

# ***Enhancing Implementation and Application of Building Regulations***

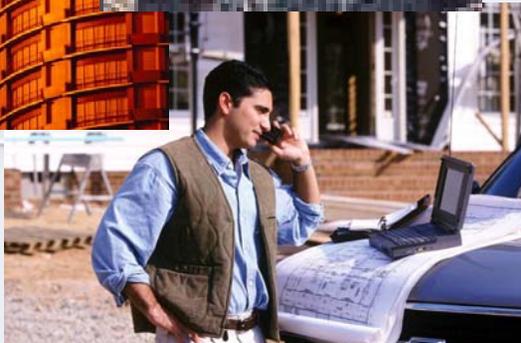
## **The Journey to 20??**

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**DOE National Energy Codes Workshop**

**August 2, 2006**

**Rebecca Baker  
Jefferson County, Colorado**



# *Objective*

**Spur creativity and collaboration that can lead to defining, developing and implementing cooperative programs related to building regulations in support of**



# *Expected Outcome*

**A vision of determining building regulatory compliance in the future**

- *Thought*
- *Discussion*
- *Shared Vision*
- *Cooperation*
- *Collaboration*



- *Cost Savings*
- *Uniformity*
- *Increased Productivity*
- *Enhanced building safety*
- *More timely approval*
- *Robust building records*

# ***Assessing Building Regulatory Compliance Today***

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- **Identify requirements (code search) – by hand through codes, standards, etc. with some word search and issue-specific automated searches of codes**
- **Prepare plans and specifications – by hand or with CADD, word processing, various software applications, etc.**
- **Submit plans and specifications – by hand in hard copy with some movement towards electronic submittal of electronic documents**
- **Conduct building regulatory review – by hand with availability of some issue-specific software such as ComCheck**
- **Revise plans and specifications (pre-construction) – by hand or in electronic files**
- **Secure plan approval – face-to-face with some movement towards electronic notification**



# ***Assessing Building Regulatory Compliance Today***

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- **Revise plans and specifications (during construction) – by hand or in electronic files**
- **Inspections and construction review – in the field using paper checklists and forms with movement toward electronic data entry and retention**
- **Commissioning and final inspection – in the field using paper checklists and forms with movement toward electronic data entry and retention**
- **Issue CO – by hand or in electronic form**
- **Ongoing permitting, inspection, review, etc. – in the field using paper checklists and forms with movement toward electronic data entry and retention**



# ***Assessing Building Regulatory Compliance Today - Summary***

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- **Predominately by hand**
- **Predominately face-to-face**
- **Assistance from various software and electronic media using human data entry**
- **Increasing ability to take data from one application and feed it directly into another software application**
- **Significant movement towards electronic data storage, revision, application and presentation**
- ***Do all data suppliers provide information in a format that will allow any and all users to apply, adjust, update and add to the available data applicable to a building?***



# ***buildingSMART***



*....the dynamic and seamless exchange of accurate, useful information on the built environment among all members of the building community throughout the lifecycle of a facility*

*....a smarter process for managing the project lifecycle*

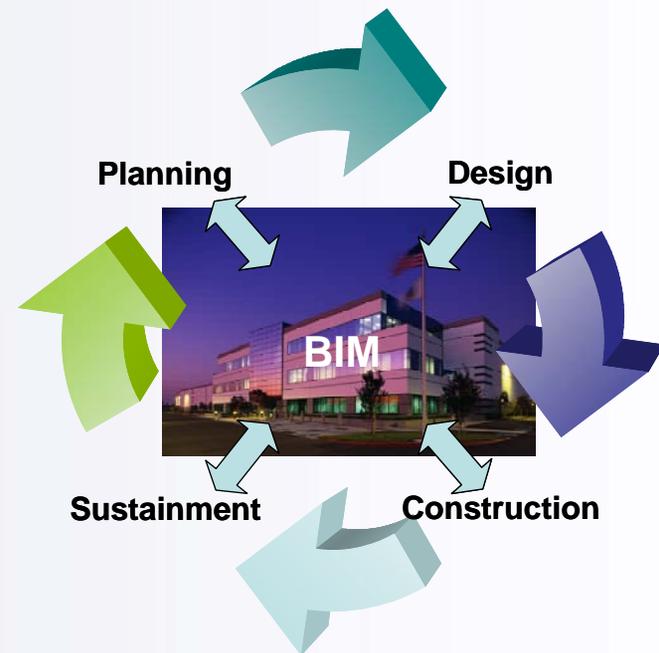


# *Interoperability*

*The sharing and exchanging of information via  
integrated technological solutions*

