Challenges in the Implementation of Enterprise GIS – TNB's Experiences

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Introduction

Being a vertically integrated electric utility company, Tenaga Nasional Berhad (TNB) is involved in all the core activities of the electricity business, namely Generation, Transmission and Distribution. TNB's assets includes power stations, mini hydros, main intake substations as well as distribution substations, overhead transmission lines, underground cables, fiber optic cables and land parcels spread across the length and width of the peninsular. TNB serves approximately 7.3 million customers

1. The Project

CGIS is envisioned to improve efficiency and reduce operational cost. In addition to serving TNB's core business of electricity, CGIS is also intended to assist in property management, security, logistics as well as managing TNB's own fibre optic network. The project will see the development of about 50 prioritized functions across all six divisions as part of 4-Year foundation period of implementation. Along the way, about 40 existing TNB systems are identified to be integrated with CGIS. The incorporation of functionalities for Generation, Transmission, Distribution, Corporate Services, System Planning and ICT divisions make this project a unique GIS implementation worldwide. Assets from TNB's core divisions of Generation, Transmission and Distribution, property and land information from Corporate Services Division as well as fibre network assets of ICT Division will be made available on a single GIS platform.

To efficiently manage the integration of the various existing systems with CGIS, Service Oriented Architecture (SOA) solution is being used.
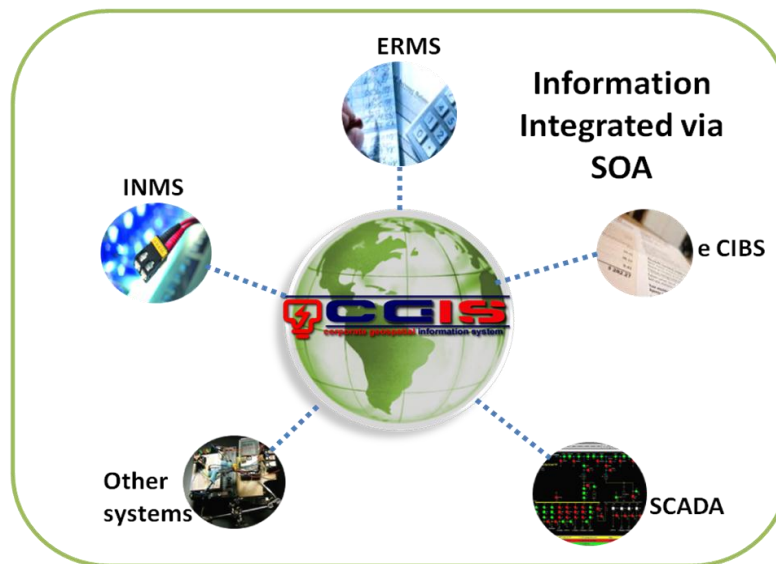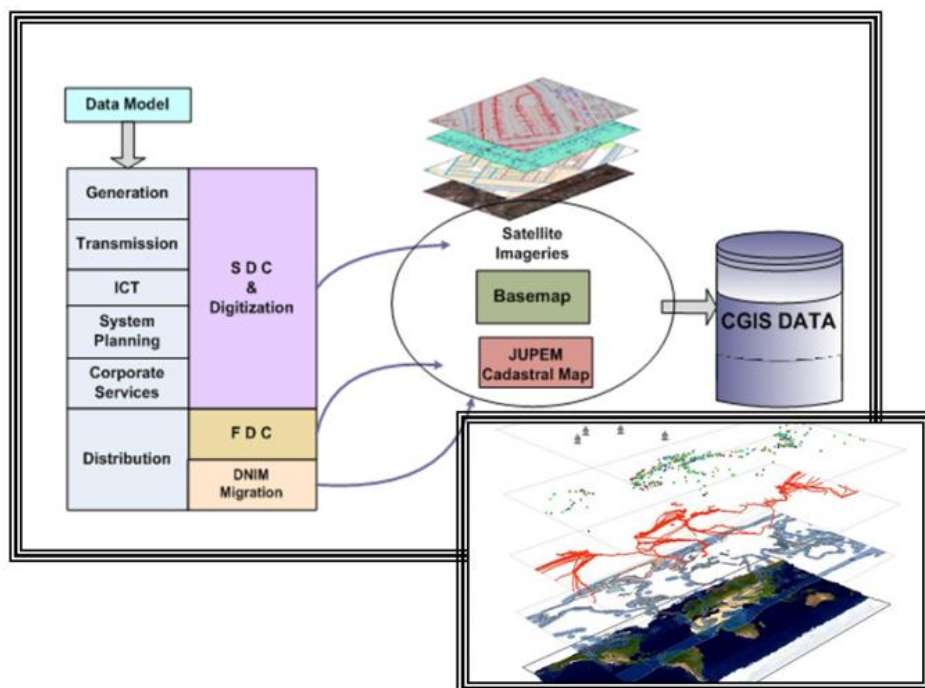
Figure 1: Using SOA for Integration to CGIS

