

## **The Initiative of Libyan Spatial Data Infrastructure (LSDI) Obstacles and Challenges of Implementation**

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### **Abstract**

Governments seek all over the world to achieve an important goal of their objectives; which is the building of a national spatial data infrastructure (NSDI) in order to increase the use of the assets of the national geospatial data. There are more than 120 countries are already considering projects of this kind; this indicates the significant impact of such projects in the field of infrastructures development for these countries, and more than half of the world countries taking part in what became known as the phenomenon of national spatial data infrastructure (NSDI), these developments produced of so-called hierarchy of the initiatives spatial data infrastructure above the national level and below it, given the global nature of this phenomenon, there are efforts by the world association for the spatial data infrastructure to enhance the spatial development worldwide, from the outset it was recognized that the building of spatial data infrastructure (SDI) is much more than just a technical task, as its effective implementation also requires fundamental changes in many cases in the institutional context that governs the collection and dissemination of geographic information in each of the concerned countries (Masser, 2007).

Since a long time Libya had suffered of complex problems regard to the availability of spatial data and access to it because of poor management and duplication and inconsistencies in the information, as well as illegal uses of spatial data, has sought the competent authorities in this area to take the necessary measures to find solutions to these problems.

In 2006, Libya has started building the Libyan Spatial Data Infrastructure (LSDI) as the cornerstone in building an overall information system on a larger scale in Libya which has called Libyan Information Infrastructure (LII). LSDI will contributes significantly to the coordination of efforts to develop the geospatial databases that were obtained within the efforts of national projects that have been initiated since 2006, including the project of the third generation of urban planning, the national program of improve water and wastewater infrastructures, and the project of national census in 2006 (Sorensen).

This research paper reviews a breif background of SDI phenomenon, its components and its importance, With some emphasis on the modest Libyan initiative experience, with a presentation of some obstacles and challenges facing the implementation of

the Libyan initiative, and the proposed solutions to deal with those challenges in the future.

**Keywords:** Spatial Data Infrastructure

## **1. Introduction**

There are a lot of environmental, political, economic and social challenges facing the communities and be the main obstacle in the issue of dealing with them is the availability of data and information needed for the study, analysis and decision-making, hence the importance of creating an infrastructure for data management, and ensuring access to decision-makers with the required accuracy at the right time to take the decisions necessary to address these challenges. That infrastructure could be called Spatial Data Infrastructure (SDI).

The term Spatial Data Infrastructure (SDI) has been formulated in 1993 by US National Research Council as an indication of the framework of technologies, policies and institutional arrangements that facilitate the produce, sharing and use of geospatial data and resources of relevant information; through the sharing of information locally, nationally, regionally or globally according to standards and policies are developed for this purpose (Esri, 2010)

SDI can be defined as an initiative to create an environment in which all organizations and institutions in the country of cooperation among themselves and interact with the technology relevant to achieve the desired objectives at various levels of political and administrative through the sharing of data and information among themselves and leading to better results, as well as SDI can be defined as a coordinated series of agreements on technology standards and institutional arrangements and policies that enable organize of the geospatial information use by users for purposes other than those which it was created (Steiniger and Hunter).

SDI has become very important in determining the way of the use and sharing of spatial data available by all organizations and beneficiary institutions across the country, enabling them to save resources, time and effort required to obtain these data by avoiding duplication of expenses associated with the produce and maintenance of data and integration with other datasets (Rajabifard and Williamson)

Libya has suffered like other countries in the world of those environmental, political, economic and social challenges which be obstacles in the way of the country's development, in addition to lower growth rates of the state's infrastructure over the past years due to poor management and lack of follow-up, leaving the country in developmental stagnation status that caused a failure to keep up the development of civilization in the world.

Under the plan ambitious development which Libya is seeking to achieve in the coming years after the political change which has occurred in the country, officials are seeking to take advantage as much as possible from all the modern technologies to build a civilized country on the basis of modern scientific, and the most important infrastructure that Libya is seeking to build and develop is the National Spatial Data Infrastructure (NSDI), because of its significant impact in the evolution of the rest of the country's infrastructures.

Despite the advantages that will provided by LSDI to address the development challenges of this country; but there are a number of social, administrative, technical and financial challenges facing the design and implementation and development of this infrastructure, which requires attention to the provision of expertise in all disciplines to address these challenges and develop solutions to deal with them (Arshad and Hanifah).