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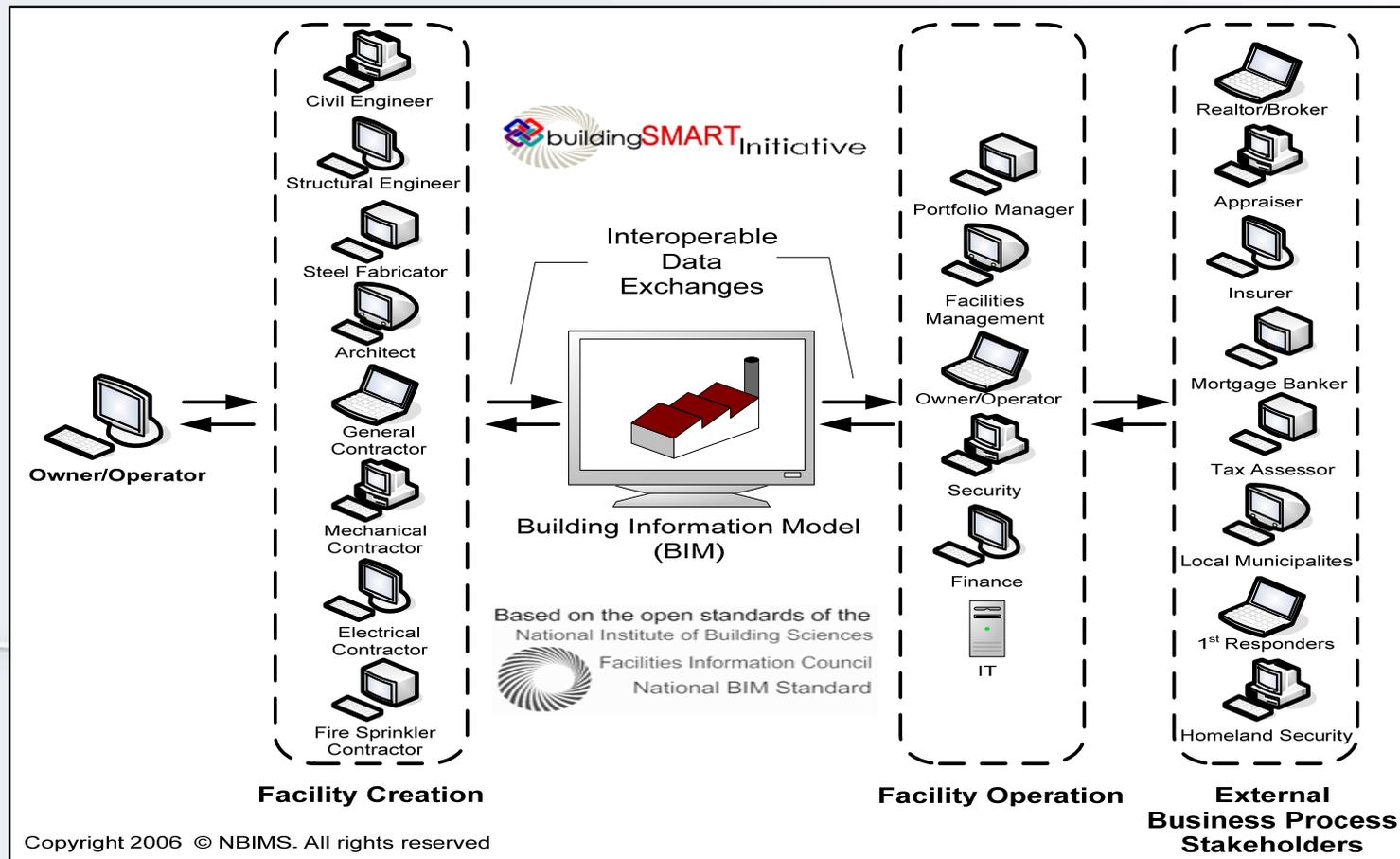
- **Interoperability is focused on software application and communication such that data can be shared by all and used by all throughout multiple applications**
- **A Building Information Model (BIM) is a digital representation of physical and functional characteristics of a building (data) – a shared knowledge source for information about a facility**



