BUILD-UP OF A BUSINESS MODEL FOR SUSTAINABLE NSDI

Vlado CETL [1], Ivan LANDEK [2], Ante RONČEVIĆ [3]

ABSTRACT

Experiences from most countries worldwide show that initial funds for setting up the first generation NSDI come from the state budget. However, the NSDI development process has several phases, including implementation, maintenance and further development, which requires a long-term stable finance mechanism. Therefore, a short-term finance mechanism can rely on the state budget, but for sustainable development it is necessary to define a long-term one. Development stage of the existing NSDI is closely related to this. In the early phase of the NSDI set-up, it is not possible to gain benefits alongside reasonable costs, and financial support is necessary. In this phase it is unlikely to expect bigger engagement from the private sector, and the financing relies on the state budget. Further development and the move from the 1st-generation to 2nd-generation NSDI marks its ability to stimulate productivity and the spatial data and service market, to achieve benefits and contribute to the overall society welfare. Support for this process is achieved through building a business model for sustainable partnership and a business network, and for functioning joint services.

This paper gives theoretical views of the build-up of an NSDI business model, as well as practical experiences of the work group for building the NSDI business model in Croatia.

Key words: NSDI, business model, Croatia.

1. INTRODUCTION

Over 80 % of all available information includes a spatial component (Ryttersgard 2001), which calls for more efficient management of spatial data at all society levels. From local to global level, there is a need for simpler access to spatial data, their integration and use. Organization of spatial records and their distribution leads to development of a spatial data infrastructure (SDI) at national, regional and global levels.

Each higher level consists of one or more elements of a lower level and besides the vertical connection between specific levels, there are some firm, complex horizontal connections based on the legal and political framework. It is difficult to define the

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extent of thoroughness of data that will satisfy users' needs at specific levels. Considering the hierarchy and needs, the given data are mostly an agreement between all available data at different levels. Results of the research done in Rajabifard et al. (2000) show that a national spatial data infrastructure (NSDI) plays a key role in the development and implementation of other levels. The initiatives taken are aimed at an unlimited, quick, single and simple access to spatial data and services for all interested users. Also, what is common to all initiatives is the economic aspect of NSDI, ie. importance and effect on the economic development of countries taking part in its implementation (Cetl, 2007). The initiators are mostly governments or competent ministries, which means that establishment of an SDI is not only in the interest of spatial data users, but is a priority for the whole society (Cetl et al., 2002).

From today's perspective, the SDI development can be divided into two generations (Masser, 2005). The first generation was primarily oriented towards technical issues and data as final products (product-oriented). In this phase it was unlikely to expect bigger engagement from the private sector, and the financing relied mainly on the state budget. The second generation has been oriented towards users and services (service-oriented). Today spatial data users not only want to access data, but also use various services and analyses, which includes combining different heterogeneous spatial databases and other sources. A prerequisite for this new, user- and service-oriented SDI generation is interoperability. From the financial point of view 2nd-generation NSDI marks its ability to stimulate productivity and the spatial data and service market, to achieve benefits and contribute to the overall society welfare.

The market for spatial data, information and services has undergone major changes, with the Internet and E-commerce as business drivers. Today we can often see every day some new products and services specified by spatial data users for a specific use. Just few years ago only producers were able to specify the content and quality of an available product. The shift from a situation where the national mapping agencies almost had a monopoly to a market with a widely distributed supply chain demands new business models, new prizing algorithms, clarified rules for copyright, standardized product specifications and access to metadata and it demands partnership and strategic partnerships between the possible players in the spatial information arena (Ryttersgaard and Ives, 2001).

The emergence of Google Earth and Google Maps has created a geo-awareness and has catalyzed a thirst for custom spatial data and services (Donker, 2009). The greatest producers but also the greatest users of spatial data and services are governments. They often possess high-quality large-scale spatial data, primarily collected, developed and maintained to support public tasks. This rich source of spatial data asks to be used and reused both within the public sector and by the whole society.

There is no doubt that simple access to geospatial data is the key prerequisite for an efficient and economically prosperous society. According to this, Croatia started an NSDI improvement to achieve benefits from usage of spatial data and services. One of the tasks in the process of improvement is creating of a sustainable business model. In this paper it will be presented some theoretical aspects of NSDI business model, as well as practical experiences of the work group for building the NSDI business model in Croatia.

2. NSDI FINANCIAL ASPECTS

The NSDI development is complex. It is a joint effort involving stakeholders from different levels of government, the private sector, academia and the professions. Individuals or groups may each play a single but different role or take on multiple roles. This is very much determined by one's positioning and business model in the spatial information industry (Chan et al, 2005).

