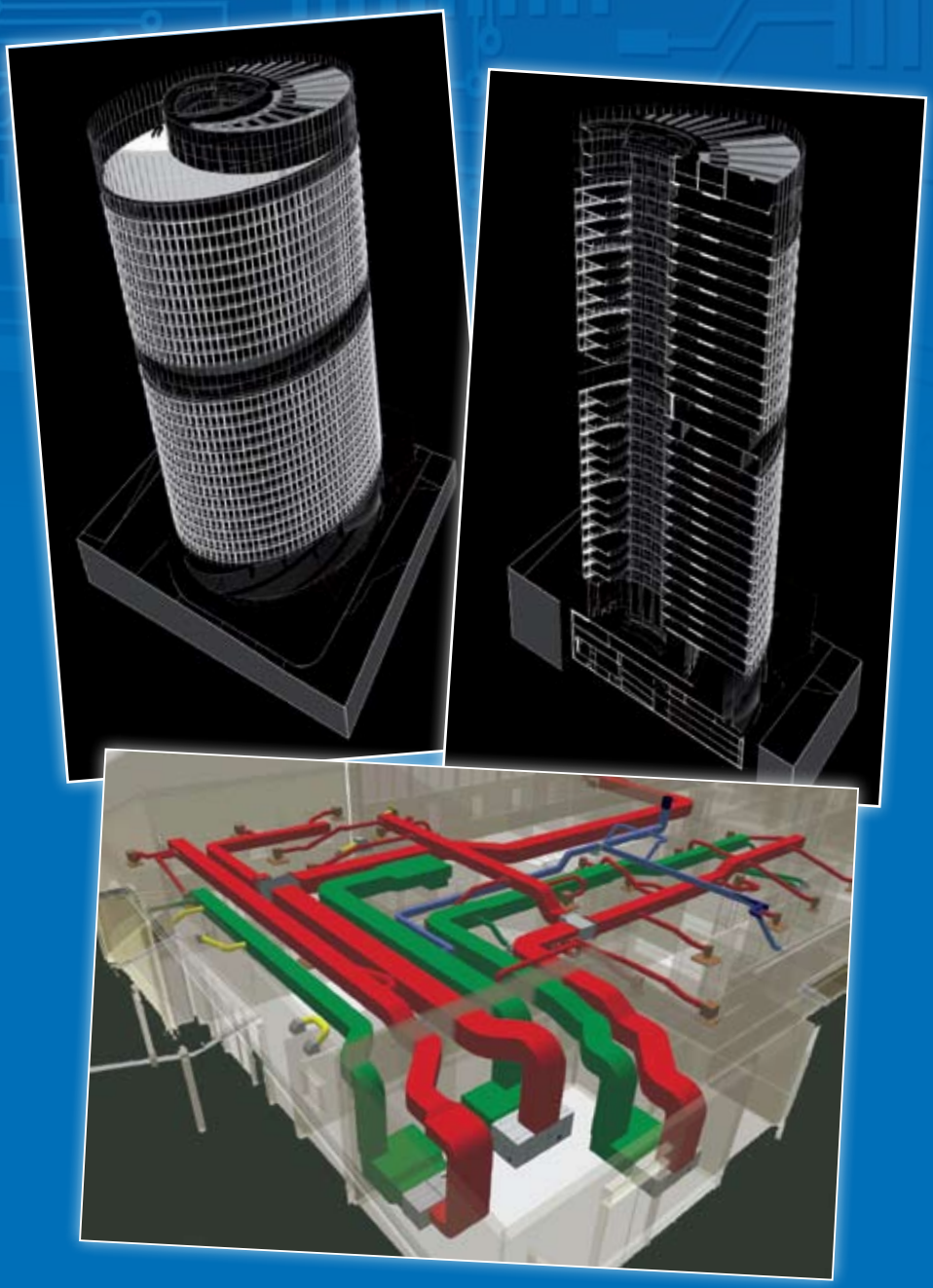
National Building Information Modelling (BIM)

Guidelines and Case Studies



Images *Upper:* Architectus+Ingehoven Architects ***Lower:*** Qld Department of Public Works

Mechanisms that improve collaboration and communication in the construction process are becoming ever more critical. The Cooperative Research Centre (CRC) for *Construction Innovation* is releasing the *National Building Information Modelling (BIM) Guidelines* which demonstrate how open and consistent processes allow practitioners to work together in developing shared "virtual building and infrastructure" projects. A set of case studies will also be published, outlining the lessons learnt in implementing BIM in Australian building projects.

Written specifically to the Australian market, the BIM Guidelines are based on experience, industry consultation and practical examples that promote consistency in the implementation of digital models for building projects. They are based on internationally accepted standards and will support stakeholders in achieving interoperability throughout the life cycle of a facility – enabling online collaboration between design and construct project team members.

