STAR Delivery - The BIM Way

A STAR is being born in Buona Vista. Its building form and structure is unique and not conventional. Looking at it taking shape, one would find it difficult to imagine how it could be drawn on plan, elevation and section, let alone having it constructed. But thanks to BIM, the Building Information Modeling technology, buildings, like The Star, not only can be conceived, but it can be born!

The Star is a civic, cultural and retail complex owned by ROCK Productions and CapitalMall Asia. Covering an overall gross floor area of 62,000 sqm, The Star has two primary components - Civic (The Star Performing Arts Centre) measuring 38,000 sqm, and Retail (The Star Vista) 24,000 sqm. It has 11 storeys above ground and 4 levels of basement. The car park spans from B4 up to B2 while B1 to Level 2 are devoted to retail. The Civic areas are from Levels 3 to 11.

Ashith Alva, Vice President, CapitalLand Retail Project Management Pte Ltd (CRPM), is the team leader of the project management team of The Star project. He shares his personal experiences in working and managing this complex building and how the challenges particularly pertaining to unconventional forms, were addressed with the use of BIM, both in design and in construction. continue on Page 8 >>

SPM President leads UniSIM BPM Advisory Panel

SPM President chairs the Building and Project Management (BPM) Programme Advisory Panel under the School of Science and Technology of SIM University.

The Panel members are a fair representation of the key industry players in project management and construction and include both practitioners and the academia.

The terms of reference of the Panel are as follows:
1. Formulate vision and strategic plan for the Programme
2. Support in achieving the School’s vision and strategic plan
3. Support the inclusion of the needs of stakeholders in the plan
4. Monitor the programme’s performance
5. Oversee the educational curriculum and provide recommendations to changes
6. Enhance the Programme’s public image and UniSIM’s philosophy of education for adult learners.

The Panel looks forward to making a great success in this Programme which the members earnestly hope would provide the fillip for more recognition of project managers as an indispensable and key member of the project team.

<table>
<thead>
<tr>
<th>UniSIM BPM Advisory Panel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mr Seah Choo Meng President, SPM</td>
</tr>
<tr>
<td>2. Mr Chung Choon San Director, Davis Langdon &amp; Seah Singapore Pte Ltd</td>
</tr>
<tr>
<td>3. Mr Eugene Seash General Manager for Project Management, Keppel Land Limited</td>
</tr>
<tr>
<td>4. Mr Goh Ngen Hong Managing Director, Davis Langdon &amp; Seah Singapore Pte Ltd</td>
</tr>
<tr>
<td>5. D Ho Ngok Yong Technical Director, Somwah Corporation</td>
</tr>
<tr>
<td>6. Mr Hu Kar Keong Deputy Managing Director, Housing &amp; Development Board</td>
</tr>
<tr>
<td>7. Mr Khoo Sze Boon Executive Director, Davis Langdon &amp; Seah Singapore Pte Ltd</td>
</tr>
<tr>
<td>8. Mr Ng Eng Kong Managing Director, Squire Mech Pte Ltd</td>
</tr>
<tr>
<td>9. Mr Silas Loh Partner, Rider Levett Bucknall Singapore</td>
</tr>
<tr>
<td>10. Mr Benedict Tan Managing Director, BCA Academy</td>
</tr>
<tr>
<td>11. Ms Leong Kok Su-Ming Principal, BCA Academy</td>
</tr>
<tr>
<td>12. Mr Paul Juwono Programme Coordinator, BCA Academy</td>
</tr>
<tr>
<td>13. AP Samir Ataliyah Vico Dean, SIM University</td>
</tr>
<tr>
<td>14. D' Luke Peh Head of BBPM Programme, SIM University</td>
</tr>
<tr>
<td>15. Ms Eleanor Eng Executive, SIM University</td>
</tr>
</tbody>
</table>
SPM President’s Message

Solutions to one and all.

Singapore’s construction volume increased from $278.6 billion in 2010 to $32.0 billion in 2011, an increase of 6%, which is considered fairly substantial by any standard.

For 2012, total construction volume is projected to hit a high of $32.0 billion. However, much of it, about 60%, is attributed to public sector work. The latter is supported by the continual strong public housing developments, as well as institutional buildings and infrastructure projects.

Private residential construction volume is expected to drop to between $3.4 billion and $4.8 billion this year amidst the current pessimistic property market sentiment and the global economic uncertainty.

While we would undoubtedly ponder on the impact of the above projections, we should not lose sight of our duty as project managers to uphold our professionalism and to play our part in improving the image and well-being of the construction industry.

Improving productivity is a perennial challenge. We must consciously lend support and implement measures to enhance our level of productivity. With the advent of Building Information Modelling (BIM) and the government’s current drafting of a Singapore Standard to cater to this new technology, it is now recognized that BIM is synonymous with the productivity movement. BIM will significantly work processes during the design stage through efficient co-ordination of the various disciplines thereby minimising discrepancies and incompatibility. It allows realistic and pratical presentations of the design that will in turn lead to more accurate cost estimates. Project managers must now embrace this change in the upstream process so as to reap the benefits of this new productivity tool.