# Interoperability

*The sharing and exchanging of information via  
integrated technological solutions*

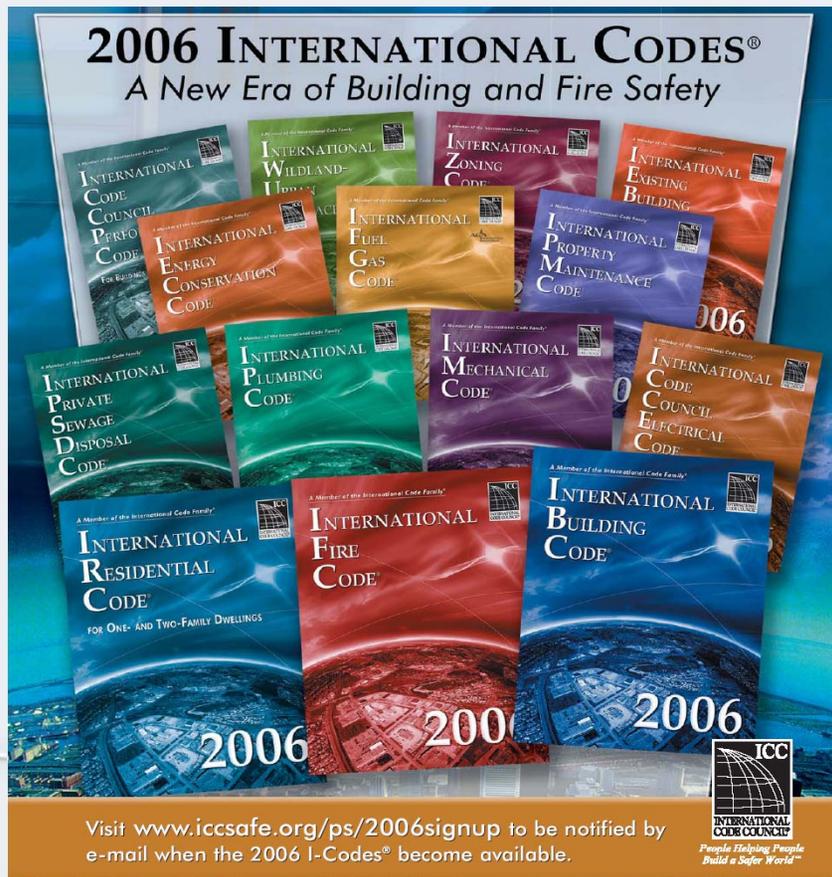
Software, computers and information technology have changed how we communicate, interact, do our work and conduct business



# ***Interoperability***

***The sharing and exchanging of information via  
integrated technological solutions***

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**Codes represent one small piece of technical content associated with a building that need to be “interoperable”**

**Other content includes standards, evaluation reports, specifications, design drawings, manufacturers data, scheduling information, O&M information, etc.**



# *Vision*



- **Fully automated and integrated building regulatory processes from project inception to demolition that are founded on the application and use of all building-related data, including building regulations, that is “interoperable”**



- **A Building Information Model (BIM) is created, developed, and updated and enhanced over time for every building and includes building safety-related considerations**



# ***Future Vision – Seamless Transparent Instantaneous and Continuous Regulatory Evaluation for Compliance***

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- **All building-related data will be easily shared and accessed**
  - Not Word/pdf but XML
  - Not DWG/DGN but IFC
  - Common dictionaries
- **The designer will construct the initial BIM**
- **The BIM will be automatically evaluated and assessed against specific criteria including building construction regulations**



# ***Future Vision – Seamless Transparent Instantaneous and Continuous Regulatory Evaluation for Compliance***

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- **The designer will be notified of results and as warranted and adjust the BIM**
- **The BIM is submitted to regulatory authorities for automatic building regulatory compliance checking and plan approval**
- **A permit to construct is issued and an inspection check list is created from the BIM**



