



**National BIM Standards Committee  
BIM Scoping Group**

2/6/2006

**Re: Extended Family of BIMS Report to BIM View Sets**

This report describes and clarifies the first page draft of the “Extended Family of BIMs” diagram. Page one covers Owner Business Goals through the Construction Coordination Model. There are two/three other diagrams to support the full building lifecycle. This is done to represent where functional viewsets of BIM are applicable for the Scoping Committee to consider. This concept aligns with IAI-lfc and BLIS view sets for data integration to support the building lifecycle process.

This work is done in support of the BIM Scoping Group which needs to define the BIM extension into the building lifecycle workflow so that initial scoping and detailed needs can be communicated to the Development Team.

**Change Record – Use Comments Tool to Make Changes on Document**

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Date	Editor	Version	Change Reference
2/6/2006	Dianne Davis	1.0 (draft)	Extended Family of BIM's Doc. Pg 1 Report

**Coordination**

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The extended family of BIMs developed by the Executive Committee is meant to show how BIM use can be all pervasive as our industry moves to a web-enabled integrated and interoperable workflow to manage the building lifecycle. It coordinates with the FIATECH Roadmap and IAI International Methodology.

The IAI has spent considerable time in developing the underlying data points required in the various building disciplines, making the standard open and accepted by the major software providers, and accepted into the ISO standards for Construction.

Today, web capabilities, networks, portals, and the growing awareness of BIM and interoperability in North America requires the BIM Scoping team to think in terms of project and process workflows, web transactional possibilities, virtual teaming and the merging of simulation and design decision processes. This is the basis of the Decision Value-Chain of the building lifecycle.

It will be a key focus of the Scoping Committee to support the development of functional data views as appropriate for this time in the industry, in software development and in North America. We have support for this focus area through the work of BLIS and the Norwegian IDM project. The BLIS organization identified additional data sets that supported communication between groups such as BIM-Costing and BIM-Energy, etc. Functional views will also require the coordination between the NCS and the NBS, which will be coordinated with David Jordani of the Executive Committee.

The diagram (See Diagram) created for the Scoping Committee (Page one) shows some of these transaction points and view sets needing functionality requirements within the building lifecycle. We have several members of the Scoping Committee that are part of the IAI, BLIS, and Lean Construction. Francois Groebler is a North American representative to the IAI. He will be reporting the IAI-No work and help with this coordination. The Scoping Committee will be coordinating with international contacts to not duplicate effort. (See Appendix 1)

**Recommendation:** Family of BIM to be changed to Functional Views or Business Views (enabled by BIM technology) which will more closely align with the IAI International views and we should supplement where necessary.

## **For Purposes of Reviewing BIM Functional Views Numbers aligned to Diagram Numbers and View Sets**

### **1. Client/Owner Business Drivers, Needs, Goals (green)**

To a great extent this kind of information is still conveyed as electronic versions of paper documents. But others/owners convey this information in the form of BIM modules that define standards for space, adjacency, cost, manufacturer, ergonomics, aesthetics, etc.

BIM models can support and convey this information in a useable form for downstream activities. BIM models can convey abstract and representation data, and support aggregation and analysis and relationships.

This diagram also aligns BIM functional views with the first two boxes of the FIATECH Diagram (Scenario Based Planning & Automated Design) and shows box three (Integrated Procurement & Supply Network) as an enabler at the bottom of the diagram because it effects all the processes. It is particularly critical for Scenario Based Planning to be automated. Automated Procurement and Supply Network is not linear in a BIM based process as this data can come into the project at any time. (Think global auctioning of materials)

#### **Scoping Team-**

Review the functional views developed by IAI International and specifically IAI.no and BLIS. Define views that need clarification or development to supplement our work. (Francois Groebler, CERL recently returned from the IAI meetings in Europe and will report on Thursday)

#### **Quick Wins-**

Give examples to the industry of BIM based planning. Research and use view sets from others that will work for Scoping Committee (USCG, Beck, Norway, CERL)

Document examples of BIM Scoping Models, Beck, CERL (USCG, as one)

Early planning committee in IAI

Work with Regulatory Standards Groups

#### **Culture Change-**

Support the move of the WBDG to a BIM based delivery method.

Support BIM based Manufacturer Product Delivery

### **2. BIM Planning Model & Scenario Based Planning (blue & green)**

The BIM Planning Model (or view set) which can be given to the design team from the owner rep and represents a usable form of the client's needs and decisions to date. It transfers data in a usable and re-usable form rather than a form which must be re-created. This data may be a mixture of schematic, unknown information place holders, abstract performance needs and detailed specifications.

As a deliverable to the design team it represents an electronic starting point much closer to a combination of AIA's schematic and design development phases. This has a potentially huge impact on data development and reduction of human error which can drive the entire project's TOC up over time.

