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# Prospect of Open SDI in Developing Countries

## Case Study: Indonesia

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### Abstract

Many developing countries established Spatial Data Infrastructure primary (SDI) based on belief its ability to facilitate spatial information sharing for their national development. As one of the countries that initiated Open Government Partnership, Indonesia committed to provides new space for openness, transparency, innovation, and establish continuous interaction between the government and its citizens. This paper proposes an improvement of SII by extending the range of spatial information sharing to citizens and non-government institutions as a contribution in transforming Indonesia as an open government.

*Keywords:* Open Spatial Data Infrastructure, Open Data, Open Government, Developing Countries

## 1 Introduction

Indonesia established National Spatial Data Infrastructure (National SDI) primarily based on belief its ability to facilitate spatial information sharing to provide spatial information in development programs. As one of the founding members of Open Government Partnership (OGP), Indonesia is committed to providing a new approach for openness, transparency, innovation by establishing continuous interaction between the government and its citizens (Harrison et al. 2012; Nugroho 2017). This platform has the real potential in facilitating innovation (Kristiawan et al. 2012), transparency, empowering the citizens, and fighting corruption and harness new technologies to strengthen open governance (Alonso et al. 2013; and Aryan et al. 2014). This improvement is also needed by the government to support Sustainable Development Goals (SDGs) agenda in Indonesia (Abidin, 2017a).

This article is presented SDI development as continuous learning process from Indonesia's case. Hopefully provides a better overview in term of improvement or developing a new scientific approach of SDI in developing countries. The next sections of this paper will present the process of NSDI development and a proposal of policy and strategy for nationwide data governance to support national developments and Sustainable Development Goals for developing countries from Indonesian experience.

## 2 Basic Information

In Indonesia, the right to access public information is protected by The Constitution 1945 (Article 28 F). Indonesia has also formalized this right with Public Information

Openness (PIO) Act (2008) which provides legal protection for the citizens in requesting information from public sector institutions. This Act mandates all institutions using state and public budget in producing information. On April 21, 2011, Geospatial Information Act (2011), a long-awaited legal foundation for spatial information, was enacted. The Geospatial Information (GI) Act defines elements of SDI as policies, institutions, technologies, standards, and human resources. In 2012, technological aspect of SDI was built to provide access to geospatial information, not only to government institutions as it was originated but also for citizens and non-government institutions to improve their decision-making and quality of life.

In many ways, spatial information is also necessary for citizens to sustain their existence. Public Information Openness (PIO) Act has influenced GI Act. To some extent, PID Act promotes the right of citizens to access information into GI Act, including through Indonesian SDI. The openness of the Indonesian SDI has been supported by the strong leadership since President Yudhoyono. He enacted Presidential Regulation No. 27 (2014) on National Geospatial Information Network or NSDI regulation (2014) to allow citizens, businesses, and non-government institutions to join the Indonesian SDI. This regulation also commands all government institutions to implement SDI.

## 3 Challenges in providing Data for Sustainable Development in Indonesia

Indonesian National Development Plan 2014-2019 aims to realize regional development disparities, acceleration of prosperity, and improving national defense and security (Abidin 2017b). Integrated data management is essential to

pursue the Indonesian Mid-term National Development Plan 2014-2019, mainly to monitor the progress of development. Indonesia believes transparency, accountability, and participation from non-government, businesses and citizens are essential in creating sustainability in national development. Sustainable Development is the vision of Indonesian development to bring equitable welfare and inclusive economic development to all Indonesian.

### 3.1 Ideal Condition for Integrated National Data Management

Bower et al. (1995) mentioned that the last e-government stage is promoting transparency, in the form of continuous information services and collaborative decision making. Open government initiative aims to empower citizens and non-government institutions to access public information. Many kinds of literature were discussing the importance of geospatial information for the national development. The availability of quality spatial information must well-organized in an integrated manner to support national development programs. As co-founder and active member of the Open Government Partnership (OGP), Indonesia established Open Government Indonesia (OGI) in 2011. OGI provides a platform to promote transparency, empower citizens, to fight corruption and to harness new technologies for strengthening good governance (Timmins et al. 2016). OGI also aims to improve public services. In promoting transparency and participation, OGI organized public consultation forums inviting government, non-government organizations and the citizens to discuss open data implementation (Satu Data Indonesia, 2017). SDI is crucial in this dialog since spatial information can describe approximately 80% of government activities (O’Looney 2000).

