

Making Technology Work for You:

Advances in Automated Code Checking and an Overview of the National BIM Standard



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Vision

....the dynamic and seamless exchange, updating and maintenance 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 lifecycle of a project and public safety

....continual access to and sharing of information about a building

Foundation to Achieve the Vision

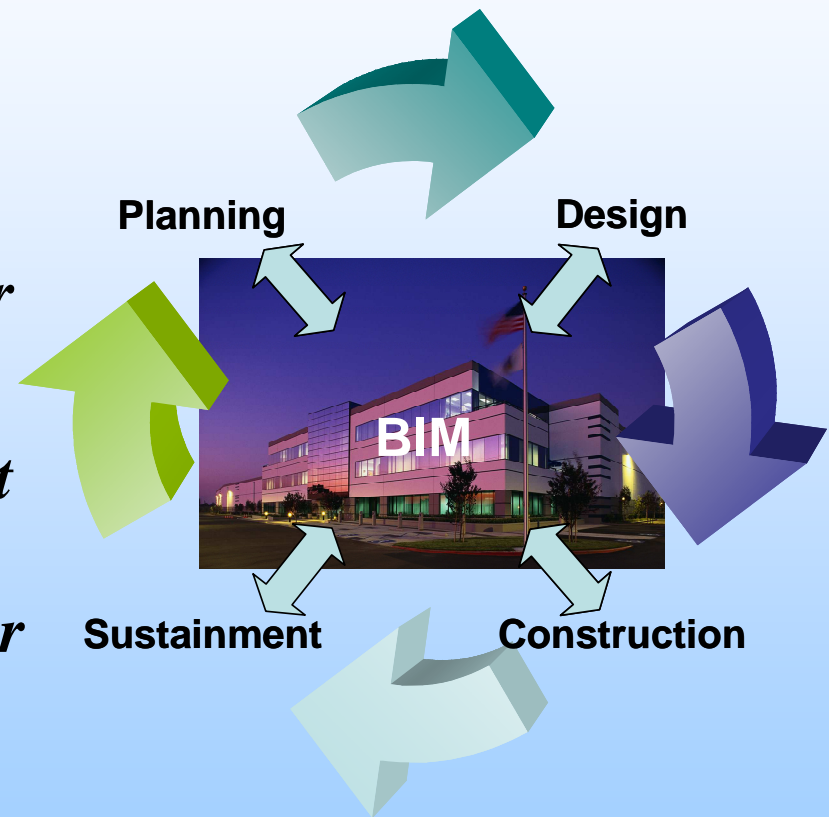
Industry Foundation Class (IFCs)

- *freely available, nonproprietary data model specifications*
- *conceived to overcome some of the limitations of the CAD drawing paradigm*
- *replace many existing proprietary data formats with a single standard*
- *end users have independent control over their data*
- *a system of data structures on which to implement a "virtual building toolkit"*

