across national and international data and information systems.
- **River-basin reporting and mandated public participation** of water legislation drive the market for water information products and services.
- Important technology trends include the development of **platforms and methods** to support the **standardisation, harmonisation, and collaborative use of water-related data**; the further development of **accurate**, the the further development and improvement of **decision support systems (DSS)**; and applications to enhance **citizen involvement**.

ENVIRONMENTAL

- **Climate change** will exacerbate **extreme precipitation and temperatures** across Europe.
- **Agriculture, forestry, fisheries, urbanisation and industry** heavily influence the state of the environment in the EU and **need for tools to help to reverse trends**.

Figure 4: Summary of the PESTEL analysis for the market for water information products and services



3.1.1 Political Factors

In 2012, the Commission released “A Blueprint to Safeguard Europe's Water Resources” (EC 2012a), which describes several measures that would improve the implementation of water legislation as well as its integration with other EU policies. The “Blueprint” serves as the water milestone for the 2011 Resource Efficiency Roadmap (EC 2011a) and also supports the Europe 2020 Strategy, a ten-year growth strategy to help “the EU to become a smart, sustainable and inclusive economy” (EC 2014h). The Digital Agenda for Europe (DAE) is the first of seven flagship initiatives of the Europe 2020 growth strategy, which is highly relevant for the market for water information products and services. The development of data portals, the adoption of the Open Data Charter as well as the release of the Communication on a data driven economy (EC 2014a) further underlines Europe’s commitment to the DAE as well as the role of Public Private Partnerships (PPPs) to support advancements in data and technology in the EU.

In order to ensure sufficient water quality and quantity is available throughout Europe, the 2012 “Blueprint” identifies the need to establish Natural Water Retention Measures (NWRM), water efficiency measures (particularly for the energy and agriculture sector as well as public use), and water re-use and desalination. Economic instruments to address market failures, such as pricing schemes, metering of water consumption, and the provision of information (e.g., through labelling in order to increase business and consumer awareness), were also cited as beneficial measures. Furthermore, the “Blueprint” notes that increased policy integration and coherence, improvements in governance and implementation, as well as the development of a more comprehensive dataset and consistent methodology for calculating water balances, ecological flows and targets would help improve the current state of European waters (EC 2012a).

In 2010, the European Union (EU) committed to a determined decadal plan expected to put the EU on the pathway towards ‘*smart, sustainable and inclusive economy delivering high levels of employment, productivity and social cohesion*’ (EC 2010a); the Strategy 2020. The Digital Agenda for Europe (DAE, EC 2010b) is a part of the plan and one of its seven flagship initiatives. Recognising the economic and social potential posed by Information and Communication technologies (ICT), the DAE contains 101 actions assembled into seven priority areas (pillars) meant to put the EU on the pathway towards smart, sustainable and inclusive growth. The priority areas include digital single market, interoperability and standards, trust and security, fast and ultra-fast internet access, research and innovation, digital literacy, skills and inclusion and ICT-enabled benefits for EU society². The key performance criteria of the DAE (Table 1) encompass thirteen quantitative targets to be accomplished by 2020 or before. The 2012 review of priorities (EC 2012b) provides seven³ additional key areas concerning stimulation growth and jobs creation in Europe.

² The progress in implementing (as for June 2013) the 101 Digital Agenda actions as well as the Digital Agenda Review package can be found in (EC 2013a)

³ [1] Create a new and stable broadband regulatory environment. [2] New public digital service infrastructures through Connecting Europe Facility loans. [3] Launch Grand Coalition on Digital Skills and Jobs. [4] Propose EU cyber-security strategy and Directive. [5] Update EU's Copyright Framework. [6] Accelerate cloud computing through public sector buying power. [7] Launch new electronics industrial strategy – an “Airbus of Chips”



Table 1: Key performance targets of the DAE; Source: (EC 2010b)

100%	coverage by broadband above 30 Mbps	2020
50%	subscriptions above 100 Mbps	
20%	reduction of the energy use of lighting	
50%	population to buy online	2015
20%	population to buy online cross border	
33%	SMEs to make online sales/purchases	
	difference between roaming and national tariffs to approach zero	
	increase regular internet usage from 60 % to 75 %, and from 41 % to 60 % among disadvantaged people	
	halve the proportion of the population that has never used the internet from 30 % to 15 %	
50%	citizens to use eGovernment	
	all key cross-border public services , to be available online	
	double public investment in ICT R&D to € 11 bn	2013
100%	basic broadband coverage	

The score board of the European information society embraces around 100 structural indicators addressing various thematic groups related to DAE. Figure 5 and Figure 6 show two indicators from the mobile applications thematic area, namely number of mobile subscriptions and average revenue per users.

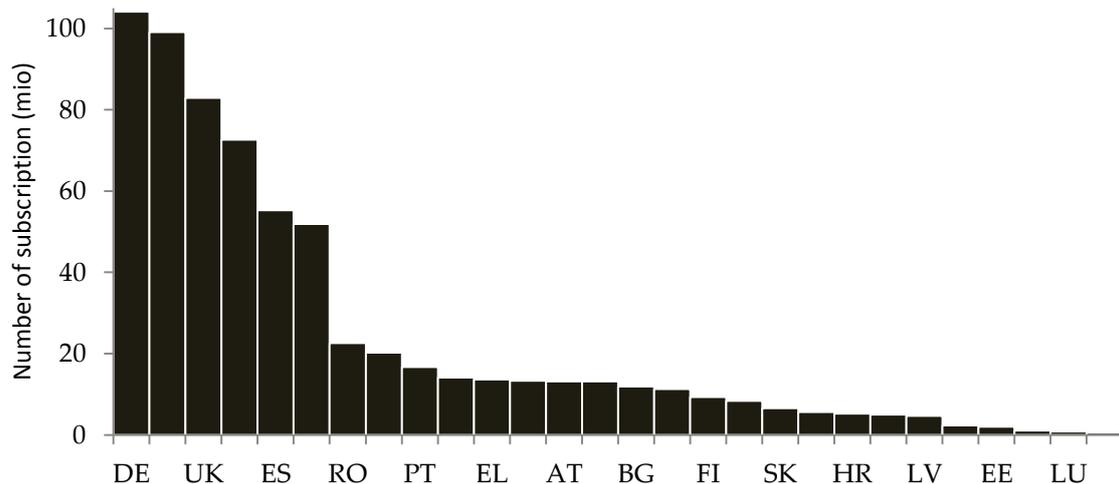


Figure 5: Total number of subscriptions [mob_subs] defined as defined as the number of active SIM cards, including voice and data services, installed in telephones, modem, USB keys or other devices. Source: own elaboration of the Digital Agenda Scoreboard key indicators⁴, reference year 2013.

⁴ http://digital-agenda-data.eu/datasets/digital_agenda_scoreboard_key_indicators/

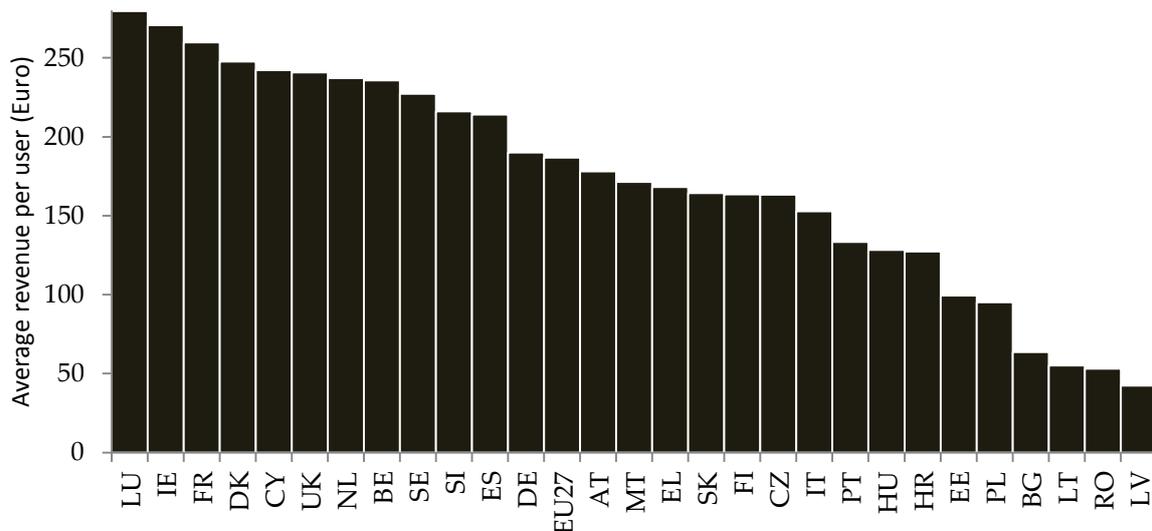


Figure 6: Average Revenue per User (ARPU) in the Retail Mobile Market [mob_arpm] defined as Total retail mobile revenues divided by number of active SIM cards. Source: own elaboration of the Digital Agenda Scoreboard key indicators⁵, reference year 2012.

To support the DAE, the EC Open Data Communication (EC 2011b) anticipated the foundation of two open data portals: The first, containing data resources of the Commission and of other European institutions and agencies, went online in December 2012.⁶ The second, envisaged to launch in 2013 as a result of cooperation with Member States, should facilitate direct access to a range of datasets from across the EU. A prototype of a pan-European search portal [publicdata.eu] was developed by the FP7 funded project LOD2 (Creating Knowledge out of Interlinked Data, 2010-2014⁷). This portal collects metadata from existing open data portal sites across Europe and makes it searchable.

Furthermore, in 2013, the Group of Eight (G8⁸) leading industrialised countries adopted Open Data Charter (hereafter only G8 charter) that commits the governments (understood in the 'widest sense') to open data vision 'by default' (G8 2013). The commitment entails pledges to release high-quality, accurate, and comprehensive open data in a timely and accessible manner. As far as possible, the data should be released free of charge and without bureaucratic or administrative barriers. The G8 Charter implicitly recognises the value of open data as a catalyst of innovation, new markets, businesses and employment. Besides, the access to government data is acknowledged as a vehicle of empowerment for citizens, media, civil society, and business to eventually be translated into better outcomes of public services, environmental protection, and governance. The European Union endorsed the five strategic principles of the G8 Charter and outlined, in October 2013 (EC 2013b), the actions to complement the already existing legislation, including the PSI Directive and the Commission Decision on the reuse of Commission documents (2011/833/EU, (EC 2011c)).

In 2014, the EC released a Communication (EC 2014a) and staff working document (EC 2014b) on *data driven economy*. The Communication laid out the plan to establish a contractual Public-Private

⁵ http://digital-agenda-data.eu/datasets/digital_agenda_scoreboard_key_indicators/

⁶ European Union Open data Portal, <https://open-data.europa.eu/en/data>

⁷ <http://lod2.eu>

⁸ Canada, France, Germany, Italy, Japan, Russia (currently suspended as a result of the Ukraine crisis), United Kingdom, United States; these countries together account for ca. 50 per cent of the global GDP (in nominal values, 2012 reference year)



Partnership (PPP), signed eventually in October 2014, to develop platforms for datasets sharing as well as mechanisms for knowledge and technology transfers. The *Big Data Value* (BDV⁹) PPP will start in 2015 while first projects are expected in 2016. The BDV Association is a non-for-profit organisation founded by 24 organisations (large companies and SMEs) among others to develop a strategic research agenda (SRIA) and act as a private counterpart of the EC in the PPP.

3.1.2 Legal Factors

Water is one of the most regulated sectors in Europe (European Investment Bank 2013), comprising various European and national legislation. The two key pieces of EU water legislation in Europe are the Water Framework Directive (WFD) and the Floods Directive (FD). The Urban Waste Water Directive, Bathing Water Directive, Nitrates Directive, and Drinking Water Directive address water quality standards for the water sector and related industries. Furthermore, several pieces of legislation set standards for information and data, namely the Public Sector Information Directive and the INSPIRE Directive, which are highly relevant for the water information products and services market.

Adopted in 2000, the WFD (EC 2000) is the most comprehensive piece of legislation that addresses the status of EU aquatic ecosystems requiring “good ecological status” of all river basin bodies by 2015. Member States are required to deliver River Basin Management Plans (RBMPs) every six years (the first was due in 2009; the second, upcoming reporting cycle is at the end of 2015) as well as Programmes of Measures (PoMs), which must be operational by 2012. Since the RBMPs are at the river-basin level and do not follow political-administrative jurisdictions (Newig and Koontz 2014), authorities are required to collaborate across national and international jurisdictions. Aimed at internalising negative externalities (Moss 2004; as cited in Newig and Koontz 2014), cross-jurisdictional collaboration creates significant challenges for authorities using different data, models and software (discussed in section 3.1.5). The Water Information System for Europe (WISE) – hosted at the European Environment Agency (EEA) – was developed in an effort to streamline the reporting of Member States as well as provide a centralised location for information about European water bodies (however, the system has experienced substantial interoperability issues, see section 3.1.5) (Hannerz and Langaas 2007). It is anticipated that the compliance data from water legislation (see overview below) will be integrated into the WISE platform (Hannerz and Langaas 2007). Furthermore, the WFD requires authorities to involve stakeholders and the public during the planning process¹⁰ and provide a summary of the information provision and consultation measures and the resulting changes to the RBMPs (see §14 of the WFD). Although the implementation remains flexible, a guidance document is provided to assist in the public participation process¹¹.

The European Floods Directive (FD) was adopted in 2007 with the objective of establishing a framework to mitigate and manage the risks that floods pose to the human health, environment, cultural heritage, and economic activity of Europe (EC 2007b). The FD requires Member States to assess and manage the risk¹² of flooding for all water courses and coastlines, including rivers, lakes, flash floods, urban floods, coastal floods as well as storm surges and tsunamis by providing Flood Risk

⁹ <http://www.bigdatavalue.eu/>

¹⁰ Newig and Koontz (2014) label this approach to policy implementation as “Mandated Participatory Planning (MPP)”.

¹¹ See the Common Implementation Strategy (CIS) Guidance Document number 8: <https://circabc.europa.eu/sd/a/0fc804ff-5fe6-4874-8e0d-de3e47637a63/Guidance%20No%208%20-%20Public%20participation%20%28WG%202.9%29.pdf>

¹² Although Newig and Koontz (2014) note that



Maps and Flood Risk Management Plans (FRMPs). The first FRMPs are due in coordination with the second cycle of the RBMPs of the WFD (December 2015, see Table 2) and aligned thereafter. Like the WFD, the FD is implemented at the River Basin District level (or smaller units of management (UoM) where identified). Public participation is also required, albeit to a lesser extent than in the WFD (Newig and Koontz 2014).