Figure 2: Data sources for CGIS Database

An integrated system with the help of SOA technology will enable the efficient use of data and services across the enterprise for the various analyses that can be performed in CGIS.

1.1 Project Objectives

The objectives of this project are:

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- To ensure that TNB's assets are accurately captured, assembled, manipulated, stored, referenced, managed, analyzed and displayed geographically to relevant groups of users throughout the organization.
- To improve work productivity by leveraging on the geographically referenced information in planning, maintaining and operating of TNB's assets.
- To ensure quality geo-referenced information is available to TNB staff at all times through client application and web-portal services.
- To ensure that TNB personnel will be able to fully support and maintain the CGIS system through effective transfer of technology and knowledge throughout the duration of project implementation.
- To improve and increase the efficiency of TNB's personnel through better organization of work, planning and decision making via the implementation of CGIS.
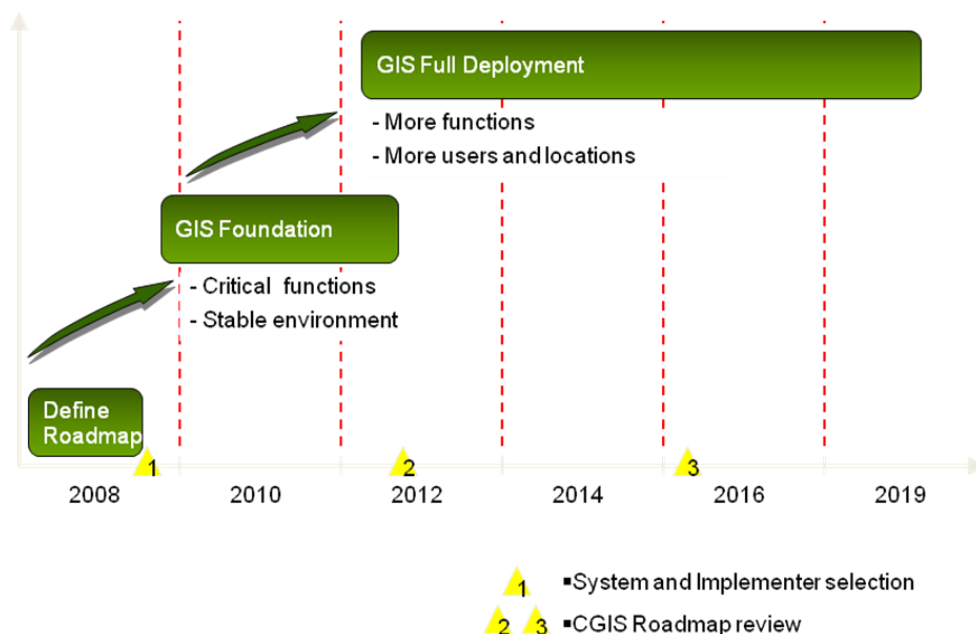
1.2 Implementation Strategy

Figure 3: CGIS Roadmap

The CGIS road-map has three key phases:

- Define Roadmap – A clear and well defined roadmap is crucial to ensure that the implementation of GIS in TNB is looked at in a holistic manner. This ensures that each Division will embark on a program that is in sync with each other and with the overall corporate strategy. By doing so, expenditure can be managed efficiently and benefits maximized.

- GIS Foundation – In the first four years, the foundation of GIS is implemented with the development of prioritized functionalities across all Divisions, albeit mainly focussing on the state of Selangor, Federal Territories of Kuala Lumpur and Putrajaya. The CGIS project is currently in this phase.
- GIS Full Deployment – Once the foundation is complete, CGIS will embark to deploy the GIS functions to all other states. The functionalities and support structure by this time would be fully tested and operational, therefore reducing the risk of deployment issues.