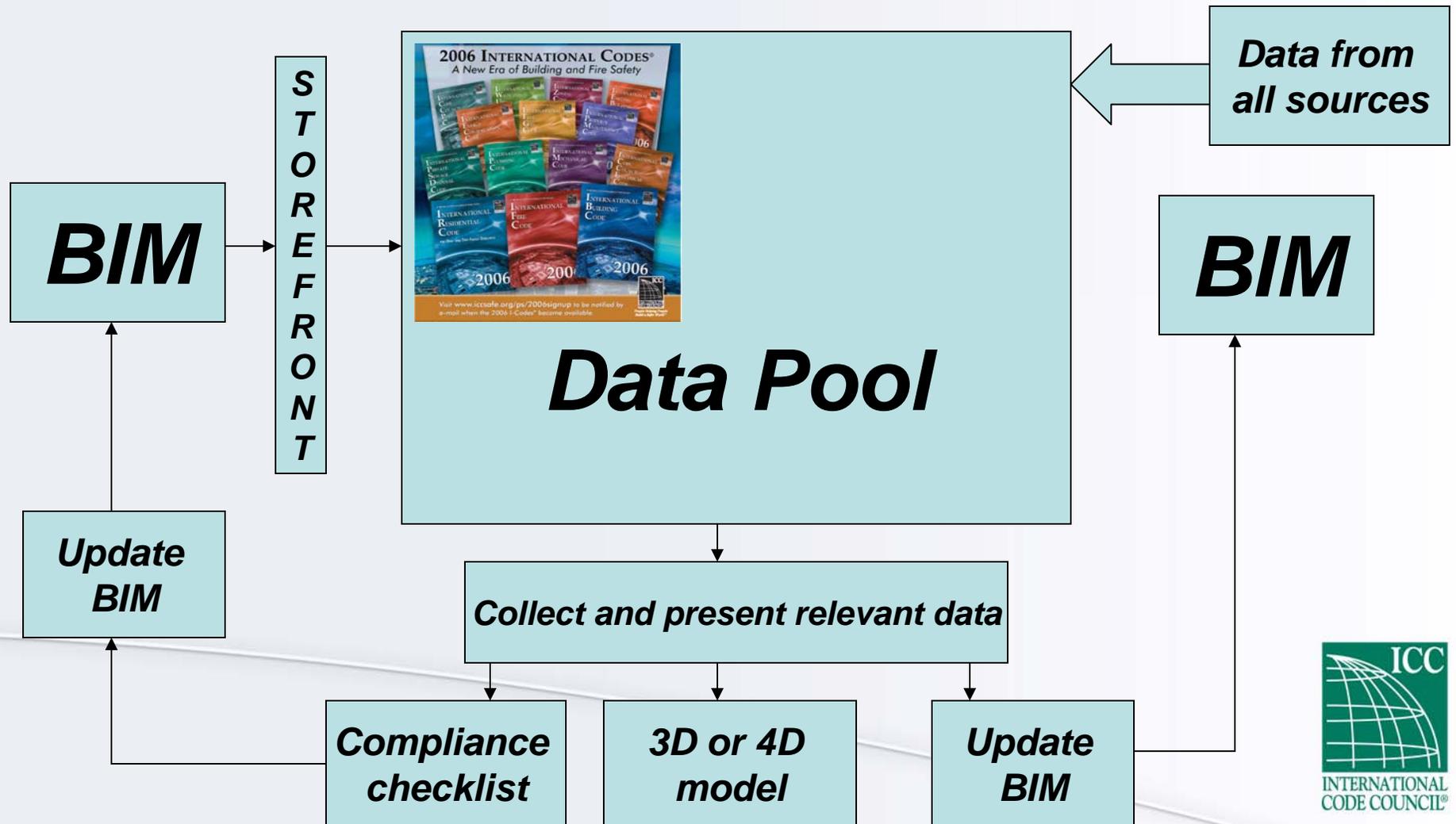
# ***Future Vision – Seamless Transparent Instantaneous and Continuous Regulatory Evaluation for Compliance***

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- **Field inspection results are collected and placed in the BIM**
- **A CO is issued and the BIM updated based on the final CO**
- **The BIM remains open, available and updated for O&M and renovations over time and access by users who need to know the current state of the building**



