

Implementation of CostX[®] – the BIM Context

1.0 Overview

BIM is a well-recognised concept throughout the global AEC industries and its potential benefits are well documented. 3D modelling software which supports BIM is also widely used for design. Notwithstanding this, industry-wide BIM workflows are yet to become fully implemented. Around the world, various authorities are taking steps to encourage or even to legislate the use of BIM to capitalise on the benefits that can be gained from its implementation.

In Australia, there is largely a “bottom-up” approach which is seeing many industry practitioners gradually introducing BIM into their workflows, and client authorities promoting or mandating its use on their projects. The local buildingSMART[®] chapter is seeking to introduce a consensus-based common standards approach via a National BIM Roadmap, and NATSPEC have recently published a National BIM Guide.

In the US, the GSA (General Services Authority) which is responsible for the construction and operation of all federal facilities, established a 3D-4D-BIM program in 2003, and has mandated the use of BIM for spatial program validation (benchmarking) on all projects starting from 2007.

Other authorities are taking a more prescriptive approach. The Singapore BCA (Building Services Authority) is implementing a roadmap to encourage predominant use of BIM throughout the industry by 2015, including the introduction in 2010 of a BIM Fund which provides grants for the purchase of BIM-related training, consultancy, software and hardware.

On 31st May 2011 the UK Government Cabinet Office announced a new Construction Strategy. In response to a perceived lack of productivity in the construction industry, the announcement signalled, *inter alia*, the Government’s intention to require collaborative 3D BIM (with all project and asset information, documentation and data being electronic) on its projects by 2016.

From a cost efficiency point of view, central to any BIM strategy is an emphasis on value for money, standards, cost benchmarking and sustainability.

Whilst there is nothing new in these requirements, the way and speed they can be achieved can be improved significantly by the use of CostX[®] as part of a BIM workflow. As an interoperable estimating software tool, CostX[®] allows the seamless transfer of digital information between Designers, Cost Managers and Estimators. This allows fast and extremely simple extraction of cost geometry and building dimensions from CAD files and BIM models to provide faster, more accurate take-offs for measurement, estimating, analysis and options resolution.

Currently, BIM in construction is primarily used only for 3D design modelling. Documentation is regularly issued in the lesser intelligent file formats, usually basic 2D raster or vector PDF files, sometimes 2D or 3D CAD formats and only occasionally 3D object-based BIM models.

Furthermore, the file data is often not configured in a way to best suit the measurement process, and the model database is minimally populated. There is therefore an opportunity to improve the configuration of data for 3D file formats to facilitate better communication and yield the greatest benefit to the team.

Properly managed and implemented, BIM provides a means to achieve a knowledge based, integrated approach to building design, procurement and ownership. The ability to combine and share data which was traditionally spread across multiple disciplines engenders greater collaboration which in turn produces better design solutions.

Implementation of CostX[®] to facilitate a collaborative BIM workflow will enable its users to play a central role in the delivery of improved building design, efficiency, performance and whole of life cost to their clients.

2.00 The BIM Opportunity

Experience to date would suggest that Cost Managers, Quantity Surveyors and Construction Estimators have been relatively slow to embrace digital workflows. As the design professions continue to collaboratively develop their CAD and BIM capabilities to ever higher levels of sophistication, this gap will continue to widen.

Based on fast and extremely simple extraction of cost geometry and building dimensions from CAD files by non-CAD users, with optional linkage to rate libraries, CostX[®] allows users to provide instant itemised budgets or valuations for proposed buildings at any stage of the design process and, crucially, allows the user to easily identify drawing changes and re-calculate when revisions are made.

Rather than working in isolation to produce their quantities and costings for the project, by participating in the data interchange the costing discipline effectively gets to play on the team instead of watching from the sidelines. Automated quantities generation provides a faster, more accurate tool to analyse data and provide better advice. This enables real-time options modelling and facilitates scenario testing to explore ways to improve building design, efficiency, performance and cost. Using CostX[®] enables Clients, Designers, Cost Planners and Estimators to collaborate and explore opportunities with the aim of eliminating risk, reducing costs and producing better buildings.

CostX[®] supports and promotes cost management as an integral part of the BIM process because ultimately, professional advice will always be needed to analyse and interpret cost data in preference to the raw output from any software program, no matter how sophisticated. The sequential nature of design will always mean that early models will lack detail and definition. These “design intent” models provide opportunities for collaboration and analysis, testing and validation but are insufficient for construction and cannot form the basis of a comprehensive costing exercise. Hence, as with traditional costing procedures, the skill and experience of the estimator will be required to fill in the gaps.

The Cost Manager is also well placed to undertake an information management role. BIM is highly reliant on effective management and dissemination of data, driven by the establishment of detailed communication protocols and the implementation of comprehensive BIM Execution Plans.

Clearly, the 21st Century is already seeing a paradigm shift in the way that buildings are designed, built and operated. Advancements in software capability and interoperability are giving greater traction to BIM and transforming how its users approach their work. As BIM continues to gain ground, its impact will become even more profound and will redefine the way the industry works. CostX[®] makes traditional inefficiencies become a thing of the past, and many processes obsolete. Its success is being driven by companies and individuals who see its potential and devote their energies to being at the forefront of their industry and the best at what they do.

