

**EnviTori market place
VISION AND SCOPE DOCUMENT
Deliverable D1.1**

Project name: EnviTori – Environmental Monitoring and Information Market Place
Project's short name: EnviTori

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1 Business Requirements

1.1 Background

There is a globally growing interest to monitor the environment. The effect of human activities on the environment is a concern, and the causes and consequences of global warming are under investigation. Technological advances enable new ways to measure, analyze, and distribute information about our environment. Environmental monitoring is estimated to be one of the most rapidly growing fields within environmental technology. The main motivation comes from new regulations, such as the Kyoto protocol, the Bali roadmap, etc.

It has been suggested that environment monitoring operations could be made more effective by coordination and that a common market place for sharing monitoring data could help the coordination and give birth to new business (Vanhanen, 2006, Hirvi, 2007). The market place enables data collecting, data refinement, data distribution and use of data. Nowadays, different organizations produce environmental monitoring data mainly for their own purposes. In the future, the data and information could be shared more easily to improve monitoring activities, and to create new business in environmental monitoring.

The EnviTori project strives for a common way of sharing environmental data, i.e. environmental data and processing services that can be used as the basis for a common environmental data market place, hereinafter referred to as EnviTori market place, or market place.

The market place is not a single central system where all the relevant data are collected - instead, the data are distributed to systems managed by different organizations. The market place is not just a technical solution. It defines 1) what data are shared and what are not, 2) rules and regulations of using the data, 3) business rules of using the data, and 4) technology, i.e. interfaces, interaction methods, and software to access and process the data, and share them between different parties.

1.2 Business Opportunity

There is on-going work of applying SOA (Service-Oriented Architecture) to geo informatics. SOA means an application architecture within which all functions are defined as independent services with well-defined invocable interfaces which can be called in defined sequences to form business processes. SOA approach is adopted into different modern initiatives, frameworks/platforms and standards that share geographical and environmental data, like INSPIRE Directive, Orchestra, S@ny, SSE (Service Support Environment), OGC (Open GIS Consortium) and SWE (Sensor Web Enablement).

Currently, there are a lot of environmental monitoring activities producing data. And some of these activities overlap. There is no mechanism to discover different data sources and access them easily. EnviTori tries to cope with this problem.

The market place provides means for consumers and companies to communicate with the public data providers more easily. It enables new ways to discover what kinds of data are available, what kinds of services are available, and what kinds of data needs there are. It is foreseen, that by sharing information new innovations and business emerges based on already existing data services. Nowadays, there is no good enough system to share information, and this slows down the development of new business within environmental monitoring. Via the market place and new services built on it, also consumers are connected

to the monitoring business. In addition to just get information about the environment consumers can also act as “sensors” by uploading their observations using mobile devices. And further on, user communities can process the data and create information by using social media tools and techniques.

1.3 Business Objectives and Success Criteria

The main measurable objectives of EnviTori are to

- design and develop environmental service architecture that can be piloted by a variety of applications and which can be expanded to real business usage
- design and develop business driven application cases that both contributes and utilises the environmental data services.
- agree about the data policy within the context of the application cases
- develop a business driven organisation model for the service architecture in the future

Success criteria:

- successful case selection and implementation in order to develop vital service innovation mechanisms and ecosystems
- crossindustry – aspects driven from cases
- proven user and business interest

1.4 Market Needs

The customers and markets can be divided in three segments, each group having distinct characteristics. The consumer/citizen segment is largely protected by consumer and privacy laws. Typically the amounts of data and the monetary transactions are quite small. The solutions offered for consumers need to be scalable and their usability must very high. The public sector segment consists of organizations whose operations are governed by public interest, such as government and municipal institutions, research centers and the political actors. The main drivers for public sector are compliance with regulations and accessibility. The business segment consists of enterprises and companies. For businesses, the main drivers are profitability and security.