## **2. Literature Review**

### **2.1 Overview**

Spatial Data Infrastructure (SDI) is of the most important basic elements for the development of country institutions and its organizations, as there are a lot of idle economic potential because of their need for spatial data, which could benefit by making this data available on a large scale through SDI at all levels from the local and national level to regional and global level.

There are many countries have established their NSDI and made it available on the Internet, this development points to a large extent to the importance of these initiatives between countries as one of the most important priorities, and formalize them, sometimes SDIs are implemented under various names as is the case in some African countries but the targets are same, as there are some countries were delayed in this area although there are a lot of unofficial activities which that would contribute to build NSDI in case the government decided to embark on this project formally, and this delay may be attributed to the lack of firm political decision to implement such initiatives because of lack of awareness of its importance for the country (Makanga and Smit).

Since the end of seventies of the last century; many national organizations specializing in the surveying and mapping began in the organization of many large investments to improve access to spatial data and promote their use widely, to reach this goal began thinking in the establishment of the necessary framework to do this task through what is called the Spatial Data Infrastructure (SDI), where the establishment of SDI mainly done by government agencies in what is called the National Spatial Data Infrastructure (NSDI), and allocate the necessary resources from public budgets of the country with a periodic assessment of progress made with time (Makanga and Smit).

## 2.2 SDIs Importance

Government agencies and other organizations seeking to get a quick response to the natural disasters, industrial accidents, and environmental crises, as a lot of the information needed to make sound decisions in such cases is based on the geospatial data that are critical in making wise decisions and the most cost-effective and efficient to deal with such disasters and challenges (FGDC, 2005).

It is well known among policy makers that the information and analysis of high-quality a sine qua non for the development of good policies, and in this regard, the back of the so-called spatial information as a result of modern technological progress, as this information is a major factor contributing to improving the policy development process, due to its ability to integrate all of quantitative and qualitative related data and presented to decision makers in innovative formulas, and we can expand our knowledge base of what is happening on the surface of the earth by increasing production and development of geospatial data using satellite imagery and other methods of data collection, production and analysis at various of SDIs levels from local to global, this explosion in the geospatial information has created new scope of works related to spatial services which contributed to economic growth and increased the volume of competition in the development of technologies associated with this area, and that rapid progress in the technology of geospatial information allows for improved access to spatial information, and expansion of the traditional role of maps to include new tools for data analysis and management, as many of datasets and digital information available currently are classified spatially, and this provides new opportunities and poses new challenges at the same time to the effective use of geospatial information to help solve the key problems of global importance.

Most of countries are using the geospatial information and describing them as an important element in the development of the national policies, but effective coordination between the countries for the use of such information is the exception not the rule, moreover, the regional efforts, such as the efforts of the European Union and the Standing Committee on spatial data infrastructure in Europe and the Standing Committee on spatial data infrastructure in the Americas and the efforts to develop infrastructure for geographic information systems for regional spatial data for Asia and the Pacific show the value of this cooperation, and international cooperation may help growing in this field to develop the potential of geospatial information and basic technology, and to make these technologies more useful and more accessible for all users and policy makers. GIS as one of SDIs tools plays by facilitating the operations of spatial analysis an increasing role in the process of decision making at all levels of government and the private sector, where spatial data analysis using GIS depends on the availability and quality of digital geographic data, in addition to the compatibility with each other (FGDC, 2005).

### 2.3 The hierarchy of SDI levels

Many developing countries seek to develop their SDI at various levels through initiatives, ranging from local to national and regional levels, and some countries are also involved in the establishment of the Global Spatial Data Infrastructure (GSDI). Develop of these initiatives at various levels aims to strengthen the economy and development by facilitating and improve assets management to take advantage of spatial data (Rajabifard and Williamson).

SDI levels ranging spatially according to the coverage area from local to national to regional and global levels, as the management and sharing of these data and geospatial information among these levels must be in different ways based on its level and intended use, where this represents an integrated process between the levels (See Fig. 1). At the local level, several authorities and institutions devoted their efforts to produce the most important geospatial data and documentation, but they often do so independently of each other and with little coordination between them and the national programs for mapping. At the national level, the role of governments is shifting from a basic provider of geospatial data to the possessor of reliable data for purposes of national programs, also as a coordinator, organizer and facilitator of partnerships between producers and providers of geospatial data and users. At the regional and global level, it has established several international initiatives to deal with aspects that are not allocated to the geospatial data and have a global nature.



