Adopting BIM and Integrated Practice

New Design Tools Facilitated by BIM

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Adopting BIM and Integrated Practice

The obvious uses of building models

- drawings
- visualization
- specifications
- analyses/simulation
- Clash detection
Adopting BIM and Integrated Practice

Some of the open-ended set of new uses of building models:

- Laser scanning
- Automated code checking
- User simulation
- Design for fabrication
Adopting BIM and Integrated Practice

GSA Automated Courthouse Design Reviews

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Circulation and Security Review in Concept Design for US Courts

Solibri Model Checker platform
Using IFC from any of the BIM architectural design tools
GSA Automation of Court Design Guide

Circulation and Security Review in Concept Design

Design guides capture best design practices for specialized building types

Large, complex and tedious to master, often ambiguous

U.S. Courts Design Guide

(Over 400 page document)
Courthouses have three distinct circulation systems: for public, staff and defendants. Security and the integrity of the court process are critical issues. Circulation and security dominate early planning and the design concept, and affect many details.
Circulation & Security Validation in Courthouses

1. Step: Select all paragraph and paragraph with associated circulation issues.

94 paragraphs are selected with ID (sector, chapter and line)

216 circulation issues

“(e.g. Ancillary spaces located near the district courtroom include: attorney/witness conference rooms accessed from public circulation; judge’s conference/robing room (provided only if the judges’ chambers are not located close to the courtroom) accessed from restricted circulation; trial jury suite accessed directly from the courtroom or restricted circulation; and prisoner holding cells accessed from secure circulation)”
Development Framework

Court design guide

U.S. Courts Design guides

Selected circulation issues

Define standard syntax and structure for Circulation Rule Language

Normalized circulation issues

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Testing a court house model on Solibri

Generate rule set

Rule Sets

IFC Court house Data

Georgia Institute of Technology

U.S. General Services Administration
Reporting Structure

Court design guide

U.S. Courts Design guides

Selected circulation issues

Normalized circulation issues

Define standard syntax and structure for Circulation Rule Language

Reference back to Design Guide description

Generate rule set automatically

Rule generation module

Rule Sets

Testing a court house model on Solibri

IFC Court house Data

U.S. General Services Administration

Normalized circulation issues:

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Circulation & Security Validation in Courthouses

US Courthouse Circulation and Security Validation Module:

Circulation and Security Validation is fast:
• it can apply about 302 rules on space classes;
• this turns into about 2,700 rules for instances of spaces;
• this turns into about 200,000 traversals between spaces;
• currently computes all paths and checks them, which takes about less than 20 seconds.
Support diverse view of a building model
- Display space according to the zone classification

- Public zone
- Restricted zone
- Secure zone
Support diverse view of a building model

- Represent spatial structure by using graph
The location of central court libraries must provide access for judges, law clerks, and other court staff by means of a restricted staff corridor. 3-13-27

Rule: Accessibility from USBC clerk office to central court library through restricted circulation

Result: Components failing the "Security Level: restricted" condition: Space.-1.14: Corridor[952], Space.-1.20: Lobby[953], Space.-1.6: Corridor[928], and Space.0.122: Corridor[336].
Circulation path searches include those involving different floor levels.

Convenient restricted circulation throughout the building, including service elevator access, must be provided for moving audio-visual equipment.
Courthouse Issues
Current work – Courtroom design and layout

400 page document

- Circulation and Security
- Courtroom Layout
- Services At Stations/Benches Within Courtroom
- Spatial Arrangement of Suites of Spaces
- Acoustical Checks
- Lighting
- HVAC Systems
- Rough-in Locations of all Drops and Services
- Space Finishes

Limited for now to concept design level checking

Work led by Jaemin Lee
Current direction of rule checking
Courtroom and other major space review details

• **Judge’s bench** – access free, height, sightlines, distances
• **Jury box** – ADA access, distances to witness, judge and public
• **Witness box** – movable, support interpreter, handicap access
• **Law clerk station** – room for multiple clerks, ADA access,
• **Attorney and Litigant Stations** – ADA access and use of spaces, visibility of jurors, litigants, witnesses, other attorneys and judge, speech privacy.
• **Spectator Area** – visibility of judge, witness, attorneys, jury, ADA access and number of seating locations by formula.
  • Good vision, but also sound privacy
  • Location of signer for deaf
  • Location of A / V screen and projector
  • Soundlocks, placement of mechanical spaces

Work led by Jaemin Lee
Current direction of rule checking

Area

Multi-level floor

Work led by Jaemin Lee
Development of a Geometric Modeling Library for Building Assessment

Critical spaces within the courtroom must be accessible: jury box, witness, public audience, lawyers, judge

Generation of paths between locations within a space

Work led by Jaemin Lee
Diverse checking issues on courtroom

The visibility of each others in a courtroom rule

Hearing-impaired persons must also be accommodated. A signer is necessary for proceedings involving deaf participants. Courtroom layouts must place the signer within the reader’s field of vision and also provide the reader a view of the speaker. This allows the participant to observe the speaker’s gestures, facial expressions, and other visual cues. (4-47)

Location of person

Filed of vision
Courtroom and other major space review details

- Clearance for entry
- Number and height of step
- Raised cap
- Floor space
- Height of work surface
- The height of the judge’s bench

Work led by Jaemin Lee
Courtroom and other major space review details

Work led by Jaemin Lee
GIS has several languages with which to query and assess a GIS model.
General point:

BIM provides the information base for many new types of new automation

Design review systems will evolve for use by building code officials, by client/owners, and as the modern incarnation of best practices, earlier encoded by Ramsey and Sleeper in *Architectural Graphic Standards*. 
When revolutions occur, traditional means of operation are no longer effective. Traditional culture becomes unstable and new practices are explored to address the instability. Some social units will succeed and become successful, while others will not adapt and fade away. Revolutions are times of creation.

Chuck Eastman