Any discourse in the construction industry must inevitably include the subject of sustainability and green initiatives. BCA recently celebrated its 1,000th ‘Green Mark Project’ at a theatre-styled outdoor recreation centre which achieved the Green Mark GoldPlus award. It was a momentous occasion bearing in mind the arduous but rewarding green journey since the inception of the Green Mark Scheme in 2005. While it is true that project managers must ensure the expeditious and satisfactory completion of their projects, they must familiarise themselves with the principles of Triple Bottom Line and consciously uphold its ideology and philosophy. It is our bounden duty to expound the principles of sustainability for the greater good of the present and future generations.

Best wishes to everyone.

Seah Choo Meng
President
Society of Project Managers (2011 - 2013)

SPM in APFPM

Launched in April 2010, the Asia Pacific Federation of Project Management (APFPM) is a grouping of member associations of Project Management of countries in the Asia Pacific region. Society of Project Managers (SPM) represents Singapore in this group. SPM joined APFPM in May 2011 and has since participated in two formal meetings in Brisbane (October 2011) and Hong Kong (March 2012).

The other member associations are:

- Australian Institute of Project Management
- Hong Kong Institute of Project Management
- Project Management Associates India
- Project Management Association of Nepal
- Ratan Ali Management Projects
- Project Management Research Committee China
- American Society for the Advancement of Project Management
- Project Management Association of Japan
- Asociacion Peruana De Direccion De Proyectos, Asociacion Mexicana de Ingenieria de Proyectos
- Project Management Association of Canada, and
- Chilean Corporation of Project Management - Corporacion Chilea de Direccion de Proyectos.

The Philippine Institute of Project Management and the Construction Management Association of Korea have just been admitted.

Currently, the Australian Institute of Project Management (APIM) is acting as the Secretariat till 30 June 2014. APFPM’s President is Bill Young of APIM.

The Member Associations (MA) from this vast and complex region have diverse ethnicity, languages, and architecture both western and eastern cultures. The Asia Pacific region effectively represents nearly two thirds of the world’s population and well over half of global trade. In a similar vein to the formation of APEC, the APFPM was formed to harness the synergies of Project Management related Professional Associations across the region.

Through international collaboration these MA can more effectively grow and develop their organisations, leveraging the stature, strength, and competitiveness of each other.

The key objectives and benefits of APFPM include the following:

- The power of collaboration: through working together brings a huge talent pool to influence and drive change improvements in project management practices and MA management.
- Ability to identify and encourage the embracing of best practice Project Management across the Asia Pacific region. Only by openly sharing among partnering MA can understand and improve practices be developed.
- Provides a mechanism that can represent and interact with governments and regional organisations such as the Asia Pacific Economic Community, Asian Development Bank, Association of South East Asian Nations, and others.

The initiatives cover suitable regional competency standards, providing a platform for the development of communities of practice, enabling reciprocity across regional MA along with facilitating the transportability of qualifications, benchmarking across regional MAs to identify and drive best practice MA management, providing a portal to share Project Management Knowledge and Research, and providing recognition of professional excellence in an Asian Asia Pacific Project Management Achievement Award (PMAA) program.

SPM is represented in APFPM Committees:
- Seah Choo Meng in Asia Pacific Disaster Response Management
- Yip Kim Seng in Standards
- Bernard Ho in APFPM Strategic Alliances
- Ting Seng Kong - Research

The APFPM PMAA was just held in Hong Kong in March 2012. The next PMAA will be hosted by Indonesia in early December 2012. SPM members who are interested in submitting their completed projects for consideration for award in the PMAA are encouraged to register their interest with SPM Secretariat: spmraj@yahoo.com

Education, Development & Research

The EDR Committee undertakes to:

- promote members’ PM skills and help keep abreast of the latest trends
- coordinate and facilitate regional and international R & D collaboration and exchange, and disseminate research findings through seminars, symposiums and publications

Activities for this year include running the course on project management for professionals of the building and construction industry with BCA Academy and continued involvement in GAPSS.

Members

Ting Seng Kong, Chairman
Yip Kim Seng
Christopher Leong
Audrey Tee (MBA)

We welcome proposals for collaboration from relevant institutions to advance project management practice.

Membership

The Membership Committee encourages practitioners in project management or in allied disciplines of the construction industry to join SPM. Allied disciplines include activities related to structural engineering, mechanical, electrical and plumbing engineering, quantity surveying, building surveying, building and facilities management and the like. If you are interested in project management, or even in the academia, teaching or carrying out research in project management, you are welcome.

Apart from helping to promote membership, the Committee assesses the membership applications for eligibility to be considered for admission. Evaluation is based on the applicant’s formal education and relevant Practical Work Experience (PWE) relative to Project Management.

