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Interoperability and Business Processes

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Chair, Scoping Committee
NBIMS Technical Team
AEC Infosystems, Inc

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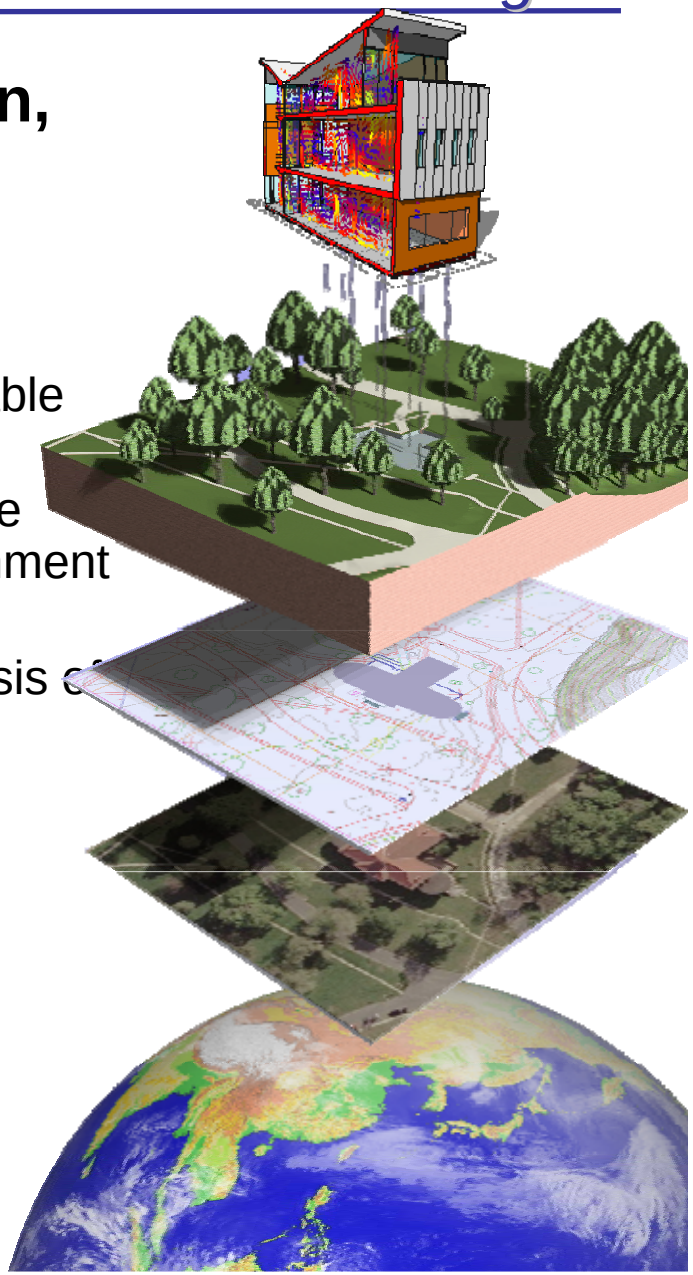
Drivers of Change

- The global drivers of **sustainable design, security, global competitiveness and diminishing resources are….**

- Forcing industries to show a transparent and quantifiable use of resources in support of those drivers….
- Global competitiveness and IT business processes are proven to support waste reduction…BIM in an environment of Strategic Information Use supports Lean Lifecycle
- Simulation, knowledge systems and embedded analysis of BIM models is on the horizon…
- The web is/will be the application
- **You will change or we will not survive…**
- **Crisis is opportunity**