An SDI at the national level is very important to a nation's development and requires a strong political will and contributions from all sectors of the society for its successful implementation (Giff and Coleman, 2002). An SDI may be viewed as a Classic Infrastructure providing public goods since spatial information displays a majority of the characteristics associated with public goods.

2.1. Business case

The NSDI must not be developed hastily, but a clear vision is needed, which is to be based on organizational, human and financial resources (Cetl et al., 2009a). How much NSDI cost and is it possible to realistically estimate all the costs necessary for its building, improvement and maintenance, plus the costs of all connected activities? The answer to this question requires an accurate definition of the SDI parts and all included subjects, as well as drawing up a business case the crucial component of which should be financing models. A business case structure has 7 steps (Centre for International Economics, 2000) (Figure 1).

Figure 1. A business case structure for NSDI

The role of a business case is defining the source, size and all other factors influencing the development and demand of a product. In the NSDI context a business model has to identify all economic and social benefits. Also, effective methods should be developed

which will demonstrate usefulness to different types of investors. Finding the most efficient financing mechanism is achieved through analyzing and testing different models in different conditions. Such analyses should give answers to and guidelines for key financial questions:

1. Where and when to look for sources of financing?
2. What are the connections between different sources?
3. How to present the financing concept in the best way to the Government and other financial subjects (banks and private sector)?
4. How to organize financing for efficient implementation (financing of different phases)?
5. What is the time period for financing?
6. What is the effect of financing on the pricing and fee policies?

Defining everything included in the NSDI includes the costs of its improvement and other connected activities. The sources and amount of costs can be seen through several factors:

1. Costs of collecting spatial data and/or their maintenance;
2. Costs of physical infrastructure (net resources);
3. Costs of adjusting data to appropriate norms, creation of metadata and catalogue;
4. Costs of people:
5. Other costs.

Unlike the costs that can be estimated and approximated to a high degree of accuracy, a benefit estimate is more complex. The reason for this is a possible big number of different applications and users who, by using spatial data and information, create further improvement and revenue in their organizations, which indirectly affects the whole society (Cetl, 2007). Rightly or wrongly it is often claimed that the "real" benefits of SDI are better decision- making, improved policy outcomes, more flexible access to data or some other so-called soft benefit (Wishart, 2009).

Doing cost-benefit analyses for the needs of NSDI is not simple and around the world there are very few extensive cost/benefit and RoI (Return on Investment) studies (Cetl et al, 2008a). It is certain that we cannot tell who and what all is included in the creation of NSDI, what costs these activities make, and what all sources of financing are necessary. Some existing cost-benefit analyses result in the ratio from 1:3 to 1:4. According to Roger Longhorn (2009) the RoI ratio for an SDI or SDI like activity was never less than 1:1! So it is unquestionable that the NSDI improvement results in financial benefits for all subjects included in the process and the society as a whole.

2.2. Business model

After defining a business case, a business model should be defined. Business model is a method of doing business by which a company can sustain itself – ie. generate revenue. Revenue is an income that a company receives from its normal business activities, usually from the sale of goods and services to customers. A business model describes the strategies implemented to achieve this goal. A business case or a financial model is an essential part of the business model.

Setting up an efficient NSDI requires creating a business model in close correlation to an implementation model (Wagner 2005) (Figure 2).

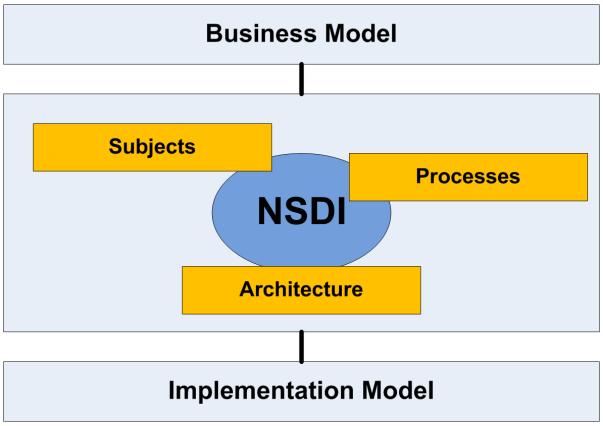

Figure 2. Correlation between an implementation and a business model

A business model defines business goals of the infrastructure. It also has to clearly define roles of all NSDI subjects for business processes within the NSDI, and enable a short-term and long-term sustainable financing and development.

