

# BUSINESS MODEL - INITIAL VERSION

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## DELIVERABLE

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### D8.5.1 BUSINESS MODEL - INITIAL VERSION

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07	14/04/2016	Peter Bednár, Marián Matušák, J.O'Flaherty	EPRO, MAC	Finalized executive summary, user interface and infrastructure management, Final edits for submission

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## LIST OF ACRONYMS

API	Application Programming Interface
DoW	SDI4Apps Description of Work, Annex I to the Grant Agreement
EC	European Commission
ERFC	European Regional Framework for Co-operation Association
EU	European Union
GI	Geographic Information
ICT	Information and communications technology
IGO	Intergovernmental organization
INGO	International non-governmental organization
INSPIRE	Infrastructure for Spatial Information in the European Community
MIF	INSPIRE Maintenance and Implementation Framework
NGO	Non-Governmental Organization
OSM	OpenStreetMap
SDI	Spatial Data Infrastructure
SME	Small and medium-sized enterprises

## EXECUTIVE SUMMARY

The deliverable describes (a) the methodology used for the development and specification of the SDI4Apps business model. It defines four main pillars of business model: Value Proposition, Customer Interface, Infrastructure Management and Financials. (b) The Business model definition, which describes each pillar of the methodology from the SDI4Apps perspective and provides for each business model component the list of options which were identified as relevant for the SDI4Apps platform. (c) The SDI4Apps business model, which provides the initial proposal and overall sketch of the business model which will be further extended either by providing more details e.g. about the price tags for costs and revenue model or by new combinations of revenue models for the specific period of the SDI4Apps platform deployment. This will be finalised in D8.5.2.

# 1. PREFACE

Today, the borders of organizations are becoming more transparent and organizations, enabled by ICT, cooperate in changing constellations. Information, services, and products can be offered by sub-units of organizations, by single organizations or by collaborations between companies.

Information technology has enabled companies to redefine their business models and to reorient their internal capabilities. They are finding it necessary to collaborate in order to execute efficient operations that reduce time, costs and also fulfill customer's demand in order to gain the competitive market position.

Business model consist of interrelations of three elements: business strategy, business organization and ICT usage and together with legal and social environment, competitive forces, customer demand and technological change impact on company's business model definition.

The presented document describes a) general methodology for design and implementation of the business models developed for the ICT based products and services and b) its application for the specification of the SDI4Apps business model. The core concepts of the methodology consist of four main pillars that encompass the product and service proposition of the company in the market, the customer relationship that the company maintains, the necessary infrastructure that will enable the company to realize all the above and lastly the financial aspects of the company.

The aim of this document is to report initial work done within the Task 8.6 focused on the continuity and sustainable operation of the SDI4Apps platform after the end of the project. During year 2 of the project, the period when the platform was being moved towards external community, this first release of the business model has been defined. It will be used also for organising events in the last year of the project.

The business model addresses the financial rules for future financing of the utilisation of the infrastructure at MU and also for future maintenance. While the MU infrastructure is available during the project lifetime, future running of the platform has to be covered from other resources. It defines potential service and support based models for the project partners to offer their consultancy to future users and developers. Definition of the SDI4Apps sustainable business model which was mainly planned to be based on the Freemium business model.

This work will be evolved in year 3 towards D8.5.2 (Business Model - Final Version) which will include an agreement on future utilisation of the SDI4Apps platform and its support will be prepared. The partners will define the model of future cooperation (multilateral agreement, association, stakeholder company, etc.)

The document is structured in 3 main chapters. The content of the chapters is as follows:

**Chapter 2 (Methodology)** provides an overview of the methodology used for the development and specification of the SDI4Apps business model. It defines four main pillars of business model: Value Proposition, Customer Interface, Infrastructure Management and Financials.

**Chapter 3 (Business model definition)** describes each pillar of the methodology from the SDI4Apps perspective and provides for each business model component the list of options which were identified as relevant for the SDI4Apps platform.

**Chapter 4 (SDI4Apps business model)** summarises findings from Chapter 3 into the initial proposal and overall sketch of the business model which will be further extended either by providing more details e.g. about the price tags for costs and revenue model or by new combinations of revenue models for the specific period of platform deployment.

## 2. METHODOLOGY

Nowadays, business models are very complex, particularly those with a strong ICT and e-business component. The relationship between the different elements of a business model and the decisive success factors are not always immediately observable (Osterwalder, 2004).

Osterwalder and Pigneur (2002) have adopted a definition that illustrates how a business model actually works. More specifically, the authors indicate that a business model consists of four main pillars that encompass the product and service proposition of the company in the market, the customer relationship that the company maintains, the necessary infrastructure that will enable the company to realize all the above and lastly the financial aspects of the company as it can be seen in the figure 4 below.

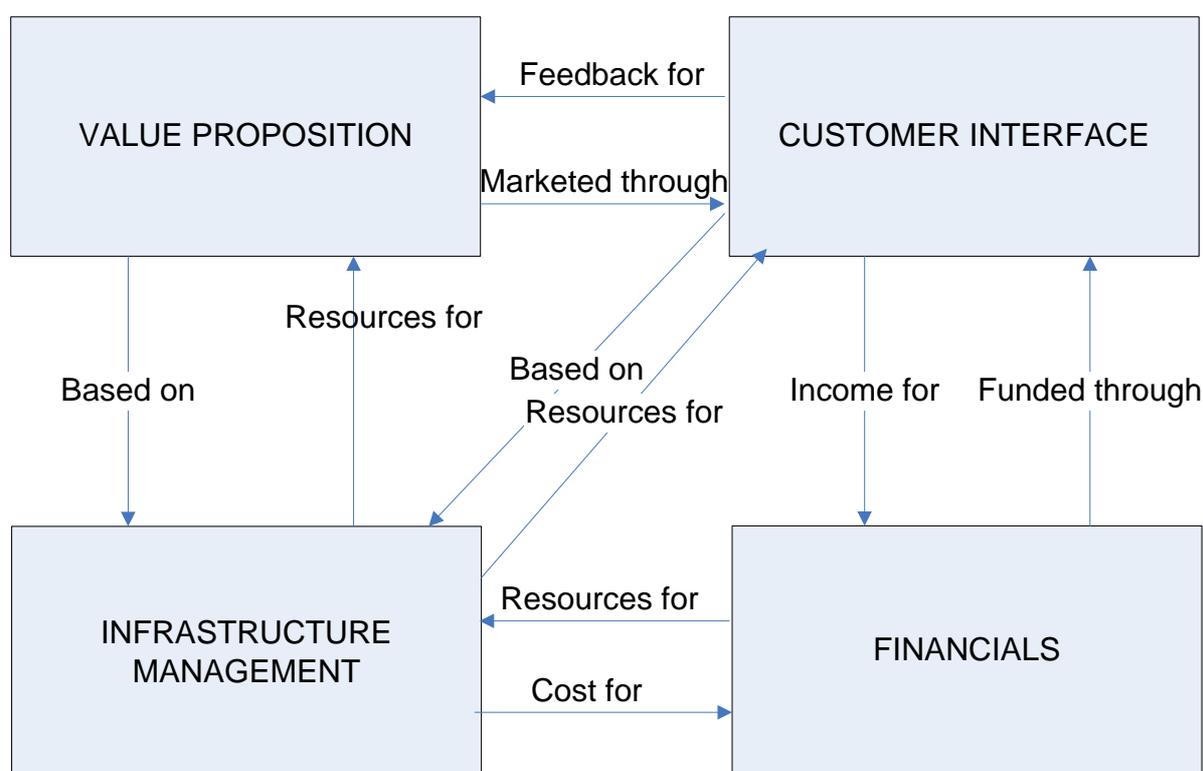


Figure 1: Business model pillar (Osterwalder, Pigneur 2001)

Clear definition of business model pillars and their interconnections supports company to ascertain the gap between current state towards wanted business scenario in order to survive and (or) expand the market position.