# *Future Vision – Seamless Transparent Instantaneous and Continuous Regulatory Evaluation for Compliance*



# ***Assessing Building Regulatory Compliance – Transition to Tomorrow***

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- **Identify requirements (code search) – from manual to automatic based on user input to questions about the building and its systems or directly via submission of a building information model (BIM)**
- **Prepare plans and specifications – from ink on paper to CADD, electronic OMNIClass, etc.**
- **Submit plans and specifications and conduct building regulatory review – from ink on paper to submission in electronic format or a BIM with automated code checking and 3D and 4D visualization of non-compliance**
- **Revise plans and specifications (pre-construction) – revise electronic format or BIM**



# ***Assessing Building Regulatory Compliance – Transition to Tomorrow***

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- **Secure plan approval – final electronic format or BIM submittal for automated plan review and assessment**
- **Revise plans and specifications (during construction) – revise electronic format records or BIM to maintain consistency with as-built situation**
- **Inspections – from manual generation of inspection checklists to automatic real-time generation of inspection checklists**
- **Construction review – from limited access to information to availability in the field of any information related to items being inspected in addition to updating of BIM from the field**



# ***Assessing Building Regulatory Compliance – Transition to Tomorrow***

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- **Document commissioning and final construction – from manual on paper to manual within the BIM format**
- **Issue CO**
- **Ongoing permitting, inspection, review, etc. – from manual on paper to manual within the BIM format**



## CORENET e-PlanCheck: Singapore's Automated Code Checking System

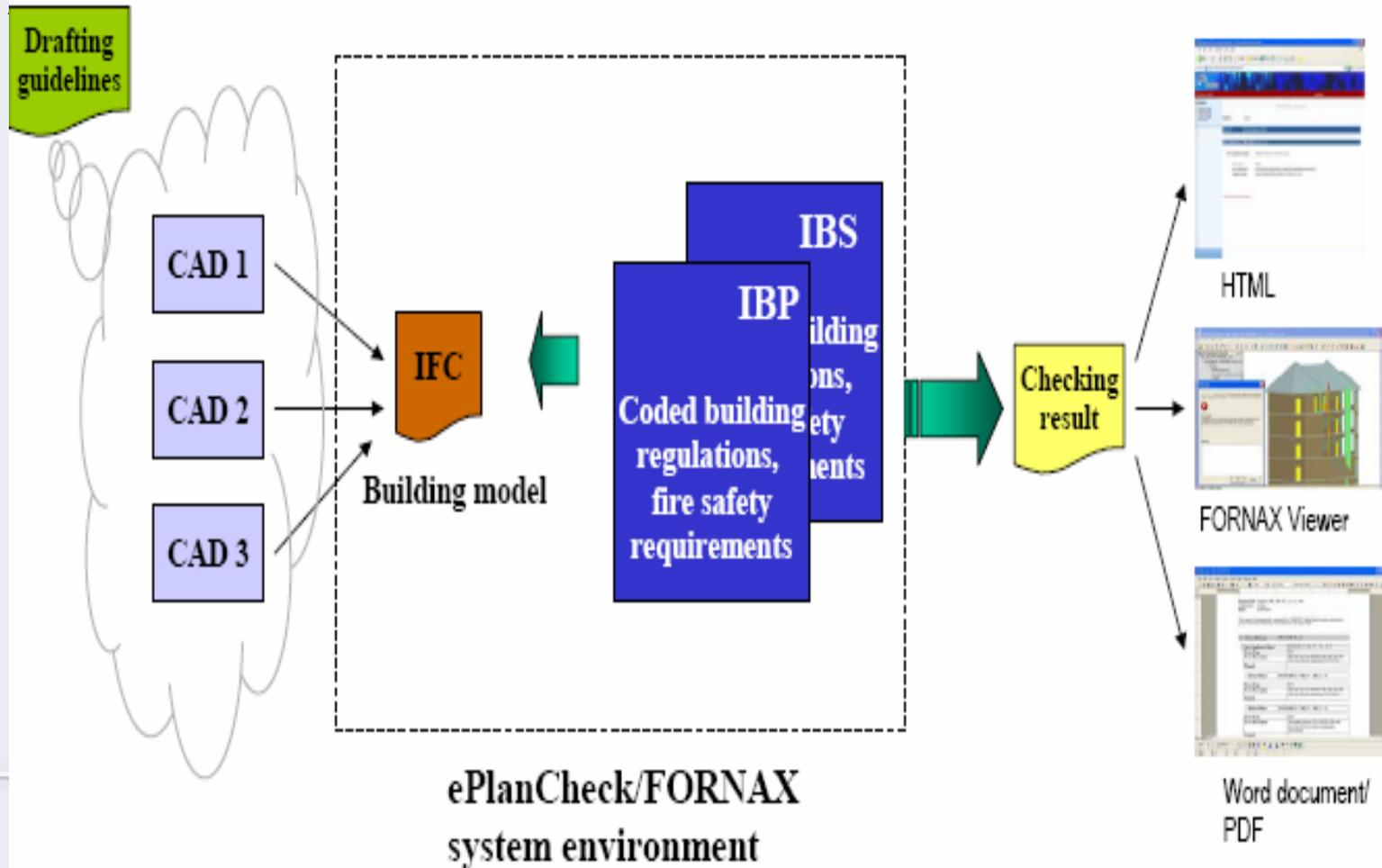
AECbytes "Building the Future" Article (October 26, 2005)