### 3.2 Identification of resource and challenges

The overlap between process-level conditions, spatial data, producers, and users is reflected in the expression: “everywhere seems producing data but is hard to find data everywhere.” Many users were difficult to find the right spatial data, either because it does not exist yet, difficult to access, or it is not updated. This condition indicated that data were scattered across stakeholders or hidden inside “silos” in some agencies. Despite the impression that spatial data exists in many locations but users could not or difficult to obtain spatial data when it was needed, including from their own data center. In most ministries, Center for data and information were not functioned as in the original design. These centers have a relatively lower position than other sectoral units, lack of leadership support concerning to spatial data governance, and missing legal basis to conduct spatial data management throughout the organization (UKP-PPP 2014). Consequently, this condition made it difficult for this center to collect spatial data from sectoral units. In some cases, sectoral units built their own data center which created competition between the center and sectoral units. The unclear role-sharing between the center and sectoral units caused by unclear role sharing between data custodian (the center for data and information) and data stewards (sectoral units). These facts were identified as the primary problem in

developing integrated spatial data management for the whole organization (see Figure 1).

It is urgent to develop a detailed, integrated, and consistent regulation to provide specific guidance related to spatial data governance. Role sharing with respect to data announcement and data publication was not partly or not performed at all. This problem was represented by inconsistent data announcement and publication, many data versions from many channels, and unverified data released to the public by an authorized organization. In 2014, there was no precise definition for data custodian, and data steward in Indonesia since no regulation provide specific role sharing between them. Further, it was more complicated to determine appropriate data custodian for data mashup—a map constructed from a combination of many layers. UKP-PPP (2014) found that low-quality data didn’t affect performance for data producers or data users in the government institutions. The implementation of an integrated data management was not valued as Key Performance Indicator (KPI). There was lack of coordination between spatial data users for national development. In term of data access, there were different users from the same institution requesting the same data to data custodian which already copied and already in their data center. There was no incentive for utilizing data with quality and integrity. In most case, relevant data which is collected and managed, and processed in the form of a compilation of indicators, was not used by users for the analysis and formulation of policy-making. This condition was caused by lack of knowledge and information among users, mainly due to inadequate outreach and human resource limitation.

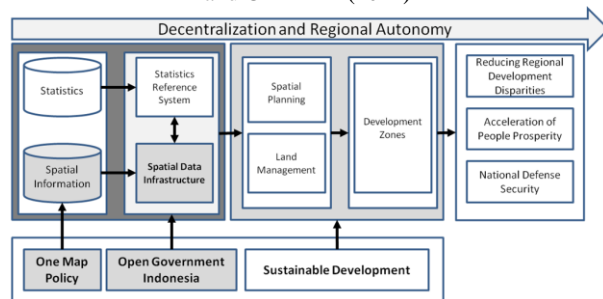
Figure 1: Identification of issues in national data management (UKP-PPP 2014)

		PROCESS	PRODUCT
PRODUCERS	PROCESS-PRODUCERS	<ul style="list-style-type: none"> <li>Low data accuracy,</li> <li>Redundancies</li> <li>Low temporal,</li> <li>Data is inaccessible or limited access</li> </ul>	PRODUCT-PRODUCERS <ul style="list-style-type: none"> <li>No incentives for data integrity</li> </ul>
	PRODUCERS-PROCESS-PRODUCT	<ul style="list-style-type: none"> <li>Unclear relationship between data steward and data custodian (data center),</li> <li>Unclear authority of data center, and</li> </ul>	<ul style="list-style-type: none"> <li>Unclear definition between data announcement and data publication.</li> </ul>
	PRODUCERS-PROCESS-PRODUCT-USERS	<ul style="list-style-type: none"> <li>Everywhere produces data but everywhere misses data</li> </ul>	
USERS	USERS-PROCESS-PRODUCT	<ul style="list-style-type: none"> <li>Not aware of complexity in process &amp; products,</li> <li>Lack of data literacy,</li> <li>Unfamiliar with data quality,</li> </ul>	<ul style="list-style-type: none"> <li>Unfamiliar with data standards,</li> <li>Lack of knowledge and skills, and</li> <li>Unfamiliar with metadata.</li> </ul>
	PROCESS-USERS	<ul style="list-style-type: none"> <li>Lack of coordination between users.</li> </ul>	PRODUCT-USERS <ul style="list-style-type: none"> <li>Data is not used</li> </ul>

## 4 Intervention for development Integrated National Spatial Data Management

Indonesian SDI was designed to support formulation and operationalization of spatial planning and land administration with the availability of framework dataset. Therefore, the map provided by Indonesian SDI must comply with national standard and specification. The base map with all its precision characteristics becomes the basis for making a map of the spatial planning and land administration of the region. Furthermore, the spatial plan map is used as a medium for thematic map depiction. The thematic map becomes the analysis material and the synthesis process of casting spatial plan in the form of a map for the preparation of the spatial plan in National Mid-term Development Plan 2014-2019 (see Figure 2).