Although EU legislation does not currently address WS&D, the Commission plans to strengthen the requirements of the WFD that are related to drought risk management¹³ and also acknowledges that more attention should be focused on water re-use for irrigation or industrial purposes, which is currently only implemented to a limited extent in the EU¹⁴.

Table 2: Specifications of the Water Framework Directive and the Floods Directive; Source: modified from Newig and Koontz (2014)

	Water Framework Directive	Floods Directive
Name of plans	River Basin Management Plans and Programmes of Measures	Flood Risk Maps and Flood Risk Management Plans
Geographical focus	River Basin Districts and sub-units	Flood risk areas within River Basin Districts and sub-units
Cyclical planning	Six-year cycles	Six-year cycles aligned with those of the WFD
Set goals	Good water status for all ground and surface waters by 2015	Abstract goal only, no concrete objectives
Public participation requirements	Access to information, formalized three-stage consultation, active involvement of interested parties	Access to information, active involvement of interested parties

The Bathing Water Directive, Drinking Water Directive, Urban Waste Water Directive, and Nitrates Directive concern the protection of water quality across Europe and therefore support the WFD. Updated and simplified in 2006, the new Bathing Water Directive requires Member States to regularly monitor, assess, and inform the public about bathing water quality (pollution and resulting health risks) and therefore complements the WFD (EC 2014c). In 2013, almost 95% of the water at Europe’s beaches, rivers and lakes met minimum requirements and were generally of high quality (EC 2014d). Also complementing the WFD, the 1998 Drinking Water Directive requires Member States to inform consumers on a regular basis about the water quality of drinking water from

¹³ This is already being done to some extent. For instance, through recommendations on the first round of River Basin Management Plans (RBMPs), which promote a more conscientious integration of drought risk management issues (COM, 2012a).

¹⁴ This is mostly likely due to a lack of harmonized EU environmental health standards for re-used water, which potentially prevents the movement of agricultural products irrigated with re-used water across EU borders; the Commission intends to develop a proposal for EU-wide standards on re-used water in 2015 (EC 2014i).



tankers, bottles, containers, etc. Member States are free to set higher standards, but are required to regularly test and monitor at least a total of 48 microbiological, chemical and indicator parameters and to inform the European Commission of the results every three years (EC 2014e). Adopted already in 1991, the Urban Waste Water Directive concerns the collection, treatment and discharge of domestic waste water, mixture of waste water, and waste water from certain industrial sectors (EC 2014f) – successful implementation of the Directive is a precondition to achieve “good status” for all waters (§4 of the WFD). Although large differences remain among Member States (with Austria, Germany, and the Netherlands at the forefront), the latest figures for wastewater treatment show overall improvements (EC 2013c). Finally, the Nitrates Directive, also adopted in 1991, (CITE) protects against the pollution of nitrates from agriculture through the promotion of good farming practices.

The effective implementation of the abovementioned water legislation support several other key pieces of EU legislation, including (European Commission 2014):

- EU Common Agricultural Policy
- EU Strategy on adaptation to climate change
- Cohesion Policy
- European Union Solidarity Fund (EUSF)
- EU Civil Protection Mechanism
- Environmental Impact Assessment Directive
- Seveso II Directive on Major accidents involving dangerous substances
- Strategic Environmental Assessment (SEA) Directive
- Aarhus Convention and related Community legislation on public participation and the access to environmental information
- Habitats Directive¹⁵

The 2003 Public Sector Information Directive (PSI, (EC 2003), reformed in 2013 (EC 2013d), established a *minimum set of rules* for documents (with a broad meaning and referred to digital and non-digital content) held by public sector bodies made ‘*re-usable for commercial or non-commercial purposes*’ (*ibid*). Excluded from the application of the PSI directive are statistical and commercial confidential information, information for which disclosure could undermine public security and defence, and other types of documents specified in the Article 1. The PSI Directive also postulates practical arrangements that facilitate the re-use of existing documents such as the marginal costs of document provision and the time frame within which the applications are to be processed. The 2013 reform of the PSI Directive among others expanded the scope of the Directive, now covering certain cultural institutions, such as libraries, museums and archives, under special regimes. The reformed Directive also encouraged Member States to provide access to documents in machine-readable and open (i.e., platform-independent and without restriction limiting the re-use) formats.

Furthermore, the 2007 INSPIRE Directive (EC 2007a) established an infrastructure for spatial information in Europe in support of EU’s environmental policies as well as policies that have an impact on the environment. As an umbrella platform, INSPIRE builds upon the spatial information infrastructures (SII) of the Member States and, to make them compatible, compels adoption of common Implementing Rules (IR).

¹⁵ In some areas, data on small water bodies are not available due to gaps in the WFD and the Habitats Directive. The WFD applies to water-dependent Natura 2000 listed in the Habitats Directive; however, a clear definition of water dependent is missing from both Directives (Werner 2012). Therefore, further integration and coordination among EU legislation is needed in this area.



3.1.3 Economic Factors

The global water market is a multi-trillion dollar industry (Bruno Tisserand and Pascal Dauthuille 2014; see Figure 7 **Error! Reference source not found.**) and is expected to be a large driver of European economic growth (Figure 8), as is the sector for Information Communication Technologies (ICT). The growing pressure on water resources is a major threat to human well-being and businesses. Furthermore, the economic costs of water-related events are enormous and projected to further increase with the intensification of weather extremes due to climate change. Moreover, the effects of the recession place pressure on the economic capacity of many national and local authorities to effectively manage water resources and cope with events such as major floods, water scarcity and droughts.

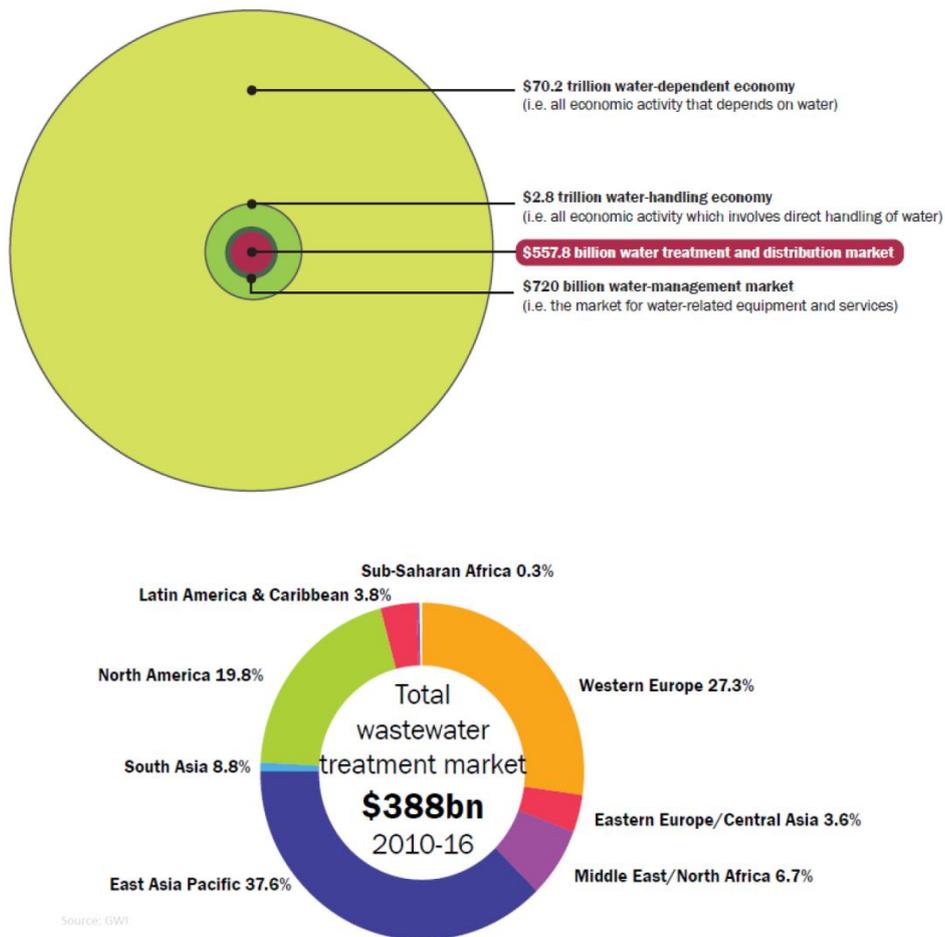


Figure 7a-b: The global water market in numbers. Source: Bruno Tisserand and Pascal Dauthuille (2014), taken from Global Water Intelligence (GWI): <http://www.globalwaterintel.com/>

The water sector in Europe is highly fragmented with over 70,000 water utilities (Bruno Tisserand and Pascal Dauthuille 2014) across Member States. National circumstances differ significantly in terms of pricing, the type of use, and ownership of drinking and waste water as well as provision quality, delivery, and reliability (See EUREAU 2009 for a comprehensive, country-level overview of the water and waste water sector in Europe). The most common structure is that local governments are responsible for providing water services with the supervision of national authorities (EUREAU 2009). In EUREAU member countries, which includes all Member States except for Estonia, Lithuania, Latvia and Slovenia, water and wastewater services provide



close to 600,000 jobs and account for annual turnover of approximately 72 billion Euro and 33 billion Euro in investments (statistics published in 2009, see

Table 3

European growth

Which business sectors will drive European growth in the coming years?

	2013	2012 reminder
Information and communication technologies (ICT)	31%	33%
Energy (including nuclear energy) and utilities (waste, water treatment)	28%	24%
Pharmaceutical and biotechnologies industries	23%	19%
Cleantech	20%	26%
B2B services, excluding finance	19%	15%
Banking, finance and insurance	18%	13%
Transport and automotive industries	14%	13%
Consumer goods	14%	12%
Logistics and distribution channels	10%	9%
Real estate and construction	8%	7%

Source: Ernst & Young's European attractiveness survey 2012 (total respondents: 840), Ernst & Young's European attractiveness survey 2013 (total respondents: 808).

Figure 8: Business sectors that will drive European growth. Source: Ernst & Young (2013)

Table 3). Infrastructure assets in the sector are vast with more than 3.5 million km of drinking water networks and 2.2 million km of wastewater networks (EUREAU 2009). An increase of 1% in the growth rate of the water industry is estimated to create 10,000-20,000 new jobs (EC 2014g).

European growth

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Figure 8: Business sectors that will drive European growth. Source: Ernst & Young (2013)

Table 3: EUREAU water and wastewater sector overview; Source: EUREAU (2009)

EUREAU water and wastewater sector overview

Population



EUREAU water and wastewater sector overview

Total population (M inhabitants)	512.15	
Population served by EUREAU member associations	DW	WW
Minh ¹⁶	399.35	334.41
% of population served by DW/WW services ¹⁷	82.51%	78.28%

Water resources

Total renewable fresh water resources (Mm ³)		2,567,129
Water abstractions	Including cooling water	Excluding cooling water
Total freshwater abstractions ¹⁸ (Mm ³ /yr)	272,734	163,697

Drinking water services water abstractions

Total water abstracted for DW (Mm ³ /yr)		47,122	
Average water abstractions per inh. for DW (m ³ , based on population supplied)		92	
DW services water delivered	Domest.	Non-domest.	Total
In Mm ³ /yr	26,736	10,902	36,816

Water service management

	total
Total investments (latest y . available, M€) ¹⁹	33.396
Average investments per inh. (latest year €/yr) ²⁰	65.21
Total annual turnover (M €) ²¹	72,086
Total number of employees ²²	584,705
Total number of operators ²³	74,578

Wastewater

¹⁶ LV and SI are not considered.

¹⁷ Based on population served by drinking water and that by wastewater collection services.

¹⁸ For figure excluding cooling, IT, IE and SK are not included.

¹⁹ Extrapolation based on 71.44% of the population.

²⁰ Extrapolation based on 71.44% of the population.

²¹ Extrapolation based on 65.63% of the population.

²² Extrapolation based on 92.32% of the population.

²³ Extrapolation based on 82.99% of the population.

**EUREAU water and wastewater sector overview**

Total length of DW water network (km) ²⁴	3,584,617	
Average number of inh./km for DW water network (based on population served)		143
Total length of WW collection and treatment network (km) ²⁵	2,228,930	
Average number of inh./km for WW network (based on population served)		230
Total WW treatment capacity (Mpe)		667
Number of WW treatment plants		68,800

By 2007, an estimated 11% of the European population and 17% of its territory were adversely affected by water scarcity, costing approximately 100 billion Euro over three decades (EC 2012c). Climate change and economic growth are worsening conditions – it has been predicted that by 2030 half of EU river basins will be affected by water scarcity (European Commission 2012; see **Error! Reference source not found.**). Since the 80s, economic losses²⁶ from extreme weather events in Europe have increased by approximately 60% (Munich Re 2007; as cited in Hov et al. 2013), with the majority of losses stemming from storms and floods (see Figure 9). From 1980-2010, direct economic losses from storms and floods amounted to approximately 145 billion Euro each (in 2010 values). Annual losses due to flood events are estimated to increase by a factor of four from now until 2050 (Jongman et al. 2014; McGrath 2014), totalling 23.5 billion Euro per year. To further exacerbate the situation, only 30% of flood losses are insured (Figure 9), with flood insurance not available in Bulgaria and Portugal at all (Jongman et al. 2014). If trends aren't reversed, substantial economic losses will continue occur in the water sector and other water-dependent sectors (energy, agriculture, and industry).

Water scarcity and extreme weather-related events (droughts and floods) also threaten biodiversity, undermine the status of wetlands and soil, and potentially lead to land degradation, desertification (EC 2012c), or contamination (e.g. in the case of floods). Many of these effects are irreversible and difficult to quantify in economic terms. Likewise, the loss of life due to scarcity of resources and weather-related events is unquantifiable.

Adverse economic conditions in some regions, particularly southern, central, and eastern European countries (World Economic Forum 2014), may affect the capacity to undertake preventative and reactive measures. For example, although investments of around 1.8 billion Euro per year could decrease flood losses by approximately 30%, some countries have decreased spending for flood defence in recent years (see Carrington and Syal 2014). As identified in the WFD, more accurate water pricing (see EEA 2013), efficient allocation of resources and better risk management may be effective – and financially viable – economic policy instruments. Innovations in technology can lead to substantial efficiency gains, which includes improving (and harnessing) knowledge and data

²⁴ Extrapolation based on 96.11% of the population.