Providing value to the customers is the essence of a customer-focused approach - without it, company can not do business. The question is: "What customer benefits does the company provide that create value for customers?" There are a large variety of ways to provide customer value, and not all of them will make sense in every situation.

It is recommended that companies brainstorm on each of these value propositions within the context of their own businesses to determine the potential applicability.

In following sections, each business model pillar is described in detailed, with the interconnections to SDI4Apps platform and possibilities for business model adoption.

## 2.1 Value proposition

The “value proposition” element covers all aspects related to the offering of the company. This comprises not only its products and services but the manner in which it differentiates itself from its competitors. Moreover, the ability to offer value to a customer demands a range of specific capabilities.

“Value proposition” element refers to the value the company offers to a specific target customer segment. ICT has created many new opportunities for value creation on the one hand and more efficient value creation on the other hand.

**Table 1: First business model pillar: “Value Proposition” (Osterwalder, 2004)**

Pillar	Building Block of Business Model	Description
Product	Value Proposition	A Value Proposition is an overall view of a company's bundle of products and services that are of value to the customer.

A value proposition is characterized by its attributes (Osterwalder, 2004):

**Description** (describes a part of a firm’s bundle of products and services)

### Reasoning

Captures the reasoning on why the firm thinks its bundle of products and services could be valuable to the customer - normally value is created either through use, reduction of the customer’s risk of by reduction of his efforts:

- *{Use}* - The value of products/services derives when their attributes (e.g. features, value-added services...) correspond to customer’s needs.
- *{Effort}* - The value of products/services derives by reducing customer’s efforts, usually through lower search, evaluation, acquisition costs, but also cheaper maintenance...
- *{Risk}* - The value of products/services derives by reducing the customer’s risks (e.g. financial)

### Value level

It allows a firm to compare itself to its competitors, the most often using qualitative value scale. The measure goes from me-too value, over innovative imitation and excellence to innovation

- *{Me-too}* - Services/products do not differentiate from the competition’s offerings.
- *{Innovative imitation}* - Imitation of existing offerings, with new innovative elements.
- *{Excellence}* - the value is pushed to its extremes.
- *{Innovation}* - Introduction of a new service/product or a revolutionary combination of products/services.

### Price level

The attribute compares the value proposition’s price level with the ones of their competitors. The scale goes from free, over economy and market to high end.

### Life cycle (optional)

It should be studied over its entire life cycle

A company generally creates value for a specific customer segment. The definition of the market scope (Afuah et al., 2001) captures the essence of where the company does and does not compete - which customers, which geographical areas, and what product segments.

To deliver the value proposition to different customers, a company must ensure that it possesses the range of capabilities that underpin the proposed value. Several authors describe how value and competencies or

capabilities are interconnected (Bagchi et al., 2000). Capabilities can be understood as repeatable patterns of action in the use of assets to create, produce, and/or offer products and services to a market.

A “value proposition” is enabled through a range of “capabilities” and is a value for a “specific target customer segment”, which has needs to be fulfilled.

## 2.2 Customer interface

Customer relationship management is also very important pillar for companies. It defines interaction with customers, especially by using modern ICT in order to provide customers with richer information and also managers to gain insight on their customers buying behavior and improve customer relationship. (Osterwalder, 2004). It describes how and to whom the company provides bundle of services (products). The “Customer Interface” includes “Target Customer”, “Distribution Channel” and “Relationship” elements. The clear definition of target segment also helps a company to define the effective channels to reach its clients. Normally, the company disposes of one or several direct or indirect channels. Internet and other modern ICTs impact on how companies reach their customers. New opportunities for companies that play the role of intermediary between seller and buyer arisen. From these reasons, it is important to assess where value can be added through ICT and which functions could become redundant.

Customer relationship management is an integral component of business strategy for on-line service providers. Building and maintaining customer relationships has long been perceived as an enabler of e-commerce. On-line service providers lose \$20 to \$80 on each customer the first year because of the high cost of acquiring customers, but can make up for the loss in the long run by retaining loyal customers (Reichheld & Scheffer, 2000).

**Table 2: "Customer Interface" pillar of business model (Osterwalder, 2004)**

Pillar	Building Block of Business Model	Description
Customer Interface	Target Customer	The Target Customer is a segment of customers a company wants to offer value to.
	Distribution Channel	A Distribution Channel is a means of getting in touch with the customer
	Relationship	The Relationship describes the kind of link a company establishes between itself and the customer.
	Value Configuration	The Value Configuration describes the arrangement of activities and resources that are necessary to create value for the customer.

Through the use of ICT companies can redefine and ameliorate the notion of “customer relationship”. ICT supports and in some cases substitutes direct physical contact with the customer. The “customer relationship” element describes the way a company goes to market and gets in touch with its customers. Additionally, it contains the strategies of the company to collect and use customer information, in order to improve relationships and adapt the companies offering to customer needs. Finally, the company must define and outline its plans to gain the customers trust and loyalty (Osterwalder and Pigneur 2005, 82).

“Target customer”. This element refers to the segmentation of customers. Effective segmentation enables a company to allocate investment resources to target customers that will be most attracted by its value proposition.

“Distribution channel”. This element refers to the way a company “goes to market” and how it actually “reaches” its customers. This means a company must define its channel strategy: either indirect or direct channels, operated by the company or provided by a third party (e.g. agent, intermediary). ICT, and particularly the Internet, has a great potential to complement rather than to cannibalize a business’s

channels. The expansion of the range of channels also increases the potential of conflicts between channels and demands strong management (Osterwalder and Pigneur 2005, 82).

“Relationships - commitments”. It is essential to establish trust between business partners when the business environment becomes increasingly virtual and the implicated parties do not necessarily know each other anymore before conducting business. There exist mechanisms to build trust in e-business environments, such as virtual communities (Hagel et al., 1997), performance history, mediation services or insurance, third party verification and authorization, and, clear privacy policies (Friedman, 2000; Dimitrakos, 2001). Customer loyalty can be understood as the outcome of the customer’s trust and satisfaction (Osterwalder and Pigneur 2005, 82).

Customers develop a relationship with a service provider as a result of repeated experiences with the service provider. Therefore, it is important to understand the individual e-business transactions, which are satisfying or dissatisfying customers and consequently influence the relationship development.

The business model should show how integrated a company’s customers are - how deeply are they involved in the value creation process and how far the value proposition is tailored to their specific needs.

Relationship commitment and trust are sentiments being identified as critically important in the development of long-term firm relationships. There is a positive relationship between trust and relationship commitment (Lancastre and Lages 2006).

The “customer interface” pillar provides feedback for “value proposition”, is based on “infrastructure management” and is and income for the “financials element”.