Activities

We aim to increase our membership and enlarge our SPM base with suitable candidates. We actively invite friends in the industry who are eligible to become members of SPM.

Members

Geok Choon Wong, Chairman
Lee Soon Ghee
Christopher Leong
John Ting

Please let us know if you are keen to help out in this Committee.

You are welcome to consider membership with SPM ...
What must I do first?

Go to our SPM website at www.spmraj.org.sg to download the application form and project record sheet. It is important that you fill up the project work sheets based on the projects that you have been involved in and sent to SPM Secretariat, Madhersinh Road P.O. Box 1063, Singapore 913412

Professional Practice & Education

The PPE Committee brings in practicing project managers and people from other professions to speak on project management topics or topics related to project management for knowledge, exchange of ideas, sharing of experiences and networking with SPM members and members from other professional bodies.

Members

Yuan Mun Wye, Chairman
Thomas Ho, Vice Chairman
Frankie Fong
Tang Hong Leng
Goh Min Seng

We will be lining up some interesting and interesting talks during the coming months and you will be informed at once.

International Relations

The IR Committee establishes links with other similar Project Management associations internationally to:

- Coordinate & network with global counterparts
- Arrange for SPM representations at these global PM forums/conferences, etc.
- Coordinate international mutual exchanges of learning.
- Achieve mutual recognition.

Members

Bernard Ho, Chairman
Ian Kian Hua, Vice-Chairman
Chang Meng Leong, Advisor
Lee Phek Yan (MBA)
Goh Swee Yee (MBA)

Plans for 2012/2013

1. Continue attendance and representation at Global Alliance for Project Performance Standards (GAPPS), Construction Project Management Committee of the Construction Industry Association (CPMI), Asia Pacific Federation of Project Management (APFPM) and other Project Management Conferences and forums.

2. MOU - Maintain and review renewal of relationship with foreign institutions and organisations.

JOIN US NOW!
Managing Procurement of LTA Rail Projects - Downtown Line 3 Experience

Our world-class people-centred public transport system has always been cited as a critical economic enabler for Singapore. To ensure that the transport network moves in time with the dynamic development of Singapore, the Land Transport Authority (LTA) has been at the forefront of driving various road improvements and rail construction projects including recent rail project development plan to build the Downtown Line 3 for faster access between the Eastern part of the island and the City and Marine Bay areas.

The lunch time talk by LTA Downtown Line 3 (DL3) Project Director Rama Venkata on 2 Nov 2011 provided an overview of the various types of mega projects commonly undertaken by LTA. The talk covered the key challenges faced in executing the projects given the changing environment, risk management and procurement of major rail transit projects by LTA, and the key technical criteria for evaluating tenders with recognition to tenders who are experienced in executing similar projects, notwithstanding their appreciation of major risks in executing the deep excavation and tunnelling works.

Risk Management and Challenges

In a typical underground rail project, several challenges arise from having to construct the infrastructure such as the tunnels and stations:

- Varying hydrogeology and complex geological conditions
- Construction within a built-up area, where the rail corridor is in close proximity (due to space constraint) to sensitive buildings and utilities
- Complex interfacing between agencies and co-ordinating parties
- Managing growing public expectations and reducing inconveniences especially due to environmental impact during construction.

It is therefore important that a robust risk management process is put in place in any complex project so that the different categories of risk are identified and managed through from conception to completion. The success of a project depends to a large extent on identification of the major risks, their potential impacts, risk management, and regular reviews of risks throughout the life span of the project.

As part of overall project risk management, procurement management is also a vital aspect that should not be overlooked or taken for granted. Past experience in similar underground projects that have failed has shown that the owner tied up with a builder/contractor who had not fully appreciated the tangible risks inherent in the project, and the contractor was adversely unable to complete the project within cost, time and/or quality targets due to poor risk allocation or almost non-existent risk management process.

There are possible scenarios that could arise. In some of the procurement processes did not take into account the effects of proper risk management and selection process, and in doing so, the owner dealt with a project to inexperienced contractors who had not adequately appreciated the risks and/or demands of the project or necessary contractors. Conversely, all possible risks identified by the owner were transferred fully to the contractor and therefore there is a possibility that the experienced contractor will cautiously price for all the possible risks and may not be willing to taking the job, especially if the contractor’s risk “appetite” is small.

The impact of such plausible situations will result in the following possible consequences:

- If the risk was not identified to a Contractor who has priced for “all” possible risks, the owner could be paying for the risk that may not materialise or eventuate. In worse case scenario, this situation can be reflected in the high tender prices.
- If the contractor managed to complete the works whilst suffering losses, the safety and quality of works will be compromised.
- If the contractor was not able to complete the works per the contractor’s schedule, the owner can incur additional or escalated cost due to variations, contractual claims, face protracted commercial disputes, etc and consequently suffer long delays in the project.