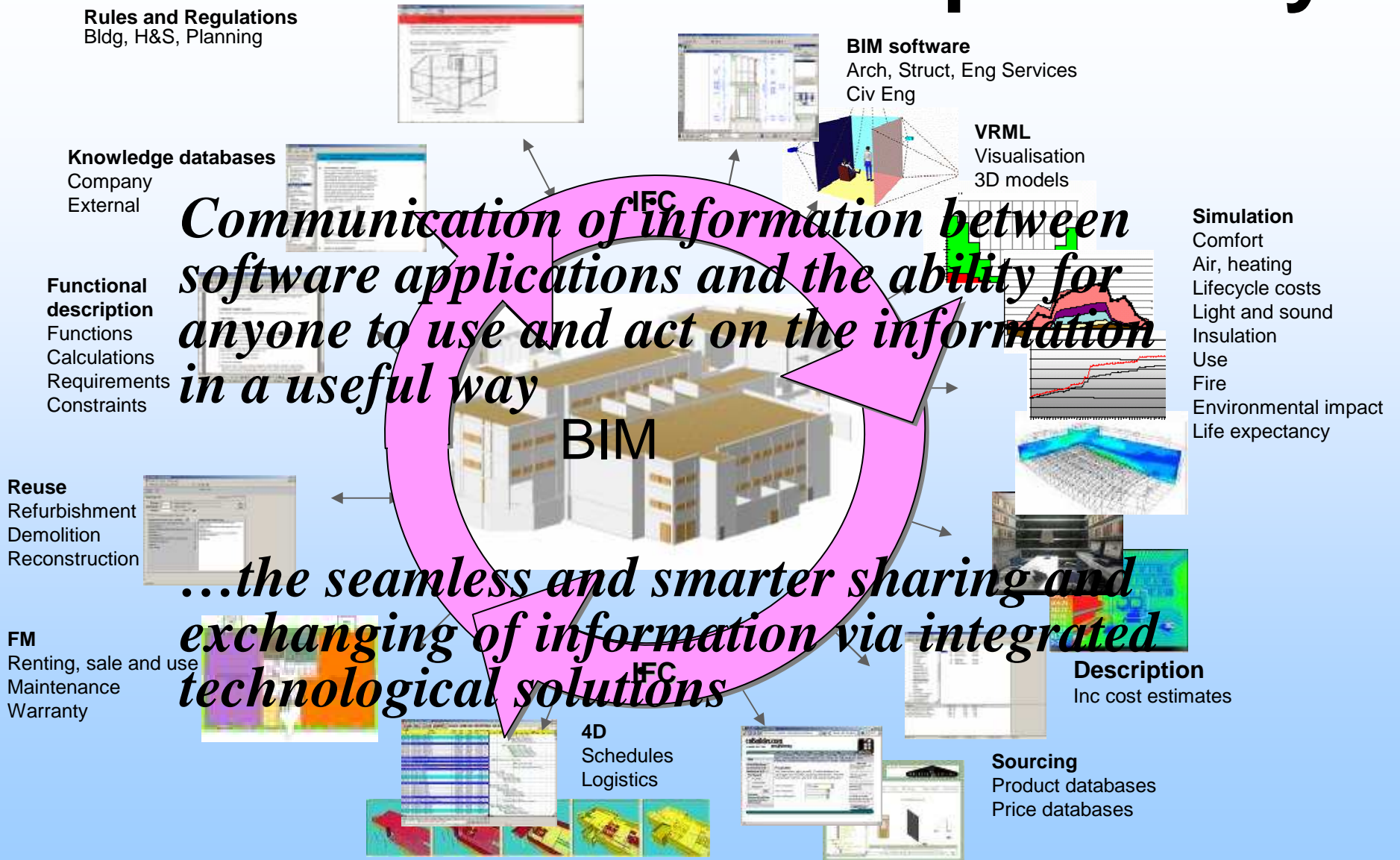
Building Information Model

A digital representation of physical and functional characteristics of a building (data)

- *... a shared knowledge source or database for intelligent information about a facility that can be maintained over time that*
- *... stays with the building forever and*
- *... can be seamlessly used by all*



Interoperability



building**SMART**

....BIM facilitated by an open standard covering information for construction (IFC) now embedded in ISO PAS 16739

....a way of doing planning, designing, reviewing, approving, costing, maintaining, etc. buildings better

....the act of building (a verb) smart (the opposite of dumb)

.....a concept that is becoming reality as different building interests collaborate without self-interest for the common good

....insert Deke Smith presentation on NBIMS here

**Codes
Standards,
Regulations ...**



Knowledge databases
Company
External



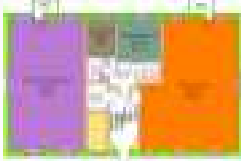
Functional description
Functions
Calculations
Requirements
Constraints