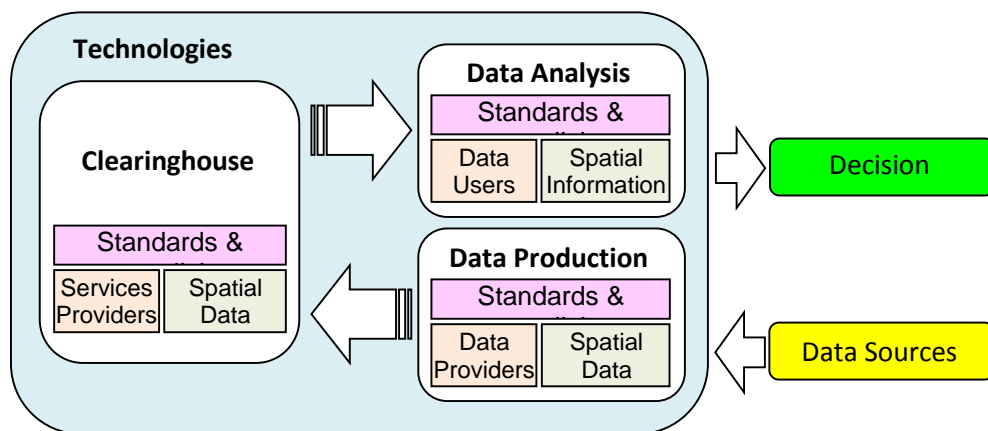
*Fig. 1 The hierarchy of SDI levels*

### 2.4 SDI components

Before the Internet and its technology takes its place widely; and perhaps even to this day to a large extent, the storage of spatial data regarding a certain location are from different sources and locations, and is often used different standards for this purpose, which makes it difficult for the user to access this data and use them. Thus, the primary goal of creating SDI is to provide the ability to access spatial data stored in these various locations and benefit from them and saving resources, time and effort, to reach this goal, SDI should include technical components which enable data

providers and users to communicate with each other to access the information quickly and easily, and besides these technical components there are organizational aspects such as licensing agreements, technical standards for quality control of data, and policies governing access to the data, these organizational aspects must be identified to ensure access to the data in consistent and reliable form. Thus, SDI is not only a technical aspect, but full frame includes political, technical, commercial and social aspects, and perhaps useful to distinguish between the five components of SDI as following (Steiniger and Hunter): See Fig. 2

- Spatial data and information.
- Technologies used for spatial data handling, both hardware and software.
- People (spatial data providers, services providers, users).
- Policies governing the methods of spatial data handling.
- Standards for the production, presentation and transfer of data.



*Fig. 2 Track of spatial data within SDI components*

## Spatial data and information

It is obvious that the key component of SDI system is those data that is produced and shared, which can be obtained from their sources using a variety of technologies, and the availability of these spatial data depends on their updates and accuracy of content, as well as the completeness of attributes and coverage, which allowing use in development at the local and national level to contribute to economic growth and improve the environment, stability and social progress, by making appropriate spatial analysis to get spatial information useful in decision-making, and spatial data must be accurate and readily available in time to be used as a source of spatial information necessary to support the decision makers, which contributes to the reduction of duplication of efforts, and reduces the cost (Arshad and Hanifah).

## **Technologies**

Came the urgent need for the use of new technologies within SDI components in line with the continuing need to monitor the earth and collect and update data continuously, providing a huge amount of databases with multiple sources.

The modern technologies of geographic information systems can provide a dynamic interface through SDI to be used by users to display spatial data and information and to deal with, where can view data on two dimensions or three dimensions, in addition to displaying data in real time, allowing more opportunity for more accurate and quick analysis for the earth status in real time using GIS technologies

SDI Can not be considered as an isolated system, but is a distributed system includes a huge amount of spatial data loaded on wired and wireless computer networks, so it is necessary to develop a system to manage those distributed databases, and resolving the issue of access to non-compatible data in a manner appropriate, as well as the issue of spatial data sharing, analysis and presentation, in addition to the issue of communication between data providers and users and data flow between them via the Internet or mobile phone (Deren Li, 2003).