²⁵ Extrapolation based on 95.97% of the population. Excluding HR and IS.

²⁶ Direct losses plus the indirect losses that can be calculated in the case of a business interruption (Hov et al. 2013).

collection (EC 2012c). The provision of water information and awareness-raising, incentive pricing, as well as financing mechanisms for water saving eco-design and sustainable consumption (e.g., product certification, labelling schemes that providing information about the water footprint of a product) could also lead to substantial gains. There is therefore a strong and growing market for innovations in the field of water information products and services.

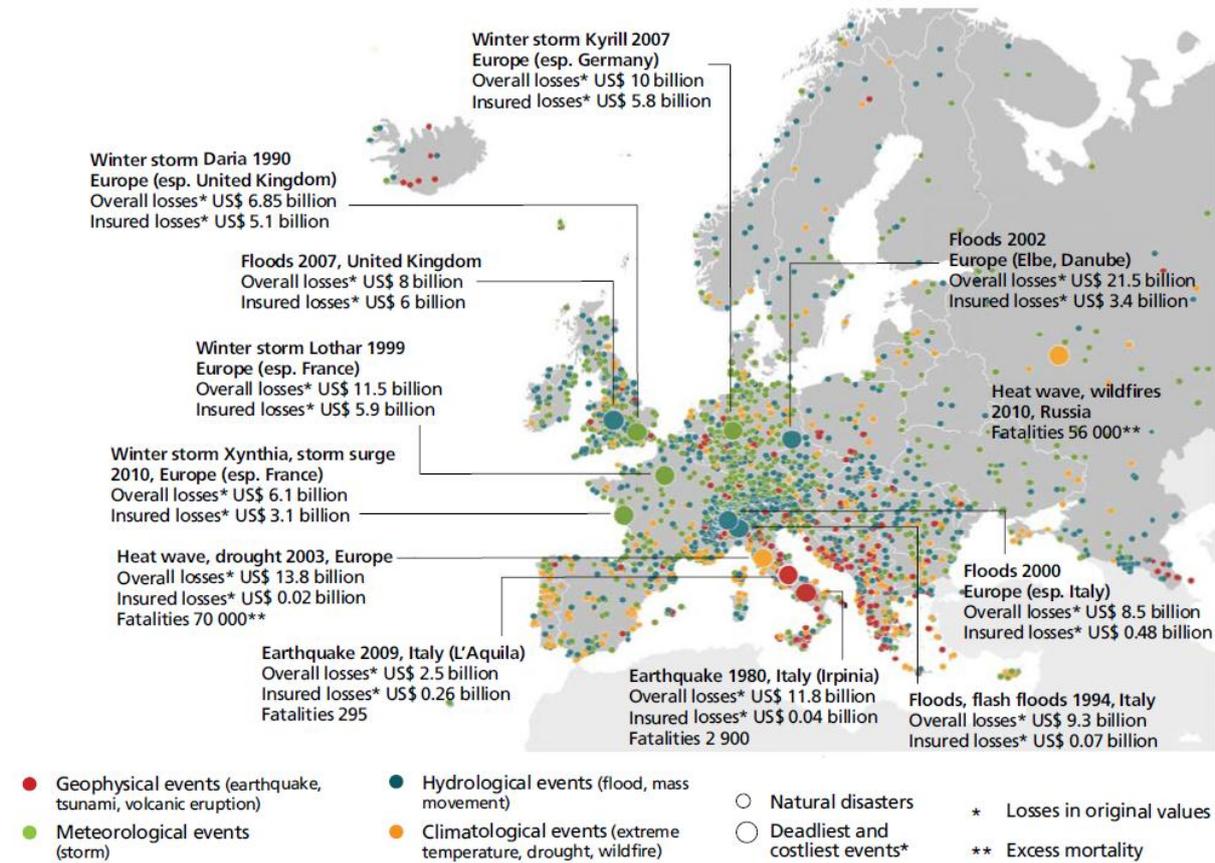


Figure 9: Distribution of loss-relevant natural extreme events in Europe 1980-2010. Source: Hov et al. (2013), using data from Munich Re

3.1.4 Socio-cultural Factors

Figure 10 provides a summary overview of societal challenges facing Europe in the upcoming decades (Hoorens et al. 2013). The rapidly increasing expansion of urban areas as well as the attitudes and behaviour of Europeans are particularly important socio-cultural factors that affect the state of water in the EU, and therefore the market for information products and services. At the macro-level, human activity – particularly related to energy, agriculture, and industry – place significant pressure on water resources through high abstraction levels and emission of pollutants, highlighting the need for information products and services to address these issues.

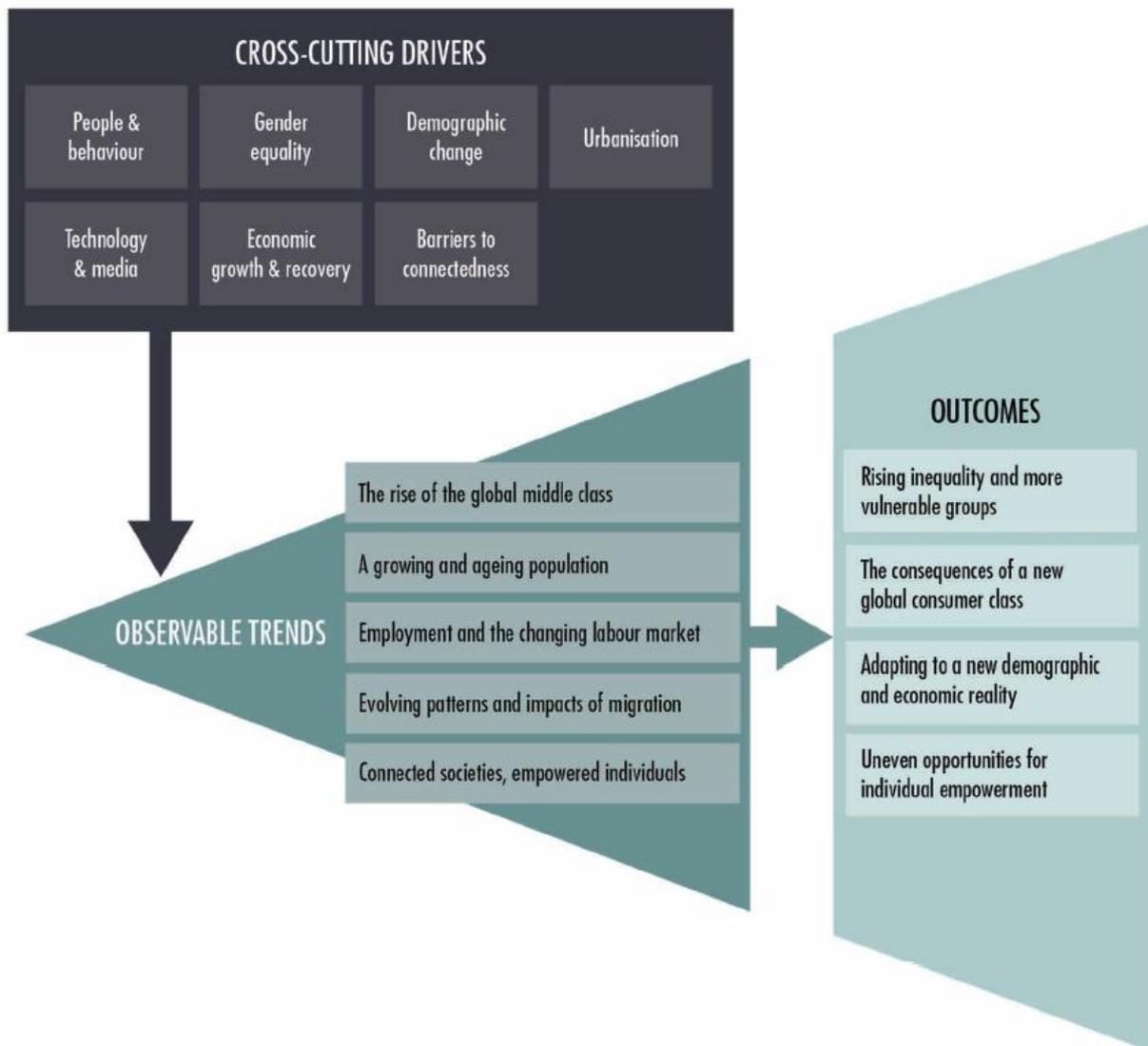


Figure 10: Main drivers, trends and outcomes of societal challenges in Europe; Source: Hoorens et al. (2013)

Depending on the type and form of development, rising urban populations in Europe may place added pressure on water resources by undermining natural defences (e.g., via the expansion of impermeable areas and the destruction of wetlands) and increasing the pollution emissions of waste water (EEA 2012a). Urbanisation also affects the levels, patterns, and structure of demand for water resources for energy, industrial, agricultural, and private consumption.

The attitudes of Europeans towards the environment and water resources could affect their consumption patterns, demand for water information products and services, and support of public and private measures to address water-related concerns. In fact, most Europeans think protecting the environment is important and feel they are directly affected by environmental problems (Eurobarometer 2014). Water pollution is one of the most concerning environmental issues for Europeans; the depletion of natural resources, agricultural pollution, shortage of drinking water, loss or extinction of species and their habitats, and consumption habits are of medium concern; and land take, soil degradation, and the spread of harmful non-native species are the issues of least concern (Figure 11).

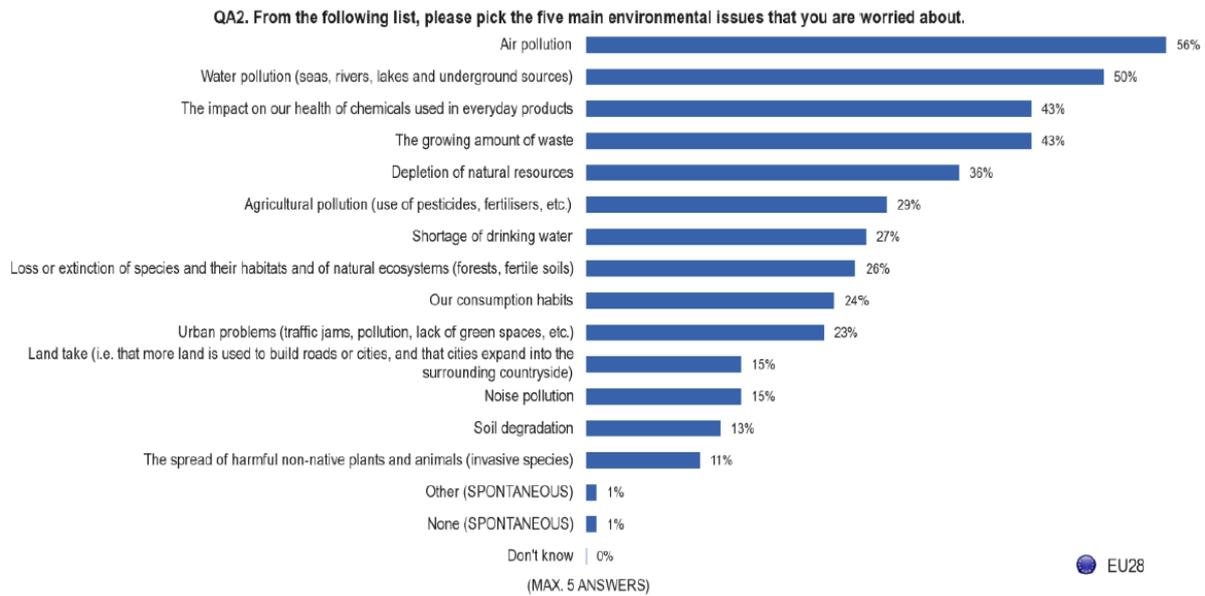


Figure 11: Main Environmental Concerns of Europeans. Source: (Eurobarometer 2014)

According to the survey, 60% of Europeans feel they are well-informed about environmental issues, with television, the Internet, and social media being the most important sources of information. Scientists, environmental protection agencies and television are the most trusted sources of information (Eurobarometer 2014). The majority of respondents indicate that they recently cut down on water consumption for environmental reasons (Figure 12) and state that they are willing to pay a little more for environmentally-friendly products; however, another survey (Eurobarometer 2013) indicates that many Europeans feel ill-informed about the *actual environmental impact* of the products they use – just over half (52%) trust claims by producers about the environmentally friendliness of their products (Eurobarometer 2013).

Which of the following have you done in the past month for environmental reasons? %

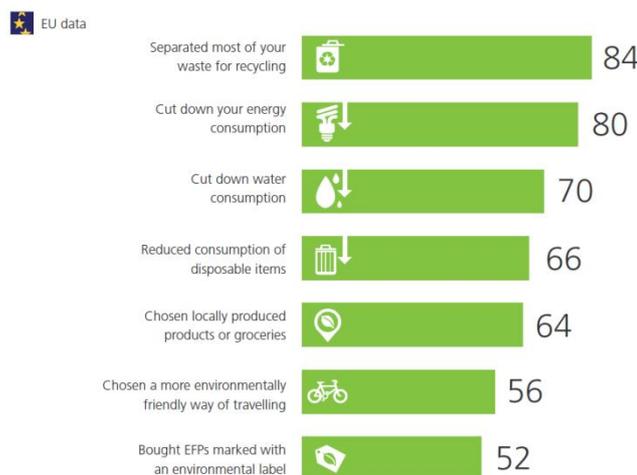


Figure 12: Actions Europeans take for environmental reasons. Source: TNS (2013); Information from the “Attitudes of Europeans towards building the single market for green products”, Flash Eurobarometer 367 undertaken by TNS Political and Social for the EC in 27 EU member countries.



Given the inherent complexity of the market for water resources and key role of other industries (energy, agriculture and industry), it is unclear how Europe's attitudes towards the environment translate to the status of water in Europe. Although water abstractions gradually decreased over the past two decades in many Member States (e.g., Bulgaria and Poland), rates remained stable or even increased in others (particularly Ireland, Spain, Luxembourg and Portugal) (Eurostat 2014). A variety of factors are likely to contribute to the reduction in abstractions, including water-saving household appliances and awareness raising (Eurostat 2014). An increase in abstractions in other regions could be attributed to the development patterns, population increase and water management, which emphasize the importance of water supply management (Eurostat 2014).