Reuse
Refurbishment
Demolition
Reconstruction

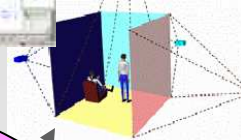


FM
Renting, sale and use
Maintenance
Warranty

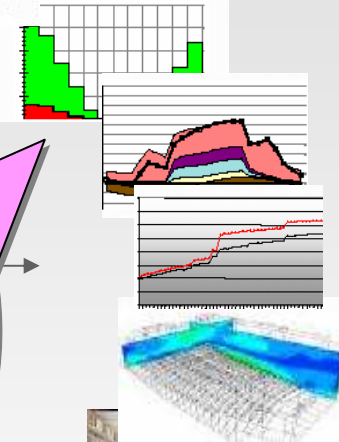


BIM software
Arch, Struct, Eng Services
Civ Eng

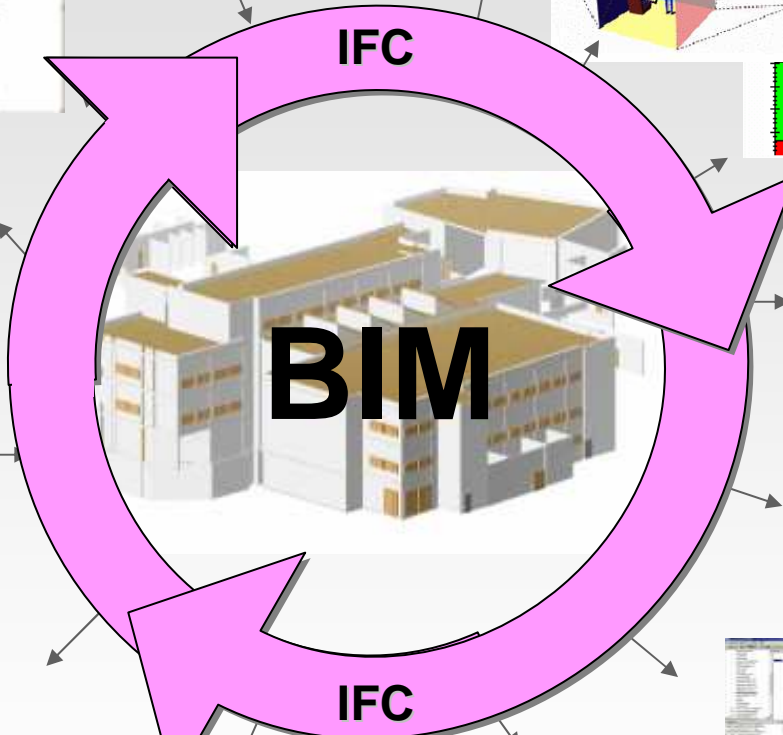
VRML
Visualisation
3D models



Simulation
Comfort
Air, heating
Lifecycle costs
Light and sound
Insulation
Use
Fire
Environmental impact
Life expectancy



BIM



IFC

IFC

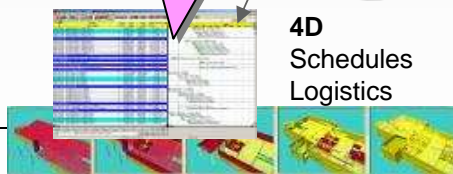
Description
Inc cost estimates



Sourcing
Product databases
Price databases



4D
Schedules
Logistics



buildingSMART™

SMARTcodes™



Thanks to

- IAI NA
- NIBS
- AEC3
- Battelle/PNNL
- Digital Alchemy
- Solibri
- NovaCity
- US Coast Guard
- ASTM
- NFRC
- USACE-ERDC



ICC's buildingSMART Focus

To make automated code compliance checking a reality in the United States

.... seamless communication between the public and private sectors through buildingSMART using SMARTcodes

.... the delivery of better and more efficient public services and enhanced public safety

.... more timely and accurate approval and validation of building design, construction and continued use

 buildingSMART™  SMARTcodes™ 



Automated Code Checking Vision

....the delivery of better and more efficient public services and enhanced public safety

....the ability of designers and others to auto code check their designs prior to submittal for approval using the same programs used by the approving entities

....many agencies, many codes, many approvals moving towards one code, more timely and accurate approval and more robust field inspection and validation

....building regulatory agencies communicating and collaborating with those regulated through buildingSMART and BIMs