Procurement Process

In LTA there are basically 2 tendering procurement methods for large-scale infrastructure projects. They are as follows:

Open Tendering

Tenders are open to all interested applicants who have the required BCA registration workloads under the tender.

Selective Tendering

This is basically open to applicants who satisfy conditions for projects of a complex or specialised nature. It requires applicants with sophisticated and high level know-how, capabilities and experiences, and where normal open tender system of procurement is not practical. This is to ensure that only suitably qualified contractors with appropriate technical capabilities, financial capability and experience competency are allowed to tender.

Typically all major rail projects are subject to Selective Tendering process for both Design & Build and Build-Only Contracts. The tender procedure involves a 2-stage tender process in line with the government framework. The first stage is the pre-tender qualification process, which is followed by tender call qualification process.

Prior to any pre-tender qualification (PQ) process commencement, LTA’s management approach has to have sought with explanation on the need to qualify contractors, the evaluation criteria and composition of the evaluation committee. The PQ process will start with invitation for qualification where the publicity will be given to interested parties. Thereafter, invitation for qualification will be sent to interested applicants and the period of qualification usually occurs within a duration of 30 days whilst a 4 to 8 weeks duration are normally provided for applicants involving international counterparts.

Key Assessment Criteria for Pre-qualification:

1. Technical Expertise - Applicants must demonstrate that they have the technical experience, resources and experience in the construction of underground MRT station and tunnels of size and complexity comparable to that of the project.

2. Safety and Quality Management Capability - Applicants must demonstrate that they have the capability to institute a proper quality assurance and control system; and safety management system to ensure that the completed work meets specified quality and safety requirements. They must demonstrate that they have a system in place to evaluate, select and control their specialist suppliers/sub-contractors.

3. Financial Capability - Applicants must demonstrate that they have the managerial know-how and skills to plan and manage the resources necessary for the timely completion of the works. They must set up a proven computerised project management system to schedule and control the multitude of activities for the works and to co-ordinate the civil contract with other interfacing contracts.

4. Performance of Previous Projects - Applicants must possess relevant track record in safety, quality management and performance in past projects. For applicants who satisfy the other pre-qualification criteria but do not possess the relevant track record, LTA may still pre-qualify them provided that:

- Applicants’ proposed specialist sub-contractors have the relevant experience at the time of award of the application. The specialist sub-contractors relevant track records shall be submitted for evaluation. Applicants are to provide details of the track records of these specialist sub-contractors
- Applicants shall ensure that their proposed specialist sub-contractors identified in the application are registered with material suppliers or appropriate workhead and financial grades, where applicable, at the time of submission of the tender documents
- Applicants shall submit together with their applications, Letters of Intent from their proposed specialist sub-contractors stating their commitment to be the applicants’ sub-contractor in the event the applicants are awarded the contract

5. Current Workload and Capacity - Applicants must not be over committed in terms of the value of projects that are currently undertaken by them. They shall have sufficient capacity to undertake the contracts that they are selected to tender.

6. Financial Capability - Applicants must demonstrate that they have the financial capacity to sustain a multi-million SGD contract in Singapore. One of the key criteria used in the financial evaluation is that the contract’s net worth shall not be less than 5% of the estimated contract sum. Net worth refers to shareholders’ equity plus the cash and cash equivalent held in Singapore dollar currency plus also have satisfactory financial health.

Applicants that do not meet the net worth and/or financial health requirement may be required to provide a Performance Guarantee by the parent company and/or a Performance Bond of a value higher than the specified amount at tender stage. This is provided the net worth of the applicant or its parent company (where Performance Guarantee by the parent company is required) must at least be positive. The parent company will also be assessed on its net worth and financial health.

Price-Quality Method (PQM)

For Downtown Line 3 (which let out 18 Build-Only Contracts), the tenders were evaluated based on the 2-envelope system (for estimated procurement value of greater than $300million) where the Price-Quality ratio (PQ) is calculated based on end-item cost and Quality account for 20% of the score. The PQ ratio for “Build Only” Tenders is hence modified to 90:10. Where tenderers satisfy the safety performance and project specific proposals account for as much as 22% and 56% respectively.

The objective of this system is to ensure that the LTA will not be influenced by the price until the quality package has been satisfied. The principle that the selection process as part of the overall tender assessment will be conducted in a fair and transparent manner.