According to the Water Exploitation Index (WEI), Cyprus, Belgium, Spain, Italy, and Malta are using 20% or more of their long-term freshwater supply per year (EEA 2010b). Water abstraction in Cyprus, Spain, Italy and Malta is primarily due to irrigation, whereas in Belgium it is mainly due to cooling purposes in the energy sector (EEA 2010b). This reflects the general pattern across EU regions - irrigation is the largest driver of water abstraction in the south (as well as in Turkey), while water use for industrial and energy purposes (cooling) is relatively high in the eastern and western regions of Europe (Figure 14).

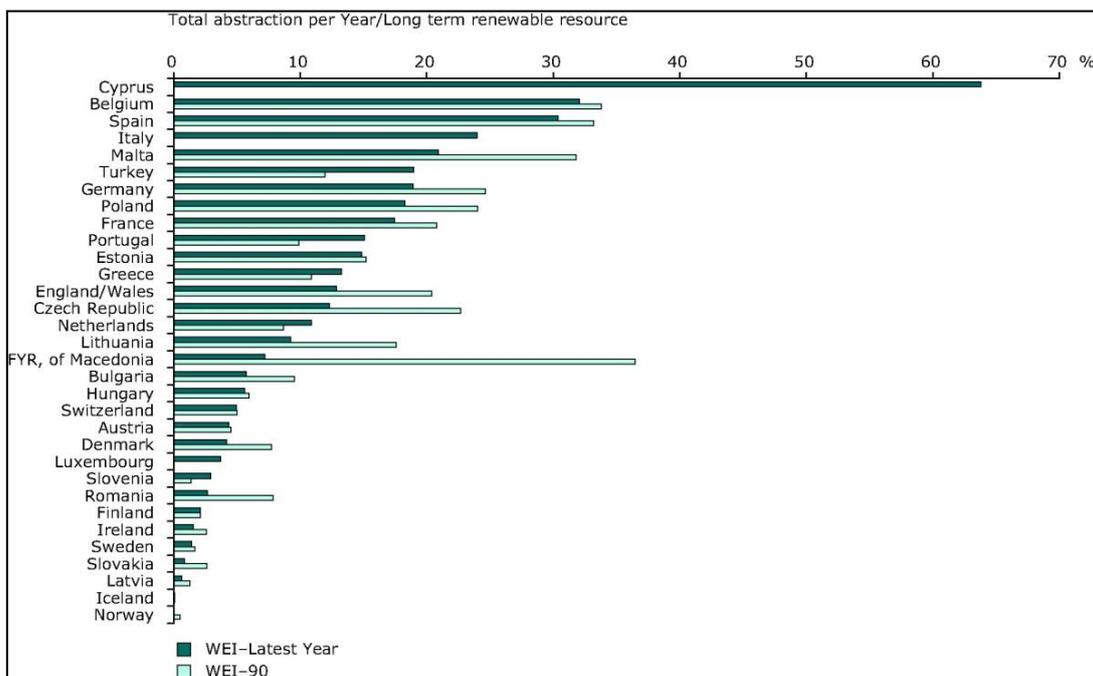


Figure 13: Annual total water abstraction as a percentage of available long-term freshwater resources around 1990 (WEI-90) compared to latest year available (1998–2007) (WEI-Latest Year).²⁷ Source: EEA (2010b)

²⁷ (WEI Latest year, WEI-90) = Cyprus (2007); Belgium (2005, 1994); Spain (2006, 1991); Italy (1998); Malta (2007, 1990); Turkey (2001, 1990); Germany (2004, 1991); Poland (2005, 1990); France (2006, 1991); Portugal (1998, 1990); Estonia (2007, 1990); Greece (2007, 1990); UK* (England/Wales) (2006, 1990); Czech Republic (2007, 1990); Netherlands (2006, 1990); Lithuania (2007, 1990); FYR, of Macedonia (1990, 2007); Bulgaria (2007, 1990); Hungary (2002, 1992); Switzerland (2006, 1990); Austria (1999, 1990); Denmark (2004, 1990); Luxembourg (1999); Slovenia (2007, 1990); Romania (2007, 1990); Finland (1999, 1990); Ireland (2007, 1994); Sweden (2007, 1990); Slovakia (2007, 1990), Latvia (2007, 1991); Iceland (2005, 1992); Norway (1985)

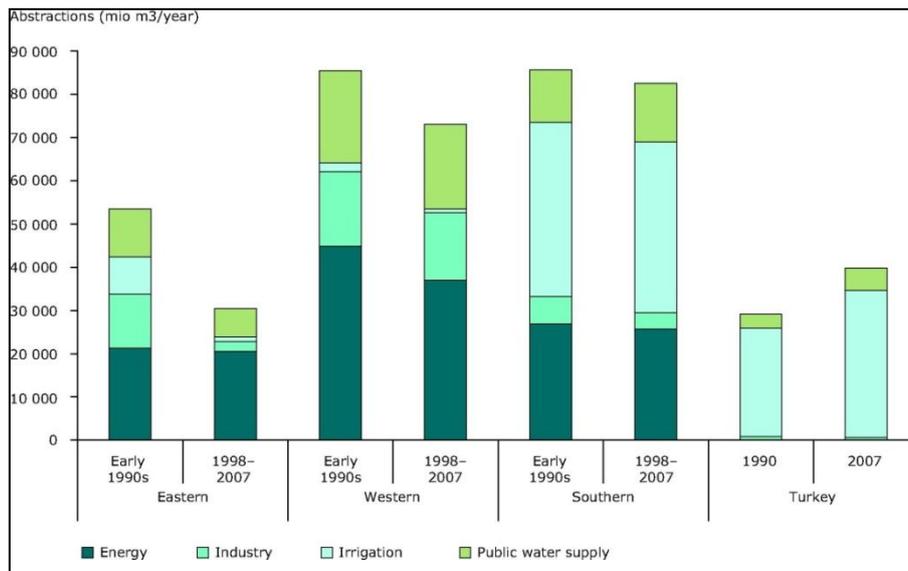


Figure 14: Water abstractions for irrigation, manufacturing industry, energy cooling and Public Water Supply (million m³/year) in early 1990s and the period 1997-2007. Source: EEA (2010b)

In Europe, most people have access to drinking water of good quality, but in some regions pollution is still problematic. Point source pollution (e.g., discharge from urban wastewater, industry and fish farms) and diffuse pollution (e.g., discharge from agriculture, atmospheric deposition on water bodies) can influence water quality (EEA 2014a). Water pollution by nitrogen and phosphate (resulting from farm fertilisers), are especially a threat to water quality (EEA 2014b). Thus, agriculture is still a major cause of the poor water quality in some European regions (EEA 2012a, 11). In the last years some improvements have been made regarding urban wastewater treatment; however, further improvement is necessary (EEA 2012a). In some countries, the proportion of the population connected to urban wastewater treatment exceeds 90% (Malta, the Netherlands, UK, Germany, Spain, and Luxembourg); on the other end of the spectrum, in some countries less than one in two households are connected to urban wastewater treatment (Romania, Serbia, Bosnia, Herzegovina) (Eurostat 2014).

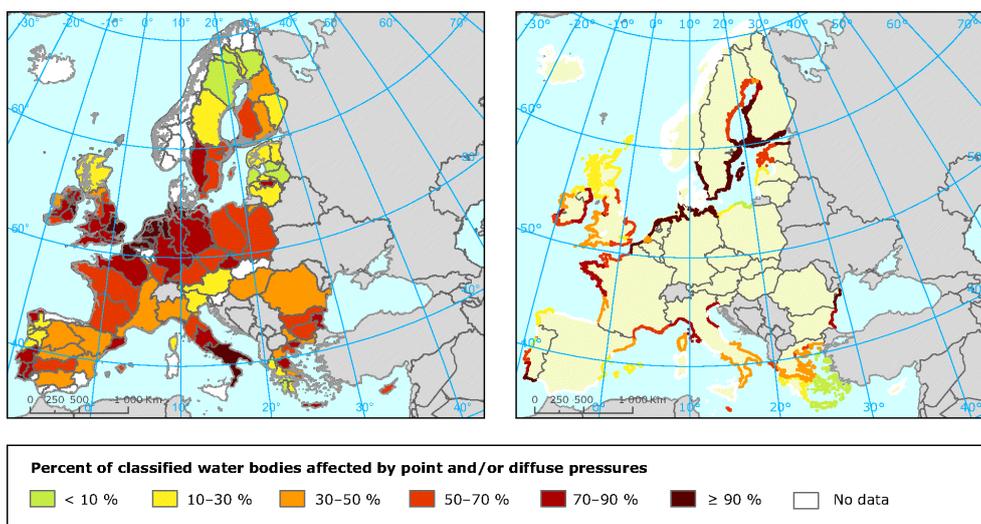


Figure 15: Percent of classified water bodies affected by point and/or diffuse pressures. Source: (EEA 2012b)



In the southern regions of Europe, the discharge of inadequately-treated municipal and industrial wastewater is one of the main sources of water pollution – due to inadequate sanitation, wastewater flows directly into the groundwater (EEA and UNEP/MAP 2014, 63). The following figures give an overview of the chemical status of groundwater and surface water bodies in the different Member States.

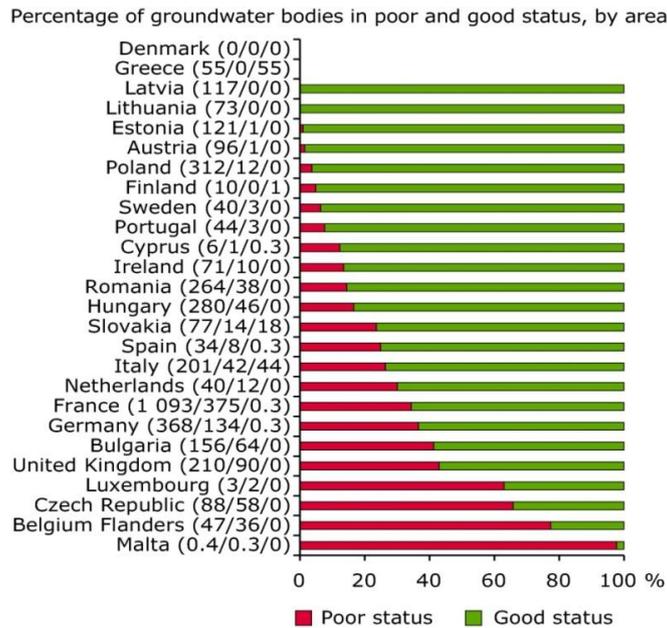


Figure 16: Percentage of groundwater bodies in poor and good status by area. Source: (EEA 2012c)

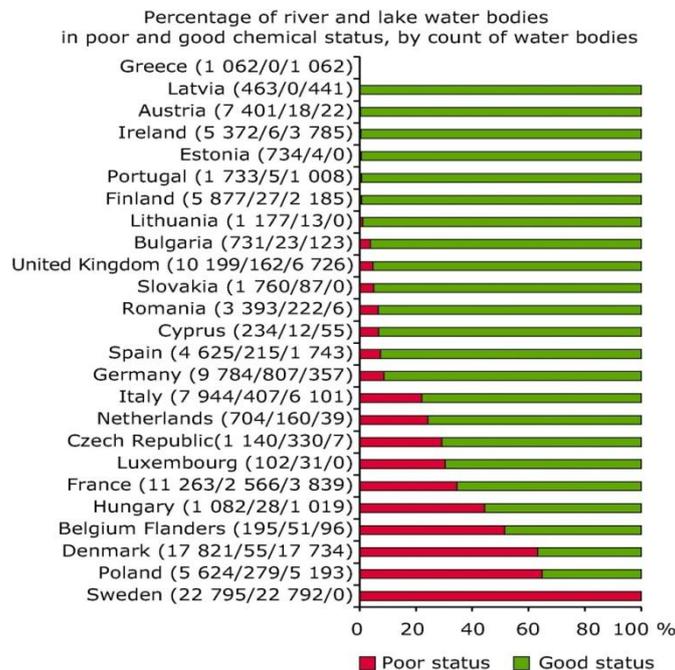


Figure 17: Percentage of river and lake water bodies in poor and good chemical status by count of water bodies. Source: (EEA 2012d)

3.1.5 Technological Factors

The water sector is characterised by a fragmentation of solutions and lack of interoperability across national and international data and information systems (Hannerz and Langaas 2007; (EC 2012d). Driven by the requirements of water legislation (primarily river-basin level reporting and mandated public participation) and the INSPIRE Directive, important trends in the market for water information products and services include the development of platforms and methods to support the standardisation, harmonisation, and collaborative use of water-related data; the further development and improvement of decision support systems (DSS); as well as applications to enhance citizen involvement.

The WFD requires a high level of data exchange and coordination across national and international administrative jurisdictions²⁸, which necessitates various types of IT systems (Usländer 2005, see Figure 18). International river basins, such as the Elbe, Rhine, Danube, Odra, Baltic Sea, Narva/Peipsi, Daugava and Neman (see Kwadijk & Sprokkereef 1998; Hannerz et al. 2002; Hannerz & Destouni 2006; as identified in Hannerz and Langaas 2007), have become important locations for the development of such IT systems (Hannerz and Langaas 2007). However, cross-jurisdiction coordination continues to be a challenge. Likewise, the development of the Water Information System for Europe (WISE), intended to be the central open information system for the status of all European water bodies, is encountering interoperability issues (Hannerz and Langaas 2007).