#### **Scenario Based Planning and other decision processes which are iterative**

These BIM view sets support machine based analysis, simulation and communication within the process. This ability to have machine based analysis (based upon open and interoperable data standards) allows the merging of simulation and design decision processes within the AEC industry. The benefit of this can already be seen in many other industries. Versioning now and into the future

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#### **Quick Wins-**

Give examples to the industry of BIM based scenario based planning. Research and use view sets from others that will work for Scoping Committee (USCG, Beck, Norway, CERL)

Document examples of BIM Scenario Based Planning use (USCG, as one)

#### **Culture Change-**

Support the move of the WBDG to a BIM based delivery method

Support BIM based Manufacturer Product Delivery

Insurance Companies Attitude toward scenario based planning

### 3. **Project Scope Model & Automated Design** (blue)

Automated design is integrated, interoperable, and machine interpretable. As part of “buildSMART” it is a transactional workplace where peer groups and sub-contractors communicate and support project needs through BIM models. It aligns our scoping activities with the IAI-Ifc use of data standards and supports web-enabled virtual teams that share and re-use data as the workflow. This is a highly BIM enabled activity, and highly interoperable.

This is the activity most associated with BIM use because it is seen as a natural extension, next generation CAD, or 3D CAD with attributes. (this is a cultural change to be worked on)

It is still iterative in nature, and follows the distribution and aggregation of data from peer professionals (structural engineer to architect, etc BIM-ifc views,) but because these views can carry data of various depths it has the ability to be a non-linear process.

#### **Scoping Team-**

Review the functional views developed by IAI International and specifically IAI.no and BLIS. Define views that need clarification or development to supplement our work.

#### **Quick Wins-**

Give examples to the industry of BIM based design charrettes, virtual teams, etc. Research and use of view sets from others that will work for Scoping Committee (USCG, Anshen Allen, WebCOR, etc)

Document examples of fully BIM Based Projects

#### **Culture Change-**

Understanding of the need of interoperability over integration (long term possibility over localized near term gain)

Support the move to a BIM based delivery method

Support BIM based Manufacturer Product Delivery and Owner’s push for BIM – benefits

### 4. **Project Decision Models & Automated Design** (green & blue)

Automated design is integrated, interoperable, and machine interpretable. As part of “buildSMART” it is a transactional workplace where peer groups communicate and support project needs with BIM. These BIM model views are aggregated together at different times to support project decisions, review, reporting, and documentation.

These extracted views are also functional view sets which can be defined the same way as paper based submittals were defined in terms of content. Ours are simply BIM based. By defining these view sets we have the opportunity of using machine interpretable checking capabilities to a fuller extent than is currently being done.

This checking can help review the current design’s adherence to regulations, client performance goals and business needs, code compliance, etc.

#### **Scoping Team-**

Review the functional views developed by IAI International and specifically IAI.no and BLIS. Define views that need clarification or development to supplement our work. Review the Singapore work and current work in US. Identify insurance needs, real estate views, and International Bldg. Code work.

#### **Quick Wins-**

Review the use of view sets from others industries to support automated decision processes that will work for Scoping Committee (FIATECH and Petro-Chemical)

Document examples and apply principles

#### **Culture Change-**

Understanding of the need of interoperability and facilitated decision processes vs. AI.

Change the contracts for deliverables to support a more flexible review process.

### 5. **Project Construction Coordination Model** (blue)

We live in a multi-media world and each has media has its place. Aggregating the data in a form which supports the next major phase of a virtual building project is the scope of project coordination view sets. What are the data types and view sets of BIM supporting the following activities: procurement, logistics, scheduling, site management, reporting, documenting, change, fabrication and productivity.

The view sets that support paper based documentation, live BIM use in the field, labor categories, geo-spatial based information, simulation, etc. How does this model get updated to become the BIM of Record?

#### **Scoping Team-**

Review the functional views developed by IAI International and specifically IAI.no and BLIS. Define views that need clarification or development to supplement our work. Review the FIATECH site work projects and current work in US. Identify insurance needs, site logistics, inspection and International Bldg. Code work.

**Quick Wins-**

Review and use of view sets from others industries to support automated documentation coordination, NCS that incorporate into BIM Standards, FIATECH and Petro-Chemical, China building boom.(Paul Daugherty)

Document examples and apply principles

**Culture Change-**

Understanding of the need of multiple mediums to support field needs. Use of aggregated models in the field. Print on demand, etc.

Change the contracts for deliverables to support a more flexible provision process.