## **People**

This component include users, providers of spatial data, and all those involved with such data available in the SDI, meaning that the people must create SDI, and SDI must serve the people, so there was an urgent need to establish closer ties between people and data; through the study of rights, restrictions and responsibilities that affect the relationship between people and data which has become increasingly complex with the increase in data volume and complexity of stakeholders networks (Rajabifard and Williamson).

## **Policies**

With the increase of spatial data amount from various sources; and the number of data providers and users; there is an urgent need to develop policies governing the relationship between data and involved people, as well as the relationship between those people with each other, and usually the focus of research in these policies at the national level although this level is one of SDI levels which ranging from local to national to regional to global, and Irrespective of this focus; understanding the different SDI levels is a challenge of the challenges facing the issue of SDI development and the ability to access data through the one level, as well as across other levels of the hierarchy of SDI.

SDI policies are which govern the relationship between people and data such as those relating to privacy, copyright and intellectual property, as well as the relationship between people with each other such as those relating to pricing, institutional

arrangements and administrative framework that supports both the development and maintenance of SDI, policies which are developed must be appropriate and applicable, which also represents another challenge facing the building of this SDI component (Williamson, 2004).

## **Standards**

Standards are important necessities for sharing of data products and provide metadata for spatial data effectively, and standards are designed to facilitate data access, improve quality and ensure the effective integration (Hansen *et al.*, 2011).

From this point; NSDI should be build based on national standards which must developed to adjust the specification of spatial data and methods of data collection, documentation, sharing and use to be integrate with other data, this integration enable to find out effective and efficient solutions for users, and increases the effectiveness of the sharing of spatial data, which will encourage providers of such data to build the databases according to priorities agreed nationally to meet the needs of users through NSDI, also must support ways to develop classification systems of national spatial data, the system of spatially referenced, content standards, and data forms to facilitate the development of spatial databases at all levels, with development of a set of national standards for quality control of spatial data in NSDI, which help users to ensure the quality of spatial data available and suitability to meet their needs, and enhance the future improvement of the quality of metadata records for spatial data.

## **3. Libyan Spatial Data Infrastructure (LSDI)**

### **3.1 Background**

Libyan Spatial Data Infrastructure (LSDI) initiative was launched officially in April 2006, when a GPC group led an international team of consultants to plan and design the initial implementation of the LSDI initiative in coordination with the Urban Planning Authority (UPA) and The United Nations Human Settlements Programme (UN-HABITAT). LSDI has been initiated as a part of a huge project to create a Libyan Information infrastructure (LII) and supervised by the Libyan General Authority of Telecommunications.

First stage of this initiative, which was a strategic plan for implementation has been completed after the cooperation of representatives from seventeen governmental and institutional entities related directly to this initiative, with the first-stage ends successfully, LSDI is now ready to move to the next stage to develop the building a network for national geospatial databases and comprehensive expansion of the beneficiaries of this initiative, and institutionalize the information maintenance and procedures for data sharing between all entities of government (GPC, 2005).



It has already started a number of national projects that will develop a lot of basic geospatial datasets for many agencies and national institutions. These projects include the third-generation planning project, the national program for water and wastewater, and the population census of 2006. These geospatial datasets will provide an important reference, which can be used by decision-makers and agencies at various levels among different sectors to improve public facilities and services (BLI\_Consulting&Training, 2006).

### **3.2 Spatial Planning in Libya**

In many countries was used technology of geographic information systems (GIS) in spatial planning, but the benefits of using this system have been modest because of the lack of any changes in the structure of technical and administrative organizations in these countries in line with the development of modern techniques of spatial planning, where there are many databases and digital maps in various institutions of public and private sectors, and municipal organizations, and even within the same department, working on an independent basis, and thus often occur duplication in the provision of data in addition to the incompatibility between them, and the presence of independent projects stand to alone have limited impact, and do not include institutional means that the project cannot rise from the project level to the institutional level, and thereby convert it to a continuous process of modernization and development. However, a growing awareness among data producers and users can be combined with investments in the development of digital databases to reduce costs and increase the benefits of GIS, especially in the field of information technology in general.