One of the important issues in NSDI business model is also a question of appropriate pricing policy. The question whether public bodies can charge for making their spatial data available has been a constantly returning item on the NSDI agenda for years. Spatial data can be used by public bodies for performing their public tasks, by the private sector for creating commercial products, or by citizens for participating in their national democracy or holding their government accountable. The arguments that are used to defend either cost recovery or open access policies will have a higher or lower value depending on this purpose of use (Janssen et al., 2009).

The ratio between prices of public information and charges for their usage is very complex. Influences on that ratio are at least from market but much more from social, political and very often subjective criteria (Cetl et al., 2008b). Generally, there are three basic models for charging spatial data dissemination:

1. Full cost recovery – costs of collecting and distributing data are fully defined and covered
2. Partial return on investment – costs of distribution and part of investment costs are defined and covered. This differs depending on whether it is a private, commercial or noncommercial user. Private and commercial users pay more, and noncommercial less or only marginal costs.
3. Model of partial return on the investments in distribution – only distribution costs are defined. There is usually no difference between private, commercial and noncommercial users. Security of data privacy and copyrights should be guaranteed.
4. Free-of-charge access to data.

There have been debates in Europe in the last years about whether fees should be introduced or free access granted, as for example in the USA. A majority advocates free access and unlimited use of all data which the public administration possesses, which is supported in academic research as well. However, the other option claims that users generally make bigger pressure if they pay for the given data, which eventually results in a better quality of spatial data. A good example is the model used in the Kingdom of Norway. To be able to consider data which are free for a wider group of users - citizens (it is assumed that use of data will not generate a new product with a new value), it is necessary to close the financing circle so that total costs are divided between the state administration, units of local self-government and big public companies (eg. INA, JANAF, PLINACRO).

3. NSDI IN CROATIA

In the last few years there have been different initiatives and activities concerned with the NSDI and most of these were initiated by the State Geodetic Administration (SGA), which is the national mapping and cartographic agency (NMCA). The first legislation concerning the NSDI in Croatia came into force in February 2007 with a new Law on State Survey and Real Estate Cadastre (OG, 2007). A separate chapter defines NSDI as a set of measurements, standards, specifications and services which, within the framework of establishing e-government, aim at enabling effective gathering, managing, exchange and usage of georeferenced spatial data. The Law gives definitions of NSDI and metadata, content of metadata information, services, NSDI data and subjects that are required to participate in its establishment and maintenance, and what is very important, gives an institutional framework and defines NSDI bodies and their responsibilities. It is to be stressed that at the time the Law was being prepared, the INSPIRE directive was in its final phase. Croatia is still a non-EU country and is not required to apply the INSPIRE directive at the moment, but it was decided to use the advantage of INSPIRE being prepared in order to make the information society ready for implementing it at the moment Croatia joins the EU. As a result there is a high compatibility between the Law and the INSPIRE directive (Cetl et al., 2009b).

Furthermore, the Law defines an institutional framework, i.e. NSDI bodies at three management levels: NSDI Council, Committee and working groups as well as their obligations (Figure 3).

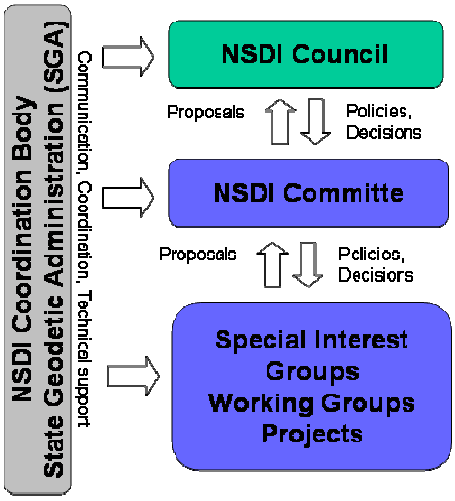

Figure 3. NSDI institutional framework

The NSDI establishment and coordination of the activities of the NSDI subjects are governed by the NSDI body composed of a chairman and 15 members appointed and relieved of duty by the Croatian Government. The members come from different ministries, state bodies, IT, geodetic and geo-informatics economic community. The NSDI Council promotes the establishment of the spatial data sets and services as well as the establishment and monitoring of the spatial metadata system functioning of the NSDI subjects (Bačić and Rašić, 2009).