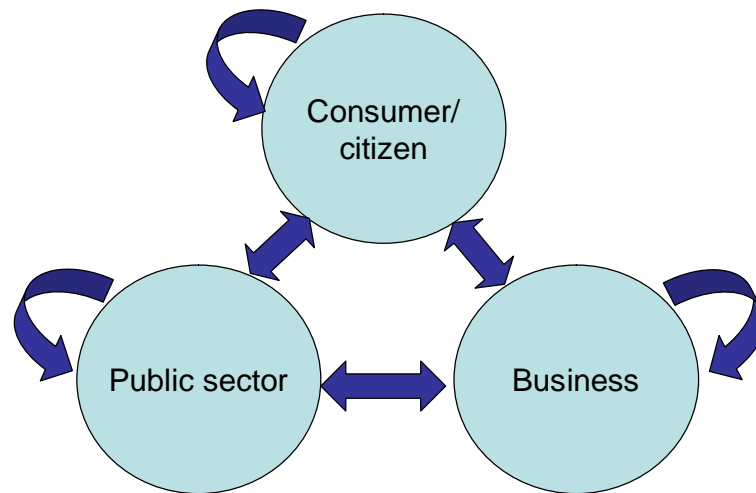


Figure 1. Market segments and their interactions

1.4.1 Consumers and citizens

We are all consumers and citizens; hence this market segment is very heterogeneous. The sub-segment may be an individual household or groups of them, “ordinary” people, different age groups, hobbyists, sensitive groups/sick people, urban/rural people, people using different means of transportation. There are some consumer/citizen needs pertaining to environmental data that EnviTori may help to address. In following tables there are some ideas what kind of data and services consumers can produce and consume.

Table 1. Consumer-originated environmental data

Type of data	Ideas, examples
Consumer profile	- Age, health, etc. - Type of living, home furnishing, form of heating, fire alarms
Physical condition	- Symptoms, measurements
Social network	- Family, friends, colleagues, travelling companions
Offerings	- Infrastructure (lending, sales, recycling) / services / know-how / social situations - Data produced by homes (inside / outside)
Needs	- Infrastructure (lending, sales, recycling) / services / know-how / social situations
LBS	- Current location - Route plan - Means of transportation
Activity	- Work / leisure (home, recreation) / sleep - Plans: Calendar information
Feedback	- Notices / evaluations (also of business services) - Photos

Type of data	Ideas, examples
	- Sensors (mobile / home-based)

Table 2. Environmental data needs of consumers

Consumer group	Examples of data needs
“Ordinary” people	<ul style="list-style-type: none"> - Weather at current / future location - Slippery walkways - Noise - Recreational opportunities - Transportation opportunities - Danger / exceptional situations / safety
Homes	<ul style="list-style-type: none"> - Air quality
Sensitive groups / sick people	<ul style="list-style-type: none"> - Air quality - Pollination
Means of transport	<ul style="list-style-type: none"> - Cars: <ul style="list-style-type: none"> - Road conditions - Traffic

1.4.2 Business segment

The enterprises and companies are a more homogenous group. Most of the companies have needs for data that enhances production or profits, they may have legal obligations for monitoring, they want to perform environmental reporting for regulatory or marketing reasons, they need to manage environmental risks and be prepared for accidents and exceptional situations. In the following tables there are some ideas of what kind of environmental data a company can produce and what it may need from others.

Table 3. Data producible by companies

Selling / offering of environmental data
Process monitoring
Monitoring energy and water consumption
Waste and recycling data
Emissions
Product life cycle estimations
Ecological footprints (carbon, water)

Table 4. Types of data usable for companies

Type of data	Interests
Weather data	- Power companies - Traffic, logistics
Water / snow levels	- Power companies - Construction, buildings - Travel
Soil, geographical data	- Construction - Geothermal production
Registers (public and commercial)	- Vehicle register - Land register - Person registers - Company register - Health registers
Life cycle estimations for raw materials	- Footprints (carbon, water) - Recycling and waste management
Emissions	- Benchmarking - Regulatory measurements - Ecological footprints for production chains
Customer (companies, consumers) feedback on environmental issues	- Consumer - social media, discussion forums

1.4.3 Public sector

The organizations working in public sector have some legal and regulatory duties which dictate their handling of environmental data. The monitoring activity involves collecting data from measurers and possibly refining it further. There are publicity principles, regulatory limitations and legal forms governing the use of monitoring data. There are some upcoming legal visions on i.e. EC level (SEIS directive) that may change the way environmental data is accessed. Some regulations such as INSPIRE set form requirements to the data. If the data is further published to citizens, it must be in context and presented in a way which is unambiguous to the consumer.

The public sector organizations have concerns for accessibility of environmental data, and whether that data is correct and accessible at correct time. In order for the data to be easily accessible, it needs to be in electronic, standard form.