At the Libyan level, it had develop a set of integrated spatial plans twice on the national and local levels, known in Libya as the first and second generations, where the first-generation plans were developed in the sixties, and the second generation plans in the mid-eighties, which aims to guide the spatial development of the country at various levels of planning until 2000, in the recent years. The third-generation planning had been launched, which included among its objectives the attempt to create the spatial data infrastructure, which will facilitate the integration of all Libyan spatial data main products in one integrated system.

During the year 2004, started preparations for the development of many urban plans at various local levels under the national level, as well as to review the maps' list, these activities aim to incorporate the latest GIS, remote sensing and imaging technology in this massive planning project, and not to consider planning as a fixed product, but as a set of continuous production processes (Almokhtar and Zidan).

During the third generation urban planning project, many sources of information and geographic data had been provided, that can be linked and expanded in a system includes all the relevant information spatially at all Libyan areas, as a part of this project, there are activities have been done by the Urban Planning Authority (UPA)

in Libya, in cooperation closely with the United Nations for human Settlements (UN-HABITAT) with respect to the national initiative to develop the Libyan Spatial Data Infrastructure (LSDI) which is seen as a development process in gradual, where an information center (GIS unit) has been established in the main office of UPA, also has been coordinating the establishment of local information centers in the branches of UPA in all Libyan regions, this work aims to create a geographic information system to guide the spatial development of the country, such a process requires a time, not only to collect and store a large amount of geographical data, but also to review and modify the institutional system, rehabilitation of technical infrastructure and capacity building to be able to maintain, expand and improve access to data, ensuring the optimum utilization of geographic information systems to meet the requirements of society (UN-HABITAT, 2006).

### **3.3 Libyan administrative structure and its relationship with LSDI**

At this time Libya is passing through significant political changes, which may result in changing the political reality radically and thus a clear change in the administrative structure of the country.

Generally, Libya consisting of a number of cities, which contained a group of urban plans for their areas according to Zoning in Urban Planning Authority (UPA) in Libya. It is also within each urban plan, there are many divisions of local and municipal character, which concerned with municipality matters for each division, with some administrative intersections among the local divisions and urban plans, causing some simple confusion in the organizational process within LSDI, which requires re-arrange the administrative boundaries of these divisions in the administrative structure to be compatible with the urban plans within the cities.

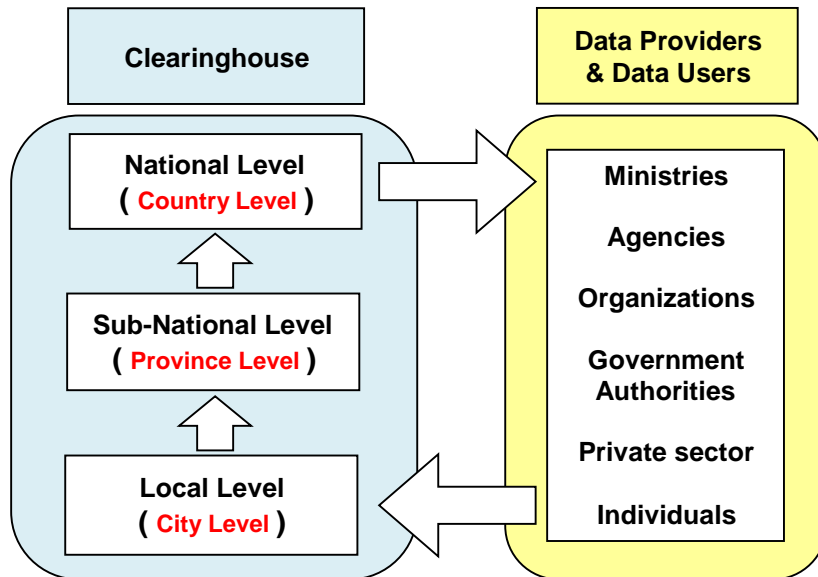
### **4.3 Proposed general structure of LSDI levels**

It is even be appropriate for the Libyan administrative structure, should be restructured it into only three levels, so that must merge all the lower administrative levels to the higher level of them, as follows:

1. **Local level (city level)**, includes all municipal divisions and urban plans located within the administrative boundary of the city.
2. **Sub-national level (province level)**, includes all cities within the administrative boundary of the province.
3. **National level (state level)**, includes all the provinces of the country.

Based on the above structure, must merge all urban plans within the city in one urban plan for the whole city which will be the basis for the LSDI at the local level for that city, and will be one of the components of the LSDI at the sub-national level of the province which the city located within its administrative boundary.