Benefits

Seamless and more timely communication

Improved efficiency

An open and transparent public sector

Centralized 24/7 service

More accurate and informed decisions

Enhanced productivity

Shorter review times

Fewer communication steps

A singular database for all

Additional resources for field inspection

Enhanced reliability of reviews

Enhanced building quality

Capture of more data during construction

Retention and availability of data

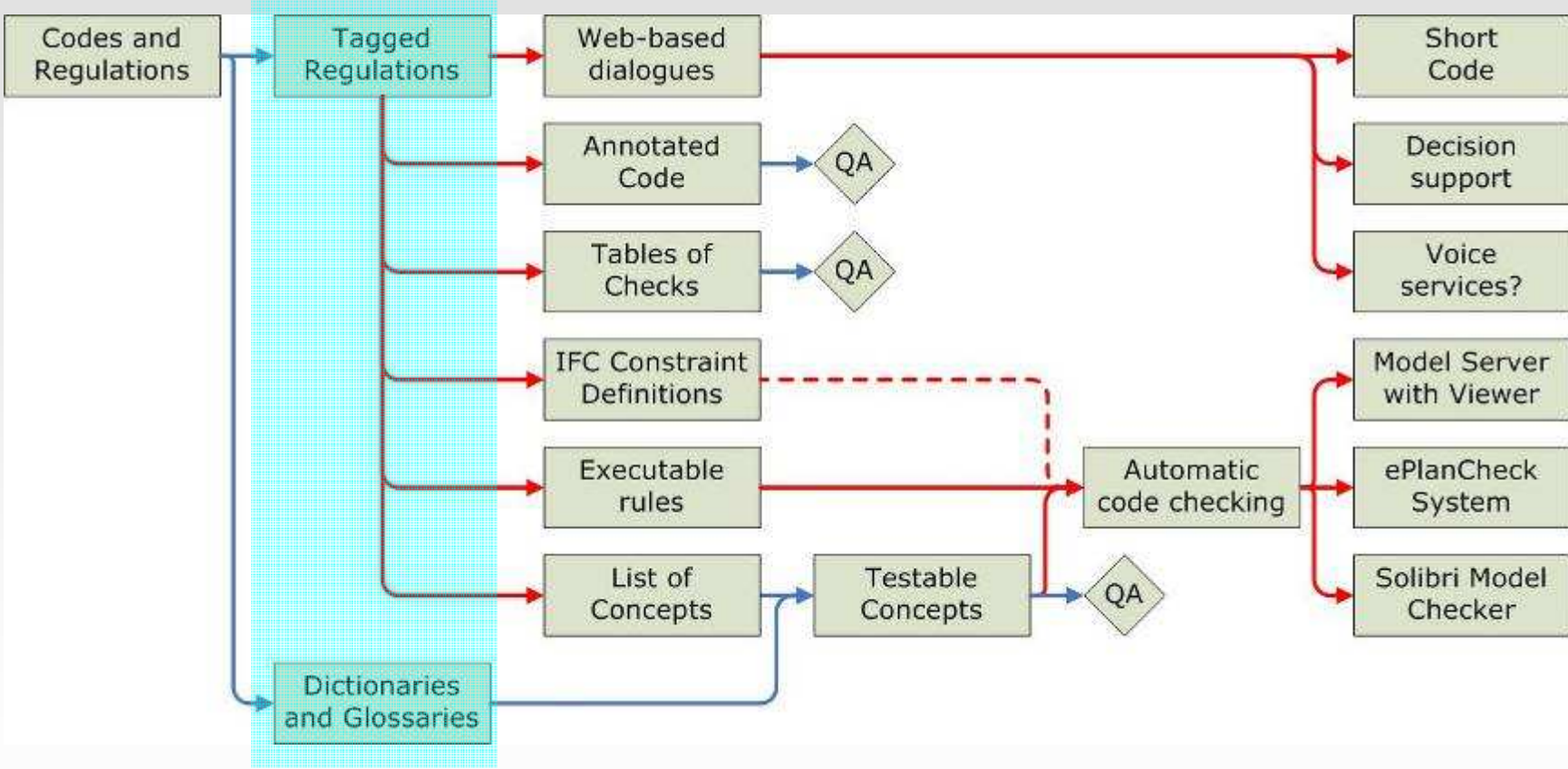
Consistent and traceable decisions

Enhanced value to clients

ICC Efforts to Date

- *ICC support for buildingSMART*