Figure 2: Geospatial information in Indonesian Mid-term National Development Plan 2014-2019. After Abidin (2017b) and UKP-PPP (2014)



### 4.1 One Map Policy

President Joko Widodo, who was elected in 2014, introduced 100 strategic programs for his term. His administration supports the utilization of NSDI in Presidential Regulation No. 9 (2016) on One Map Policy (One Map Policy Regulation) as part of his Economic Policy. The One Map Policy Regulation aims at the acceleration of geospatial information availability and utilization of NSDI initiative to facilitate information sharing. This regulation instructed National Mapping and Cadaster Agencies (NMCAs) to accelerate the production of accurate maps for national development agenda, particularly for spatial planning and investment-related activities. Further, his administration proposed the integration of SDI into open government activity to include citizen and non-government participation in Indonesian SDI as part of national SDGs agenda (Nugroho 2017).

### 4.2 Open Government Initiative

The data should be timely available and updated continuously to be able to take a snapshot of actual development conditions. Equally important, this spatial data should be accessed by the broader community according to the principle of open data. Integrated spatial data management and data sharing across ministries, agencies, non-government institutions or individuals are required for data integrity. Coordination

between data custodian and data steward is required to produce quality data. In other words, data and sustainable development are inseparable. Without data quality and data integrity, it is impossible to manage the resource for sustainable development. Therefore, in 2014, the government initiated integration of one data initiative into Open Government initiative. OGI adopted open government principles into three pillars: transparency in public institutions, public participation, and innovations. As government's led initiative, OGI was designed to renew the public sector in Indonesia, including local governments to provide better public services (Sekretariat Nasional OGI 2016). Moreover, to provide a constructive dialogue, GOI built an open governance ecosystem that promotes transparency, accountability, innovation, and inclusive aspects in governance and public services with the national development partners and constructing National Action Plans for Open Government. The purpose of National Action Plans 2016-2017 was to accelerate the government's commitment in increasing public participation in government administration; improvement of governance through the improvement of bureaucratic reform and public services; strengthening PIO Act; and strengthening of data governance.

In 2014, GOI established One Data Indonesia (ODI) initiative as part of OGI to provide the structure of the regulatory framework and institutions in providing data. The Office of the Presidential Staff (KSP) and the Ministry of Development Planning took leadership in designing ODI including developing annual national action plans to increase data accessibility, timeliness, usability, interoperability, and capacity building. ODI integrate NSDI policy in strengthening PIO Act through improvement on data utilization and data governance (Maail 2017; and BAPPENAS 2016). Increased public participation Indonesian SDI in the implementation of open government principles is considered as part of achieving the targets of Sustainable Development Goals (BAPPENAS 2016). NSDI policy is considered part of the intervention to increase public participation along with the formulation of an open government roadmap and the development of guidelines containing the adoption of open government principles in achieving the targets of Sustainable Development Goals (Sekretariat Nasional OGI 2016). As implementation of the Geospatial Information Act and NSDI Regulation, GIA has abolished the commercialization of data classified as the Basic Geospatial Information in all scale by removing them Non-Tax Government Revenue and provide these maps to be downloaded through geoportal freely. This action has been appreciated by the Presidential Office as the excellent practice of Open Government Data and encourages other institutions to do the same. Until 2016, there are hundreds of geospatial information containing public sector information can be accessed online through the Indonesian geoportal (<http://tanahair.indonesia.or.id>). Indonesia considers open government as a method to achieve to tackle social and economic problems.

## 5 Discussion: NSDI as Open Government Indonesia Platform

Transparency, social benefit and democratic are foundations of Geospatial Information Act (2011). "Transparency" in this Act meant that the geospatial information activities are intended to be used by many parties can be accessed easily by the society. While "democratic" is as the process in the geospatial information activity is widely implemented by involving the participation of the community (Art. 2). This Act classified basic geospatial information (topography, bathymetry) as open data and considered government produced thematic maps shall be open by default with the exception of some maps which are proven to be eligible to be closed according to PIO Act. Further, Geospatial Information Act commands GOI to give a reward to everyone who helps to disseminate spatial information classified as open data. By these Acts, we consider spatial information in Indonesia is generally open and should be easily and readily accessible to the users for optimal utilization for the benefit of the society and improving public services by government. NSDI Regulation (2014) mentioned that citizens and non-government institutions could participate in Indonesian SDI (Art. 13). This participation may include data utilization, submitting update or input to improve existing data, and spatial information dissemination in Indonesian SDI.