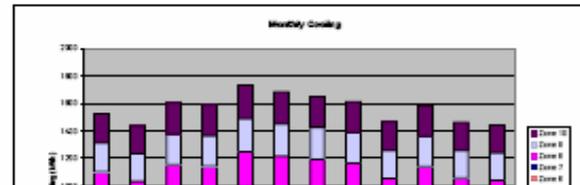
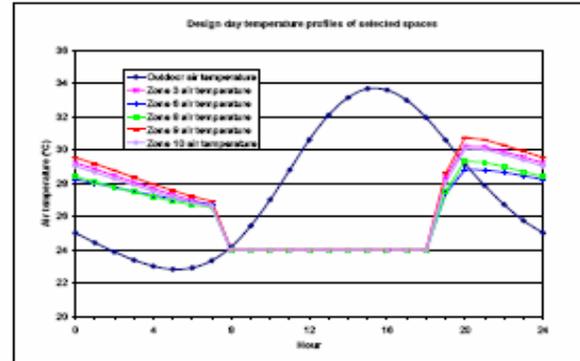
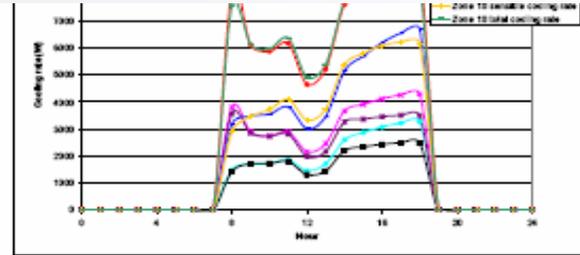
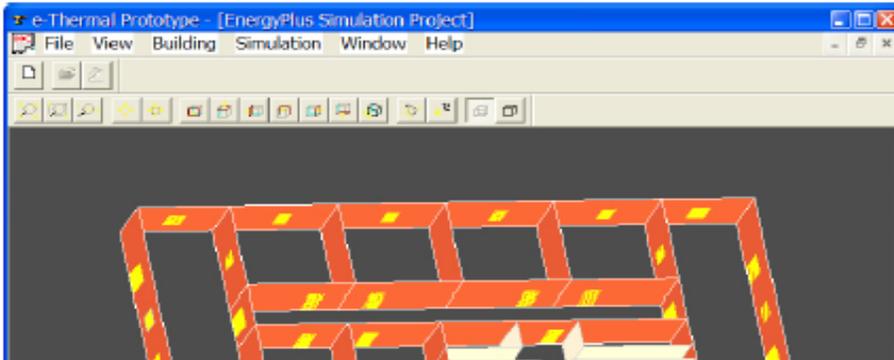
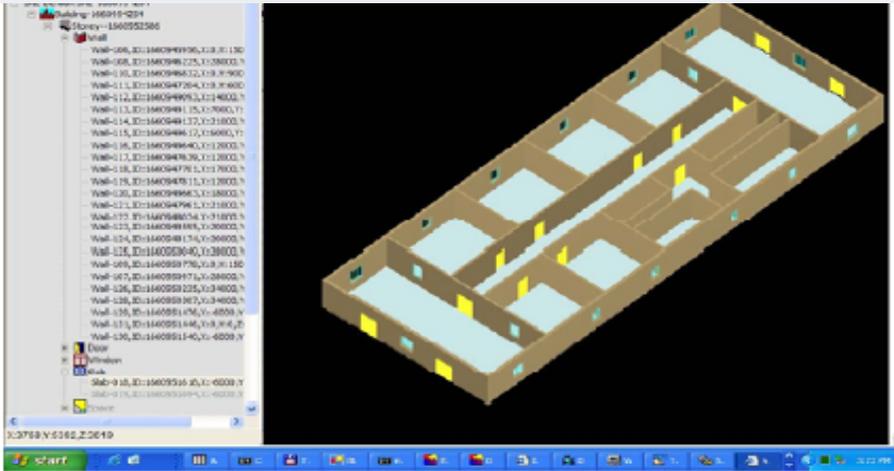
## Tomorrow exists in Singapore