At the managerial level, there is the SDI Committee appointed by the Council and consisting of three representatives from the Council, two from the SGA and the heads of working groups. The NSDI Committee implements the NSDI establishment policy determined by the NSDI Council, performs the works and tasks delegated by the NSDI Council, coordinates and monitors the work of the working groups and coordinates the implementation activities of the NSDI subjects related to their establishment in accordance with the NSDI Council guidelines.

Working groups are temporary or permanent work bodies responsible for the concept and implementation aspects. Their members are representatives of the state authorities at all levels, of users and producers of spatial data, research and educational institutions, etc. These bodies are appointed or dismissed by the NSDI Committee, with approval of the NSDI Council. A prerequisite for forming a body is a clearly defined mission and a detailed execution plan. During 2008 two working groups (WGs) were created: a WG for NSDI technical standards and a WG for spatial data sharing policies. At the end of 2009 three new working groups were created: WG for building the NSDI establishment capacities, WG for linking the NSDI program and e-Government and WG for establishing a business model for the NSDI.

The State Geodetic Administration in the organizational structure is a coordination body, a kind of secretariat, providing continuous support in the NSDI development process, coordinating work of all NSDI bodies, and providing technical support. Its main tasks are: set-up and maintenance of the central NSDI web portal, securing communication support, public relations, services of leading projects, services of quality control, etc. This organizational structure is similar to that in countries like Germany or the Netherlands.

3.1. WG for establishing a business model for the NSDI

The Croatian vision of NSDI concluded that spatial data and services should be treated as economic goods, produced and integrated in the value chains and as such an object of trade. Market mechanisms will be used to coordinate the supply and demand of products based on spatial data. Due to complexity of tasks which are to be realized to set conditions for a market treatment of public spatial data, it is necessary to network three types of partners:

- infrastructure management,
- content management,
- sales management.

Precisely with this aim the NSDI Council decided on 8 July 2009 to form a WG for establishing an NSDI business model. The first meeting of the WG was held on 20 October 2009. The working group has a director and 28 members. A response to participate in the group outdid all expectations and this WG has the most members in comparison to others which have 10 members on average. The WG members come from the state administration, ministries, academia and private sector. The WG is organized as one operational WG and three subgroups. The operational WG has a director and three representatives from each subgroup, who meet regularly once a month.

The WG will develop a model for establishing sustainable partnership and a business network, and for works of joint services such as a catalogue, etc. It should be emphasized that this WG is doing a pioneering work because similar WGs in other countries are also in the early phases of work.

The activities which the WG is doing at the moment are:

- enabling exchange of experiences, good examples and other information for efficient implementation of an NSDI business model,
- monitoring the activities of implementing INSPIRE,
- collaboration with other working groups within the NSDI establishment,
- creating a strategy for building an NSDI business model,
- reporting on its work to the NSDI Board and NSDI Council.

One of the first goals to be achieved is creating a strategy for NSDI business model, which will be put forward to the NSDI Council, and which should be accepted by the Croatian Government as a national strategy or a white paper.

3.2. Existing business model for spatial data producing

The whole production of official spatial data in Croatia that are under responsibility of SGA has been outsourced and performed by private sector. The Law on State Survey and Real Estate Cadastre confirmed the co-financing model, defining that counties, cities, municipalities and other interested legal and natural persons can participate in the provision of funds for carrying out the state survey and real estate cadastre works. The described process was a prototype of NSDI (Figure 4).

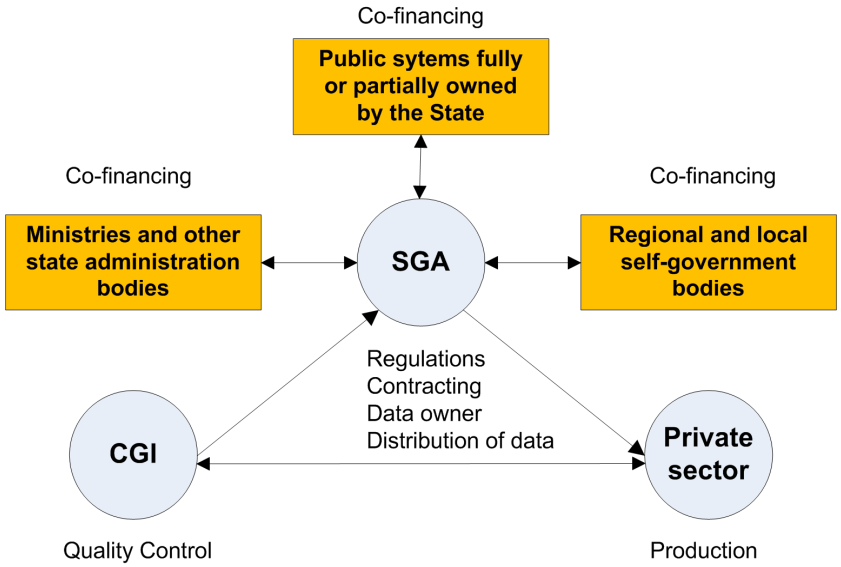

Figure 4. Cooperation model as an NSDI forerunner (Bačić et al, 2008)