## 2.3 Infrastructure management

Internet and modern ICT have had a very high impact on the way companies organize their activities inside and with business partners. “Infrastructure management” describes the value system configuration that is necessary in order to deliver the company’s offering and to establish and maintain a customer relationship (Osterwalder and Pigneur 2005). It is composed of the “Capability” and “Partnership” elements. Capabilities and Resources can be assured within the firm or can involve outside actors, with whom a firm enters a partnership in order to provide a specific services or carry out projects.

**Table 3: “Infrastructure Management” pillar of business model (Osterwalder, 2004).**

Pillar	Building Block of Business Model	Description
Infrastructure Management	Capability	A capability is the ability to execute a repeatable pattern of actions that is necessary in order to create value for the customer.
	Partnership	A Partnership is a voluntarily initiated cooperative agreement between two or more companies in order to create value for the customer.

“Capability”. In order to create value, a company needs resources. Grant (Grant, 1995) distinguishes tangible, intangible, and human assets. Tangible resources include plants, equipment and cash reserves. Intangible resources include patents, copyrights, reputation, brands and trade secrets. Human resources are the people a company needs in order to create value with tangible and intangible resources (Osterwalder and Pigneur 2005, 83).

“Partner network”. The partner network outlines, which elements of the activity configuration are distributed among the partners of the company. Shrinking transaction costs make it easier for companies to vertically disintegrate and to reorganize in partner networks (Osterwalder and Pigneur 2005, 83).

Companies are also interested in partnering for reducing risk and uncertainly and acquiring resources, knowledge they lack (not possess).

The success of such business models depends on the content and quality of the partnerships that have been established. The key factors associated with such partnerships are: (E-FACTORS, 2003)

- Number of partnerships
- Cross-selling
- Resource sharing
- Contracts/agreements
- Degree of equality
- Governance mechanisms (contracts, trust etc.)
- Co-branding
- Conflict resolution mechanisms

The “infrastructure management” element is a resource for “product innovation” and “customer interface” and a cost for the “financials” element

## 2.4 Financials

Revenue model includes Revenue stream element and Pricing element. Particularly the Internet has had an important impact on pricing and has created a whole new range of pricing mechanisms (Klein, Loebbecke 2000).

**Table 4: “Financial aspects” pillar of business model (Osterwalder and Pigneur 2005).**

Name of business model element	FINANCIALS
Consists of	Revenue model Cost structure Profit/loss
Related to	Resource for Infrastructure management Funded through Customer relationship

The “financials” element is composed of the company’s “revenue model” and its “cost structure”, which finally define the “profit/loss” of a company. This element is a resource for “infrastructure management” and is funded through the sales in the “customer relationship” (Osterwalder and Pigneur 2005, 84).

“Revenue model”. This element measures the ability of a company to translate the value it offers its customers into money and therefore generate incoming revenue streams. A company’s revenue model can be composed of different revenue streams that can all have different pricing models. The new pricing mechanisms enabled by ICT should be used in order to maximize revenues. Particularly the Internet has had an important impact on pricing and has created a whole new range of pricing mechanisms (Klein et al., 2000).

“Cost structure”. This element measures all the costs the company incurs in order to create, market and deliver value to its customers. It sets a price tag on all the resources, assets, activities and partner network relationships and exchanges that cost the company money. (Osterwalder and Pigneur 2005, 84)

“Profit model”. This element is simply the outcome of the difference between the “revenue model” and the “cost structure”. Therefore, it can be seen as the culminating point and as an expression of the entire e-business model ontology.

Whereas “product innovation” and “customer relationship” shall maximize revenue, an effective “infrastructure management” shall minimize costs and therefore optimize the profit model. The “revenue model” increases the company’s “profit” (or diminishes its “loss”) whereas the “cost structure” decreases “profit” (or increases “loss”) (Osterwalder and Pigneur 2005, 84).

## 3. BUSINESS MODEL DEFINITION

### 3.1 SDI4Apps platform

SDI4Apps is a cloud based platform that aims to bridge the gap between the top-down managed world of INSPIRE, Copernicus and GEOSS, built by SDI experts, and the bottom-up mobile world of voluntary initiatives and thousands of micro SMEs and individuals developing applications (apps) based on Geospatial Information, by adapting and integrating experience from previous projects and initiatives to build a cloud based framework with open API for data integration, easy access and provision for further reuse.

The project is strongly based on cooperation on data sharing and technological developments with other initiatives funded by the European Union. The purpose is to increase the exploitation opportunities for open geographic information, facilitate market entry for new companies and to develop innovative services based on open geographic data.

The open cloud-based SDI4Apps platform includes both basic and extended enablers supporting:

1. Data harmonisation
2. Linked Open Data
3. Multilingualism
4. Advanced visualisations
5. Integration of mobile apps
6. Analytical and modelling API
7. Scalable execution of spatial models
8. Data analysis
9. Interoperability between local and global geospatial models.

The SDI4Apps platform is being driven and validated by the following 6 Pilot Applications and 11 Services (from D2.3.2) are:

1. Easy data access
  - European Tourism Indicator System (ETIS) service stakeholder crowdsourcing apps
  - Potential Monuments Ground Truthing Application
2. Open Smart Tourist Data
  - Smart Points of Interest data base
  - Open Transport Map
  - Smart Tourist Data Portal
3. Open Sensors Network
  - IoT discovery
  - IoT view
4. Open Land Use Map
  - Open Land Use Map data base
5. Open INSPIRE 4 Youth
  - Thematic Map viewer
6. Ecosystem Services Evaluation
  - SK Pilot Ecosystem Services Evaluation
  - Web services.

The platform structure, main components, involved roles and their interactions are depicted on the following schema on Figure 2.

SDI4Apps platform consists of the set of technological enablers - software components that provide functionalities and application programming interfaces supporting the development of domain specific applications. Enablers can be divided to generic enablers such as databases and application server components and specific for the development of applications managing geo-located data such as map servers, visualization user interfaces, etc. The enablers are running on the base hardware and software infrastructure which provide required resources (e.g. disk capacity, computational resources and networking connectivity).

The platform enablers can be deployed on the premises of Application provider or can be deployed as the common software-as-a-service cloud application infrastructure sharing resources between many Application

providers and multitenant applications. Besides of the software services, platform provides sourcing and sharing of domain data, which can be provisioned by the Application provider to provide added value for the end-customers.

The business model designed for the SDI4Apps platform is centric to Platform provider user role. Platform provider has capability of the software integrator who mainly integrates existing software components and provides preconfigured and prepackaged installation of platform enablers. Main services provided by the Platform provider is the consultancy, development support and maintenance of the enablers and sourced data. The main customers of the Platform provider are Application developers, which develop application using the interfaces, services and data provided by the platform and Application providers running the specific applications for the End users.

Data in the platform are provided by the Data provider. The distribution of data can be limited by fees or restrictive licenses or can be provided for free and unrestricted applications. Regarding the business partnership, Platform provider is the broker between the Application provider and Data provider.

Finally, Platform provider can outsource maintenance of the software and hardware infrastructure to the external Infrastructure provider.