- *Robust project plan to guide ICC efforts*
- *ICC Project team of staff and private sector experts*
- *Task group of federal, state and local officials*
- *A process to create and use SMARTcodes*
- *Collaborate with other buildingSMART initiatives and other relevant and interested parties*

Overview

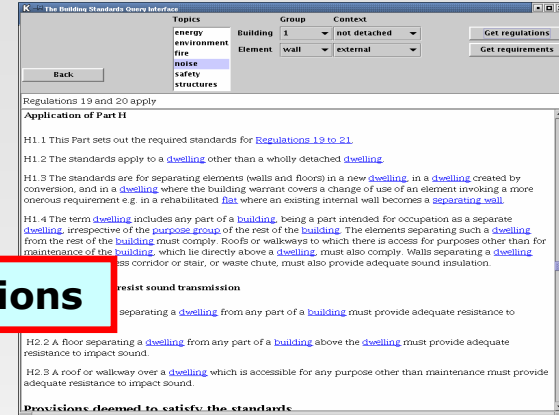
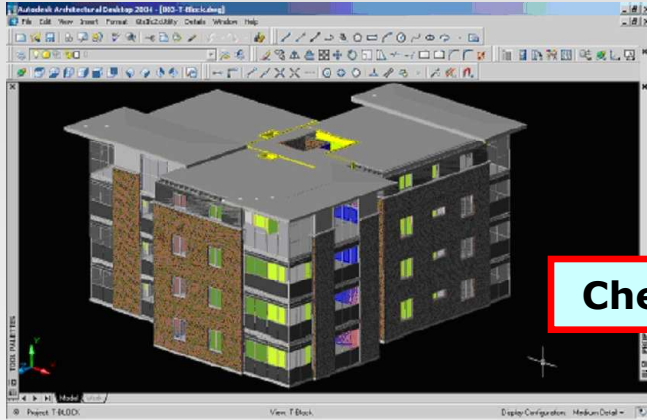


Code Checking

Building Information Model (IFC)

Usable Output

Active Regulations Document



Check Model against Regulations

Building Model (exported from CAD)

Regulations Model (computer interpretable regulations)