Interactions between public sector organizations and citizens can be two-way: as well as publishing data to the people, citizens can send feedback to the public services. Also, it is possible to harness civil activity: citizens can be of help in taking measurements or making observations.

1.5 Business Risks

In the following table possible business risks facing EnviTori marketplace are identified. Each risk

Table 5. Business risks for EnviTori marketplace

Business risk	Probability	Loss	Mitigation
Common interfaces and technological solutions are not achieved/agreed upon.	Low	Market place is not going to happen.	<p>Proceed iteratively. First concentrate on sharing data from application case point-of-view using existing data formats and servers. Later on develop selected interfaces to access the data.</p> <p>Study state-of-the-art technology and utilize best practices, OGC, SSE.</p> <p>Study state-of-the-art systems and utilize best practices.</p>
Not enough data providers adapt to the market place	Medium	Not enough data for useful services.	Develop iteratively using case services. Involve data providers and users/consumers in the development in early phase. Disseminate. Cooperate with other projects and programmes.
Not enough data for useful or commercializable services	Medium	No useful services based on data in the market place.	Study user and data needs. List and describe potential data sources.
No organization is willing to take the business risk in managing and developing the market place.	Medium	Environmental data service catalogues and interface definitions are not going to be maintained. Market place is not going to happen.	Involve companies and users/consumers in the business modeling in early phases.
Sector organizations cannot agree about data sharing and common applications.	Medium	No applications that utilize data from multiple sector organizations	Organize communication / meetings. Disseminate.
Companies don't open their databases in the market place	Medium	No applications for utilizing company data	Involve companies in the development in early phase. Develop company lead case services where company data is involved.

2 Vision of the Solution

2.1 Vision Statement

- **For** environmental data providers, processors, users, and consumers
- **Who** are interested in environmental information and services
- **The** EnviTori market place
- **Is** an environmental monitoring data and information market place service
- **That** provides metadata about environmental information and services, and technological solutions to share the data between parties
- **Unlike** existing environmental information services
- **Our service unifies** monitoring procedures, data formats, interfaces, and data sharing technical solutions.

2.2 Vision of Major Features

Table 6. List of major features

Feature	Description
Feature 1.1	Support for environmental data: Measurement of physical quantities for environmental data. Location-based environmental data. Real-time environmental data, situational awareness. Support for mobility of entities (sensors, users, system components, etc.).
Feature 2.1	Provide an interface for describing data source capabilities (description/metadata for data).
Feature 2.2	Provide an interface for describing data processing service capabilities. (Description/metadata for process.)
Feature 3.1	Search/browse for a data source or processing service with an API (for machine).
Feature 3.2	Search/browse for a data source or processing service using a UI (for human).
Feature 4.1	Service registration API. Registering a data source or processing service in the platform.
Feature 4.2	Manual self-service service registration.

Feature	Description
Feature 4.3	User registration and management.
Feature 4.4	Organization registration and management.
Feature 5.1	Support for charged services.
Feature 5.2	Integration of payment scheme in the system. (E.g. micropayments.)
Feature 5.3	Support for service ordering.
Feature 6.1	Country and locale-specific user interface/service set. It should be possible to register a service in any number of locales (city/region/country level) taking into consideration currency, timezones, legal issues etc.
Feature 7.1	Explication of data accuracy with some confidence interval
Feature 7.2	Trust/reputation management (per service provider). The system shall provide means to build mutual trust between the counterparts (service providers and service consumers). See e.g. (Ruohomaa 2007).
Feature 7.3	Managing service level for aggregated/composed services. “Uncertainty propagation”.
Feature 8.1	Remote management and operations
Feature 8.2	Auto configurations

2.3 Quality characteristics

The system shall support for SaaS (Software as a Service) –principles.

The system shall provide subscriber connection independent data exchange (GPRS, 3G, fixed line).

In addition to the major features listed in prior chapter, the system shall have following quality characteristics:

- Scalability for; millions of data sources and, thousands of users,
- Efficient information exchange between end entities (users, sensors, applications, etc.),
- System shall be reliable and dependable,
- Support of strong security in all levels,

- Components of the architecture work globally and are duplicable,
- Open architecture/system APIs for service creation,
- Supports end user specific solutions
- Support of flexible service creations,
- Support of 3rd party applications (connectivity between legacy systems).