2. The Challenges

Implementing an 'Enterprise GIS' is really a challenge. CGIS projects involve coordination and communications between multiple parties including top management, stakeholders from various divisions, project teams, and external vendors. These projects start with the formulation of 10-Year Master Plan and appointment of System Integrator followed by the staggered rollout of the functionalities for the first 4-Year Foundation Period ended 2013. With the massive requirements of the highly complex business processes for the complete assets, lifecycle in TNB plus huge data volume to be captured and digitized into the system, proper planning and project management is becoming very critical. The project team are required to coordinate and integrate the deliverables from internal and external parties in an efficient manner to achieve the overall objectives. Challenges that are being experienced by the project team are as below:

2.1 Change Management

Year-1 implementation was about the Asset Register functions. In order for the remaining functions to work, it is very crucial to make sure accurate data is in place first. During Year-1 users were very skeptical about the system because they tend to compare with the old way of doing things & asking what are the benefits to them. No doubt without data CGIS system will have no value, but here comes the challenge, which is to make sure users are updating the data so that the various functions in CGIS can be further develop and deployed. Various necessary steps have been taken by the project team including conducting "road shows" as part of user awareness program. Apart from this, handholding session was also being conducted to make sure users really understand on how to use the system. The project team was also taking extra efforts by going to some user's site to understand the users concern & taking necessary action from the findings.

Change Management is a continuous effort for CGIS. In line with that, appointment of CGIS Account Manager for each district especially in Distribution Division is part of the initiatives to improve CGIS utilization.

With all initiatives taken by the project team as above, users slowly understand the long term benefits and the action required from their side.

2.2 Diversified requirements from various divisions

Developing 50 prioritized functions during the foundation period were also a big challenge where user representatives need to play active involvement by giving the necessary input before design & development of the functions can be done. Even though initially only 50

functions were identified, as the project goes along there might be additional requirements that are required by the users. This will end-up with scope creep if the situation is not properly handled by the project team. To date, various change requests, which considered as new scope as result of various urgent requirements by the stakeholders.
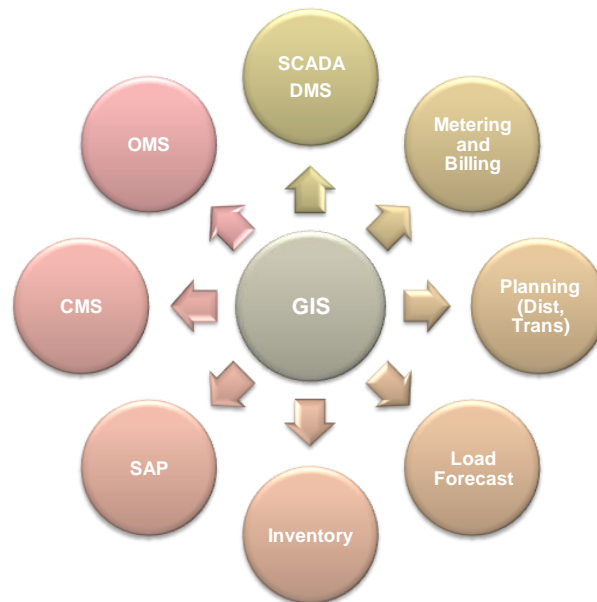

Figure 4: Functions requirements across all divisions in TNB

2.3 Managing the Data Readiness & Accuracy

Data readiness & accuracy is one of the most important factors that would give big impact on the system utilization. For Distribution Division being the largest division in TNB, the initial data were migrated from the previous "Network Information System". This was a huge effort since it involves the migrating of network data from a different platform. As result, 30% of the data were still misaligned & the realignment exercise is currently ongoing.

Apart from the migration, data collection exercise is also challenging task. Various initiatives are being undertaken by the project team such as the introducing of Integrated Data Capture, Data Update Device etc. With a proper Data Collection Method & the decision to outsource the data digitization, the current data collection status has been quite encouraging.

2.4 Integrating with multi systems (38 systems) through Oracle SOA

In total, there are 38 applications with 140 shared service components have been identified to be integrated with CGIS. Oracle Service Oriented Architecture (SOA) Suite is the framework that has been chosen to integrate CGIS application with existing applications in TNB to be implemented within 4-years.