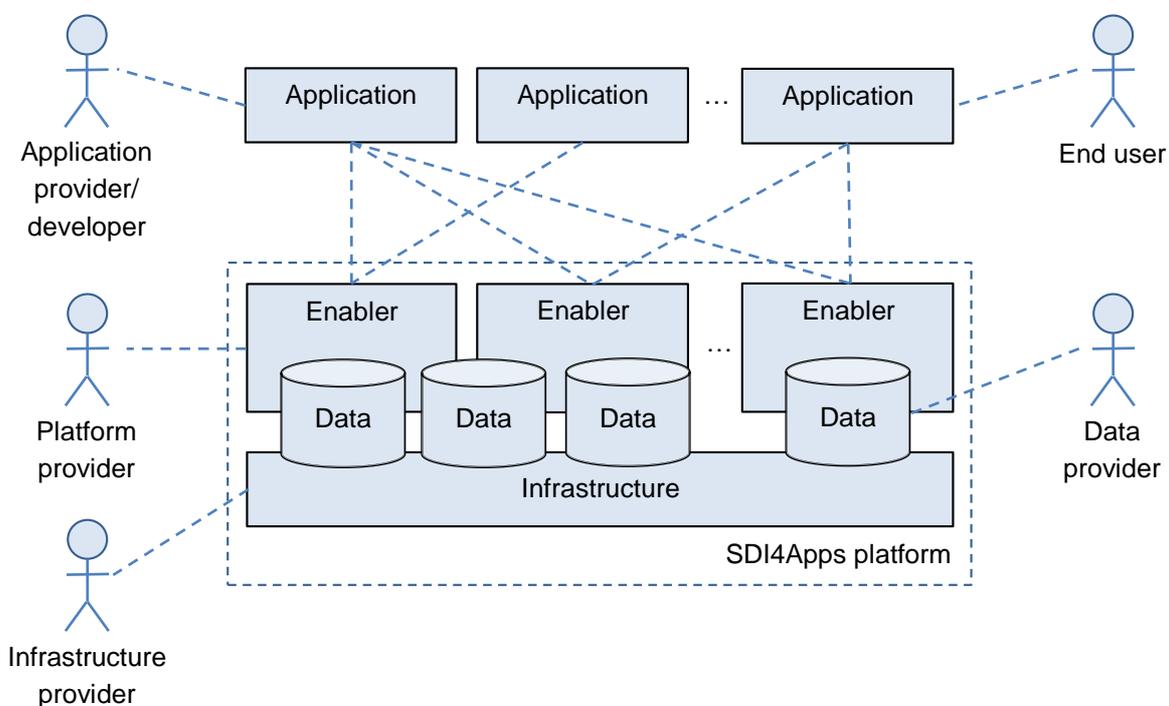


Figure 2 Overview of SDI4Apps platform architecture and involved user roles.

### 3.2 SDI4Apps business scenario

The SDI4Apps business scenario describes possible scenarios how the various roles can interact with the platform. The first issue is business scenarios for platform

**SDI4apps platform as Software as a Service**

Target customers: Smaller data holders, don't have their own infrastructure, SME developers not having own infrastructure	Providers, developers: HSRS, BOSC, CCSS, Avinet, Plan4all, MU SDI4Apps platform provider
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SDI4apps platform will be moved after end of the project on the servers of commercial partners of SDI4Apps. They will offer their services on the principles of freemium model. Any person and company will have possibilities to run their data (till certain amount) as free, if this data will be open. They will have also free possibilities to build their application and run this application till certain level of access per Months.

Providers will offer next commercial services:

- Restricted access to data
- Providing large scale of data
- Running large scale applications

Additional profit will be generated in later stage from advertisement

**SDI4apps platform as Open Source Virtual Server**

Target customers: Data providers, SMEs developers	Providers, HSRS, BOSCS, AVINET, CCSS, MU SDI4Apps platform provider
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SDI4apps platform is now available as virtual server integrating all components, which could be easy install on other clouds or virtual servers. This virtual server is available as Open source for anybody to use it and install without any support. It means that update and integration of components, etc. everybody will need to provide himself.

Additionally to this will technical partners of set of commercial services including:

- Training
- Installing on customer platforms
- Update and maintenance of single components and their integration with the system
- Assistance for developers
- Guarantee for bug fixing

The following scenarios are summarized from the SDI4Apps pilots.

**European Tourism Indicator System (ETIS) service stakeholder crowdsourcing apps (Visitors, Residents and Enterprises).**

Target customers: Geoparks Network	Providers, developers: MAC application provider/developer, SDI4Apps platform provider
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The Burren Geopark has adopted the ETIS (European Tourism Indicator System) for sustainable management of its destinations to monitor and measure performance. The ETIS is based on an offline Excel file with no real-time inputs nor benchmarking possibilities.

MAC company uses the ETIS service stakeholder crowdsourcing apps (Visitors, Residents and Enterprises), which streamlines and enhances manual indicator system by transforming the ETIS Excel dataset into Linked Data. The Burren GeoPark Manager and her team define their targets and elements of the ETIS standard they wish to use to manage their GeoPark on the service dashboard, and then monitor and manage the crowd sourced data coming into the service. Data are subject to on-line collection and automatic updating by various stakeholders including Destination management Enterprise, Residents and Visitor Surveys. Collection of information is available easily using smart phones.

Thanks to linking to the appropriate Geospatial data sources this enables automatic geographic visualisation on progress and results achieved. ETIS Webservice App provides benchmarking opportunities for the respective Geopark.

MAC as an SME project partner in this case is an App Provider encouraging further European Geoparks and Global Geoparks Network to implement SDI4apps enabled ETIS Service for their parks. In addition MAC targets ETIS standardized app to all sustainable tourism destinations.

**Potential Monuments Ground Truthing Application**

Target customers: National Parks Wildlife Service (NPWS), Heritage Council, National Monuments Service, Geoparks Network, Public sector bodies	Providers, developers: MAC application provider/developer, SDI4Apps platform provider
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Irish Heritage Council was looking for the integrated approach to heritage including cultural and natural aspects. To enable communities, experts and stakeholders to take responsibility for the development and conservation of their heritage and monument sites, Irish Heritage Council is willing to put in place infrastructure and networks to ground-truth the sites.

MAC as an SME project partner uses SDI4Apps Platform enabled Heritage Ground-Truthing App to provide an easy access service for use by Field Officers and mobilised very motivated community to seek out and ground-truth potential heritage and monument sites. App provides on-line mobile crowd-sourcing ground-truthing observations, which are being automatically updated and may be included as a permanent VGI layer on the National Monuments map.

MAC as an SME partner in the project is an App Provider transferring the SDI4Apps Platform enabled Heritage Ground-Truthing Application and the service license for the local, regional or national public agencies on a flat annual fee basis or on a cost per transaction. The app and service use may be exploited further across Europe to crowd source ground-truthing of environmentally sensitive sites. In addition MAC company will extend service providing dual-licensed features for proprietary added value.

**Smart Points of Interest publication (SPOI) Open Smart Tourist Point of Interest**

Target customers: Public institutions, Urban and spatial planners	Providers, developers: HSRS, BOSC, Avinet, CCSS, SDI4Apps platform provider
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Regional Tourism Cluster/Tourism Authority is looking for the comprehensive tourism data analysis of respective region, including tourism trends and traveller’s social sentiments and behaviour, all to be used as a basis for the long term development strategy. Regional authorities have collected different regional and city/municipal data to be used in the analysis and be set as a basis for the long term strategic plan.