The BIM Guidelines place architects, engineers, contractors and sub-contractors that use BIM along a continuum developed by the Australian Institute of Architects in conjunction with this CRC project. The Guidelines will provide a process for progressing to a higher level along the BIM implementation scale (summarised in the *Towards Integration* diagram overleaf with explanatory details on back page).

CRC Construction Innovation
BUILDING OUR FUTURE

Australian Institute of Architects

TOWARDS INTEGRATION

Taking the Australian construction industry forward

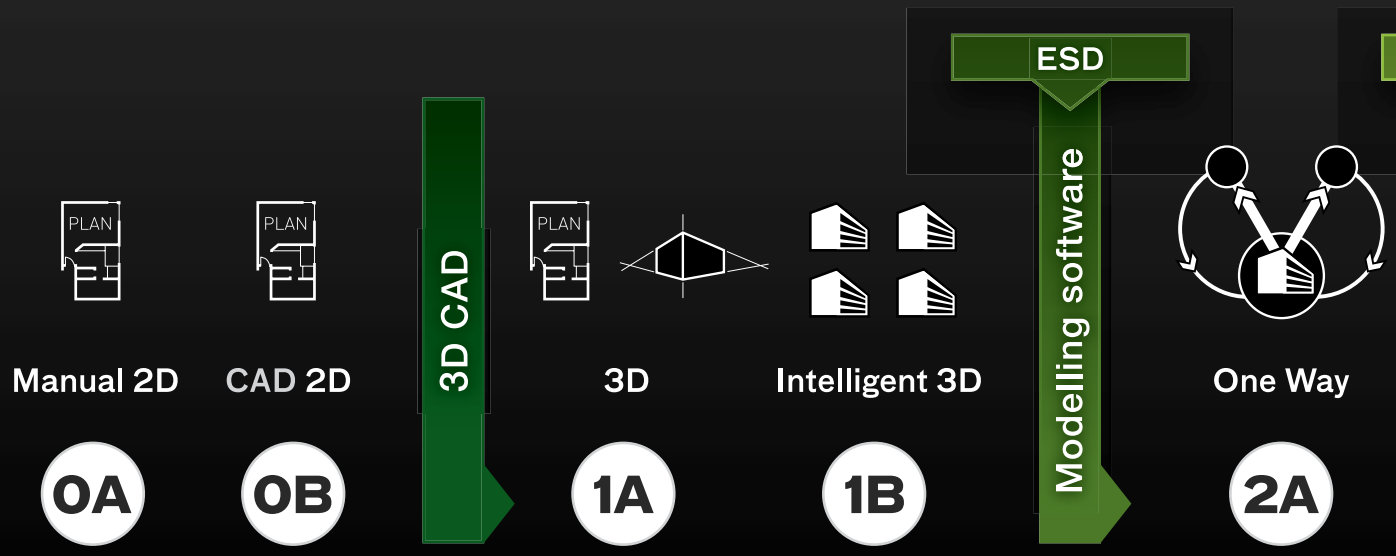
WHERE WE WERE | **WHERE WE ARE**

0 – 2D
Manual and CAD based (2D or 3D)

1 – MODELLING
Single-disciplinary use of object-based 3D modelling software within one discipline