The previous model was primarily oriented towards certain ministries, units of local self-government and larger state and public companies. This co-financing model will be continued also with new participants in the upcoming period, given that there is readiness and interest of all stakeholders that have been participating in the co-financing so far.
Subjects which sign this agreement with the SGA are given the right to use of official spatial data under the SGA's authority for the period in which the agreement is in force.

Although the described model is functional and efficient, its primary purpose is financing the creation of new spatial data and updating the existing data. Also, the agreement is signed for a fixed time period, and the NSDI requires a long-term stable financing model. For this reason the evolution from the 1st to 2nd generation NSDI requires a bigger engagement of the private sector.

Financing mechanisms for the NSDI improvement have to cover a short-term (initial) as well as a long-term (permanent) period. Spatial data and information within the public sector bodies represent public goods, and the aim of NSDI improvement is a support to efficient management and e-government. Besides, it has already been mentioned that

the Government is generally the biggest user of spatial data. So it can be concluded that initial funds for the improvement should be provided from the state budget. Further financing requires additional sources, and according to research results, the optimal mechanism seems to be public-private partnership (Figure 5).

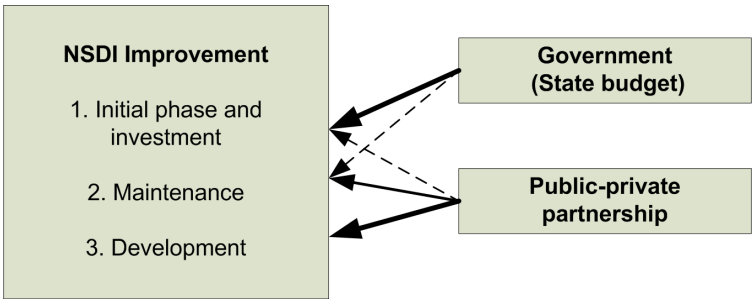

Figure 5. NSDI financing model (Cetl, 2007)

One of ever more common financing sources for infrastructural projects is public-private partnership, which involves cooperation between the public administration bodies and the private sector with the aim of satisfying a public need. In this way, through different methods the private sector can employ its own resources and skills to offer goods and services traditionally provided by the public administration bodies.

A bigger engagement of the private sector in the NSDI improvement can be expected only after the initial phase. The reason for this is the achievement of added value, which is the main factor in this sector. The end of the initial period should result in setting up services which will be recognized by the private sector for further investment, which will finance the maintenance and development or the 2nd generation NSDI.

4. CONCLUSIONS

Considering the effects and significance of wider interest to the public and society, the NSDI improvement should be regarded as an essential prerequisite and basis for building an overall societal information infrastructure, and as such a public project. This is supported by the fact that most spatial data which make the NSDI frame are public spatial data. Here the important task is to define a business model that will ensure a long-term financing and a sustainable NSDI. Most of the existing 1st generation NSDIs worldwide rely largely on a combination of financing from the state budget. In most cases these financing models were planned for one-time use with no future vision.

The first generation NSDI in Croatia also relied exclusively on the state budget. Since the NSDI is currently in a transition phase from the 1st to 2nd generation, this requires the right structuring of financing mechanisms and a much bigger participation of the private sector. This is not possible without an efficient business model, which is the main task of the working group for its building. The existing model which served as the basis for NSDI has to be expanded through bigger engagement of the private sector. The future business model will have to describe an information and communication

platform, products, business processes, legal aspects, pricing, marketing, support of new businesses and business networks. It will also define concepts and rules for business processes within the NSDI and the participating companies.

Creating a pricing policy as part of the business model is also a very important factor in the NSDI improvement. The issue of data price and fees for usage is debatable, but the main NSDI principle should be "as cheap as possible". In line with that there should be a combination of: open access and cost recovery, use of spatial data and services for non-commercial purposes free of charge or with minimum costs of dissemination and maintenance, and charging for commercial purposes.

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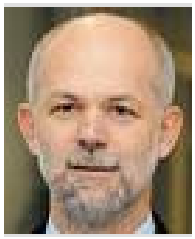

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