Designers can pre-check for compliance before actual submittal and if warranted ask for variances on areas of non-compliance as part of the submission

The screenshot shows a web browser window displaying the CORENET e-Submission system. The address bar shows the URL <https://www.corenet-ess.gov.sg/>. The page features a login form with fields for "User ID:" and "Password:", a "Login" button, and a "Regulatory Authority" dropdown menu. A list of regulatory authorities is visible, including AWA, BCA, CITYGAS, DSTA, EMA, ENV&PU, ENVPCD, FSSB, HDBAR, HDBCS, HDBME, HDBSVY, IDA, JTC, LTA, MPA, NPARKS, PUBDD, PUBSEW, PUBWTR, SLA, TEST1, UPG1, and URA. The page also includes a "Planned Downtime for e-Submission System Updates" notice, a "Helpdesk" link, and a "FAQ" link. The background of the page features a computer monitor displaying a green wireframe model, a globe, and architectural plans.

- Automated checking of building design against conformance to the building codes





**One can map between the BIM and code issues related to energy and an energy simulation tool for the purpose of performance based code checking**



# ***Drivers Making this Happen***

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- **Federal agencies such as GSA, NASA, DOS and DoD**
- **State and local government**
- **University and research**
- **Software and hardware developers**
- **Professional organizations**
- **Trade groups**



# ***Making the Vision a Reality – ICC Short Term Steps***

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- **Demonstration of automated code check and plan review for IECC provisions for commercial buildings and for the issue of fire barriers across all the ICC Codes – November 2006**
  - **Development of “interoperable” content based on the ICC Codes – underway**
  - **Development of user “storefront” screens that facilitate user interaction with the content manually or automatically via a BIM – September 2006**
  - **Development of approaches to capture and package the content into usable formats – September 2006**
    - **Plan review and inspection checklist**
    - **Code search and compilation of criteria**
    - **Integration of results with 3D and 4D building modeling**



# ***Making the Vision a Reality – ICC Short Term Steps***

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- **Establishment of a Federal, state and local government agency task group to guide project development and ensure satisfaction of agency needs – first meeting July 2006**
- **Establishment of an industry task group to guide project development and ensure the needs of data developers and users are addressed – Fall 2006**
- **Capture of relevant standards, evaluation reports, listing directories, manufacturers data, etc. related to IECC in demo - underway**



# ***Making the Vision a Reality – ICC Long Term Steps***

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- **Gradual enhancement of content from IECC and fire barrier provisions to all ICC codes – 2007**
- **Inclusion of relevant standards, evaluation reports, listing directories, manufacturer's data, etc. – beginning 2007**
- **Development of Federal, state and local content files that address revisions and additions to adopted codes – beginning 2007**
- **Development and deployment of robust storefronts and content packaging and presentation formats to facilitate automated plan review – beginning 2007**



# ***Future Vision – Seamless Transparent Instantaneous and Continuous Regulatory Evaluation for Compliance***

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***Data Pool***

***Collect and present relevant data***

- **Can we fill the pool with relevant content in the appropriate format?**
- **Can the storefronts be constructed to allow manual or automatic ID of project-relevant content?**
- **Can the project-relevant content be packaged and applied in ways to enhance the building regulatory process?**

**YES**

# *Questions ???*

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