Based on the above it can be proposed cycle of the data sharing within the framework of LSDI as shown in the following figure: See Fig. 3



*Fig. 2 Cycle of data sharing within LSDI*

## 4. LSDI Challenges

### 4.1 Overview

Matter involves technical and policy challenges, such as data producing, and sharing, and interoperability, standards, privacy, confidentiality, and national security, and licensing of datasets, and partnerships between the public and private sectors, and the role of public participation and the private sector and governments to develop strategies for managing geospatial information and use.

At the global level, there has been some progress in this regard, such as the work of the Group on Earth Observations for the establishment of the Global Earth Observation System, but there is still much to be done. It believes that the way forward the establishment of a new global mechanism that combines all the regional organizations of mapping, and leading the role of the entity who heads the scientific communities relevant to the geospatial information, where the mapping and standardization of geographical names is one of the most important tasks in the development and implementation of geospatial data infrastructure projects in the modern era.

SDIs include various types of data associated with the location, such as data on population, health, environment, topography, size and economy. These data don't just publish in the media, but also have been provided as an informational services through the Internet too, so it is very essential to expand the traditional role of mapping and adapted to the geospatial data management and spatial data

infrastructures to meet the needs of a very broad base of data users at all levels. It is generally accepted that there is a tendency to move away from traditional approaches exist for mapping, and the trend towards the production of spatial data and information as an useful goods.

Despite taking a lot of practical steps for the successful implementation of such initiatives to build and develop the Spatial Data Infrastructures, however, there are still many technical and organizational challenges that need to be studied and addressed. The organizational challenge of the most pressing is the maintaining of the momentum and the high level of commitment of all stakeholders in this regard as well as the commitment of experts to contribute to the development of this SDI, and this requires some significant resources of time, expertise and money. The main technical challenge is developing of SDI to ensure effective use of a spatial data system according to a set of international standards (Esri, 2010).

## **4.2 Challenges Classification**

Based on the above can classify the challenges facing the LSDI initiative to the following classifications:

### **4.2.1 Social and Cultural Challenges**

The key element in this type of challenges is the lack of awareness among individuals, government institutions and private sector institutions of the NSDI importance, and what can contribute to the development of the country through the potentials that can be provided by GIS, because of the recent use of such technology in Libya, and not spread widely in its different institutions.

To raise awareness of GIS importance and its uses in LSDI, it is necessary to demonstrate the benefits that can be obtained, and access to support and encourage investment for the implementation of LSDI by providers of spatial data and users within institutions in the Libyan country. It should implement a plan for communication among all stakeholders in the LSDI implementation, and monitoring of different points of view through a series of workshops regarding implementation of LSDI.

In general, in spite of the importance of awareness of the significant role of GIS and NSDI, however, this level of awareness is not enough. It may contribute to increase the number of spatial data producers to provide large geospatial databases, but the limited means of dissemination of such data, may contribute to the limited benefits within the higher levels of SDI (Arshad and Hanifah).

#### **4.2.2 Administrative and organizational challenges**

Administrative and management institutions have been established on the basis of doing a specific task to serve its customers, and not prepared administratively to meet the needs of data and information sharing, and this often leads to duplication of efforts and inefficient use of financial and human resources in some cases due to the lack of a culture of information sharing between institutions as a central feature of the institution. Most of the institutions create their own database and information system interested with the priorities and needs of the institution, this results in the other challenge which is the lack of compatibility between the data among the various institutions of the country, making it difficult to share and make use of them at a higher level of institution-level (Arshad and Hanifah).

#### **4.2.3 Economical challenges**

Might be the most important challenge that may come to mind for any new project is the economic challenge and finding the source of funding, but with respect to Libya, this challenge can be viewed from another perspective, the economic challenge in this case might be a combination of cultural challenges and management obstacles, because in the event, convinced decision-makers of the importance of this project, and the provision of good economic management of budgets, the economic challenge loses its value due to the availability of funding source, where that Libya is one of the oil-producing countries and does not suffer the problems in the provision of financial coverage of new projects if the political will for that.