Relationships

Entities

Choices

Metrics

*In which wall is the door?
What is the adjacent space?*

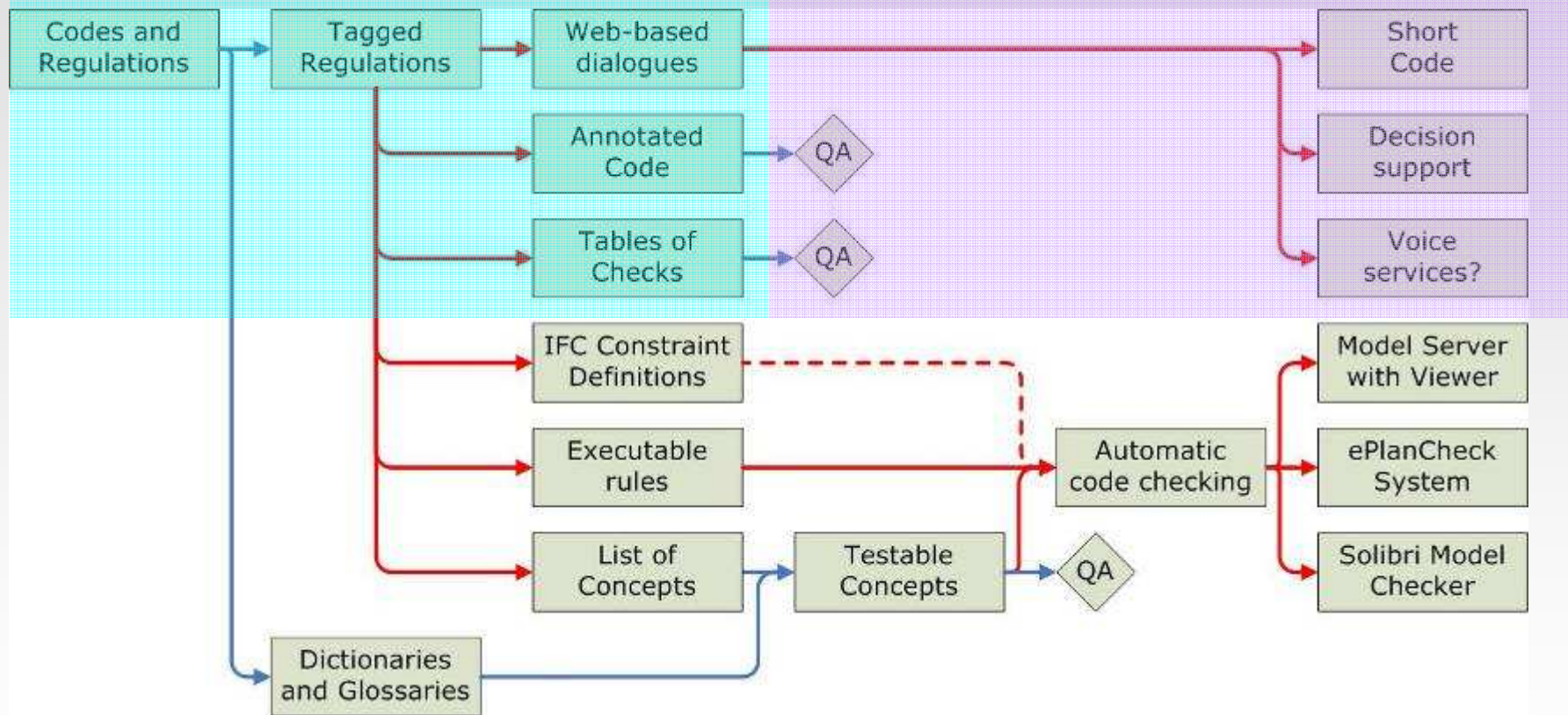
*'Things' in a building
e.g. Walls, Doors,
Windows, Spaces,
Ducts, Cables*

Regulations that apply

Pass/fail criteria?