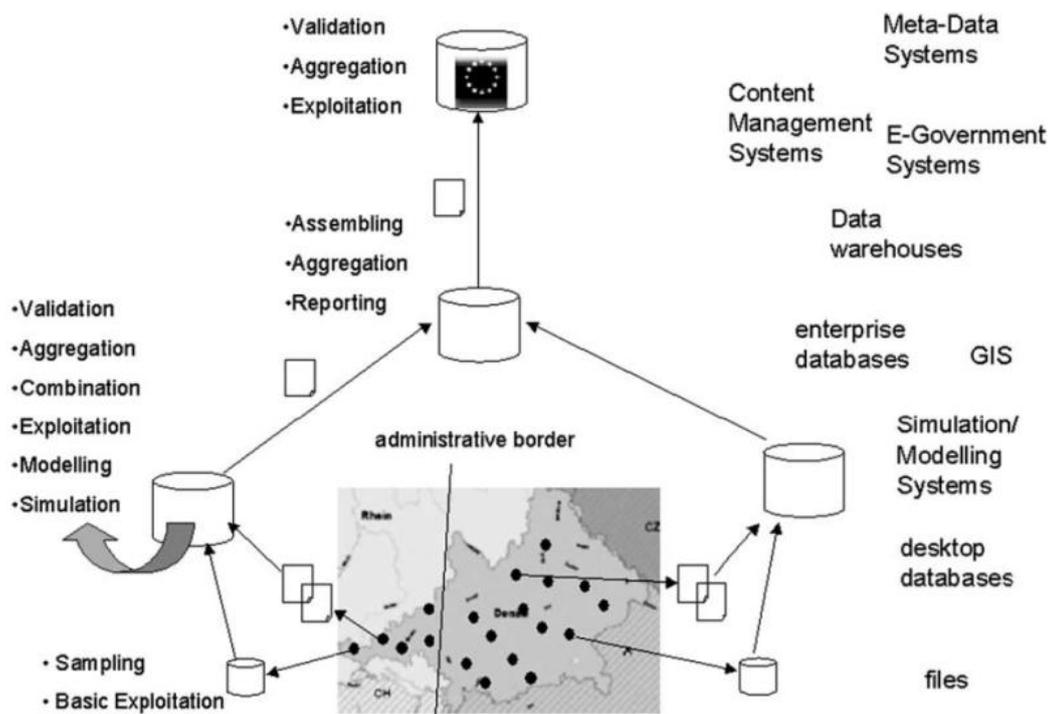


Figure 18: Functional requirements of the WFD reporting obligations (left-hand side) and involved types of IT systems (right-hand side). Source: (Usländer 2005)

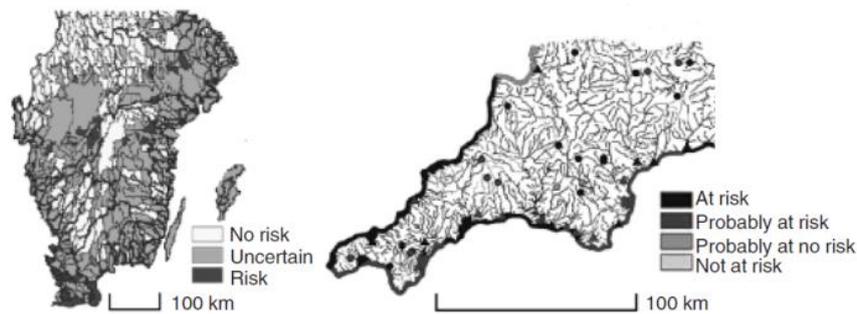
²⁸ In fact, two-thirds of the total river-basin area covered by the WFD is international (Nilsson, Langaas, and Hannerz 2004; Hannerz 2008).



Analyses of the 2009 RBMPs demonstrate the significant lack of data comparability across Member States and extreme differences in terms of spatial analysis units, temporal scale, and parameters (Hannerz and Langaas 2007; Pierre Strosser et al. 2012; for example, see Table 4 and Figure 19). Furthermore, data are often highly unreliable and inconsistent (Pierre Strosser et al. 2012). A comprehensive set of comparable, reliable, and accurate local-level water data on all European water bodies could be scaled at the national and EU levels, help streamline reporting processes (EEA 2012a), and potentially lead to improvements in forecasting and risk management. Several research initiatives focus on developing harmonised, pan-European databases (Loek Essers 2014); however, the resulting tools and models are sometimes not effectively made operational by water managers due to insufficient integration between policy and research (see Willems and de Lange 2007 for a discussion of this topic).

Table 4: Overview of data availability in WISE-SoE#3 at RBD (or SU) level. Source: Pierre Strosser et al. (2012)

Country	Data on Freshwater Availability	Data on Freshwater Abstractions	Data on Freshwater Use
Australia	+++		
Belgium	++	++	++
Bulgaria	+		
Cyprus	+++	+++	
Czech Republic	+++	+++	+++
Denmark	+	+	
Estonia	+++	+++	
France	+++	+++	
Ireland	+++	+++	+++
Latvia	+++	+++	
Lithuania	+++	+++	+++
Portugal	+++	+++	
Romania		+	
Slovakia	+++	+++	
Slovenia	+++		
Sweden	+++	+++	
Switzerland	+++		
United Kingdom	++	++	
Total 18 countries	Overall satisfactory	Overall satisfactory	Overall poor



Note: The basic analysis and mapping unit in Sweden is the river basin, while in England it is the individual water body. Legends show the different risk classification schemes used in the two countries. Furthermore, the analysis methods used are different. Areas that risk failing the WFD objectives are identified in Sweden based on eutrophication (displayed), acidification and metal loading, while in England identification is based on macroinvertebrates, point source emissions, diffuse emissions, water abstraction and regulation and morphological factors as well as from the sum of all analysed risk categories (displayed).

Figure 19: A comparison of WFD spatial data reported by southern Sweden (left) and south-western England (right). Source: (Hannerz and Langaas 2007)

Water information systems are not only used for data collection and reporting, but also support decision-making – for example, to help forecast and assess the effects of the RBMPs. Substantial improvements of the accuracy of data and predictive models (i.e., rainfall predictions) are necessary to improve decision support systems (DSS) as is the usability of the interface and presentation of information (see Usländer 2010 for a detailed discussion). The provision of real-time and dynamic information can also better fulfil the needs of decision makers. For instance, maps that detail important water information, e.g., flood hazard and risks, have been used in many areas for a long period of time, with more recent efforts aimed at increasing the accuracy, comparability, scope (in terms of parameters), and geographical scale of information across the EU, as well as the way information is transmitted (de Moel, van Alphen, and Aerts 2009) – e.g., the development of interactive and dynamic web and mobile applications that can output the relevant information on demand rather than static maps.

Furthermore, technological innovations have a strong influence on the lives of Europeans, particularly through the enhancement of social networks and connectivity, development of e-government and e-participation²⁹ platforms, as well as enhancement of educational programs and innovative learning formats (Hoorens et al. 2013). Increasing attention has been given to citizen observatories in environmental observation and conservation, which aim to involve the public in data and intelligence gathering. Data can be mined from social media (“big data”) without the active engagement of individuals or can be collected by the volunteered observations of citizens (photos, videos, etc.) (Wehn and Evers 2014). Moreover, advanced citizen observatories also include functionalities that aim to actively inform and engage two-way communication between citizens and decision makers (e.g., allowing for feedback, the expression of preferences), which can be applied during the preparation, response, prevention, and recovery phases of a water-related event (White, Kingston, and Barker 2010; Wehn and Evers 2014). Hence, ICT could be used to support the public participation components of the WFD and the FD, although there are substantial limitations to such tools that should be considered (White, Kingston, and Barker 2010; Wehn and Evers 2014).

²⁹ Economic disparities between Eastern and Western European countries have led to a “digital divide” in Europe, which may limit the benefits technology in some areas (Hoorens et al. 2013). Furthermore, a declining level of trust in political institutions (Eurobarometer 2013) as well as data mining by governments and the private sector may lead to a decline in use or personal censorship by individuals (Cave et al. 2009; United Nations 2012; United Nations 2014; van Oranje-Nassau et al. 2009; as cited in Hoorens et al. 2013), which could undermine the effectiveness of e-government and e-participation platforms.

3.1.6 Environmental Factors

Europe is already experiencing the effects of climate change in the form of extreme precipitation and temperature, which are projected to exacerbate. Furthermore, human activities such as agriculture, forestry, and fisheries heavily influence biodiversity – nearly half of the land area in Europe is used by agriculture (EEA 2010a, 47), with urban areas and infrastructure also occupying large areas.

Although annual precipitation has decreased for many European countries and regions (see Figure 20), heavy precipitation (in the form of multi-day and short-term precipitation) has become more severe and frequent (Hov et al. 2013; Zolina 2012; van den Besselaar, Klein Tank, and Buishand 2013; EEA 2014c). Multi-day and short-term intense precipitation events can lead to large-scale river floods and localised flash floods (EEA 2014c). In general, the wet period has increased in northern-eastern Europe, with increased winter rainfall (Figure 21). The opposite trend is observed for south-western Europe (Hov et al. 2013; Zolina 2012; van den Besselaar, Klein Tank, and Buishand 2013; EEA 2014c). More nuanced trends for short-term heavy precipitation are difficult to distinguish due to a lack of comparable, long-term Pan-European data; however, extreme daily winter precipitation was observed for many regions, particularly central and western Europe (Hov et al. 2013; EEA 2014c; EEA 2012a). Summer dryness has increased in central and southern Europe (Figure 21; EEA 2014; Sousa et al. 2011; Hov et al. 2013). Weather trends in some regions of Europe indicate more and longer heat waves and fewer extremely cold days, particularly in the eastern Mediterranean region (Hov et al. 2013).

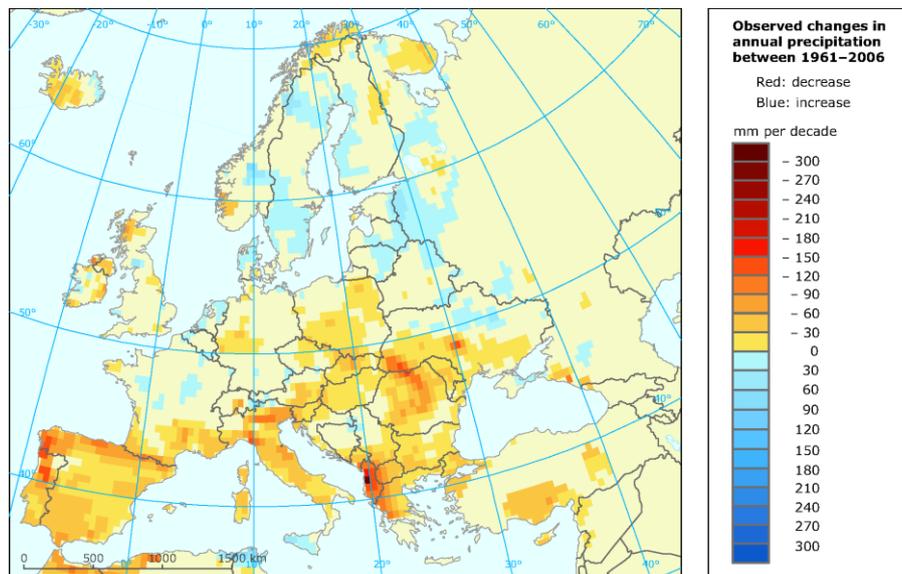
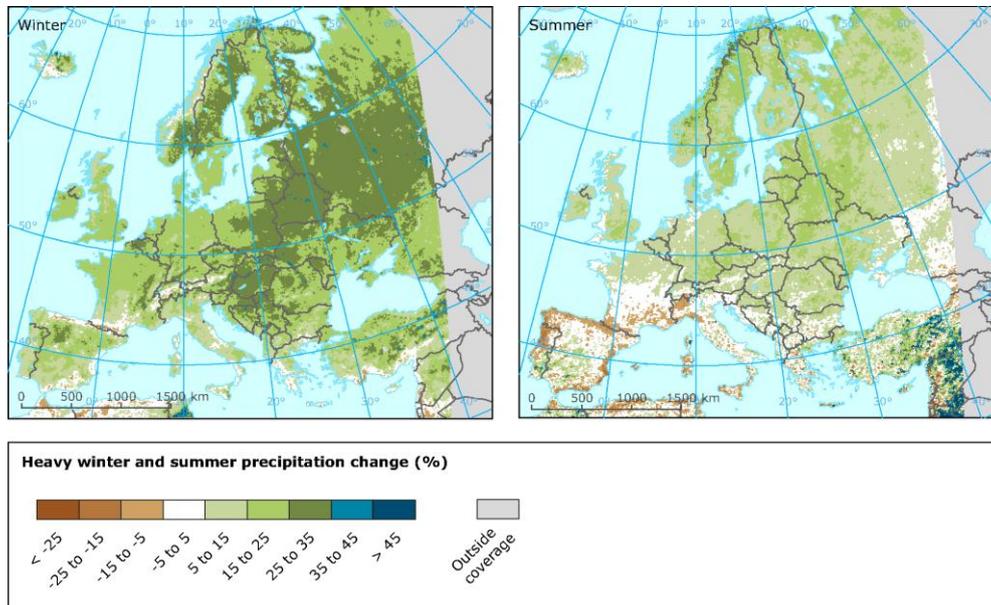


Figure 20: Observed changes in annual precipitation between 1961 and 2006. Source: (EEA 2012e)

Climate change projections indicate that the trends of extreme precipitation and longer dry spells will continue to intensify. Intense winter precipitation could increase by up to 35% and summer precipitation decrease in the Mediterranean region between 15-25% (EEA 2014c; Jacob et al. 2014; Rajczak, Pall, and Schär 2013; IPCC 2012). In southern Europe, dry spells could increase by up to 24 days in length and decrease between 1-2 days in northern Europe (Jacob et al. 2014; EEA 2014c). The frequency, intensity and duration of heat waves is also expected to increase (Hov et al. 2013), whereas cold spells and number of frost days is projected to decrease. Reduced precipitation, increased average temperatures and dry spells in southern Europe enhances the risk of water scarcity and drought as well as soil moisture deficits (Hov et al. 2013). On the other hand, flash and

urban floods and associated risks are also expected to increase with the number of extreme precipitation events.



Note: Projected changes in heavy precipitation (in %) in winter and summer from 1971-2000 to 2071-2100 for the RCP8.5 scenario based on the ensemble mean of different regional climate models (RCMs) nested in different general circulation models (GCMs).