#### **4.2.4 Technical challenges and capacity building**

There is a close relationship between the implementation of NSDI and the technical resources available, beginning of the capabilities of the communication infrastructure of the country, in addition to providing equipment and software necessary for the implementation of this initiative, additionally qualifying the technical staff that will produce, maintain and update spatial data, and cannot be an institution or organization alone does this task because of the high cost, but the process is a symbiotic process needs to participate in all institutions and organizations, where many organizations suffering of lack resources to use and spatial data analysis because of the high cost of equipment and specialized software to do so, and in many cases, are buying these resources only to be used for a specific project, and when the project ends, they become useless, which makes projects associated with the use of geospatial data applications in problem-solving work is very expensive, and only a few organizations can do and afford (Arshad and Hanifah).

Among the technical challenges are also the incompatibility of the data, in many cases, spatial and temporal coverage, resolution, origination and format of the maps that are prepared by different organizations are not compatible, in addition to the lack

of metadata that defines data quality and suitability for use, which makes integrate and sharing such data available in these maps is a complex matter, and is being processed such this matter by the adoption of a set of basic national standards, which focus on the quality of documented data.

It is also the most important technical challenges facing the NSDI implementation is the capability of the communication infrastructure to accommodate this initiative, and provide the appropriate environment for data sharing through the communication networks smoothly and easily, which requires attention to audit and scrutiny of this issue and ensure the ability of the communication networks to perform this task properly and efficiently.

In addition to the above, it is worth noting the importance of building capacity to accommodate development spawned by this initiative, with the acceleration of the need for high technical capacity high-efficiency continuously, increases the need to expand the concept of capacity building, to a wider meaning of the focus on capacity development through formal education or training programs to address the shortage of qualified elements in the project in the short term, but must focus on addressing capacity-building measures on a long-term to include developing and maintaining the institutional infrastructures for longer periods of time. This applies to the capacity building necessary for the development of NSDI, which will help effectively to accelerate progress to develop such initiatives and take advantage them (Arshad and Hanifah).

#### **4.2.5 Legal Challenges**

There are three types of policies to promote the availability of spatial data, access to the data and re-use and sharing, and policies that facing a challenge and an obstacle regarding the availability of spatial data are those that relate to privacy, liability intellectual property and Intellectual Property Rights (IPR), which constitutes a major threat to the possibility of developing any NSDI, all these obstacles and challenges must be dealt by a legal way to ensure the right of the owners of the spatial data, at the same time provide the opportunity for users to benefit from this data legally.

#### **4.2.6 Privacy and Security Challenges**

With the widespread use of the Internet and sharing a huge data and information increased the difficulty and complexity of the issue of security control and privacy regard this information, because of the spread of the phenomenon of electronic hacking in general, and increase the ability of hackers to access the internet contents illegally, causing recently a lot of piracy on some websites and tampering with their contents that often may be private and secret.

Hence, the importance of this issue as a major challenge for information systems that depend heavily on the Internet as a means to access and sharing of data, as is the case for SDIs, so it was necessary to address this issue without limiting access to data, which caused in SDI inadequate to reach its goal for which it was created, in the same, time there are needs to protect data and information from tampering and theft.

There are standards can be relied upon to meet this challenge, such as SAML / XACML, which can provide the appropriate framework in SDI environment for access control and authentication, and thus ensure the security and confidentiality of information (Dasgupta, 2010).

## **5. Discussion and General Tips**

Always, the problem does not lie in the existence of challenges, as it is normal to face any new project or innovative idea challenges during its appearance in practice for implementation, but the real problem is in our vision of these challenges and how to think for its confrontation, and identify the priorities of the confrontation, and not be successful in this matter unless an adequate and accurate study of these challenges and define the root of the problem, and trying to see the problem by farsighted vision, to clear the relationship among these challenges, as it is possible to find solutions for some challenges by confronting other challenges (i.e. the most challenges we face are the challenges related to each other), so it should not overplaying the size of the problem, and at the same time should not be underestimated, but give the real size of the problem in order to contribute to solve it.

With regard to the challenges facing the implementation of LSDI, could be argued that these challenges start mainly from the challenges of social and cultural terms, the problem mainly lies in the lack of acceptance of the idea of data sharing with others, either because of the exaggerated privacy, or because of desire to preserve ownership of the data and not to waste this right for free, and sometimes not wanting to participation with others for fear of going into any problems that may result from such participation because of the lack of the policies that govern such relationships, especially when the interest does not call for such participation with other parties. It may be difficult to address this culture in a limited period, and may need a lot of time and effort to eradicate these negative thoughts and illustrate the importance of teamwork and participation for the success of the business at the general level which will directly affect to the success at the private level.