Manual Code Search and Compliance Check

Usable Output



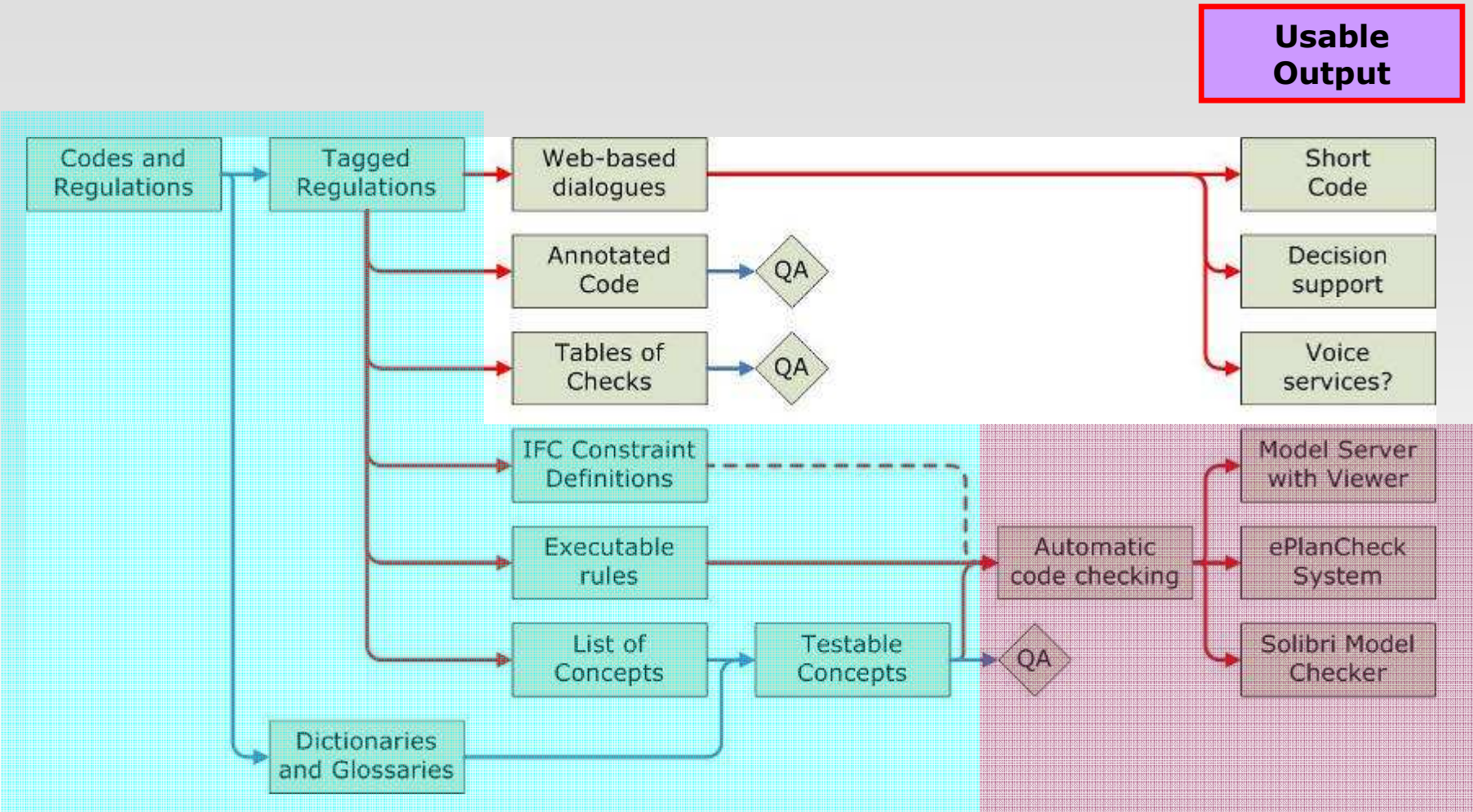
Manual Code Search and Compliance Check

Smart Code Presentations

Washington, D.C.
October 31, 2006

Heather Dillon

Automated Plan Review



Automated Plan Review

Smart Code Presentations

Washington, D.C.
October 31, 2006

Richard See

Future Plans

- *Fine tune processes and software for creating **SMART**codes and companion rule sets*
- *Continue work on dictionaries, terms, object models, etc.*
- *Complete short term efforts with software engines/model checkers to facilitate manual and automated code compliance checking for IECC*
- *Work with NBIMS, BIM software developers, etc. to ensure BIMs contain information to support auto code checking*