Scoring of the key criteria under the Project Specific proposals that the Tender Evaluation Committee will consider in the assessment of tenderer’s submission proposals are as follows:

- Whether the proposed Project Management (PM) team and key personnel are competent, experienced and suitable
- Whether the level of resources to be deployed is reasonably adequate for the entire duration of the major activities
- Whether the tenderer has demonstrated good understanding and appreciation of the job scope and risks and the project construction methods, approach and schemes
- Whether the tenderer has demonstrated good appreciation on the impact of his work to the surrounding environment and affected stakeholders. Did the tenderer submit a reasonable and Comprehensive Stakeholder Engagement Plan?
- In situations where special equipment or machinery is required to carry out the specialist work, whether the tenderer is cognizant of such requirements and provides assurance that the equipment/ machineries will be suitable, adequate and made available for the execution?
- Whether the tenderer has displayed good in depth appreciation of the risks involved and his proposed mitigation measures
- Whether the tender proposal is reasonable - programmed with clear logic flow, identified the critical path properly by the PQ ratio, and Quality account for 20% of the score. The PQ ratio for “Build Only” Tenders is hence modified to 90:10. Where tenderers satisfy the safety performance and project specific proposals account for as much as 22% and 56% respectively.
- Whether the tenderer has comprehensively and satisfactorily submitted responses to further project specific clarifications requested by LTA?
- There are also other criteria in the assessment e.g. past safety performance of the tenderer and how well they have met past project performance, related awards, past and present adjudication/mediation cases. The overall assessment will also take into account how satisfactory and comprehensive the tenderers responses were to further clarification requests requested by LTA on any aspects of the tenderer’s proposal.

To open the Price package, the tender submitters will be informed of the date and time of the opening. A Score of 50 points (out of 100) for Overall Quality and Minimum score of 29 out of 50 points for Project Specific proposals for it to be shortlisted for further evaluation.

After the quality assessment has been made and endorsed by the Tender Steering Committee, the price package will be opened. In this assessment, the lower the price, the higher the score.
Project Complexity

Appraisal and Assessment (Part 3)

The tool, named after two major contributors to GAPPs, is used to differentiate project manager roles based on the complexity of the projects managed. The CIFTER factors collectively define a project's management complexity.

1. Stability of the overall project context.
The project context would include the stakeholders, the degree to which the applicable methods and approaches are known, the project life-cycle, and the wider socioeconomic environment. The symptoms of an unstable project context would include poorly defined phase deliverables, frequent and significant scope changes, and frequent changes in team members, applicable laws and regulations.

2. Number of distinct disciplines, methods, or approaches involved in performing the project.
Most projects involve more than one management or technical discipline; some projects involve a large number of different disciplines. For example, constructing a project to develop a new polyclinic or medical facility could include engineers, architects, security and environmental sustainability consultants and specialist contractors. Each discipline tends to approach its part of the project in a different way, so when there are more disciplines, a project is relatively more difficult to manage, with more communication lines and interacting elements.

3. Magnitude of legal, social, or environmental implications from performing the project.
This factor addresses the potential external impact of the project. For example, the potential for catastrophic failure means that the implications of constructing a petrochemical refinery plant close to a major urban centre, or to a river that is a major water supply source, will likely be much greater than those of constructing an identical plant in a remote area. The management complexity of the urban project will be higher due to the need to deal with a larger number of concerned stakeholders and a more diverse stakeholder population.

4. Overall expected financial impact (positive or negative) on the project's stakeholders.
This factor accounts for the relative importance or significance of the project outcome to the project’s stakeholders. It refers more to primary stakeholders. A small project can be considered high impact if the performing organisation is a small size or new. Financial considerations related to actual or potential legal liability incurred by the performing organization. For example, financial penalty (liquidated damages) incurred for not delivering on time or to specification.

5. Strategic importance of the project to the organisation or organisations involved.
This factor addresses how critical the project's outcome and benefits are to the organisation's strategic direction. Not every project can be of equal importance to the organisation or organisations involved.

6. Stakeholder cohesion regarding the characteristics of the project.
When all or most stakeholders are in agreement about the characteristics of the product of the project, they tend to be in agreement about the expected outcomes as well. When they are not in agreement, or when the benefits of a product with a particular set of characteristics are unknown or uncertain, the project management challenge is increased. Decision making process in the project can be encumbered by differing expectations.

7. Number and variety of interfaces between the project and other organisational entities.
In the same way that a large number of different disciplines on a project can create a management challenge, a large number of different organisations can as well. For example, a project can be less complex with one main contractor overseeing many trade subcontractors as compared to managing one with many direct trade contractors.

CIFTER

GAPPs has developed an approach to assessing and categorising projects based on their management complexity. The GAPPs framework uses a tool called the Crawford-Ishikawa Factor Table for Evaluating Roles, or CIFTER in short.