Even though 38 applications has been identified in the Ten-Year GIS Master Plan Study, a more in-depth study shall be carried out during the CGIS implementation to ensure that only the relevant, currently in use, and applicable applications will be integrated to CGIS through SOA.

The enabling of web services of the identified applications shall be the responsibility of the application owners. This is due to the fact that the application owners are expected to be better versed on the functionality of their applications.
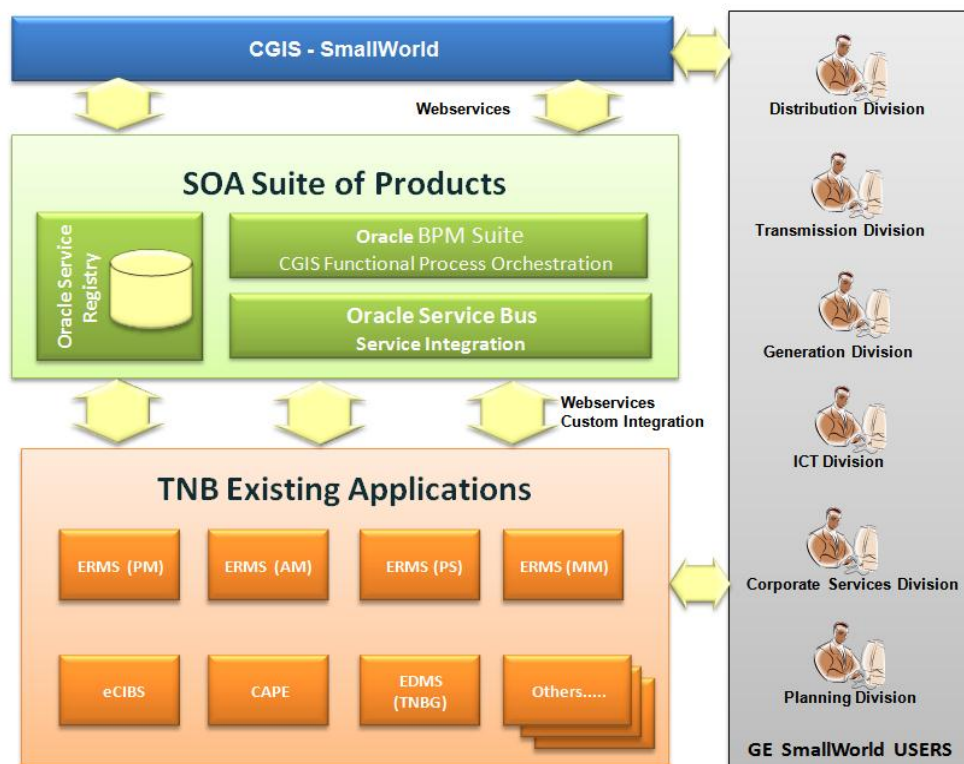

Figure 5: SOA and CGIS

2.5 Preparing the internal team with the relevant technical knowledge

Transfer of Knowledge and Technology (ToTK) program is a platform to ensure that the Project Team know and understand in depth how to develop and maintain applications and functions in CGIS.

Currently the ToTK program is being undertaken to successfully deliver CGIS 4 – Year Foundation Period deliverables. Apart from that the project team also need to be prepared with technical skill for any new requirement after the foundation period.

3. Summary

With various kind of challenges resulted from various requirements for such a long haul project, necessary step has been taken by the project team to minimize the risk by having

CGIS Roadmap which comprises of 3 implementation stages : (1)Define Roadmap (2)Foundation Period & (3) Full Deployment. A clear and well defined roadmap is crucial to ensure that the implementation of GIS in TNB is looked at in a holistic manner. In the first four years, the foundation of GIS is implemented with the development of prioritized functionalities across all Divisions, and mainly focusing on the state of Selangor, Federal Territories of Kuala Lumpur and Putrajaya. The CGIS project is currently in this phase. Once the foundation is complete, CGIS will embark to deploy the GIS functions to all other states. The functionalities and support structure by this time would be fully tested and operational, therefore reducing the risk of deployment issues.

References

[1] CGIS 10 Year Master Plan, Tenaga Nasional Berhad
[2] Various internal development documents

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