Given the principle of the priority of the challenges' confrontation, it is unacceptable to initiate solutions to the administrative and organizational challenges in the time when the social and cultural challenges still lie ahead, where must accept the idea and conviction in the beginning, and then comes the role of finding appropriate ways to manage and organize it, this context also applies to the technical challenges, it may be very easy to deal with them if the management and organizational challenges have lost its influence largely through the creation of effective management systems,

and equally important the priorities of the challenges' confrontation do not mean of course the lack of parallel lines for the confrontation provides the opportunity to implement the project in the less time.

Through review and discussion of LSDI challenges, can come up with some general tips that will help in general in facing of those challenges, which can be listed in the following points:

- Raising awareness of the importance of LSDI at the level of individuals, institutions and the country.
- To encourage the continuous data sharing in order for the public interest.
- To ensure the establishment of cultural seminars and scientific conferences to promote a culture of teamwork and the sharing of data and information, and to find appropriate solutions and satisfactory to all parties to achieve this goal.
- Undertake an adequate and continuous study for the Libyan management system, and try to adapt it to allow data sharing among departments, institutions and various ministries to serve the public interests.
- Development of policies necessary to organize the activities of data production and sharing among the institutions of the Libyan country.
- Study the experiences of developed countries in this area and trying to capitalize on it in accordance with the conditions of the Libyan country.
- Seek to transfer modern technology with respect to NSDI and utilize them to increase LSDI efficiency.
- Continuous training of the Libyan staff in this area to cover the need for technicians for operation, maintenance and development.
- Review legal provisions on intellectual property, and modifies to allow data sharing among the parties and stakeholders, and in the same time preserves the right of the owner to seek compensation for incurred the effort, time and money in the production of this data.
- Enact the laws and regulations governing bases of data pricing, and determine their value according to its quality and their comprehensiveness, which encourages data providers to move forward in the production of data and developing the means to obtain.
- Establishment of an effective data security system to ensure that LSDI are not subjected to penetration, which constitutes a danger to its contents and components.
- Lay the policies necessary to maintain the confidentiality of the special data and information and identify the sharing areas within the framework of LSDI locally or GSDI globally in the future.
- Allocation of budgets for finance the LSDI project, and follow-up maintenance and continuous development.
- Seek to develop a program of self-financing within LSDI in the future by investing of LSDI's resources with the beneficiaries and stakeholders, making LSDI as a source of economic funding in the future, rather than it is an economic burden on the country.



## 6. Conclusion

Establishment and development of NSDI are a difficult task, because it requires an identification and study of a large number of issues and challenges in various fields, in addition to that this task is a collective task requires consensus among all the institutions of society, which cannot be carried out by only one institution. It is a national collective act by all institutions and organizations in the country.

This research paper serves as a general review of SDI initiatives and their importance, components and levels, and as a case study; the research paper reviews the Libyan initiative and its current situation, in addition to the challenges faced and will face this initiative in the future, considering that most these challenges associated with each other despite differences in their classifications, which make the confrontation's methods of these challenges depend on each other.

Noteworthy that Libya is currently experiencing difficult political conditions, may result to clear changes in the administrative structure of the country entirely, and this is a good chance to build the administrative structure of the country to suit the requirements of LSDI based on correct and well-established from the beginning, which contributes to the disposal of the issue of administrative modifications and the resulting big problems, which may be difficult to solve in a limited period of time.

After discuss these challenges and study the relationship between them, could be argued that the basis of these challenges lies in the cultural challenge and not feels the importance of LSDI for Libya as a country, which makes thinking for any step forward to face other challenges is too difficult, so the political decision and the true national desire for the implementation of this project is the key to resolve all issues and other challenges, this applies well to the Libyan case, where the country has experienced a long period of the developmental stagnation, which generated with all the administrative staff in the country a state of administrative monotony, gave them a satisfaction for the current situation, and made them do not want to develop anything, this requires effort and time of great to get out of this managerial vortex, this paper presented also some general tips to face these challenges without exposure to details, which may be in need of further study and auditing of the current situation of the Libyan country

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