Regional Tourism Cluster/Tourism Authority hires SME project partner, which uses SDI4Apps Platform to implement and link regional data. Using the SDI4Apps Platform enabled OST Crowdsourcing application SME partner undertakes a survey on request for the client in respective region. SME project partner will evaluate Open Smart Tourist Data for the respective region and client request using the SPOI.

Travel agencies hires SME project partner, which uses SDI4Apps Platform to implement and link their data about their destination. Using the SDI4Apps Platform enabled OST Crowdsourcing application SME partner undertakes a survey on request for the client. SME project partner will evaluate Open Smart Tourist Data for the respective travel agencies request using the SPOI.

SME partner is a Service Provider exploiting the SDI4Apps Platform enabled SPOI web site and providing advisory and consultancy services on request to national, regional or local tourism authorities, or tourism organisations/clusters. In addition, SME partner in this case may act as an App Provider developing the Application for automatic data collection via OST Crowdsourcing and its presentation on the created regional web portal on the SPOI web page, both enabled by SDI4Apps Platform.

SME partner is a Service Provider exploiting the SDI4Apps Platform enabled SPOI web site and providing advisory and consultancy services on request to national, regional or local tourism authorities, or tourism organisations/clusters. In addition, SME partner in this case may act as an App Provider developing the Application for automatic data collection via OST Crowdsourcing and its presentation on the created regional web portal on the SPOI web page, both enabled by SDI4Apps Platform.

Applications provider could offer possibilities of advertisement

**Smart Open Sensor Network - catalogue, Senslog and client**

Target customers: Farmers, public sector, SMES, researchers, farm association	Providers, developers: BOSC, HSRS, UWB, CCSS, SDI4Apps platform provider, research partners
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The basic services of Sensor catalogue will be free and also will be free discovery and access data from sensors. The access will be limited with numbers of accesses per Months. As Premium possibility could be guaranteed access with guaranteed level of services with non-limited access.

The main expected business will be in developing of end user applications for farmers and public sector using data available through the OSN network. Developers will prepare customer applications and sell this applications.

Research partners will use OSN mainly for research purposes.

### 3.3 Model element 1: Value proposition

The main purpose of a company is the creation of value that customers are willing to pay for. This value is the outcome of a configuration of inside and outside activities and processes. The following tables describe list of services provided by SDI4Apps platform.

Table 5: SDI4Apps value proposition

Service description	Reasoning	Value level	Life Cycle
Provisioning of data	{Use, Effort}	{Me-too, Innovative imitation}	{Value use}
Sourcing of data	{Use, Effort}	{Me-too, Innovative imitation}	{Value use}
Import and maintenance of data	{Use, Effort}	{Me-too}	{Value purchase, Value use}
Application programming interfaces	{Effort, Risk}	{Me-too}	{Value use}
Common cloud infrastructure	{Effort}	{Me-too}	{Value use}
Datasets	{Use, Effort}	{Me-too}	{Value use}

#### Reasoning:

{Use} - The value of products/services derives when their attributes (e.g. features, value-added services...) correspond to customer's needs.

{Effort} - reducing customer's efforts by creating value through lower search, evaluation and acquisition costs, but also easier and cheaper maintenance, operations and training.

{Risk} - The value of products/services derives by reducing the customer's risks (e.g. financial)

#### Value level:

{Me-too} - Services offered to customers does not differentiate itself from the one of the competition's

{Innovative imitation} - Imitation of existing offerings, with new innovative elements.

#### Life cycle:

{Value use} - The value that comes from the actual consumption of a products and services

{Value purchase} - Value created during the purchase phase by facilitating customer's experiences

Table 6: SDI4Apps services and their value proposition

Service description/Reasoning	Value level/Innovation
Provisioning of data	{Me-too} - SDI4Apps data provisioning services are based on the standard technologies for which many open or proprietary implementations exist

<p>This is the main functionality provided by SDI4Apps platform. SDI4Apps platform provides service interfaces for provisioning of:</p> <ul style="list-style-type: none"> <li>• Geo-referenced map images using the standard OGC Web Map Service protocol</li> <li>• Geographical features, i.e. geographical elements (points, lines, polygons, shapes) annotated with metadata properties using the standard OGC Web Feature Service protocol</li> <li>• Linked data using the standard W3C protocols defined for Semantic web (SPARQL endpoint) with extensions for geo-localized linked data</li> </ul>	<p>on the market. Some of the implementations are also provided as software-as-service.</p> <p><i>{Innovative imitation}</i> - The potential of linked data is not commonly leveraged in the development of OGI applications. SDI4Apps provides innovative integration of OGC standards and semantic data.</p>
<p><b>Service description/Reasoning</b></p>	<p><b>Value level/Innovation</b></p>
<p><b>Sourcing of data</b></p> <p>Besides of data provisioning, SDI4Apps platform provides services for data sourcing of geo-localized data in the form of geographical features specified using the OGC standards or in the form of geo-located linked data specified using the W3C Semantic Web standards. The main groups of sourced data are:</p> <ul style="list-style-type: none"> <li>• Data from applications crowd sourced from end-users</li> <li>• Data from sensor networks (via SenseLog software or generic Orion FI-WARE connector)</li> </ul>	<p><i>{Me-too}</i> - SDI4Apps data sourcing services are based on the standard technologies for which many open or proprietary implementations exist on the market. Some of the implementations are also provided as software-as-service.</p> <p><i>{Innovative imitation}</i> - By leveraging FI-WARE IoT platform, SDI4Apps platform provides innovative integration of sensor data which will be compliant with the emerging IoT standards.</p>
<p><b>Service description/Reasoning</b></p>	<p><b>Value level/Innovation</b></p>
<p><b>Import and maintenance of data</b></p> <p>SDI4Apps provides services for initial import, harmonization and maintenance of data provided by data providers. This include generic data harmonization tools which can be reused and orchestrated for specific new dataset harmonizing input formats and data semantics. Additionally, in cases where data are provided by proprietary format which require specific software components, platform provider can provide software development and customization services.</p>	<p><i>{Me-too}</i></p>
<p><b>Service description/Reasoning</b></p>	<p><b>Value level/Innovation</b></p>
<p><b>Application programming interfaces</b></p> <p>Besides of the enablers which provide web service interfaces (SOAP or REST-like), platform consist of enablers which simplify development of the client parts of the applications. These enablers consist of integrated suite of client JavaScript libraries for developing of web based responsible user interfaces allowing development of applications for web browser clients and mobile devices.</p>	<p><i>{Me-too}</i> - SDI4Apps provides integrated suite of client libraries which is preconfigured for the platform “background” services allowing application developers to directly start development of new applications without difficult setup.</p>

Service description/Reasoning	Value level/Innovation
<p><b>Common cloud infrastructure</b></p> <p>Besides of the specific enablers, which provide data services, SDI4Apps platform provide also generic enablers which form common infrastructure for development and deployment of applications. This infrastructure consists of generic software components such as relational databases, triple stores, application and web servers, load balancers and proxy servers, account management system, etc. The platform cloud infrastructure is pre-configured and pre-packaged for the deployment into the cloud virtualization environment based on the OpenNebula cloud management system and KVM and Xen hypervisors.</p>	{Me-too}
Service description/Reasoning	Value level/Innovation
<p><b>Datasets</b></p> <p>Important added value of SDI4Apps platform will be catalogue of datasets provisioned for application developers and providers during the development or testing of applications or for (commercial or open) utilization by end-users.</p> <p>Initially, the selected data from pilots will be available for application developers. These initial data will be extended by Platform provider for open datasets or integrated and provisioned from Data providers.</p>	{Me-too}

## 3.4 Model element 2: Customer interface

Customer relationship management is also very important pillar of business model. It defines interaction with customers, especially by using modern ICT in order to provide customers with richer information and also managers to gain insight on their customers buying behavior and improve customer relationship (Osterwalder, 2004). It describes how and to whom the company provides bundle of services (products).