CIFTER

5 entities: 10 communication lines

10 entities: many more communication lines

5 entities: 10 communication lines

Project Management Complexity Factor

<table>
<thead>
<tr>
<th>Project Management Complexity Factor</th>
<th>Descriptor and Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low or very low (1)</td>
<td>Moderate (2)</td>
</tr>
<tr>
<td>Moderate (2)</td>
<td>High (3)</td>
</tr>
<tr>
<td>High (3)</td>
<td>Very high (4)</td>
</tr>
<tr>
<td>Low or very low (1)</td>
<td>Moderate (2)</td>
</tr>
<tr>
<td>Moderate (2)</td>
<td>High (3)</td>
</tr>
<tr>
<td>High (3)</td>
<td>Very high (4)</td>
</tr>
<tr>
<td>Very low (1)</td>
<td>Low (2)</td>
</tr>
<tr>
<td>Low (2)</td>
<td>Moderate (3)</td>
</tr>
<tr>
<td>Moderate (3)</td>
<td>High (4)</td>
</tr>
<tr>
<td>Very low (1)</td>
<td>Low (2)</td>
</tr>
<tr>
<td>Low (2)</td>
<td>Moderate (3)</td>
</tr>
<tr>
<td>Moderate (3)</td>
<td>Very low (4)</td>
</tr>
<tr>
<td>Very high (1)</td>
<td>High (2)</td>
</tr>
<tr>
<td>High (2)</td>
<td>Moderate (3)</td>
</tr>
<tr>
<td>Moderate (3)</td>
<td>Very high (4)</td>
</tr>
<tr>
<td>Very low (1)</td>
<td>Low (2)</td>
</tr>
<tr>
<td>Low (2)</td>
<td>Moderate (3)</td>
</tr>
<tr>
<td>Moderate (3)</td>
<td>Very low (4)</td>
</tr>
</tbody>
</table>

The following ranges of the total points are applied to calibrate complexity:

- 11 points or less: this project cannot be used to provide evidence for a GAPPs compliant performance assessment.
- 12 points or more: this project can be used to provide evidence for a GAPPs compliant performance assessment.

For example, a project can be less complex with one main contractor overseeing many trade subcontractors as compared to managing one with many direct trade contractors.

The CIFTER Ratings

Each of the seven factors is given equal weighting when evaluating the management complexity of a project.

The using table shown, each factor in the CIFTER is rated on a point scale of 1-4. There are six possible scores: across the seven factors to determine whether a project is Global 1, Global 2 or neither.

5. Strategic importance of the project to the organisation or organisations involved.

6. Number and variety of interfaces between the project and other organisational entities.

7. Stability of the overall project context.

The impact on the contractor’s relationship could be huge.

The characteristics of a project may change over time. Hence, we can expect the CIFTER factors may change over time as well. Details on how the GAPPs development team established the point ratings can be found in the GAPPs website: www.globalstandards.org.

To manage a project successfully, the Project Manager needs to understand the characteristics and the nature of the project and appreciate the complexity. Complexity of the project is to a large extent determined by the context in which the project exists. We can apply the PESTLE tool to analyse the project context and environment – the political, economic, social, technological, legal and environmental aspects. The GAPPs CIFTER tool can be used to assess the complexity of a project.
STAR Delivery - The BIM Way

Why The Star needs BIM?
The key reason BIM was used in The Star was to understand the complexity of the form and structure and enable its coordination amongst the various disciplines.

Spatial Components

were not so apparent in conventional studies; and areas of hot spots and low wind movement can be identified and supplemented with mechanical ventilation to improve user comfort.

c. Improved Structural detailing
With the use of BIM tools - both Autodesk Revit and Tekla - Parsons Brinckerhoff (PB) was able to understand the complex structure and resolve the challenges the design presented. Details were developed after interrogating the various interface issues. Some of the challenges that PB faced were the interface between the RC and steel structures, the complex connection points at nodes, as well as the planes of the elements such as the inclined columns, inclined facades, bowl skin and structure interfaces.

CONSTRUCTION PHASE

a. Construction Workshop
Aedas/PB/CRPM

Weekly BIM coordination workshops were an important part of the project implementation. It began during the design phase and continued through the construction phase. Cross checking of the Architectural and Structural models were done on an iterative basis. Problematic issues like clashes of two or more surfaces, structures where they were not meant to be, headroom issues, facade clashes with structural element, were identified and listed out. They were discussed in the workshops amongst the various parties - Aedas, Anup, PB and CRPM so that they could be tracked, resolved and closed out. This process helped in resolving many of the conflicts that would have otherwise arisen during the actual construction activity on the site.

b. Contractor Coordination and Planning
Hexacon, the Main Contractor viewed this project as an opportunity to build up their in-house BIM capability. Key members of their team were sent for training so that they could use the various BIM tools such as Tekla, NavisWorks and Revit so that they could understand the models developed by Aedas and PB and use it for their own construction coordination. BIM has helped in their planning of the construction sequence and methodology such as lifting of the double roof truss and the sky bridge.

Tekla and Revit to assist in their fabrication of components. All three sub-contractors worked closely with the architect and structural engineer to ensure that the design intent was met. Regular meetings were held to resolve conflicts of RC slab, beam surfaces and facade panels.

BIM helped in the identification and successful resolution of these issues. On conventional 2D drawings, such conflicts and challenges could not have been identified. In addition, the sub-contractors were able to use this information in their fabrication of components and subsequent installation at site.