2.4 Assumptions and Dependencies

The market place shall provide a means to declare how metadata should be defined, and how the data should be accessed.

The market place does not necessarily contain the data itself, only the metadata.

The market place is not a central system for gathering all kinds of data.

The market place must accommodate very large amounts of services.

INSPIRE directive (2007/2/EC) of the European Union will dictate spatial information services infrastructure of public organizations concerned by the directive in the member states, i.e. the availability, quality, organization, accessibility and sharing of public spatial information.

It is highly possible, that so-called SEIS directive (<http://www.eea.europa.eu/about-us/what/shared-environmental-information-system>) will dictate how public environmental information infrastructure is to be organized in the member states.

3 Scope and Limitations

3.1 Scope of Initial and Subsequent Releases

Version 1.0 (October 2009) contains the following features:

- Feature 1.1
- Feature 2.1, 2.2
- Feature 3.1
- Feature 7.1

3.2 Limitations and Exclusions

Omitted.

4 Business Context

4.1 Stakeholder Profiles

Stakeholder	Major value	Attitude	Features of interest	Constraints
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Stakeholder	Major value	Attitude	Features of interest	Constraints
Consumer groups				
Homes	New services: Security, safety, green ICT, saving money	Slow adopters, disbelievers	Warnings, calculators, monitors, privacy	Must be “fool-proof”, likely to invest only in proven technology with wider adoption
“Ordinary” consumers	New services Existing services with a “twist” Compensation possibility	Heterogeneous	UI-intensive services, consumer VAS, privacy	Terminals/technology Business case?
Sensitive groups / sick people	Enables new services that improve the quality of everyday life	Perceptive	Notifications, warnings	Technology adaptation, accessibility, financing
In-transit people	New services that mitigate risk whilst in transit	Not willing to invest lot of money	Should be usable with current terminals (smartphones, navigators)	Services need to be widely (at least country-wide) available
Business stakeholders				
Industrial plant	Compliance, governance, PR	Possibly very mixed	Calculators, report generation (data accessibility)	Attitude, financing
Telecom operator	Mediator, infrastructure provider	Very likely to adopt, proven that EnviTori will improve business	A place holder for market place, A message broker, Billing, SLAs,	Standardization, Technology maturity, Fitting into current business model
Refiner of env. data	Data and measurement quality, new business opportunity	Positive, proven that EnviTori will improve business	Discovery, interoperability (standards), billing, SLAs	Investments required
Measurer of env. data	Data and measurement quality Wider use of data and services New service development Improved productivity Streamlined business processes	Mixed	Interoperability, data policy, billing, SLAs	Investments required
Hardware provider	Extending existing business		Interoperability, possible new standards	

Stakeholder	Major value	Attitude	Features of interest	Constraints
Software provider	New business opportunity			May break existing lock-ins
Public sector				
Monitoring and control (incl. officials)	Better access to data Wider use of data and services New service development Improved productivity. Streamlined business processes.	May not want to make major investments, May also be a driving force (e.g. EU directives)	Discovery, data policy, interoperability	Bound by regulation
Media	Better access to data	Very likely to adopt	Discovery	
Research institute	Data and measurement quality Platform for innovation	Very likely to adopt	Discovery, interoperability	
Refiner of env. data	Automation of previously manual tasks. Ability to perform entirely new tasks. Data and measurement quality		Interoperability, data policy	
Measurer of env. data	Data and measurement quality Wider use of data and services New service development Improved productivity Streamlined business processes. Compliance (INSPIRE, SEIS)		Interoperability, data policy, billing	
Politicians	Better access to data Saves public spending		Discovery, interoperability, data policy	

4.2 Project Priorities

First priority is interoperability. End-to-end service realization that is available to / used by all three market segments will drive the design and implementation iterations. The air quality case will be the first customer service case implementation, and it will be used as the basis for the first implementation round of the marketplace. The business cases and other following cases will further direct the implementation. The services are intended to international markets, but pilots are implemented in Finland.

4.3 Operating Environment

The system must be designed so that it can be available 24/7. Continuous access to the system is critical, as the data services may be related to accidents and disasters. The pilot/prototype system does not have to be mission-critical.

Any user related profile data must be secured. No malicious parties should be able to alter or destroy the data, or user profile data.

The system should not alter or distort any metadata or measurement data it possesses.

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