The “Customer Interface” includes “Target Customer”, “Distribution Channel” and “Relationship” elements. The clear definition of target segment also helps a company to define the effective channels to reach its clients. Normally, the company disposes of one or several direct or indirect channels. Internet and other modern ICTs impact on how companies reach their customers. New opportunities for companies that play the role of intermediary between seller and buyer arisen. From these reasons, it is important to assess where value can be added through ICT and which functions could become redundant.

### 3.4.1 SDI4Apps target customers

SDI4Apps is focused to provide value added services for specific customer segment, which are companies developing and providing OGI applications for end-users. SDI4Apps is willing to provide application developer/provider companies a number of value added services in order to provide them common integrated environment for development and deployment of their applications helping them to lower development costs and risks, provide innovative services for end users and to access the single European market.

D2.1.2 has identified SDI4Apps External Customers to be mainly communities of application developers; potential “clients” in the SDI4Apps Business Model (i.e. “willing to pay” for the use of platform services linked

to open data). While its External Partners are mainly data providers and non-technical partners interested in the platform: experts, enterprises, companies and SMEs, public bodies involved in pilot exploitation. And SDI4Apps' External Users are Citizens, public bodies, other local communities involved as final users of the SDI4Apps platform applications.

#### **Stakeholders (end-users)**

- Geoparks Network
- National Parks Wildlife Service (NPWS)
- Heritage Council
- National Monuments Service
- SMEs and Farmers
  - Farmers with heritage sites and monuments
  - Providers of tourism services
  - Tourism SMEs
  - Farmers using precision farming tools
  - Agriculture business consultants
  - Advertising and marketing companies
  - Real Estate Developers
- Public sector bodies and Public institutions
  - National, regional and local tourism authorities
  - Urban and spatial planners
- Citizens
  - Interested in their local heritage
  - Visitors, Tourists, Travellers
    - Geo routes Cultural Heritage, Visitors
- Associations
  - Regional and local tourism clusters
  - Farmers associations
- Universities and Research institutions
  - Tourism and cultural heritage domain
  - Landscape and nature protection domain
  - Agriculture

#### **Application providers**

- Enterprises
- Companies

#### **Application developers**

- App developers in the tourism sector
- App developers in cultural heritage

### 3.4.2 SDI4Apps distribution channels

This element refers to the way a company “reaches” its customers. ICT, and particularly the Internet, has a great potential to complement business’s channels and streamline business operations.

SDI4Apps collaboration environment will offer its customers new business opportunities - reach out new buyers and new suppliers and more efficient support to conduct business transactions in electronic way.

The “Distribution Channel” should be studied over the customer’s entire buying cycle (Osterwalder, 2004):

- Awareness,
- Evaluation,
- Purchase,
- After sales.

Customer relationship management is an integral component of business strategy for on-line service providers. Building and maintaining customer relationships has long been perceived as an enabler of e-commerce. On-line service providers lose \$20 to \$80 on each customer the first year because of the high cost of acquiring customers, but can make up for the loss in the long run by retaining loyal customers (Reichheld & Scheffer, 2000).

Customers develop a relationship with a service provider as a result of repeated experiences with the service provider. Therefore, it is important to understand the individual e-business transactions, which are satisfying or dissatisfying customers and consequently influence the relationship development.

The business model should show how integrated a company’s customers are - how deeply are they involved in the value creation process and how far the value proposition is tailored to their specific needs.

The following table presents suggested SDI4Apps channel strategy:

**Table 7: SDI4Apps Reach out channel strategy**

Channel	Awareness	Evaluation	Purchase	After sales
SDI4Apps website / Internet	Banners, personalized e/mails, online courses on SDI4Apps topics	Customer responses	Inclusion to the SDI4Apps network of users	Support and further data
Direct - SDI4Apps Platform website (Internet)	Advertising Promotions Public relations Partnerships Affiliate programs/Websites Events Hackathons Advertising of new mobile phone technology & models	Multimedia applications Online Chat, Voice-over-IP or Web cams streamline the consulting process Independent information from user communities or consumer groups Profile evaluator, phone comparison, product catalogue	This includes negotiation, decision, contract, order and tracking, billing and payment and fulfilment. Wishlists Get your free trial Shopping cart On-line (license) purchase Order status	Embrace implementation, use, training, maintenance, monitoring, troubleshooting and reverse logistics Support Transaction history Subscription cancellation

	<p>Readings and signature sessions</p> <p>Banners</p> <p>Personalised e-mails</p> <p>Specialized affiliate websites</p> <p>Free online courses</p> <p>Mass advertising</p> <p>Tips and lists blog posts</p> <p>High-quality curated articles</p> <p>Free downloadable guides and reports</p> <p>Infographics</p> <p>White papers</p>	<p>Search engine</p> <p>Customer reviews</p> <p>Excerpts</p> <p>Critics</p> <p>Recommendations</p> <p>On-line courses</p> <p>Freemium/License Comparison tables</p> <p>Case studies</p> <p>Ultimate guides</p> <p>Analysis reports</p> <p>Tutorials</p> <p>Webinars</p> <p>FAQs</p> <p>Reviews</p> <p>Buying guides</p> <p>Comparative articles</p>		
<b>Indirect - Channel partners, re-sell partners</b>	<p>Social media - High-quality curated articles, white papers</p>	<p>Free access to all functionalities limited extent</p>	<p>Periodic access - Online shopping cart and checkout</p>	<p>Subscription cancellation</p>
SME partners	<p>Free online courses</p>	<p>Freemium/License Comparison tables</p>	<p>Selling white label Dual-licensed features</p>	<p>Order status, transaction history</p>
Value-adding resellers (App developers)	<p>Free downloadable guides, reports</p>	<p>Demonstrative free output presentations, case studies, visualizations</p>	<p>Negotiating and Invoicing Support and Customization</p>	<p>Customer Support, Troubleshooting, FAQs</p>
Affiliate programs	<p>Events - Hackathons</p>	<p>Independent information from user communities or consumer groups</p>		<p>Manuals and Guides</p>
	<p>Conferences</p>	<p>Case studies, Referenced existing solutions</p>		
Media (articles, movies, SDI4Apps related events, ...)	<p>Mass advertising</p>	<p>Feedback of interested companies</p>	<p>Free of charge newsletters to the mailing lists of interested companies and</p>	

			potential SDI4Apps users	
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### 3.5 Model element 3: Infrastructure management

ICT and particularly the Internet have had a fundamental impact on the way companies organize their activities inside and with their business partners. One of the new web based solutions focused on specific needs of providers and developers of the open geographic information services is also SDI4Apps platform. In order to provide services for the platform customers, Platform provider has to have capabilities and resources for infrastructure management.