CHALLENGES

At the end of the construction process, some of the challenges that were quite apparent are the different skill levels of the collaborating teams. Some are more experienced while the others developed their skills during the course of the project; by the end of which they were quite proficient too.

At the same time the interoperability of the software needs to be spelt out clearly. If the BIM software used by one team member is not compatible with that used by another, then the BIM venture in the project is not likely to succeed. The various software needed for the project must be spelled out clearly at the outset.

Another challenge is the ownership of the model and tracking its updates. A system needs to be in place to ensure that all team members have a protocol that can be followed so that all members are using the most updated version of the project when they work on the project BIM model. This is more challenging on the 2D Autocad platform.

The fourth challenge is construction knowledge itself. If the team is unable to possess the necessary knowledge to continue...
MANAGING PROCUREMENT OF LTA RAIL PROJECTS - DOWNTOWN LINE 3 EXPERIENCE

The total scores from the quality and price package are then added to form the total aggregated score and tenders are then ranked based on their total scores. The tenderer with the highest weighted P-Q score (in terms of overall %) will be recommended for award.

Alternative proposals
For DTL3 contracts, there were several tenders submitted alternative proposals to the conformity (design) schemes. LTA had also embarked on a few pioneering project initiatives for the tenders to submit and conform as part of the respective tender package e.g. the initiative to adopt SFRIC tunnels and the direct purchasing of TBMs by LTA and subsequently renting to the successful tunnelling contract; albeit this is not the 1st time LTA is purchasing TBMs as this was also previously done for Changi Airport Line where the ground conditions were similar.

In such cases, the Contractor's experience and capability in being able to propose safe, workable and compliant tender proposals were key consideration factors in the project specific evaluation and tender selection process.

Conclusion
As part of the Land Transport Masterplan (LTMP), LTA plans to double the current rail network by 2020 as a result of increasing travel demand and growing public expectation for higher quality travel using public transport. As LTA rolls out more new railway lines to meet the increasing transport demands and to shift the modal split towards public transport, there is an imperative need for LTA and its partners from all sectors of the railway industry to embark on these projects and deliver them safely, on time and within budget.

We strongly believe that BIM is not the panacea to all the challenges in the Construction Industry. A fundamental understanding of the construction process coupled with the BIM tools available, the challenges of compatibility of the various software, updating of models, and ownership are all issues that need to be thought through carefully in order to ensure that BIM can contribute positively to the success of project implementation of BIM in building projects.

Acknowledgement: Materials used in this article are from Aedas, Arup, BLP, Hexagon and CRPM.

Contributed by: Ashish Alva, Vice President, Capitaland Retail Project Management Pte Ltd

Managing Procurement of LTA Rail Projects - Downtown Line 3 Experience

from the Editor's pen
Dear Readers,
The Publications Committee is pleased to bring to you the second edition of The Project Manager in 2012. We have kept to the regular period of one edition per quarter. This is not an easy task, given that everyone in our 6-member team hold a full-time occupation. We owe it to those who have contributed their written and articles. To help us keep to this regular interest, we need contributions from more SPM members and readers.

We like to look at senior or fellow members of SPM to share their experiences and journeys in their PM profession. This can enhance our learning. You can share on any of the many aspects that you had in your Project Management in the Construction Industry. Your views and comments on any of our articles or general feedback are welcome to help us improve the newsletter and make your reading more pleasurable and interesting. You can send your feedback to spmj@yahoo.com

We also welcome SPM members who can contribute their time in our Publications Committee to work on future editions. Please contact us on the same email address as above.

Thank you!

Editorial Team

Looking Forward...

Due to the limited space, we are able to bring to you only three out of five articles that we had indicated in the previous edition. For the next edition, you can look forward to the following:

STAY TUNED!

1. Managing Safety and Risks in Singapore MRT Projects
2. The Gardens by the Bay Project
3. Accreditation of Project Managers
4. The Role of Project Manager in BIM Projects

Calendar of SPM Events in 2012

<table>
<thead>
<tr>
<th>S/N</th>
<th>EVENT</th>
<th>EXPECTED DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lunch Time Technical Talks / Site Visits</td>
<td>Jun, Sep, Nov</td>
</tr>
<tr>
<td>2</td>
<td>SPM Seminar</td>
<td>3 October</td>
</tr>
<tr>
<td>3</td>
<td>SPM Annual Dinner @ The Ritz Carlton</td>
<td>4 October</td>
</tr>
<tr>
<td>4</td>
<td>GAPP Working Session 25 - Vienna</td>
<td>31 May to 2 June</td>
</tr>
<tr>
<td>5</td>
<td>GAPP Working Session 26 - Singapore</td>
<td>Late October</td>
</tr>
</tbody>
</table>

GAPPs WS24 in Dubai

GAPPs held its 24th Working Session at The British University in Dubai (BUiD), United Arab Emirates, from 17 to 19 Feb 2012. SPM was represented by Yuen Mun Wye. Participants worked hard over the 2 days to achieve the agreed outcomes of GAPPs in the following areas - Standards Development (Project Sponsor standards and Project Contract standards), Mapping of global project management assessments and Operational issues (tendering, website & marketing).

