National BIM Standard - United States™ Version 2

4 INFORMATION EXCHANGE STANDARD

Chapter 4.3   Design to Spatial Program Validation

Introduction

Design to Spatial Program Validation (SPV) is an open, IFC-based BIM information exchange that enables designers and building owners to assess the performance of a building design in satisfying spatial program requirements defined by the owner of the building. An SPV analysis application loads the Building information Model (BIM) and the spatial program requirements and assesses the performance of the building model in satisfying the owner's requirements.

Several building owner organizations support and are beginning to use BIM exchange for SPV in their projects. These include: GSA, Statsbygg, and Senate Properties. Several software organizations have already implemented, or are now implementing support for the BIM information exchange in their products. These include: Autodesk, Beck Technologies, Bentley, Gehry Technologies, Graphisoft, Nemetschek, Onuma, and Solibri.

More information about this program can be found on the GSA BIM/4D/3D Program web site and in the GSA BIM Guide for Series 02 of their BIM program. More detail, including the Information Delivery Manual (IDM) and Model View Definition (MVD) can be found on the IFC Solutions Factory Website.

Information Exchange

As part of the NBIMS standard, this open, IFC-based information exchange and the products supporting it will improve the quality of design using BIM, but providing quantitative feedback to designers and owners about how a proposed design will satisfy the owner's needs. Buildings will be better because they fulfill their intended use more completely -- if this IFC BIM exchange is made a US standard.

IDM Submission Requirements

1. Process Maps - http://www.blis-project.org/IAI-MVD/IDM/GSA-001/PM_GSA-001.pdf

2. Exchange Requirements - http://www.blis-project.org/IAI-MVD/IDM/GSA-001/ER_GSA-001.pdf

3. Exchange Requirements Model Description - http://www.blis-project.org/IAI-MVD/MVDs/GSA-001/Overview.pdf

4. Exchange Requirements Model - http://www.blis-project.org/IAI-MVD/reporting/browseMVD.php?MVD=GSA-001&BND=Generic&LAYOUT=H

   For convenience, the ERM can be downloaded in PDF format from: http://www.blis-project.org/IAI-MVD/Snapshots/GSA-001_ERM_(SPV)_Design_to_SpatialProgramValidation.pdf

MVD Submission Requirements

1. Model View Definition Overview - http://www.blis-project.org/IAI-MVD/MVDs/GSA-001/IFC2x3.pdf

2. Model View Diagrams - http://www.blis-project.org/IAI-MVD/reporting/browseMVD.php?MVD=GSA-001&BND=IFC2x3&LAYOUT=H

   For convenience, the MVD can be downloaded in PDF format from: http://www.blis-project.org/IAI-MVD/Snapshots/GSA-001_MVD_IFC2x3_(SPV)_Design_to_SpatialProgramValidation.pdf

Implementation Specifications:
Each MVD concept in the MVD diagrams is hyperlinked to the Implementation Guidance for that concept. Simply click on the MVD Concept box in the diagrams (either online web pages or the PDF download) to link to the implementation specifications web page in your browser.

Software Implementation Requirements

Implementation Support
As described above, four vendors have already implemented support for SPV in 5 products, as part of their implementations supporting the Concept Design BIM 2010 (CDB-2010). CDB-2010 rolls together the requirements of four IDMs into a single composite MVD. Implementations began in September 2009. Vendors have been supported through the implementation process through a bi-weekly meeting in which questions are addressed, results are reviewed, and issues resolved. Implementing vendors and products include:

Exporting Applications:
• Autodesk – Revit 2012 and AutoCAD Architecture 2012

• Beck Technologies – Dprofiler

• Bentley Systems – Bentley Architecture (early version of IE)

• Gehry Technologies – Digital Project (early version of IE)

• Graphisoft – ArchiCAD 15

• Nemetschek – Vectorworks (early version of IE)

• Onuma – Onuma Planning System (early version of IE)

Importing Applications:

- Solibri Model Checker + Spatial Program Validation Plug-in

Certification Test Program

Certification testing began in October 2009. We expect that all of these applications will be certified for correct support of SPV in 2011 (as currently defined). Certification testing is MVD concept-based, and takes the unit testing approach. This means that there are tests for each and every bit of data required by the MVD. These tests are specific enough to ensure that the IFC BIMs being exported by certified applications are absolutely consistent and can be predictably loaded and analyzed by any certified SPV analysis application.

Sample Certification Test Results Package – http://www.blis-project.org/IAI-MVD/testing/GSA-005/DProfiler_CDB-2010_TestResults_02-Jun-11_3.zip

This package includes:

- Submitted IFC BIM file

- Certification Test Results Summary Report

- Certification Test Results Detailed Reports – 37 of these – one for each high-level MVD Concept (e.g. wall, door, window)

Use of this Information Exchange in Industry Projects

Pilot Projects using SPV

- Van Buren Land Port of Entry - Use of SPV exchange in this project began in late 2010 and is expected to conclude successfully by end of summer 2011. The BIM authoring application is ArchiCAD 14 and 15. The SPV analysis application is the SPV plug-in for the Solibri Model Checker.

- O'Mahoney Federal Courthouse -- Use of SPV exchange in this project began in late 2010 and is expected to conclude successfully by end of summer 2011. The BIM Authoring application is Beck Technologies' dProfiler. The SPV analysis application is the SPV plug-in for the Solibri Model Checker.

SPV BIM Validation for end users

An online BIM Validation service is being developed and will be made public by end of 2011. This online service will enable end users to upload their IFC BIM to be checked for conformance to exchange standards defined by IDMs and MVDs. Checking IFC BIMs for conformance to the SPV information exchange will be supported by this service. Testing with Vendors has already begun.

Reference Standards

- Industry Foundation Classes (IFC) standard – see http://www.buildingsmart.com/

- IFC Solutions Factory – tools for developing IDMs/MVDs – see http://www.blis-project.org/IAI-MVD/
- OmniClass Classification – see http://www.omniclass.org/

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