

# **GEOSPATIAL INFORMATION SCIENCE AND TECHNOLOGY: OVERCOMING BARRIERS THROUGH COLLABORATION**

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## **Greetings**

Good morning distinguished guests  
Ladies and gentlemen

1. It is my pleasure to share some of my thoughts on the topic with you today. Thanks to the World Bank team for the invitation.
2. The Singapore Land Authority (SLA) is a public agency in the Singapore Government. Apart from managing land in Singapore, SLA is the authority on Geospatial Information Science and Technology (GIST) in Singapore. Together with our partner agencies, we drive the Singapore Geospatial Collaborative Environment (SG-SPACE), which is our national spatial data infrastructure. I will share with you Singapore's experience in driving GIST for policy and decision-making, as well as the challenges that we faced in building collaboration across different sectors.
3. Before I begin, I would like to lay the importance of GIST for urban management and operations.

## **GIST is Important for Planning and Service Delivery in Cities**

4. As dynamic hubs of human activity and consumption, cities constantly deal with complex problems that span a wide range of sectors and issues. Building sustainable, inclusive cities demands precision and accuracy. A holistic understanding and high level of situational awareness are needed for efficient planning and service delivery. This is underpinned by diverse information about the economy, society, and the environment.

5. Location is the thread that weaves the various information into a picture. By overlaying key urban variables on a common base map, GIST enables planners to visualise, analyse, and model various scenarios. Reliable GIST systems for combining geospatial information are essential. From water management, to food production and disaster mitigation, planners can make better decisions about where to allocate resources in the long term, as well as how to deliver services at the right time and place. Local and municipal governments need to come together and share geospatial information for an integrated, data-driven approach to policymaking. In this regard, adopting GIST is a collaborative effort.

### **Collaborative Use of GIST: The Singapore Example**

6. Singapore is one example where a collaborative culture has benefited the use of GIST for overcoming urban problems. As a small city-state, Singapore faced numerous physical and resource constraints during its developmental years. Prudent and precise planning was critical to managing the complexities of its challenges. Breaking down information silos and bringing people together was thus key to optimising the use of information for maximum insights on planning issues. This depended on institutional arrangements, policies, and technologies that promoted collaboration and a whole-systems perspective towards cross-cutting issues. In order to act as one government, Singapore's public agencies needed to share and use geospatial information consistently.

### **Challenge: Coordinate Data Sharing**

7. Strong leadership and effective policies are necessary for coordinating the use of GIST. In the past, our public agencies relied on isolated systems; leadership and capabilities for developing a common set of geospatial data was not available. Similarly, our agencies were unaware of what geospatial data were available in their desired formats, due to a lack of clear data sharing protocol. Redundant resources were spent to collect data. To help us overcome these challenges, in 2008, we established SG-SPACE (Singapore Geospatial Collaborative Environment), which is our national spatial data infrastructure.
8. One important component is a framework to share reliable and accurate information in a timely manner. In this regard, an inter-

agency steering committee was set up to provide the overall leadership. The Committee directed various workgroups to implement the organisation and use of data. I deem this as the single most important factor for driving the use and sharing of geospatial data, i.e. strong mandate from political and administrative leadership.

### Increasing Data Accessibility and Availability

9. Recognising the need for further data access and discoverability, the government mandated essentially the cost-free sharing of data among public agencies. Beyond that, we created a taskforce that specialised in matching data requestor agencies to data owner agencies for the sharing of datasets. To facilitate the integration of diverse sources of shared data, our experts enforced conformity of data content and structure to international standards for interoperability. This ensured that high-quality data could be used across multiple purposes in a cost-effective manner.
10. Nevertheless, the lack of geospatial datasets in GIST-usable formats remained a challenge. These ranged from topographical features and physical infrastructure, to traffic movement and noise. We embarked on an initiative to geotag all government datasets, in other words, attach locational reference to them. We put aside some money called the GeoFund, which allows possible funding support for the revamp and enhancement of some ICT systems to enable the geotagging effort. At the same time, our consultants trained agencies to geotag their data, and spread awareness about the importance of geotagging to increasing data availability for planning.

### Challenge: Build Integrated Data Sharing Platforms

11. An equally important component of SG-SPACE was the technological systems needed to operationalise the policies. To enable data sharing, we established two important geospatial platforms, GeoSpace and OneMap. They served as centralised data portals for the government and public respectively. GeoSpace provided public officers access to detailed, updated data for their operations, as well as in-built tools and applications for analysis and modelling. Through integrated processes, it allowed agencies to streamline procedures and avoid duplication in data collection. Data in GeoSpace that were permitted for public sharing were fed into

OneMap. This increased accessibility to the authoritative information needed to make everyday decisions. GeoSpace and OneMap had been key enablers of planning and public service delivery.