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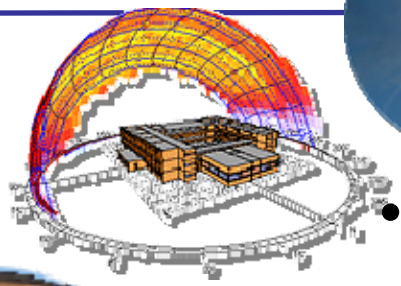
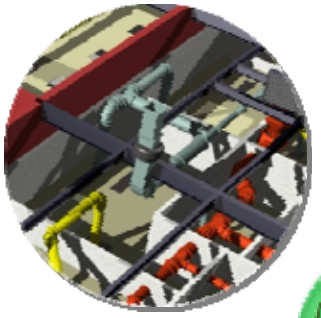
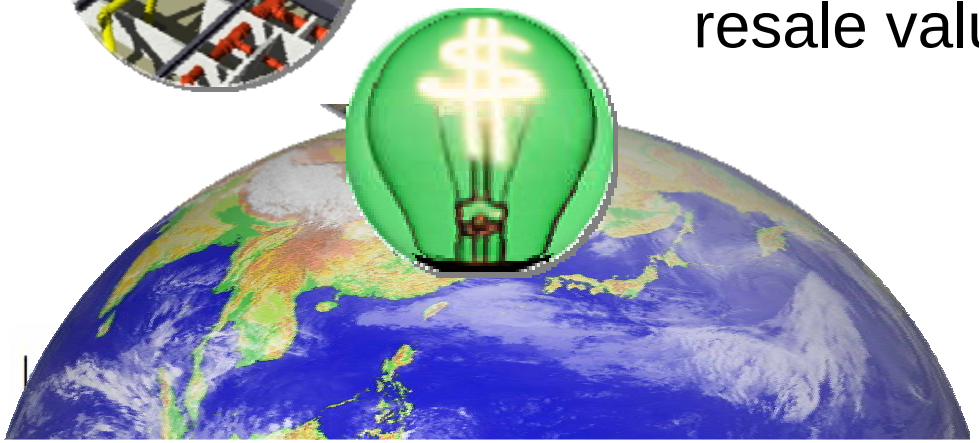
Sustainability







- It’s a new alignment of forces, and it’s rational for architects to plan for this new reality. Owners have until now looked at the first cost, which may conflict with design costs that will make the building sustainable.
- Now they are understanding that green architecture may be worth the price as a “brand” to clients and also increases the resale value of these buildings.

Data That Produces and Enables Decisions and Outcomes

Information systems are developed around the available forms of communication

We are evolving…….
from paper-centric *to* an info-centric process
from conversation *to* communication
from outputs *to* outcomes
from ad-hoc *to* standardized

- CAD to BIM
- Text to Database
- E-Mail to Portal Workflows
- Unstructured to Structured Data
- Knowledgable Workers to Knowledge Management
- Stovepiped Disciplines to Collaborative Teams

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2. “Lean Thinking” recommends and uses well understood workflows

Opportunities for reduction of waste in design		
Area of waste reduction	Percentage of design waste	
Designs never used, completed, or delivered	Unknown	
Downtime while finding information, waiting for test results, etc.	33-50%	
Unnecessary documents and prototypes		
Underutilization of design knowledge, for example in costly parts	18%	58%
Over design, such as features customers don’t need	8%	
Validating manufacturing errors early in the design process	17%	
Poor designs producing product defects	15%	

Sources: UGS analysis of Tier 1 Automotive suppliers; A.T. Kearney, *The Line on Design*, 2003.

The future is **Integrated Practice**

“Integrated Practice leverages early contribution of knowledge through utilization of new technologies, allowing architects to better realize their highest potentials as designers and collaborators while expanding the value they provide throughout the project lifecycle.”

*A Methodology is **Lean Design***

Clearly defined and well understood exchanges support reduction of waste in time, materials, and rework. Data standards are not created “on-the-fly” or office to office. Exchanges are openly available to support rapid team collaboration

In a recent analysis of Automotive Tier 1 suppliers, the pre-discovery process identified between 33% and 50% of design cost spent on delays finding information, waiting for information and producing unnecessary information such as paper documents and physical prototypes 58%
What is the waste in our process?