GAPPs WS24 participants at Dubai Khattar. Dubai.

SPM Outstanding PM Awards 2012

SPM encourages exemplary contributions in project management practice by individuals. The OPM Awards are once again to celebrate and recognize such achievements at our Annual Dinner on 4 October. Watch out for the launch of the nomination exercise in May/June on the SPM website.

Calling for sponsorship!

Dear Readers,
We invite you or your company to place an advertorial under our sponsorship scheme.
The cost of sponsorship is $83,000 for one full page or $52,000 for a half page. Your advertorial can be in the form of a feature article such as a write up on a project or projects undertaken by the sponsor or on any subject of project management interest.

You can convey your interest to spmj@yahoo.com.

We sincerely look forward to your support!

SPM Publications Committee
Punggol-Serangoon Reservoir Scheme

One of Boon Aik’s recent major contributions is the S$300 million Punggol-Serangoon Reservoir Scheme (PSRS), which is a key part of Singapore’s water supply plan to enhance water sustainability. Under this scheme, the river mouths of Punggol and Serangoon Rivers have been dammed up to form Singapore’s latest 16th and 17th reservoirs. The new reservoirs help to increase Singapore’s catchment area to two thirds of the total land area, in line with the effort to capture every drop of water that falls on Singapore soil. The two reservoirs can cater to about 8% of Singapore’s water demand. PSRS is a whole-of-government effort. Boon Aik was personally involved in planning and working together with other agencies, to overcome difficulties and build a sustainable model of a ‘city of the future’ which blends urban and water considerations. The new reservoirs, along with floating wetlands, park connectors, and the Punggol Waterway, have also enhanced the living and recreational space for the community.

As part of the construction works, the two rivers have to be dredged. An underwater rock bund has to be specially built off Pulau Semakau to hold the dredged materials classified as “contaminated”.

Many challenges were encountered in the development of Punggol and Serangoon Reservoirs. These included shortage of rock for underwater rock bund, poor soil conditions, and the measures to minimise environmental impact. The scheme included innovative solutions to solve unique issues. Serangoon Reservoir is unique in that it is located next to the Lorong Halus Dumping Ground. To deal with the leachate, which is polluted water percolating through the decomposing landfill materials, measures that were conceived and implemented included an impervious cut-off wall all the way from the surface down to the impervious soil, a series of leachate collection wells, and a wetland for biological treatment of the collected leachate.

Boon Aik graduated from the then University of Singapore in 1977, and joined PUB as a Civil Engineer. He rose through the ranks to his current post of Director, and has covered the whole spectrum of water supply management from policies, planning, design and implementation of major water supply schemes, to operation and maintenance of waterworks and the water transmission and distribution pipeline network. He spent a large part of his career in the planning, design and implementation of water supply schemes. Other key projects under his charge over the years include:

i. Johor River Extension Scheme Stages 4 & 5, involving the expansion of the treatment capacity of the waterworks at Johor River, together with the pumping stations and 34km of pipelines from waterworks to Singapore, thereby enhancing our water supply capability;

ii. Linggiu Reservoir Project in Johor involving the construction of Linggiu Dam and four saddle embankments, for regulating the flow in Johor River. This regulating reservoir allows Singapore to abstract the maximum possible water under the Water Agreement;

iii. Island Service Reservoir at Upper Peirce - construction of 5 pre-stressed concrete cylindrical tanks with a total capacity of 70 million gallons (318,000 m³) on a Design & Build contract;

iv. Chestnut Avenue Waterworks - the first water treatment plant using membrane technology with a treatment capacity of 60 million gallons/day [mgd] (273,000 m³/d);

v. NEWater Infrastructure Plan - This project involves laying 87 km of 2200 mm diameter pipeline to convey NEWater from Changi NEWater Factory in the eastern part of Singapore to Jurong in the west. It was implemented within a very tight timeframe;

vi. Marina Barrage and Reservoir Scheme - This is a unique “3 in 1” mega project serving as a water supply source, flood alleviation scheme and recreational purpose. The barrage across the Marina Channel creates an iconic reservoir-in-the-city. The project posed many challenges beyond pure engineering;

vii. Several projects were implemented under Design, Build, Own, Operate (DBOO) scheme with the private sector:
    a. 30mgd (138,500 m³/d) Desalination Plant at Tuas commissioned in 2005;
    b. 50mgd (227,000 m³/d) Changi NEWater Factory completed in 2010;
    c. 70 mgd (318,500 m³/d) Desalination Plant at Tuas (ongoing).