### Co-Creating Solutions Around Common Goals

12. More importantly, both platforms highlight our efforts to provide interactive spaces for government agencies and citizens to use GIST collaboratively. In GeoSpace, our GeoCommunities brought agencies together to solve common problems. For example, agencies with slope management responsibilities collaborated to build geostatistical models, in order to identify slopes that are vulnerable to failures. OneMap offered agencies opportunities to co-create solutions with citizens. An example is the Municipal Services Office's OneService app, a one-stop app for crowdsourcing citizen feedback on municipal issues. Using OneMap's API, this app allows anyone to geotag and report municipal issues, so that they could be routed to the responsible agency for processing in the shortest possible time.
13. Another example is the Singapore Civil Defence Force (SCDF)'s myResponder app that allows CPR volunteers to locate any victim of cardiac arrest within their vicinity. This allows them to render first aid to the victims before ambulance arrival.
14. Currently, we are creating a digital platform to share high-resolution 3D data for city planning, operation and management, through the Virtual Singapore project. This is a collaborative project led by SLA, the National Research Foundation (NRF), and the InfoComm Development Authority (IDA).

### Challenge: Develop Capacity for Using GIST Extensively

15. Technology itself could only achieve so much in promoting the collaborative use of GIST. The various users needed the know-how to implement GIST competently as well. Only a couple years ago, few agencies incorporated geospatial data into their decision-making processes. The application of GIST was limited within specialised domains. SLA formed a Central Geospatial Expert Service to coach a wide range of agencies to perform geospatial analytics. For example, the National Library Board, which was

previously an unlikely user of GIST, planned library locations by mapping customer catchment areas based on the proximity of libraries to their homes. Similarly, healthcare institutions identified gaps in emergency services in order to optimise their coverage. These capacity building efforts will eventually form part of a wider initiative to set up a Centre of Geospatial Capabilities, which aims to build a range of geospatial skills throughout the public sector.

### Achieving Wider Outreach Across Sectors

16. In the long term, we aim to engage the industry, academia and public to build geospatial awareness and literacy. One main vehicle for achieving this was the geohackathons and challenges that we organised regularly. In these events, participants innovated planning solutions using geospatial datasets, which gave rise to new use cases and technologies. For example, the winning team of SLA's GeoHackathon in 2014, designed an app that helped a voluntary welfare organisation, Food from the Heart, allocate bread delivery routes to volunteers. By allowing volunteers to visualise these routes and commit to them more readily, Food from the Heart improved the coordination of its delivery operations.
17. I am excited to mention that this weekend will be our ninth annual Singapore Geospatial Challenge. This year we will see pre-university and university students compete in using geospatial analytics to solve business problems, a non-traditional application of GIST. This will be an opportunity to showcase the diverse uses of GIST and excite students to pursue careers in the field. The Singapore Geospatial Scholarship, which was started in 2014, offers students the support to do so at the undergraduate and postgraduate levels. This unique scholarship sees eight agencies coming together to nurture geospatial talents. At the same time, we hope that businesses will be our valued partners in growing the local geospatial ecosystem. Our GeoInnovation Fund programme already provides them with funds and resources to launch geospatial projects.
18. Our engagements with educational institutions have helped us design relevant courses to meet geospatial manpower demands. For example, the National University of Singapore (NUS) launched its Master of Science in Applied GIS programme last year, while the Nanyang Polytechnic developed a certification course in the

development of GIST-based applications. In order to address skills gaps in a targeted manner across the different educational levels, we are developing a geospatial competency framework to articulate the core capabilities needed at various levels of proficiency.

### **A Holistic Strategy: 6 M's**

19. These 6 Ms provide an overview of the strategies that I just mentioned. We have seen how “Mandate” and “Method” played a key role in building strong leadership for sharing data in a coordinated manner, while “Medium” provided the platforms for doing so. “Material” ensured the availability of datasets as a currency for the production and exchange of geospatial knowledge, and “Manpower” built the capacity needed to think and act geospatially in making decisions. While we have succeeded in bringing people and information together, we recognize that it is still a work in progress and many of our challenges still persist. We need to relentlessly strengthen our effort and commitment to widen the use of GIST in order to tackle future challenges.

### **Closing**

20. To end my sharing, I would like to reiterate the key points that I have made. I have shared the importance of GIST for helping cities achieve sustainable planning and service delivery. The integrative nature of GIST helps decision-makers gain the holistic insights needed to achieve precision and accuracy for managing complex urban issues. Collaboration is key to using GIST effectively. In aiming to do so, Singapore faced various challenges related to data sharing and availability, technological capabilities, and capacity building. We overcame these challenges through strategic partnerships among public agencies, citizens, academia, and the industry.
21. In an increasingly interconnected world, barriers and boundaries around knowledge and fields are fast becoming irrelevant. People and institutions can no longer operate in distinct silos. GIST will become indispensable to the way we discover and make sense of the world. GIST systems built upon strong governance and a collaborative culture are becoming ever more important. On this note, I wish you a good day, and a fruitful meeting. Thank you.