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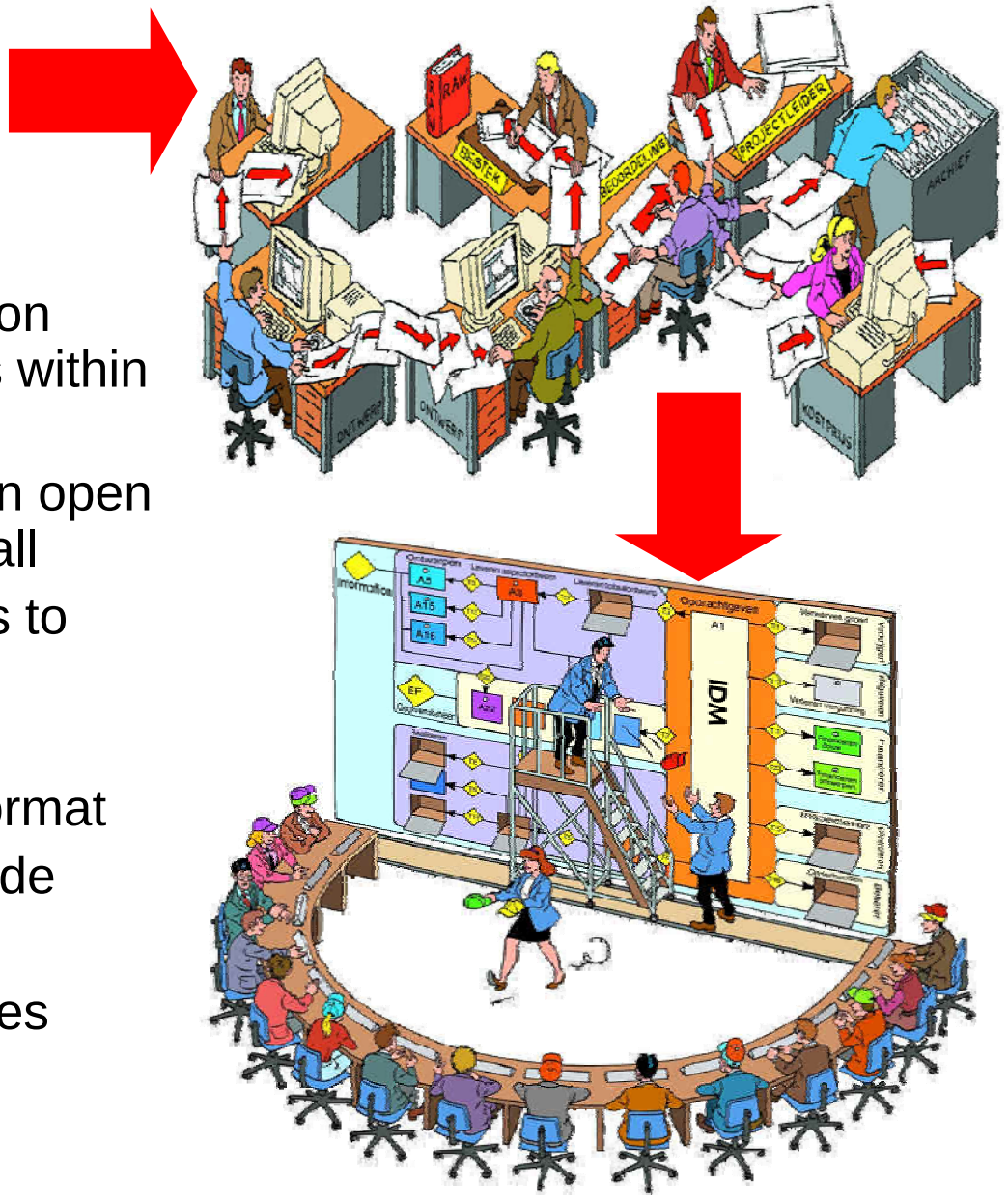
Collaboration thru the Model and Objects, Web

- Move from Paper-Centric Workflows and Outputs to Information Outcomes
- Requirement & Goal
  - Standardize on information needed for specific tasks within the building lifecycle
  - Development based upon open data standards used by all
  - Provide the requirements to software companies
- In NA uses data standards
  - CSI, OMNICLASS, Uniformat
  - International Building Code
  - OSCRE
  - CIS/2 and other authorities