Figure 21: Projected changes in heavy precipitation in winter (left) and summer (right). Source: (EEA 2014c)

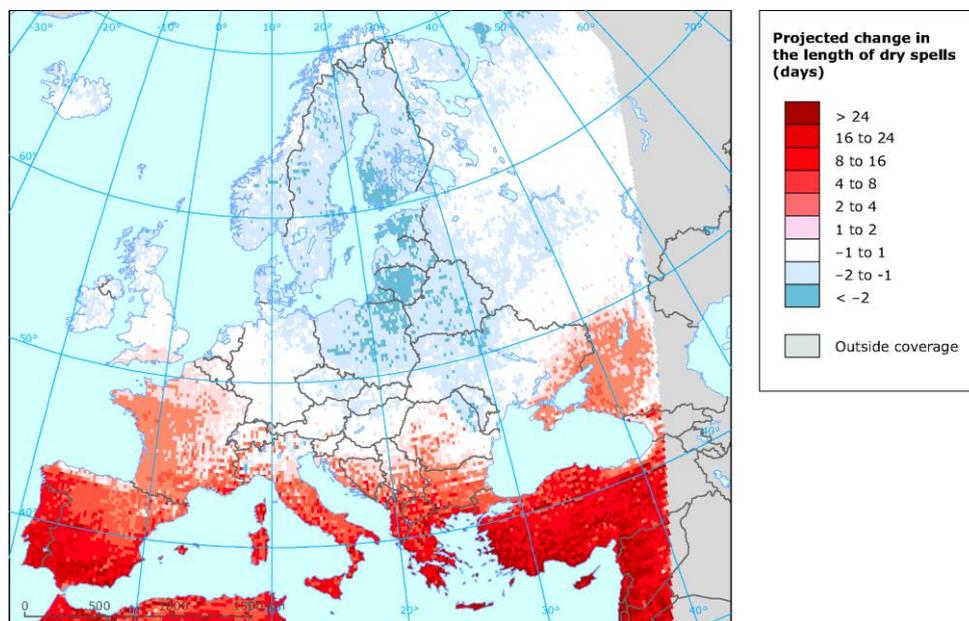


Figure 22: Projected change in the length of dry spells. Source: (EEA 2014c)

Although large areas in Europe are protected under the EU Habitats and Birds Directives as well as other programmes to save endangered species, degradation of ecosystems, and therefore loss of natural capital, is continuing (EEA 2010a). Whereas the trend in the EU regarding pressure on ecosystems (e.g., eutrophication) remains stable (neutral development), the loss of biodiversity is intensifying, especially for marine and terrestrial species and habitats (EEA 2010a, 18).

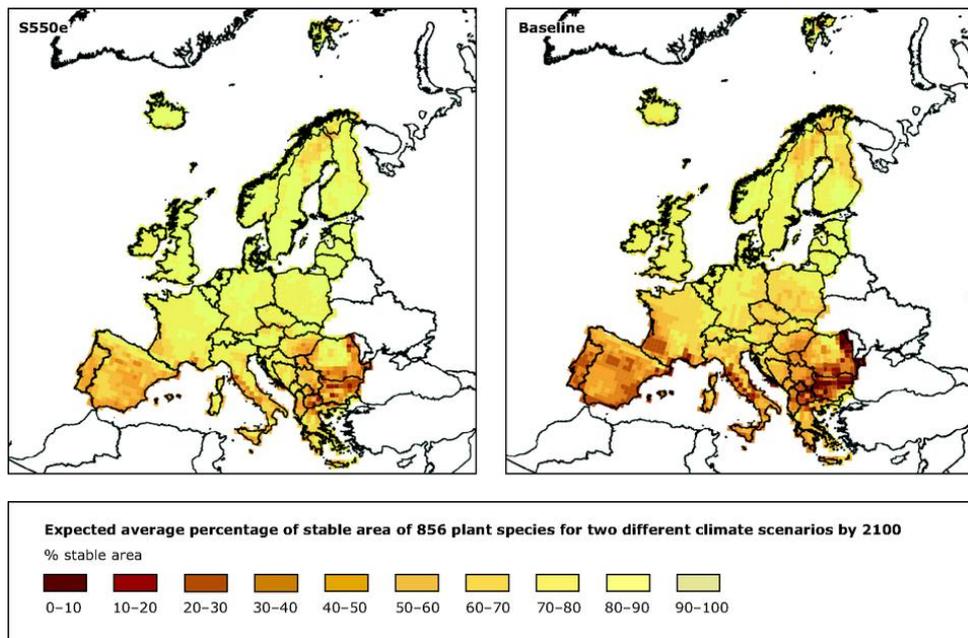


Figure 23: Expected average percentage of stable area of 856 plant species for two different climate scenarios. Source: (Alkemade, Bakkenes, and Eickhout 2011)

Figure 23 above shows the expected effects of global warming on biodiversity change. Northern Europe will face the most dramatic changes – in the year 2100, more than 35% of the species composition will be new for that region. On the contrary, around 25% of the existing species in southern Europe will disappear in 2100 due to climatic conditions (Alkemade, Bakkenes, and Eickhout 2011).



Part II – Tools for the collection and assessment of target market data

4 Market Segmentation

Segmentation is the first key step of the product-specific approach to be adopted in Part II of the MAF and it is the basis to study the needs and behaviour of potential end-users. In this exercise, one main target group and one group representing the key growth opportunity will be selected from a list of stakeholder groups. This is to be done by the product developers with guidance from WP5 partners. Depending on their interest and the resources they have available, product developers are encouraged to analyse other target groups independently.

4.1 Defining the segments

Aaker and McLoughlin (2010: p.26) define market segmentation in the context of strategic market management as “the identification of customer groups that respond differently from other groups to competitive offerings”. In other words, groups of actual and potential customers are aggregated based on similarities in their needs and other variables like geographic location, customer type and benefits sought. In general, the marketing literature seems to agree that there is no single way to segment a market (e.g., Kotler and Armstrong 2013). This is in part because the set of variables used may differ depending on the marketer’s choice and the market type (consumer market, business market, international market). Furthermore, the exercise can be undertaken from different viewpoints: segmenting by customer characteristics (e.g., age and interests) or looking at product characteristics (e.g., benefits provided and potential applications). In general, experts suggest the following as main variables for the different market types:

Table 5: Segmentation variables for different market types. Adapted from (Kotler and Armstrong 2013).

Consumer Market		Business Market		International Market	
Variable	Example	Variable	Example	Variable	Example
Geographic	<i>Nations; regions; states; cities</i>	Geographic	<i>(same as consumer market)</i>	Geographic location	<i>Regional cluster (e.g., EU, South East Asia)</i>
Demographic	<i>Age; life stage; gender; income; education level</i>	Demographic	<i>User type; Industry; company size</i>	Economic situation	<i>Level of economic development; per capita income levels</i>
Psychographic	<i>Lifestyle; personality</i>	Operating characteristics	<i>Technology applications; decentralised operation</i>	Political and legal factors	<i>Government type; political stability level</i>
Behavioural	<i>Usage rate; benefits sought; loyalty</i>	Procurement approaches	<i>Loyalty to suppliers; benefits sought</i>	Cultural factors	<i>Language; religion; values</i>

A non-exhaustive list of candidate customer groups based on user type and benefits sought has been prepared and is presented in Table 6 below. While the current list is limited to the main stakeholder



groups for the three sub-markets as identified in the literature, it can easily be expanded to account for new developments in the arena of water information products and services. Depending on the resources they have available, product developers are encouraged to include new groups to the list based on different combinations of the characteristics listed in Table 5 above.

Table 6: Primary stakeholders identified within the water information products and services market

Stakeholder Group	Description
Local authorities	Local administrations and authorities can play an important role within local and regional watersheds. Local authorities can act both as service providers and as regulators. Furthermore, local authorities have responsibility for the water quality and quantity security of their communities and their industrial base (GWP 2013).
National and regional authorities	Ministries and other government institutions (e.g., agencies) at the national level are responsible for socio-economic development as well as water management and use. For Member States, their responsibilities include the development of management plans and risk maps for reporting related to the FD, WFD and daughter directives.
Water managers	Water managers can be found in the area of water allocation, river basin planning, stakeholder participation, pollution control, monitoring, economic and financial management, and information management (GWP 2010).
Water suppliers	Water suppliers are the companies providing water in an agreed geographical region. There exist various forms of water provision. The most widely used governance structure in the European Union is public water provision. In the European Union there are few exceptions. France and the United Kingdom provide their water mostly by private sector or mixed management (Medalye 2008).
Insurance and re-insurance companies	Insurance companies offer insurance policies to the public to cover water-related damages (particularly floods, but also for droughts). An insurance company can specialise in a specific type of insurance or offer multiple types. Re-insurance provided by a company is used to provide higher coverage levels to costumers when the risk is too high to one insurance company alone.
Researchers (universities or extramural research institutions)	Researchers work in universities or extramural research institutes. In this context, this group develops ideas, e.g., on how to measure water flows, create more accurate models, develop alarm systems for floods, prevent droughts, etc.
Strategic planners (including spatial planners, urban planners, sustainable urban designer, environmental assessment)	Strategic planners work for small businesses, large corporations and NGOs and support them by planning long-term growth and development strategies. The outcome of their planning can influence the overall risk of a water-related event. Hence, strategic planners must have a good understanding of the water sector and potential risks to make recommendations.
Emergency planners	They perform advanced consultative services in planning, development of emergency and response plans, also in the case of water-related events. When an emergency occurs, emergency planners set the appropriate plan into operation and therefore have a direct impact on the realised risks.
General public (e.g., residing in at-risk areas, water	The general public refers to people living in at-risk areas, and are water



Stakeholder Group	Description
consumers)	consumers or water users.
Citizen organisations, environmental organisations	Citizens and/or environmental organisations raise awareness of the effects of certain life-styles and or land-uses and can further education in schools and universities. Environmental organisations provide information for the general public and for practitioners in different areas.
Recreational users (canoeing, fishing, etc.)	Recreational users engage in water activities for enjoyment, such as canoeing, fishing, swimming. These recreational users can be threatened by the quantity and quality of water.
Agriculture	The agricultural sector needs clean and affordable freshwater to meet irrigation demands. This sector is also highly affected by water quantity and quality risks and is an important driver of water abstraction and pollution (nitrate and phosphate leaching into groundwater and surface waters).
Energy sector	Energy is used to pump and distribute water and water is used to generate energy. Efficient water use can therefore save energy and energy efficiency can conserve water. Water quality can be affected by increasing energy production. Most of the used water in the energy sector is for cooling power plants.
Thermoelectric power producers (energy cooling)	Thermoelectric power plants account for 43% of annual freshwater use in Europe (Rubbelke and Vogele 2011). Most of the required water is used for cooling processes.
Biofuels	Biofuels are low-carbon energy sources. They are made by biomass conversion and can be used as fuel. However, they bring greater water consumption and food insecurity.
Hydropower	Hydropower produces electricity through the force of moving water. The three most commonly used hydropower typologies are the followings. Run-of-river hydropower channels the flowing water from a river through a canal to spin a turbine. The storage hydropower system uses a dam to store river in a reservoir. Water of the reservoir is released through a turbine which activates a generator, and the pumped-storage hydropower system let water cycling between an upper and lower reservoir by pumps (IHA 2014).
Tourism sector	Within the tourism sector there are different industries that provide consumption goods and services demanded by tourists (UNWTO 2014).
Consultants/Private companies	Environmental consultants or private companies conduct surveys and inform companies about options to reduce negative effects on nature, respectively (Olesen 2011).
Manufacturing industry	The manufacturing industry is often highly water intensive and frequently exerts pressures on water quality by various types of contamination (UNW-DPAC 2011).

4.2 Selecting target groups

In selecting a target group, there are three main issues to be considered according to Aaker and McLoughlin (2010). First, the capacity of the developer to create a product that is appealing to the individual target group. Second, reflecting whether this appeal could be sustained even after



competitors react to your market actions. And last, estimating whether the return (i.e., benefit) is higher than the investment (i.e., cost) required to provide an appealing, customised product. In constructing a simple scorecard to assess a group’s attractiveness, the authors have reformulated these issues into criteria and included two more based on the literature.

Based on the background information provided in this report as well as their own expertise and business objectives, product developers are asked to pick those stakeholder groups from Table 6 that they deem to be best candidates. The attractiveness of these shortlisted groups will then be evaluated using the Group Attractiveness Scorecard (Table 7) below. Here, the product developers evaluate the potential customer groups according to the predefined criteria and calculate a total attractiveness score. This exercise will feed into the study of target groups for each SWITCH-ON product in Chapter 5, where a more in-depth analysis will be conducted.

Table 7: Group Attractiveness Scorecard

Market Segment	Criteria	Rating*					Total Score
		1	2	3	4	5	
Segment 1	[C1] The customer group has a pressing need and is willing to act upon it.						
	[C2] Our offering can satisfy that need.						
	[C3] We can easily communicate/access the customer group.						
	[C4] There are no known competitors addressing this need.						
	[C5] The customer group is substantial and potentially profitable.						

**A rating of 1 denotes the statement is totally inaccurate, a rating of 5 denotes the statement is totally accurate.*

5 Market Analysis

This chapter presents and explains a set of exercises and tools that can be used to determine the attractiveness of the selected market segment, as well as understand its dynamics. To complete these exercises, two methods can be adopted:

- The exercises are completed by a multidisciplinary, cross-functional group, and discussions are held ad hoc, or
- The exercises are solved individually and results are subsequently discussed by a multidisciplinary, cross-functional group.

The assessment will yield best results when conducted by a team of specialists with different relations to the product, and due to the strategic elements to be considered, including one of the firm’s senior managers in the team would be highly recommended. For the most part, the outcomes of the following exercises will be hypothetical conclusions. Nevertheless, these will endow the evaluators with an increased capacity to recognise opportunities, detect threats, and foster competitive advantages.



5.1 Secondary research

While the PESTEL analysis conducted in Chapter 3 provides a good outline of the external environment and dynamics, the individual sub-market segments fall beyond its scope. As some of the following sections will involve the elaboration of assumptions and informed approximations about specific attributes of the target group selected in Chapter 4, it is necessary that product developers conduct secondary research to get acquainted with it and construct a target group profile. This is initiated by attempting to answer the following question: *What is the specific need of the target customer that our product or service will be satisfying?* Once the answer to this question has been reached, a careful reflection on the attributes that may influence the buying decisions of the target group must follow. Table 8 below exhibits a non-exhaustive list of these attributes for the business and consumer markets.

Table 8: Some attributes to consider in the construction of a target group profile. Source: Adapted from (Kotler and Armstrong 2013).

Business markets	Consumer markets
Company size	Age/life-stage
Ownership model	Culture/sub-culture
Organisational structure	Gender
Objectives	Education
Strategies	Income/Job position
Stage of development	Personality
Systems and technologies	Motives
Procedures and policies	Preferences

The background data required for this preliminary task can be gathered through desk research and typically collected from published sources, most of which are available online. These sources include official statistics repositories; market studies; trade magazines; business press; and periodic reports from governments, companies, industry associations and trade associations; among others.

The depth of the secondary research will depend on the resources devoted to it by the product developers. An exceptionally high level of detail is not mandatory, but having a good general overview is recommended.