### 5.1 Collaborative Arrangement

NSDI Regulation (2014) instructed government institutions and local governments to establish two functional units which are crucial in information activity: data production and data management and dissemination (Art. 7). Unit for data production is responsible for collecting, processing, storing and utilizing of geospatial information. The unit for data management and dissemination performs data storing, data maintenance and security, and disseminating geospatial information. Government institutions may have many units to perform data production function in its organization, but it can only establish only one unit for data management and data dissemination. The data management unit is often attached to Secretariat General in each institution. These functional units have the task to manage spatial data and information, but the only unit that performs data management entitled to data dissemination for internal and external uses. Both functional units are performing data storage; the difference is data production unit to store data for to process the data while data management unit is to store data for data archive and dissemination of geospatial information. As part of ensuring the integration of successful Indonesian SDI to national e-government ecosystem, President Widodo arranges GIA and Statistics Indonesia under the same coordination which is BAPPENAS in 2015. This arrangement enables NSDI stakeholders to play a more significant role in constructing a credible national and regional development plan with the multi-dimensional approach, (holistic, integrated, thematic and spatial).

Both Geospatial Information Act (2011) and Government Regulation No. 9 (2014) about Geospatial Information Implementation promote the integration of NSDI policy into

the national medium-term development plan and performing as a reference in the formulation of the National Action Plan and the Government Work Plan. NSDI policy is also adopted in the One Map Policy for data sharing in the synchronization process. This policy is collaboratively developed by all stakeholders and shall be evaluated annually. The Geospatial Information Act acknowledges the importance of institutional arrangement to ensure data custodianship and must be facilitated through inter-group meetings regularly. This forum consists of elements of government institutions; local government; citizens and non-government institutions.

### 5.2 Large Scale Spatial Information in Indonesian Open SDI

The urgency for spatial information production and access in Indonesia is for detailed spatial planning and cadaster. Minister Decree No. 20 (2010) define requirement of spatial information for zonation and infrastructure planning at scale 1:5,000. By this definition, most of the formulation of spatial planning and detailed spatial planning at all levels were considered late or stagnant, and public service for the land certificate is far behind schedule. The root of this problem is the absence of maps at large-scale (scale 1:5,000 or better), mainly basic geospatial information (Table 1). This information covers at least eight layers: coastlines, hypsography, hydrography, toponym, administration boundary, transportation and utilities, building and public facilities, and land cover. GIA in cooperation with National Land Agency and National Institute for Space and Aeronautics developed an innovative way to find solutions for this problem by producing high-resolution ortho-imageries at scale 1:5,000. However, the production of topographic maps was managed proportionally and focused on cities and the built-up environment. BAPPENAS pledged to allocate a particular budget for topographic mapping between USD 15 million to USD 20 million through GIA since 2012 (Pers Comm with BAPPENAS). Compared with the amount of city and its growth in Indonesia, the budget available for production is far from sufficient. Furthermore, there are urgent needs for new approach and technology for large-scale topographic maps production, particularly in the map scale of 1:1000 (Karsidi 2014) and 1:5.000 (BIG 2016b).

## 6 Conclusion: Opportunity of Indonesian Open SDI

Indonesian constitution ensures its citizens to have the right to freedom of association and expression, promoting in action for their rights collectively to build a community. Furthermore, there are also laws protecting the citizen's right to defend his life and livelihood, to have a prosperous life, to the better living environment, and to have equal access to public services. Geospatial information will empower citizens in implementing their rights in all conditions, including during the time of crises. Moreover, geospatial technologies are proven to enable citizens by providing compelling, up-to-date, and visual proof to authenticate on-the-ground reporting of a condition affecting their rights.

Every information has a validity period. Therefore, geospatial information should be able to represent the phenomena or the

changes base on the latest condition. It is essential for producers to ensure the availability and access of geospatial information services promptly. NSDI Regulation (2014) mandates that every ministry, provincial government, and cities/municipalities share their geospatial information as the network nodes in Indonesian SDI. Moreover, this regulation encourages private sectors, academia, and citizens to join Indonesian SDI. GIA is mandated by law as the network connector, to supervise the current implementation of Indonesian SDI. Geospatial Information Act (2011) and NSDI Regulation (2014) stated that GIA is responsible for the integration of open data principle and SDI. GIA has the capability and capacity to the legal aspect, technology, human resources, and experiences in the development of Indonesian Open SDI.

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