Construction, Smart Grid and Intelligent City Models

Geoff Zeiss
Principal
Between The Poles
Technologies are evolving rapidly in the $7 trillion annually construction industry.
Evolution of CAD to Model Based Design (BIM)

**CAD**
- Graphics only
- Lacks intelligence
- Lacks domain knowledge

**Model based design or BIM**
- Integrates geospatial and engineering design data
- Enforces business and engineering rules
- Automates clash detection
- Automates change propagation
- Reduces data redundancy
- Improves collaboration among design teams
- Automates bill of materials and job costing
- 3D visualization involves non-technical stakeholders in design process

**Benefits**
- Increases productivity
- Reduces risk
- Reduces costs
- Improves design quality

Deliverable is **paper**

Deliverable is an **intelligent digital model**
Geospatial technologies
Gaming technology and 3D visualization
Convergence breaks down silos and changes the construction process.
Intelligent City Models

**OUTSIDE**

- Exterior, above ground
  - Transportation networks (roads)
  - Full city blocks
  - Precise spatial orientation
  - 3D buildings
  - Pedestrian networks

**INSIDE**

- Full interior
  - Utility / HVAC systems
  - Floor plans
  - Mechanized lifts / elevators
  - Walls, doors, windows
  - Staircases

**BELOW**

- Subterranean
  - Water and sewer systems
  - Utility / Phone systems
  - Electrical systems
  - Access – manholes, poles
  - Transportation networks (tunnels)
Some examples
ACROSS THE UNITED STATES

THE CONCERNS

- UNDERGROUND UTILITY LINE HIT EVERY 60 SEC
- ANNUAL COST DUE TO UTILITY DAMAGE RANGES IN THE BILLION $
- INACCURATE RECORDS AND LOCATING
- UTILITIES NOT MARKED
- CROWDING WITHIN THE RIGHT OF WAY
Las Vegas Digital Above and Below Ground Infrastructure Model
Las Vegas Digital Above and Below Ground Infrastructure Model
Las Vegas Digital Above and Below Ground Infrastructure Model
Los Angeles Community College District
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Los Angeles Community College District

View Mode
Change the view mode to display wall transparency and highlight specific systems or components real-time interaction.

- Walls
- Plumbing
- Structure
- Mechanical
- Electrical
Sydney Down-under

BUILDINGS

Building Interiors
Floorpart Functions
Owner, number of occupiers and contact details

Ongoing collaboration between City of Sydney and EICU

Geospatial Media
Belo Horizonte, Brazil
Policy and legal issues
Current construction process

Ron Singh, Chief of Survey, Oregon DOT
New construction paradigm: Oregon DOT

Liabilities?
Protected Critical Infrastructure Information Program (PCII)

- Sharing information with the government will not expose sensitive or proprietary data.
- Satisfies the requirements of the Critical Infrastructure Information Act of 2002
- Protected from
  - The Freedom of Information Act (FOIA),
  - State, tribal, and local disclosure laws, and
  - Use in regulatory actions, and
  - Use in civil litigation.
- PCII can only be accessed by trained and certified Federal, State, and local government employees or contractors
Municipal Freedom of Information and Protection of Privacy Act (MFIPPA)

MFIPPA provides a right of access to information under the control of institutions

1. Information should be available to the public,
2. Necessary exemptions from the right of access should be limited and specific
3. Decisions on the disclosure of information should be reviewed independently of the institution controlling the information

To protect the privacy of individuals with respect to personal information about themselves held by institutions and to provide individuals with a right of access to that information
MFIPPA – Mandatory exemptions

Mandatory exemptions that prohibit the City from disclosing particular information

- **Section 9** - “Relations with Governments” information the City has received in confidence from (a) federal, provincial or foreign governments or agencies

- **Section 10** - “Third Party Information”
  - Reveal a trade secret, or scientific, technical, commercial, financial or labour relations information
  - Significant prejudice to the competitive position of a person, group or organization
Example: Toronto Building

Toronto Building staff must review your plans to ensure that they comply with the Ontario Building Code, local Zoning By-laws, and other applicable regulations.

MFIPPA gives the public a right of access to records held by the City of Toronto.

- Toronto Building allows public access (including viewing and copying) to residential building plans associated with permit applications from the 22nd day following the permit application date to three months following the closing of the relevant permit.
Intelligent infrastructure networks

SMART GRID
A vision for the future—a network of integrated microgrids that can monitor and heal itself.


Massoud Amin, Univ Minnesota
© 2009 Autodesk

Geospatial Media
California Public Utilities Commission rules for consumer access to electricity usage data

- PG&E, SCE, and SDG&E must make price, usage and cost information available to its customers online and updated at least on a daily basis.
  - Each day’s usage data, along with applicable price and cost details, and with hourly or 15-minute granularity must be available by the next day
- PG&E, SCE and SDG&E must provide third parties access to a customer’s usage data via the utility’s backhaul when authorized by the customer
- Customer Authorization.
  1. Authorization. Separate authorization by each customer must be obtained for all disclosures of covered information...
  2. Revocation. Customers have the right to revoke, at any time, any previously granted authorization.

In other words the date belongs to the consumer, not the utility, and the consumer decides who has access to it, not the utility.
Use Limitation:
How is the Information Used?

Purpose Specification:
• Identify the primary purpose – then only collect what you need to fulfill that purpose;
• Data minimization – Minimize the collection of PII – personally identifiable information;

Use Limitation:
• Secondary purposes – don’t use the information collected for unrelated secondary purposes, without the consent of the data subject.

If you need a shorthand for thinking about privacy, think “Use.”
Outage tracking
Energy density mapping