2 – COL
Sharing o
between t

Representation | Pr



BUSINESS MODEL

ISOLATED | **COLLABORAT**

Legend
Communication type
traditional
digital

UPTAKE

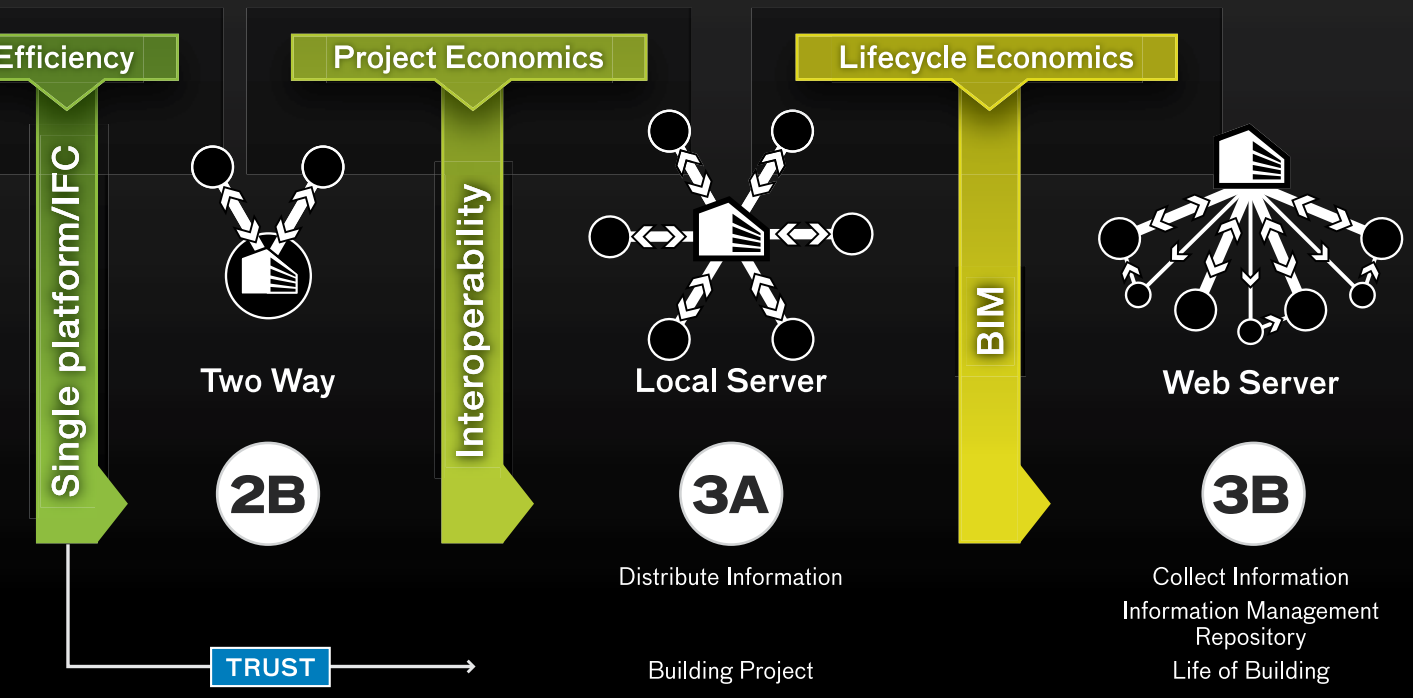
TOWARDS INTEGRATION

	NEXT STEP	WHERE WE ARE GOING

LLABORATION
f object-based models
wo or more disciplines

3 – INTEGRATION
Integration of several multi-disciplinary models using model servers of other network-based technologies

ototype	Full Information Capture



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Towards integration

The *Towards Integration* diagram describes graphically how digital modelling can be adopted in defined stages. This simplification of a complex and evolving process aims to improve awareness of modelling implementation and provides a common vocabulary to be shared between professions and organisations. The diagram has already served as a valuable communication tool for professionals in the building procurement, design and construction industries and will further evolve over time.

The *Towards Integration* diagram is arranged in four major stages, each with two minor stages referred to as 'levels'.

Stage 0 — 2D Documents

Level 0A: Manual 2D Drafting
Level 0B: CAD 2D Drafting

These two levels represent the traditional production of two-dimensional (2D) documents, primarily drawings. A large part of industry practice is still operating at this stage.

Stage 1 — Modelling

Level 1A: 3D CAD Modelling

3D CAD Modelling is the creation of three-dimensional (3D) geometry for improved visualisation. The building model objects have little or no data attached to them. Some of industry is operating at this stage.

Level 1B: Intelligent 3D Modelling

Intelligent 3D Modelling is the first stage in the adoption and use of BIM and most practitioners of BIM are at this stage.

A well-constructed model will reveal building issues that can be resolved immediately, rather than during the construction phases. This requires modelling procedures and standards, so that building model objects are created and connected in consistent ways.

Traditional views, drawings and documents can, if required, be automatically extracted and internally consistent, such as Automated 2D Plan, Sections, Elevations, Details, Schedules, Quantities, e-Specifications, 4D Construction Scheduling, 3D Visualisations, Perspectives, Sun studies, Animations, and Automated model checking.

Widespread industry capability at Level 1B can have a significant effect on the quality of project coordination and documentation.

Stage 2 — Collaboration

Level 2A: One-way Collaboration

In a one-way collaboration, the BIM model file can be exported to other participants for visualisation, coordination, communication, assessment, analysis, simulation or discipline design.

Feedback to the original discipline author for design and coordination would be in traditional formats and the original model is updated in digital isolation from other discipline models. For example, a structural engineer might export a model to the steel shop detailer/fabricator for detailed design and fabrication.

Coordination is required to select compatible file formats, versions, data structures etc. and the agreed formats make it easier for quality control and definition of responsibilities and ownership.

Level 2B: Two-way Collaboration

In a two-way collaboration, a common BIM model file data can be shared by two or more project participants in an iterative collaborative process which greatly enhances feedback and produces tighter integration of disciplines. A significant amount of coordination is required to establish compatible file formats, versions etc. and the correct selection of objects and their mapping settings.

A project could be made up of a number of discipline models, and in practice, might have some disciplines collaborating at different levels (e.g. architectural and structural at Level 2B and all other discipline collaboration at levels 1B or 2A).

Stage 3 — Integration

Levels 3A and 3B describe technologies and processes hosted on Model Servers and are considered in the CRC *Construction Innovation* Research Project 2007-03-EP Collaboration Platform Project — BIM Model Servers.

Project participants

Industry	Government	Research
Arup	Brisbane City Council	QUT
Bovis Lend Lease	Building Commission	RMIT
Mirvac	Qld Dept of Main Roads	
Sydney Opera House	Qld Dept of Public Works	
Woods Bagot		

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