A note on primary research

While primary research plays a key role in market analysis, the topic is addressed here as a supplementary note. The reason is that the MAF has been designed to focus on assessments that can be conducted by an SME or a small product development team in a simple manner and without the need of resource intensive processes like surveys and focus groups. This, however, should not be understood as downplay of primary research and its relevance within SWITCH-ON. On the contrary, primary research tools are being actively used for market analysis purposes within the project, and they are expected to produce a host of valuable information that will complement, enhance and validate the results of the MAF. Thus, while the value of direct exchange with the relevant customer groups through the use of systematic methods is acknowledged, the context in which the MAF is intended to operate does not require a detailed treatment of these. In considering those users of the



MAF who would like to complement the exercises presented in this chapter with primary research tools, the authors have included sample questionnaires and a focus group protocol used for one of the SWITCH-ON products in the Annex.

5.2 Estimating the potential size of the target market

Having selected a target group in Chapter 4 and conducted secondary research in the last section, the next task is to estimate the potential business that can be generated from addressing its needs. To elaborate this approximation, four steps need to be completed:

- Estimating the number of customers in the target group (C)
 - Depending on the nature of your target group, the necessary information upon which to base your estimate may be found in national/regional statistics databases (e.g., population levels in a certain area), industry association reports (e.g., number of customers of products/services analogous or complementary to yours), or other official documents (e.g., organization charts of administrative bodies in different countries)
- Assuming a market penetration rate (R)
 - Penetration rate is a percentage that can be assumed on the basis of the circumstances that drive your target group's need (e.g., changes in EU regulation), the priority assigned by your target group to this need (i.e., their willingness to act upon it), and the additional requirements that your target group would have to cover to benefit from your product (e.g., training, equipment).
- Calculating the potential market size (S_p)
 - This is simply the product of the number of customers (C) and the penetration rate (R), as shown in the formula:

$$S_p = C \times R$$

- Calculating the potential monetary value of the market ($S_{p€}$)
 - This is the product of the potential market size (S) and the expected sales value, i.e. the price of your product (P), as shown in the formula:

$$S_{p€} = S_p \times P$$

Given that the outcome of the market size estimation procedure as described above is highly dependent on the assumptions made in the first two steps, it is strongly recommended to establish a range by developing estimations for best- and worst-case scenarios. It should also be highlighted that the main purpose of this exercise is to gain a better understanding of the factors that could influence the potential size and value of the target market, and apply that knowledge in the development of a market entry strategy.

Finally, the method described above is suited for the analysis of new markets, hence the use of the term *potential market size*. When analysing established markets wherein the market share and



turnover of a competitor during a certain period are known (e.g., from the company’s annual reports), the actual monetary value of the market ($S_{a€}$) can be calculated as the quotient of the turnover (T) and the market share (MS), as shown in the formula:

$$S_{a€} = T / MS$$

5.3 Analysing trends and responding to opportunities and threats

Once the potential size of the target market has been estimated, it is important to get clear, actionable insights about its dynamics. Having a structured way to recognise opportunities and detect threats from the external environment is helpful. Furthermore, matching these with the strengths and weaknesses of the products and the firms behind them can become a key to growth, or, in the worst case, to subsistence. The strategic analysis tool proposed for the purposes described above is the Advanced SWOT (Strengths, Weaknesses, Opportunities, and Threats) Analysis.

When analysed from the vantage point of the individual products, the findings shown in the *Summary of the PESTEL Analysis* from Chapter 3 (*Market Intelligence*) can provide a backdrop for the identification of opportunities and threats. The idea in this section is to expand on the identified potential drivers (e.g., changes in the regulatory framework, demographics, lifestyle, technology) from the product’s perspective. On the other hand, a well-structured group brainstorming exercise should result in a thorough list of strengths and weaknesses.

Typically, the principal objective of any business activity is to generate economic return. To do this, the firm’s offering (i.e., its product or service) must create value; in other words, it must successfully satisfy the target customer’s need or want. The SWOT analysis is used to structure a brainstorming exercise that identifies and sorts those issues that could potentially either facilitate or hinder the achievement of a business activity’s goal (CIMA 2007). The advanced version of the tool includes a final step to rank these issues according to their relevance.

In the context of the MAF, the first step in this section is to clearly define the product’s goal. To start the SWOT Analysis, answer the following question using one sentence of no more than 30 words:

- In what way will your product or service create value for the customer (i.e., what is the goal of your offering)?

Goal of the product or service:	
--	--

Once the objective has been reflected upon and concisely formulated, the next step is to identify the factors that could obstruct or facilitate its achievement. Figure 24 shows a SWOT matrix which includes a list of sample questions to help identify entries for each of the quadrants. A SWOT Analysis template that can be used to record the results of the brainstorming exercise is included in the Annex.

When filling in the template, all entries must refer to actions (e.g., *the product offers no capability for processing and analysis*), and they must be specific, clearly formulated and based on facts rather than opinions.



STRENGTHS	WEAKNESSES
<ul style="list-style-type: none">▶ What does your organisation do better than others?▶ What are your unique selling points?▶ What is your organisation's competitive edge?▶ What do competitors and customers in your market perceive as your strengths?	<ul style="list-style-type: none">▶ What political, economic, social, technological, environmental, or legal changes are happening that could be favourable to you?▶ Where are there currently gaps in the market or unfulfilled demand?▶ What new innovation could your organisation bring to the market?
OPPORTUNITIES	THREATS
<ul style="list-style-type: none">▶ What do other organisations do better than you?▶ What elements of your business add little or no value?▶ What do competitors and customers in your market perceive as your weakness?	<ul style="list-style-type: none">▶ What political, economic, social, technological, environmental, or legal changes are happening that could be unfavourable?▶ What restraints do you face?▶ What is your competition doing that could negatively impact you?

Figure 24: SWOT Analysis matrix and sample questions. Source: Adapted from (CIMA 2007).

Once the evaluators are satisfied with the lists of entries for each quadrant, the next step is to prioritise them. The steps to do this are:

- Evaluate each entry using two criteria: *probability of impacting the achievement of the goal* and *level of impact on the achievement of the goal*
 - Probability of impact: each entry in the two top quadrants (strengths and weaknesses) is given a probability rating between 1 and 100 (where 1 = low probability and 100 = high probability) and the sum of all the given ratings for both quadrants must equal 100. The same is done for the entries in the two lower quadrants.
 - Level of impact: a value between 1 and 3 is assigned to each item to indicate whether it can result in a major (3), moderate (2), or minor (1) impact to the achievement of the goal
- Calculate the priority score by multiplying the criteria values for each of the entries (see Figure 25 below)



STRENGTHS	Impact Probability	Impact Level	Priority Score
▶ What does your organisation do better than others?	30	3	90
▶ What are your unique selling points?	10	1	10
▶ What is your organisation's competitive edge?	25	3	75
▶ What do competitors and customers in your market perceive as your strengths?	10	2	20

Figure 25: Excerpt of the Advanced SWOT Analysis template.

Once the prioritisation has been elaborated, the exercise should be concluded by selecting a manageable number of the high priority entries and agreeing on an action plan to address the high priority weaknesses and threats; pursue the opportunities; and foster and exploit the strengths.

5.4 Calculating the market growth rate

Calculating market growth entails collecting or estimating information about the size of the market at two or more points in time. Historical data can be used to calculate actual growth rates and estimate forecasts based on trend projections. An informed projection requires that the driving forces behind the market be identified. For instance, an increase in the size of the market segment “regional authorities with a need for digital water quality data management systems” could be supported by observations of stricter reporting requirements and a foreseen increase in the availability of remote-sensing techniques.

It is also important to reflect on whether the market is in its growth, maturity, or decline stage. Keeping this in mind when studying the market data will facilitate the identification of possible points of inflexion that, in turn, can hint the surfacing of threats or opportunities (Aaker and McLoughlin 2010).

The market growth rate can be calculated in three steps:

- Calculate the market size in the reference year (S_{y0})
- Calculate the market size in the year of interest (S_{y1})
- Calculate the market growth rate (%G) using the following formula:

$$\%G = (S_{y1} - S_{y0}) / S_{y0}$$

The result of these calculations can be used to elaborate time series, make observations, and identify trends. The figures can also be used to conduct a comparative analysis against other market segments of interest, other industries, or growth rates of aggregated indicators like GDP.



5.5 Competition and profitability

Competitor Identification Framework

As in the market definition and market segmentation chapters, the first step in competitor analysis is to define boundaries. In this case, define boundaries refers to identifying current and potential competitors. Out of the different approaches found in the literature, the authors propose to follow the Competitor Identification Framework by Peteraf and Bergen shown in Figure 26 below.

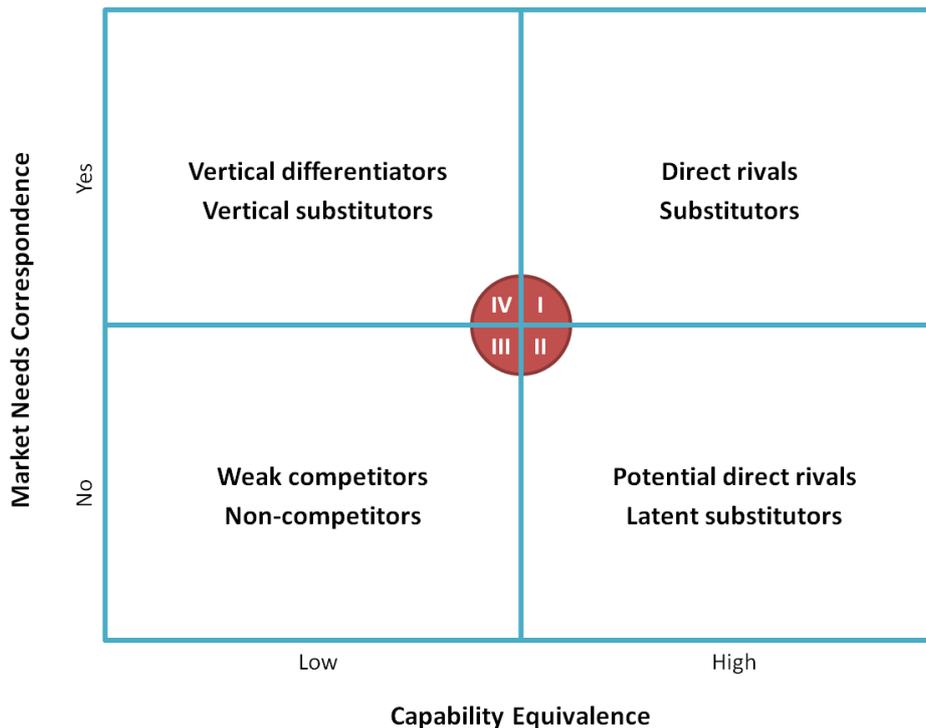


Figure 26: Competitor Identification Framework. Source: (Peteraf and Bergen 2003).

In this framework, the term *Market Needs Correspondence* is an indicator of whether or not the observed product or service addresses the same set of customer needs as the offering of the observing firm. This is plotted against the concept of *Capability Equivalence*, which can be explained as a measure of how well the observed product or service actually satisfies the set of needs addressed (Peteraf and Bergen 2003). Under this setup, competitor offerings are not only identified, but also classified into four different categories based on their competitiveness.

Competitive Strength Heatmap

Once the relevant competitors and their products or services have been identified and classified, a comparative examination of their assets, competencies, and features can be undertaken. A helpful tool to structure this exercise is the Competitive Strength Grid by Aaker and McLoughlin, which has been adapted into a heatmap for the MAF (see Figure 27 below). To use this tool, three steps need to be completed:



- Decide in the group which assets and competencies (if the competitor firm will be examined) or features (if the product or service will be examined) should be evaluated³⁰
- Separate the assets and competencies into two categories, those which are a “key for success” and those which are of “secondary importance”
- Conduct a qualitative evaluation of each of the identified competitors using a 3 point scale (1=below average, 2=average, 3=above average)

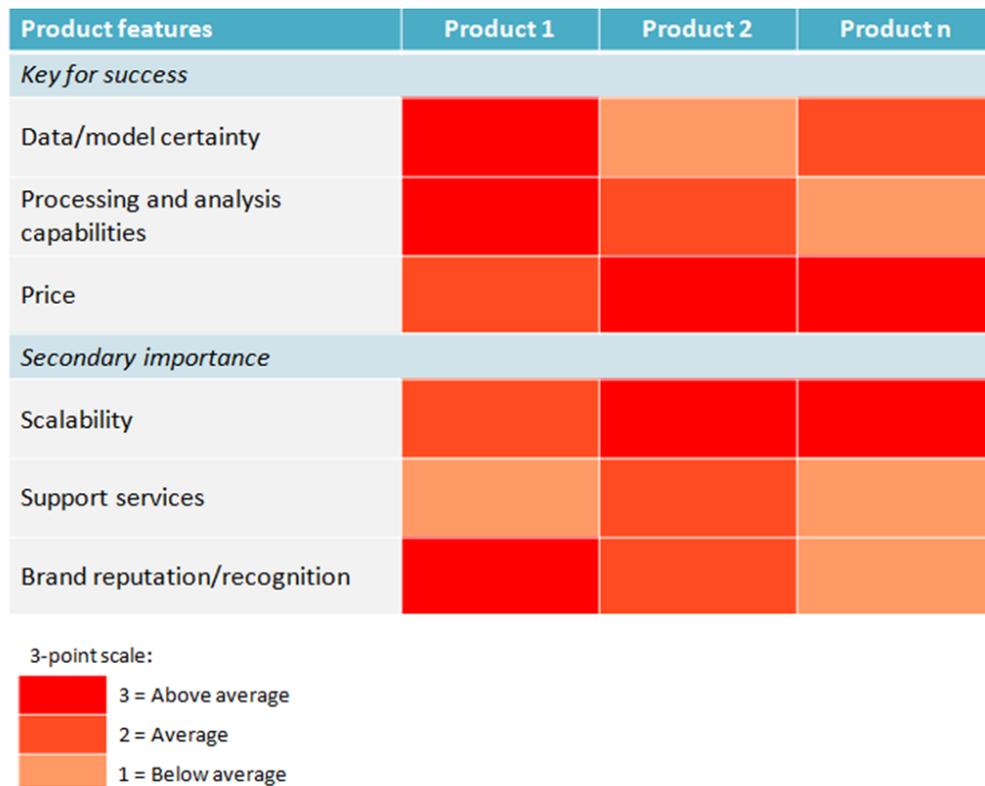


Figure 27: Competitive Strength Heatmap. Source: Adapted from (Aaker and McLoughlin 2010).

Porter’s Five Forces

After evaluating the competitiveness of the most relevant products and services in the segment, the next step is to widen the scope of the analysis to include other actors involved the business situation (e.g., buyers and suppliers). The goal is to draw a blueprint of the state of competition that shows the balance of power in a specific business situation. A widely used tool for this is the Porter’s Five Forces model.