Capabilities and Resources can be assured within the company or can involve outside actors, with whom a company enters a partnership in order to provide a specific services or carry out projects. The aim of SDI4Apps is to involve the outside partners in order to exploit SDI4Apps solution in the market (i.e. Application providers and developers on one hand side) or in order to outsource some infrastructure management tasks such as development of software enablers to open source communities or to outsource management of the hardware or software cloud infrastructure.

Grant (Grant, 1995) distinguishes tangible, intangible, and human assets. In the context of SDI4Apps, tangible resources include hardware and software infrastructure and cash reserves. Intangible resources include patents, copyrights, reputation, brands and trade secrets. The core of the resources required from the Platform provider are human resources, i.e. people a company needs in order to create value with tangible and intangible resources. The tasks in the activity configuration are fulfilled by in-house resources or by partner network. The following table list the capabilities required for the management of the SDI4Apps platform.

**Table 8 Capabilities of human resources.**

Capability	Description
Software integration and maintenance	This is the main capability of the Platform provider which includes basic software customization and maintenance, release and version management and integration testing tasks.
Data integration and maintenance	The Platform provider provides expertise and technological tools for the data import and harmonization. The Platform provider and Data provider have to cooperate in order to overcome initial format or semantic heterogeneity in imported and maintained data.
Software development	<p>This include common software development tasks (design, implementation, testing, development process management) involved in the maintenance of technological enablers and in the implementation of the new functionalities.</p> <p>The main strategy for the SDI4Apps platform provider is to outsource development tasks to the existing open source communities developing adopted and integrated technologies.</p>
Infrastructure maintenance	This capability includes common software and hardware administration tasks (installation, monitoring, backup, etc.) on the underlying infrastructure.

	The SDI4Apps platform provider can outsource this capability to external Infrastructure provider.
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As it is described in the Table 8, the main focus of the Platform provider is on building the strong partnership with the direct customers (Application developers and providers) or with the technology providers (Software developers in Open source communities developing the enablers' technology). Generally, in order to succeed, network partners need to overcome the following main challenges:

- The partnership must make business sense for everybody (every partner should deliver real value)
- Technical obstacles must be overcome (integration of services within the general architecture)
- A sensible financial arrangement must be reached
- Questions about customer ownership must be addressed
- Potential regulatory obstacles must be taken into account (for example for standardization or regulation for data sharing)

The Partners agreed that the SDI4Apps Platform will be transferred to the Plan4All Association when the project ends, so that its infrastructure can be managed and sustained into the future. The Plan4All Association is a non-profit organisation that is already running the services of the Plan4All and Plan4Business projects (on which much of the SDI4Apps platform open source technology is based) and includes SDI4Apps partners HSRS, AVINET, UOW on its Board.

The evolving SDI4Apps Business Model will specify how and why the Association will be able to fund maintenance of the virtualised platform definition and/or portal after the project ends. One option might be to focus on providing the platform services free to application developers but charging for value-added services, or perhaps for use of the major databases (such as SPOI, OLU and OTM) that are emerging from the project.

## 3.6 Model element 4: Financials

The financials element is the culmination of an e-business model. The best products and services and the finest customer relationship are only valuable to a company if it guarantees long-term financial success.

The financials element is composed of the company's:

- Revenues model and
- Cost structure,

which finally define the profit/loss of a company.

### 3.6.1 SDI4Apps Revenue models

This element measures the ability of a company to translate the value it offers its customers into money and therefore generate incoming revenue streams. A company's revenue model can be composed of different revenue streams that can all have different pricing models. The new pricing mechanisms enabled by ICT should be used in order to maximize revenues. Particularly the Internet has had an important impact on pricing and has created a whole new range of pricing mechanisms (Klein et al., 2000).

ID	Category	Description
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R1	Software licensing	<p>Customer will pay for software license that grants him permission to use software or to redistribute it.</p> <p>Since most of the SDI4Apps enablers are covered by Open Source Software licenses (e.g. MIT style license or the GNU General Public License), Software licensing revenue model is not suitable for SDI4Apps platform. For in-house developed enablers (metadata catalogue Micka developed by HSRS), dual licensing can be adopted, which can (partially) cover software development costs. See more comments in R2 Open source model.</p>
R2	Open source	<p>According to this model, financial return on open-source software comes from selling services, such as training and support, rather than the software itself.</p> <p>This model suits the ‘open’ nature of the SDI4Apps project and may appeal especially to developers. The downside is that open source models and software, even when supported by a community of volunteers, still require a big company contributor to thrive.</p> <p>Since the SDI4Apps platform is mainly integration project, which combines various existing Open source software components (enablers), the main commercial services are oriented to integration, configuration and packaging of the integrated platform.</p> <p>Development and maintenance of specific component is driven by existing open source community. For Platform provider, this reduces costs for platform development. On the other side, the Platform provider doesn’t have full control over the development of the specific enabler and there is a risk that the component’s functionality will diverge from the SDI4Apps needs or the adopted open source project will be abandoned by community.</p> <p>Beside the selling professional services, the following approaches were identified for funding of open source software (Wikipedia, 2016a):</p> <ul style="list-style-type: none"> <li>• Dual-licensing</li> <li>• Selling of certificates and trademark use</li> <li>• Selling software as a service</li> <li>• Partnership with funding organizations</li> <li>• Voluntary donations</li> <li>• Bounty driven development</li> <li>• Pre-order/crowdfunding/reverse-bounty model</li> <li>• Advertising-supported software</li> <li>• Selling of optional proprietary extensions</li> <li>• Selling of required proprietary parts of a software product</li> <li>• Re-licensing under a proprietary license</li> </ul>

		<ul style="list-style-type: none"> <li>• Delayed open-sourcing</li> </ul> <p>As it was mentioned in Software licensing model, some approaches can be applied only for in-house components developed within the SDI4Apps consortium where some project partner is the copyright holder for the developed software. These include Dual-licensing, Re-licensing under a proprietary license and Delayed open-sourcing approaches.</p> <p>Selling software as a service and Selling of required/optional proprietary parts of the software are overlapping with the Freemium/Premium model and are described in the following part.</p> <p>Advertising-supported software is described in the Advertising model.</p> <p>Besides the Partnership with funding organizations, rest of the approaches requires stable community of users and supporters. This includes Voluntary donations, Bounty driven development and Pre-order/crowdfunding/reverse-bounty model approaches. These approaches can be further investigated especially for further extension and development of the new features in order to partially cover costs associated with the development and maintenance of the software.</p>
R3	Freemium/Premium	<p>“Freemium is a pricing strategy by which a proprietary product or service (typically a digital offering such as software, media, games or web services) is provided free of charge, but money (premium) is charged for advanced features, functionality, or virtual goods. The word “freemium” is a portmanteau neologism combining the two aspects of the business model: “free” and “premium.” (Wikipedia 2016b).</p> <p>The Freemium model is used by many service providers such as Skype, Dropbox, LinkedIn, Evernote, Github, Survey Monkey and many others.</p> <p>In this model, software is usually provided as cloud service.</p> <p>In order to stimulate development of applications using the SDI4Apps platform, all Application Programming Interfaces and background services should be available for free for Application developers including the learning materials and demo data. The free usage should be limited to development and testing of applications only for example by constraining the number of transactions or by limiting the volume or scope of demo data (however, various types of demo data should be available to demonstrate all platform features)</p> <p>The Freemium/Premium model can be further graded by:</p> <ul style="list-style-type: none"> <li>• Geographical area - a customer can access data by a predefined map sheets (a fixed price for a map sheet) or by a user-defined area (price is set per e.g. km2).</li> <li>• Level of detail - different levels of detail can be differently priced. For example European and national levels can be offered for free and regional and local level can be charged.</li> <li>• Type of data delivery - the data or a service result (e.g. a map or a report) can be delivered to users in different</li> </ul>