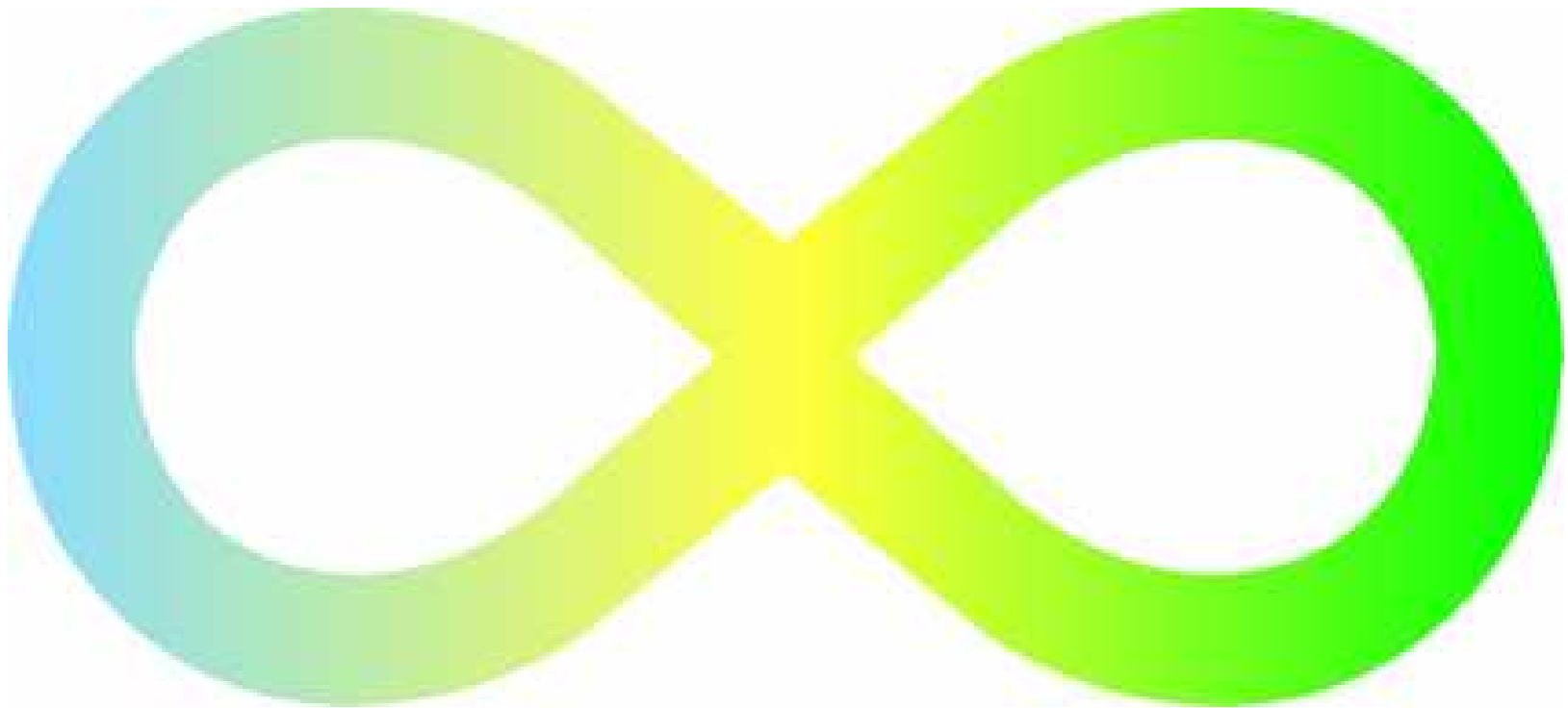
Future Plans

- *Assemble library of BIMs and establish a process for QC of IECC **SMART**codes and beta testing of their application and use by designers, code officials and others*
- *Continue work with software engines/model checkers to yield multiple outputs meeting building community needs*
- *Enhanced outreach and communications*
- *Market research and business planning to facilitate the availability of **SMART**codes*

Future Plans

- *Create **SMART** codes for provisions of **ICC Codes** relevant in the preliminary design stage*
- *Continue with **SMART** codes creation until all key **ICC codes** are completed*
- *Facilitate creation of **SMART** regulations for Federal, state and local amendments to the **ICC codes** and associated building regulations*
- *Ongoing and continuous collaboration with relevant initiatives and organizations*

The Possibilities



THANKS!

Deke Smith, RA

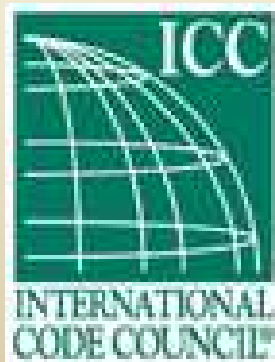
Chair, NIBS National BIM Standard Project Committee



**National Institute of
Building Sciences**

National Building Information Model Standard

Based on and supporting



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SMARTcodes ™