According to Michael Porter “the state of competition in an industry depends on five basic competitive forces”. These are: rivalry among existing firms; threat of substitute products or services; bargaining power of buyers; bargaining power of suppliers; and threat of new entrants (Porter 1980). Figure 28 below shows a graphic model of the five forces and sample drivers for each. The exercise consists in assessing the drivers listed in the figure and think of other relevant ones in order to shed

³⁰ The term *assets* refers to a firm’s resources such as facilities, equipment, the customer base, or a brand name; *competencies* refers to a firm’s exceptional capabilities such as scientific excellence, consumer understanding, or innovation; *features* refers to the specific characteristics of a product or service (Aaker and McLoughlin 2010).



light on the balance of power and potential changes that could result in the attainment or loss of competitive advantages. The template in the Annex can be used by product developers to sketch out the positions of their (existing and potential) competitors, suppliers, and buyers according to their relative power. As was mentioned early in this chapter, it is important to highlight that these exercises should be conducted by a multidisciplinary, cross-functional team, which is well acquainted with the product and its environment, in order to enhance their results.



Figure 28: Porter's Five Forces model. Source: Adapted from (Porter 1980).

Cost-Volume-Profit Analysis

Until this point, section 5.5 has provided visibility on the competitiveness level in the target market and the capacity of other actors to influence the business and profit potential within this segment. This section closes with a means of estimating the profitability of a product through a cost-volume-profit (CVP) analysis. The tool requires the observer to input the target income from the commercialisation of a product or service, as well as the costs incurred in all (or the most relevant) stages of its value chain. The flexibility of the CVP analysis allows the observer to assess the impact of different pricing schemes and sales volume projections on achieving the designated target income. For the MAF, the CVP analysis is done using a MS Excel spreadsheet (see Figure 29), which can be found in the Annex. The required inputs to use the tool are:



- A breakdown of all the costs (fixed and variable) related to the product or service along the value chain (development costs, sales and marketing costs, etc.)
- The unit price (subscription fee, download, etc.)
- The projected unit sales (number of units expected to be sold)
- The target income in net figures (the revenue goal set for the product or service)

On the basis of the designated target income figure, the spreadsheet calculates the contribution margin per unit sold, the break-even point (in units and monetary values), and the gap to reach break-even (in units and monetary values).

SWITCH-ON FP7
Cost-Volume-Profit Analysis - Template for Product Developers

Cost Categories	Fixed	Variable
<i>Product Development Expenses</i>		
Direct labor	5.000,00 €	5,00 €
Equipment (Computers, etc.)	5.000,00 €	5,00 €
Software and Development Tools	3.000,00 €	3,00 €
Other Development Expenses	1.000,00 €	1,00 €
<i>Sales and Marketing Expenses</i>		
Sales Salaries & Commissions	5.000,00 €	5,00 €
Advertising	500,00 €	5,00 €
Web Site Development and Maintenance	100,00 €	1,00 €
Other Sales and Marketing Expenses	100,00 €	
<i>General Expenses</i>		
Overheads (office space rental, supplies, etc.)	20.000,00 €	20,00 €
Other General Expenses	5.000,00 €	
	44.700,00 €	45,00 €

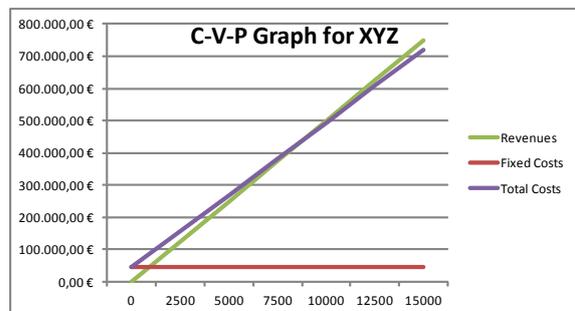
Price per unit (subscription fee, app download, etc.)	50,00 €
Projected sales (units)	10000
Projected Net Income	500.000,00 €
Target Net Income	1.000.000,00 €

Contribution margin per unit	5,00 €
Contribution margin ratio	0,10

Break-even point (units)	8940
Units to achieve Target Net Income	208.940

Break-even point (euros)	447.000,00 €
Euros to achieve Target Net Income	10.447.000,00 €

Switch-On Product: XYZ



Units sold	Revenues	Variable Costs	Fixed Costs	Total Costs
0	0,00 €	0,00 €	44.700,00 €	44.700,00 €
2500	125.000,00 €	112.500,00 €	44.700,00 €	157.200,00 €
5000	250.000,00 €	225.000,00 €	44.700,00 €	269.700,00 €
7500	375.000,00 €	337.500,00 €	44.700,00 €	382.200,00 €
10000	500.000,00 €	450.000,00 €	44.700,00 €	494.700,00 €
12500	625.000,00 €	562.500,00 €	44.700,00 €	607.200,00 €
15000	750.000,00 €	675.000,00 €	44.700,00 €	719.700,00 €

Figure 29: Cost-Volume-Profit Analysis spreadsheet.

5.6 Marketing communication

To provide guidelines for communicating with the customer –i.e., raising the target group’s awareness of the product or service, generating interest, and promoting action– this section follows an adaptation of the step-wise approach proposed by (Kotler 2002: p.271). The steps for developing effective marketing communications are as follows:

- Identifying the target audience
 - In this case, the target group selected in Chapter 4
- Determining the goal of the communication
 - In the case of marketing communication for innovations, the goal can be to: a) raise awareness about the offering; b) promote a deeper understanding of the offering; c) generate interest in the offering; d) persuade a favourable attitude towards the



offering; e) engage the audience into testing the offering; f) convince the audience to adopt the offering

- Formulating the message
 - It is necessary to reflect and design the content, structure, format, and source of the message (i.e., what to say, how to say it, and who should say it)
- Selecting the communication channel(s) to be used
 - This will depend mainly on the goal of the communication. For instance, mass media is better suited for raising awareness and fostering understanding, whereas interpersonal channels are more efficient in persuading attitudes and engaging people into action (Rogers 2003)
- Deciding on the budget to be allocated to marketing communications
 - The budget can be: defined as a percentage of sales (current or forecasted) or price; based on what the firm can expend according to the management; based on what competitors are spending; based on actual calculation of the costs of activities necessary to achieve the communication goals
- Developing and managing the Marketing Communications Mix
 - It must be decided what promotional tools (advertising, sales promotion, public relations and publicity, personal selling, and direct marketing) will be used and what proportion of the marketing communication budget will go to each
- Measuring results
 - The product developer should keep track of whether the communication efforts have achieved their goals (e.g., by measuring conversion rates, fulfilment of customer expectations, awareness levels)

Given that most of the SWITCH-ON products and services will be web-based or are expected to use primarily online channels to communicate with customers, a set of guidelines for Search Engine Optimisation (SEO) has been included in the Annex.

5.7 Assessment of risks

Ansoff Matrix

The Ansoff Matrix, also known as the Product/Market Expansion Grid, is an indicative tool used in marketing and business strategy to outline the potential risks related to business growth. The matrix portrays strategic decisions that can be combined in various ways to elaborate business growth strategies. Each resulting growth strategy has a related risk level (see Figure 30). The assumption behind the matrix is that each time managers decide to move into a new quadrant (either horizontally or vertically) risk is confronted.



Figure 30: Ansoff Matrix. Source: Adapted from (Ansoff 1965) and (Ward and Rivani 2005).

The matrix provides an indication of risk based on three levels (low, moderate, and high). Choosing to offer the existing product or service to the currently addressed market involves the lowest risk level (however, this also limits the growth possibilities of the business). Expanding by offering the existing product or service to a new market involves a moderate risk (e.g., the new market may have needs and wants that the existing offering does not cover), and the same accounts for offering a new product or service to the currently addressed market (e.g., the new offering may not be attractive to the currently addressed market). By moving with a new offering to a new market, risks are increased to the highest level (MindTools 2014).

Risk Matrix

The risk matrix developed by (Day 2007) helps businesses estimate the probability of success or failure of an innovative product with which they intend to enter a market. The assessment is based on the firm’s familiarity with the intended market and the type of product being developed, and so it requires a deep understanding of the business (participation of a senior manager in this exercise would also be highly valuable).

To use the terms employed earlier in this chapter, the word “familiarity” in the context of the risk matrix refers to the validity, or usefulness, of the firm’s assets and competences in pursuing the new venture. The risk matrix works under the assumption that the more the intended market and product/service divert from the common areas of expertise of the firm, the less the latter will be able to apply its assets and competences to succeed.

The steps for conducting an assessment using the risk matrix are:

- Carefully read the statements listed in Table 9 and Table 10 and provide a response using the sliding scale
- Add the individual responses to calculate the total



- Plot the results onto the risk matrix (Figure 31: Risk matrix. Source: (Day 2007).)

Table 9: Assessment of the intended market. Source: (Day 2007).

	Intended Market					
	...be the same as in our present market	...partially overlap with our present market		...be entirely different from our present market or are unknown		
Customer's behaviour and decision-making processes will...	1	2	3	4	5	
Our distribution and sales activities will...	1	2	3	4	5	
The competitive set (incumbents or potential entrants) will...	1	2	3	4	5	
	...highly relevant		...somewhat relevant	...not at all relevant		
Our brand promise is...	1	2	3	4	5	
Our current customer relationships are...	1	2	3	4	5	
Our knowledge of competitors' behaviour and intentions is...	1	2	3	4	5	
Total (x-axis coordinate)						

Table 10: Assessment of the product or service. Source: (Day 2007).

	Product or Service					
	...is fully applicable	...will require significant adaptation		...is not applicable		
Our current development capability...	1	2	3	4	5	
Our technology competency...	1	2	3	4	5	
Our intellectual property protection...	1	2	3	4	5	
	...are identical to those of our current offerings	...overlap somewhat with those of our current offerings		...completely differ from those of our current offerings		
The required knowledge and science bases...	1	2	3	4	5	
The necessary product/service functions...	1	2	3	4	5	
The expected quality standards...	1	2	3	4	5	
Total (y-axis coordinate)						

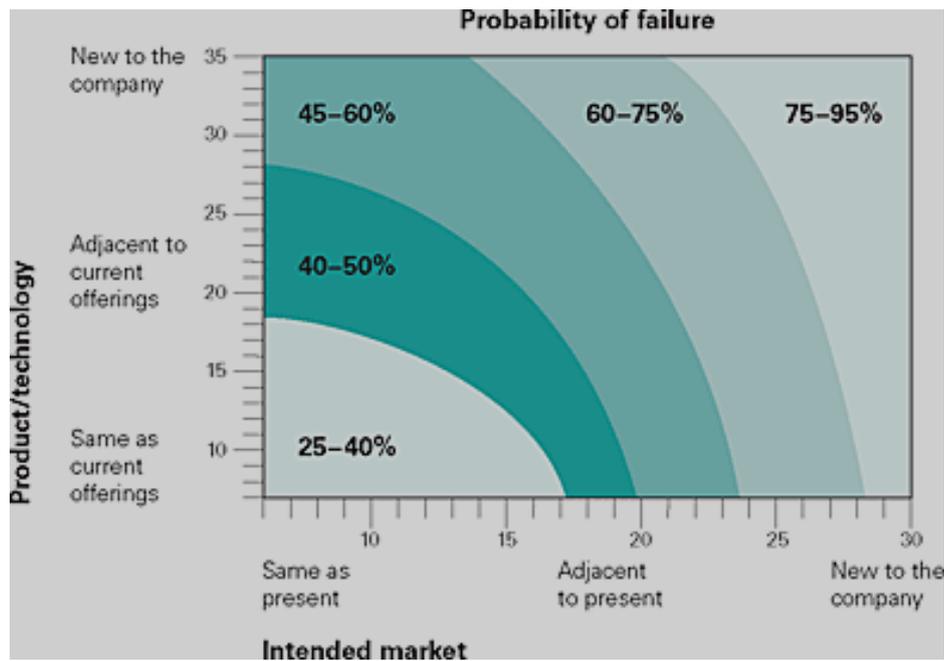


Figure 31: Risk matrix. Source: (Day 2007).

Figure 31 above shows a series of ranges depicting probability of failure as percentage levels. These estimated ranges have been validated by Day (2007) on the basis of interviews with consultants and senior managers involved in innovation initiatives. As can be seen, the ventures falling in the upper right area of the matrix will generally be considered high-risk, whereas those falling in the bottom left area should be less prone to failure.

While the results stemming from the Ansoff and Risk matrices may seem rather limited when treated in isolation, reflecting upon them in the light of the insights gathered earlier in the MAF can increase their transcendence and applicability. The importance of the exercises lies in the conscious reflection on issues and conditions that can greatly impact the success or failure of a business venture and that could be controlled or influenced before taking final decisions.



6 Lessons Learned

The results of the macro-environmental analysis provided by the PESTEL framework show there is a strong market opportunity for the SWITCH-ON information products and services in Europe. Analysis of the product factsheets, D4.1, D4.2, and direct consultation with the developers indicated that the developers wanted more support implementing standard marketing tools to understand and capitalize on the market. Therefore, instead of comparing the products against each other, we decided to include a “marketing toolkit” for the developers to complete during T5.2 with the support of our team.

During the development of this marketing analysis framework, we tested an earlier version for one of the most developed products (WET) and discovered that the provision of such toolkit was very interesting and useful for developers. Feedback also indicated that a concise document with additional marketing tools would be useful and we revised the later version of the document accordingly. Although the second part of the MAF is less SWITCH-ON oriented, the plan is to upload a “completed MAF” for one of the products so the WP4 partners can use that as an example for their product-specific analysis to be conducted in T5.2. Lessons learned from the completion of the MAF for the first product will be extended to the other products – if necessary, additional tools may be included and existing tools may be modified.

Furthermore, although it was originally anticipated to identify cost-efficient marketing channels for customer segments (such as water managers, policy makers, etc.), it proved to be too early to do so and we therefore decided to concentrate on creating a general structure for the evaluation framework. As products develop, it will be much easier to identify target groups and marketing channels. We already began this process for the four products featured during the end-user workshop held in Berlin in October 2014 and the results of the more end-user oriented activities of T5.2 will be described in D5.2.

In addition, T5.1 also included work on selection criteria for successful water-information products and services. Legal, technical criteria are covered, but perception-based criteria, organizational criteria and criteria for quality assurance/control of underlying data and viability are difficult to assess before we have more mature products and contact with end-users. The plan is to include the complete set of criteria as part of the MAF available on the portal.



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