2.01 Dynamic Cost Planning

The performance and cost parameters of a building throughout its construction and life cycle are largely determined during the early design stage. It is therefore critical that the emerging design, which establishes the scope of the building, contains no in-built inefficiencies which may impact on:

- Construction cost
- Maintenance cost
- Operational cost
- User comfort and productivity
- Economic performance

Now, using CostX[®], not only can the computer provide a visual simulation of the design, it can simulate the performance of the building with respect to its construction cost. This kind of simulation enables the Cost Manager to create “what if” scenarios early in the design process, to explore ways to improve the performance of the design.

This enables fast and accurate comparative evaluation of early scheme options. It facilitates active cost modelling, which can be readily manipulated to examine permutations of any or all cost factors and provide a common basis for comparison for any number of scheme options and sub-options such as façade and structure, environmental services and ESD.

This innovative approach allows a speedy/real-time response to design options, allowing the design to flow to an affordable cost, and provides comprehensive and reliable cost data upon which informed development decisions can be based. The process provides significant time savings over traditional methods and the direct link to CAD also provides a dynamic tool for managing scope and design creep.

2.02 Dynamic Scope Management

Scope ‘creep’ – a progressive growth of project quantum and quality over that provided in the project cost budget – is a major cause of cost-overruns and client dissatisfaction with project outcomes. The project cost directly correlates to the building function, quantum and quality. Changes to these parameters, which occur regularly throughout the design process, have a direct impact on the project cost budget.

To effectively control the project budget, scope must be clearly defined at the outset and managed throughout the design and delivery stages. Whilst major changes or design revisions are usually easy to identify, the more insidious form of scope creep arises from the myriad of small and minor changes which occur throughout progressive design iterations – perhaps not of major consequence within themselves, but with a cumulative effect that if undetected can lead to major cost implications.

CostX[®] technology which directly links cost to the CAD design offers the best opportunity for improvement and re-engineering of costing processes and techniques to support scope management.

For a particular building type there are inherent relationships in the geometry of its design that directly impact on its cost – its “cost geometry”. These relationships are defined at the earliest design stages and are the framework upon which the project scope is built.

Using CostX[®], the cost geometry can be extracted from the earliest CAD designs and quickly applied to generate a project specific cost model for the building which defines project scope at an elemental level and establishes a realistic and achievable budget.

The live links to the CAD drawing or model enable CostX[®] to readily identify and highlight all changes that are then made in progressive drawing issues. The associated quantities are updated and the cost automatically recalculated, with all changes recorded as an audit trail.

Following this iterative process, scope is effectively managed and nasty surprises arising from scope creep become a thing of the past.

In commercial terms, this means time and money is saved because the traditional problems of redesign, excessive tendering costs, costly resolution of variations and frequent contract disputes over matters of fact or interpretation are avoided.

2.03 BIM Process Management

CostX[®] provides a powerful tool to re-engineer workflow protocols because the entire process is electronic. Cost benefits of such workflow improvements are far greater than those provided by document management tools alone. Company-wide electronic workflow process enables work to be carried out in any location – across continents, on the building site, on a laptop in a car, anywhere that an internet connection can be established.

Freed from tedious process, it puts skilled professionals in a far better position to use their skills to evaluate the data provided and focus on improving the quality of the information provided.

The ability to generate cost data and communicate it in a visual form by connection to the CAD drawings has several benefits. One is the value added through interaction. Rather than a static hard copy document, an understandable and interactive cost model will be available for all stakeholders to view in pursuing their particular contribution to the building process.

Secondly, as the value of this model becomes more evident to the stakeholders, more attention will be given at the design stages to ensure that the model is comprehensive as this will result in savings further on in the process because the information can be constantly re-used. Management of this process can be a key enabler for improved project outcomes.

Thirdly it provides an extremely useful building management tool, an electronic database of building cost information connected to CAD drawings which allows consideration of issues such as maintenance management, facilities management and, with further development of the software, interaction with other programs that the client can use for the ongoing life of the building.

In commercial terms there is probably a larger demand for services in this field than there is in new projects, not just in construction but applied to capital expenditure generally, for example engineering and petrochemicals, major resource areas, plant building, ship building and so on.

Thus, there is a huge potential to harness the software to develop services to better serve the needs of the property industry at large and the quality of the built environment on a worldwide basis, which, with Internet technology and communication, could be made available anytime, anywhere.

3.00 Conclusion

Key opportunities exist to exploit new technology to up-skill staff, re-engineer workflows to improve the effectiveness of existing services, and create additional service offerings. The first-mover advantage lies in commercial positioning. Being first to leverage the BIM advantage to enhance the range and effectiveness of client services will differentiate CostX[®] users from their competitors and provide a platform for a new phase of growth.

Exactal has a proven track record of innovation, with continual development of the CostX[®] platform to remain abreast of changing industry technologies, and ahead of the competition. CostX[®] remains the first and only product to fully integrate 2D and 3D workflows within a single package. Future developments will include further improvements to the BIM interface including the ability for users to add data to the model properties which can be used not only for quantification purposes, but potentially for life-cycle modelling and other broader applications. A cloud application, CostX[®] Live, is also in advanced pre-release.

The CostX[®] software platform is entirely developed and owned by Exactal which means the company can be extremely responsive not just to changing market conditions, but to the needs and demands of our users as they implement and develop their CostX[®]-based service offerings. The CostX[®] solution is therefore scalable and future-proofed, and may be selected with confidence.