		ways such as for viewing (e.g. a web service WMS, WMTS, WFS), for printing or for downloading (in various formats).
R4	Data licensing	<p>According to INSPIRE directives (INSPIRE, 2012), one of the principle is that spatial data needed for good governance should be available on conditions that are not restricting their extensive use. Open Data experts specifically require data to adopt an Open License (e.g. Creative Commons, Open Government License) in order to be disseminated in a truly open fashion; thus aspiring to some rights reserved Copyright rule.</p> <p>Open License applies that Data licensing is not suitable revenue model for SDI4Apps. It can be used in case of licensed data in order to (partially) cover costs associated with the data import and maintenance or license fees applied by the Data provider for the (commercial) usage of the provisioned data.</p>
R5	Advertising	<p>A common option, which is a part of the Freemium revenue model, is using adverts next to services, which are given for free. The purpose of the services is to attract as many users as possible. The site accompanied by adverts can generate a profit.</p> <p>Advertising model can be adopted by provisioning of data, which have character of promotional marketing messages targeted to end-users of applications developed and deployed on the SDI4Apps platform. Data provider (advertiser) can pay for advertising by the following ways:</p> <ul style="list-style-type: none"> <li>• Pay per view (PPV)</li> <li>• Pay per click (PPC)</li> </ul> <p>Pay per view model corresponds with the pay by data transaction and can be directly supported in the platform. Pay per click model requires extensions of the client programming interface in order to track clicks of the end-users in the application.</p> <p>(Part of the) income from Advertising model can be redistributed to Application developer (for example in the form of discounts for premium services or access to more functions or data) in order to stimulate further development of the application and extend target group of end-users.</p> <p>The downside of the Advertising model is that it can be used only when the SDI4Apps will build large target community of end-users which will be interesting for advertisers in the various sectors.</p>

### 3.6.2 SDI4Apps Cost structure

This element measures all the costs the company incurs in order to create, market and deliver value to its customers. It sets a price tag on all the resources, assets, activities and partner network relationships and exchanges that cost the company money.

In the first version, we will provide decomposition of costs and identify and describe costs associated with the operation of the SDI4Apps platform, data provisioning and maintenance and development and

maintenance of the applications build on the platform. In this initial version, we will not provide any calculation of price tags for each of identified costs, since many costs are dependent on technical testing in order to estimate resources required for operation of applications for the specified target group of users.

The following table provide decomposition of costs identified for the SDI4Apps platform. Table provides only costs related to Platform provider role either directly or indirectly via partnership with sub-providers (e.g. for software development of technological platform enablers or for infrastructure provisioning). Any other costs associated with the development, maintenance or operation of sector specific applications are excluded.

ID	Category	Description
C1	Infrastructure	This category covers any direct or indirect costs associated with the installation, maintenance and operation of the basic hardware and software infrastructure including pricing of bare metal servers, licensing of operating systems and software virtualization infrastructure (hypervisors and management software) and pricing for networking and internet connectivity.
C2	Platform development	This category includes any direct or indirect costs associated with the development of specific platform components (technological enablers) in order to implement bug fixes or new functionality. This includes also any costs for management of software development process (e.g. release management, etc.) including the community management in case of open source software. This assumes that components are developed in generic way and are not specific nor customized for specific application.
C3	Platform maintenance and operation	This category includes costs associated with the installation and maintenance of the software enablers provided by SDI4Apps platform and their dependencies. Costs cover basic administration tasks such as installation, updating, monitoring, backup management etc. Besides the administration tasks, costs additionally cover any software integration and testing tasks associated with the integration of components' updates and re-assembling of the integrated platform. This category also includes software development costs for critical updates and bug-fixes excluded from the platform development or in-house development in the case that the component is not further developed by open source community.
C4	Data import and maintenance	This category includes costs associated with the initial import of new data and subsequent maintenance of data updates (excluding the cases where the platform services are used for data sourcing). These costs include also software development of connectors and data harmonization tools specific for the new format not directly supported by the platform and costs associated with the semi-automatic data harmonization and quality control of imported data.
C5	Data licensing	This category refers to costs associated with the provisioning of licensed data in case where data are not provided for free for platform users by data provider.

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C6	Marketing and dissemination	This category covers all costs associated with the promoting of SDI4App platform to all target groups of users (application developers/providers, data providers, end users) covering entire buying cycle of distribution channels (awareness, evaluation, purchase, after sale).
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## 4. SDI4APPS BUSINESS MODEL

### 4.1 Stages

With regarding to the business model, we distinguish three stages of the business activities related to the SDI4Apps operations:

1. Data import and maintenance Transition stage - This stage includes a transition to advanced capabilities of the SDI4Apps services offering higher value to the customers and making the platform cost recovery and profit making. All the partners have committed to contribute to the platform development, upgrade and marketing as an in-kind contribution within this transition stage. The business mode will be targeted to one-year Transition stage.
2. Full business stage - The platform will be cost recovery and profit making.

### 4.2 Business Model Canvas

The following Business Model Canvas summarizes our initial intensions and conclusions about the SDI4Apps business model divided according to four model elements and three stages. This first sketch will be further investigated and complemented with the estimation of price tags for costs and revenue streams in order to reach Full business stage.

**Table 9 SDI4Apps business model sketch**

	Project stage	Transition stage	Full business stage
<b>Value proposition</b>	Provisioning of data, Sourcing of data, Import and maintenance of data Application programming interfaces, Common cloud infrastructure, Datasets		
<b>Customer Interface</b>	Key stakeholders - end users, Application developers, Application providers		
<b>Infrastructure management</b>	<ul style="list-style-type: none"> <li>• Software integration and maintenance capability</li> <li>• Data integration and maintenance capability</li> <li>• Software development capability mostly outsourced to open source communities</li> <li>• Infrastructure</li> <li>• Infrastructure maintenance capability can be outsourced to external Infrastructure provider</li> </ul>		
<b>Financials</b>	<b>Costs:</b> <ul style="list-style-type: none"> <li>• Infrastructure</li> <li>• Platform development</li> <li>• Platform maintenance and operation</li> <li>• Data import and maintenance</li> <li>• Marketing and dissemination</li> </ul>	<b>Costs:</b> <ul style="list-style-type: none"> <li>• Infrastructure</li> <li>• Platform development</li> <li>• Platform maintenance and operation</li> <li>• Data import and maintenance</li> <li>• Data licensing</li> <li>• Marketing and dissemination</li> </ul>	
	<b>Revenue models:</b> <ul style="list-style-type: none"> <li>• Partnership with funding organizations</li> </ul>	<b>Revenue models:</b> <ul style="list-style-type: none"> <li>• Open source</li> <li>• Freemium/Premium</li> </ul>	<b>Revenue models:</b> <ul style="list-style-type: none"> <li>• Open source</li> <li>• Freemium/Premium</li> <li>• Advertising</li> </ul>

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