There are BIM view sets which exist for all levels and actors in the buildSMART process. These views are functional in nature and support a more automated and coordinated virtual process. With the information standards used to populate these view sets defined for North America, new levels of productivity, quality control and communication are possible. Underlying and supporting this dynamic workflow is an electronic marketplace that supports in BIM enabled ways the dissemination of information, automated purchasing, and auctioning.

The Scoping Committee may add to these views. At the same time we need to focus on our first steps in defining these data exchanges and transactions. Also a simpler view of this process is needed for the Communication Committee.

If there are questions, additions, comments, please use the comment capability of the software. Use my email or the server to start a conversation. We will have a conference call scheduled after Thursday's Executive Committee meeting.

Dianne Davis, Chair, National BIM Standards Scoping Committee

## Appendix 1-Norwegian Update on IDM (functional view sets) Information Delivery Manual – Norway BIM, IFC and Process Issues

Building Information Modeling (BIM) is the new approach to describing and displaying the information required for the design, construction and operation of constructed facilities. In Norway, there has been rapid take-up in the use of BIM and in understanding that new ways of working must be adopted to enhance its benefit.

A key to this is the knowledge that the quality of communication between different participants in the construction process needs improvement. This means making information available when it is needed and ensuring that its quality is satisfactory. To make this happen, there must be a common understanding of construction processes and of the information that they use and provide.

The Industry Foundation Classes (IFC) schema is seen as fundamental to the effective use of BIM and exchanging information between different BIM users. It provides a comprehensive reference to information within the lifecycle of a constructed facility. However, it does not handle individual processes within building construction or the information communication between them.

### Solution

To address this, the State Building Authority (Statsbygg) together with DDS and Selvaag and supported by AEC3 started developing the Information Delivery Manual in February 2005. It's value was rapidly seen by many organizations within Norway and it is already being used to support particular tasks in projects including the new Akershus hospital and the Tromso College development. It is now being adopted more widely. The Information Delivery Manual (IDM) identifies discrete processes undertaken within building construction, the information required for their execution and the results of that activity. It targets both BIM users and software solution providers.

- For BIM users, it provides a simple to understand, plain language description of building construction processes, the requirements for information to be provided for process to be carried out successfully, additional information possibly needed from the user and the expected end results.
- For BIM solution providers, it identifies and describes the detailed functional breakdown of the process and the IFC capabilities needing to be supported.

The IDM is evolving to provide a comprehensive reference to the processes executed within building construction, to describing the use of BIM to support communication between processes and to providing standard specifications for information structures to be supported by software solutions for this communication.

From this reference list, end users will be able to specify those that are relevant to the needs of their specific project and, in so doing, will specify the information that needs to be communicated between the various participants.

The components of the IDM are:

- Process maps that describe the evolution of information for key topics throughout the project lifecycle.
- Each process map identifies the requirements for information exchange and the roles within the project from which the information is received or to which it is provided.
- Each requirement for information exchange is described individually in the IDM.
- Each description is in two parts, the first targeted at the BIM user and the second at the BIM solution provider.
- For the BIM user, information is described in non-technical terms that do not need a knowledge of the IFC schema.
- For BIM solution providers, descriptions break down the IFC schema into reusable "functional parts" (commonly occurring sets of data that may be used by any number of processes).

### Benefits

IDM offers substantial benefit to BIM users and solution providers including:

- regulates information flow between processes and between participants
- improve information quality within processes
- enables quality checking of information at various stages through the development of validation rules
- supports decision making through guaranteed information availability and quality
- provides for more reliable and effective IFC support in software solutions
- allows more effective BIM use

# BIM Scoping – Family of BIMS Expansion

# DRAFT Performance Based BIM Planning, Scoping Decision Models



National BIM Standard Scoping Committee  
 Author: Olanne Davis

The Executive Team "Family of BIMS & FIATECH Capital Project Technology Roadmap Defined in terms of BIM . (This isn't the final BIM definition- (there are four to look at including the NIBS one) For the purposes of this chart-BIM isn't just for the design team. BIM isn't just the next generation of CAD. In the buildSMART environment, BIM is an integral, integrated, and interoperable workflow and technology supporting the virtual construction and simulation of the building lifecycle for all players and at all levels. It gradually develops client specific solutions that reflect the original business and performance goals of the project. Through this workflow, the BIM process supports a performance based methodology. IT supports efficient management and quality control through data re-use and re-purposing through planning, scoping, rapid prototyping, testing, documentation, execution, commissioning and occupation with data mining for future needs. (BIG SCOPE) It ties the business goals to the project requirements, project execution and TOC

**LEGEND- White Boxes are explanatory**

	<b>Design or Project Team</b> Linkage to Int. and External Data	<b>Potentially Pre-defined BIM elements, data (Functional Views)</b>	<b>3</b> The Numbers Reference the sequence of the FIATECH Roadmap and Written Doc on BIM Expanded Family
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