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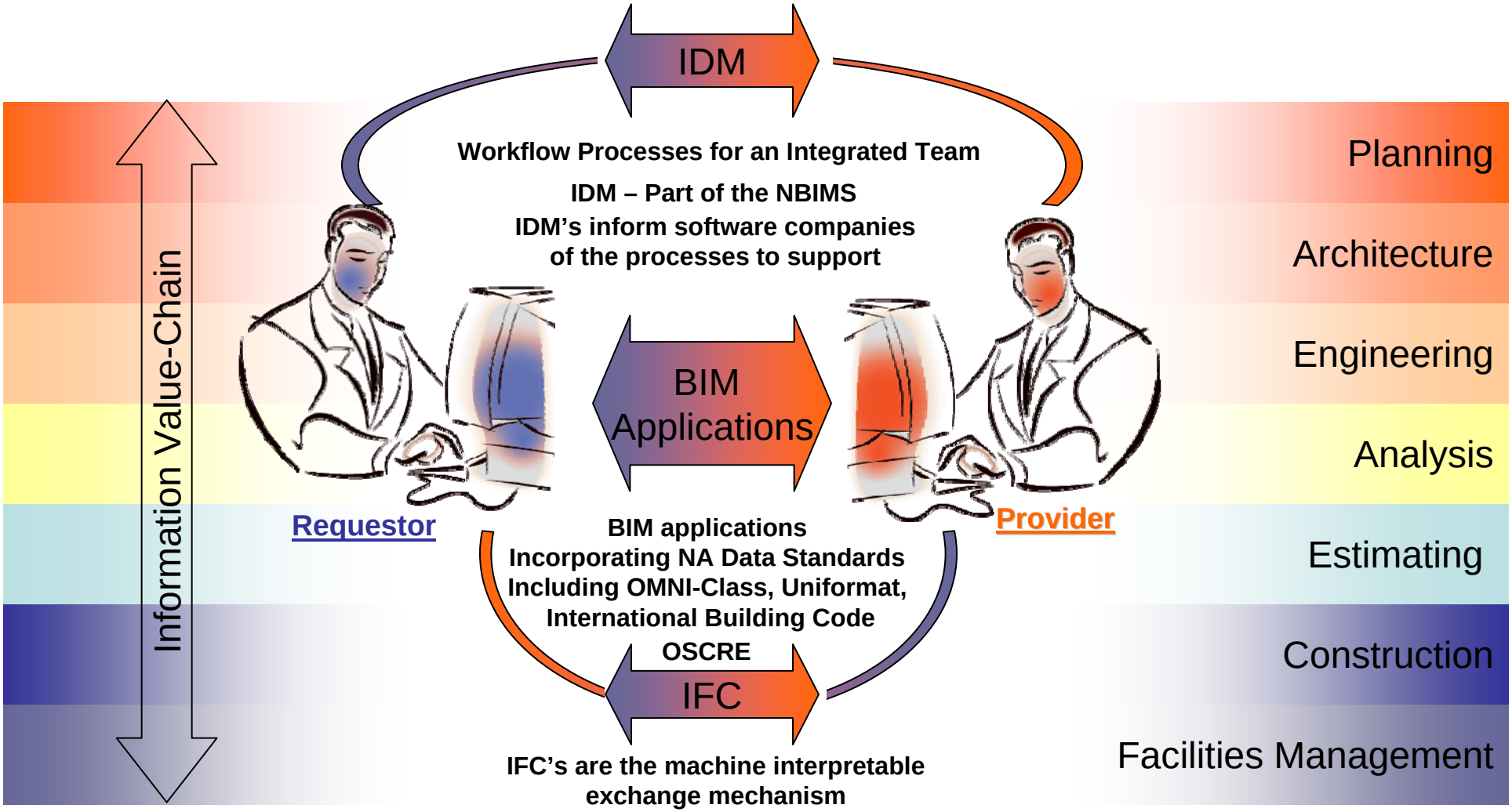
Goal -Value Chain for BIM Implementation



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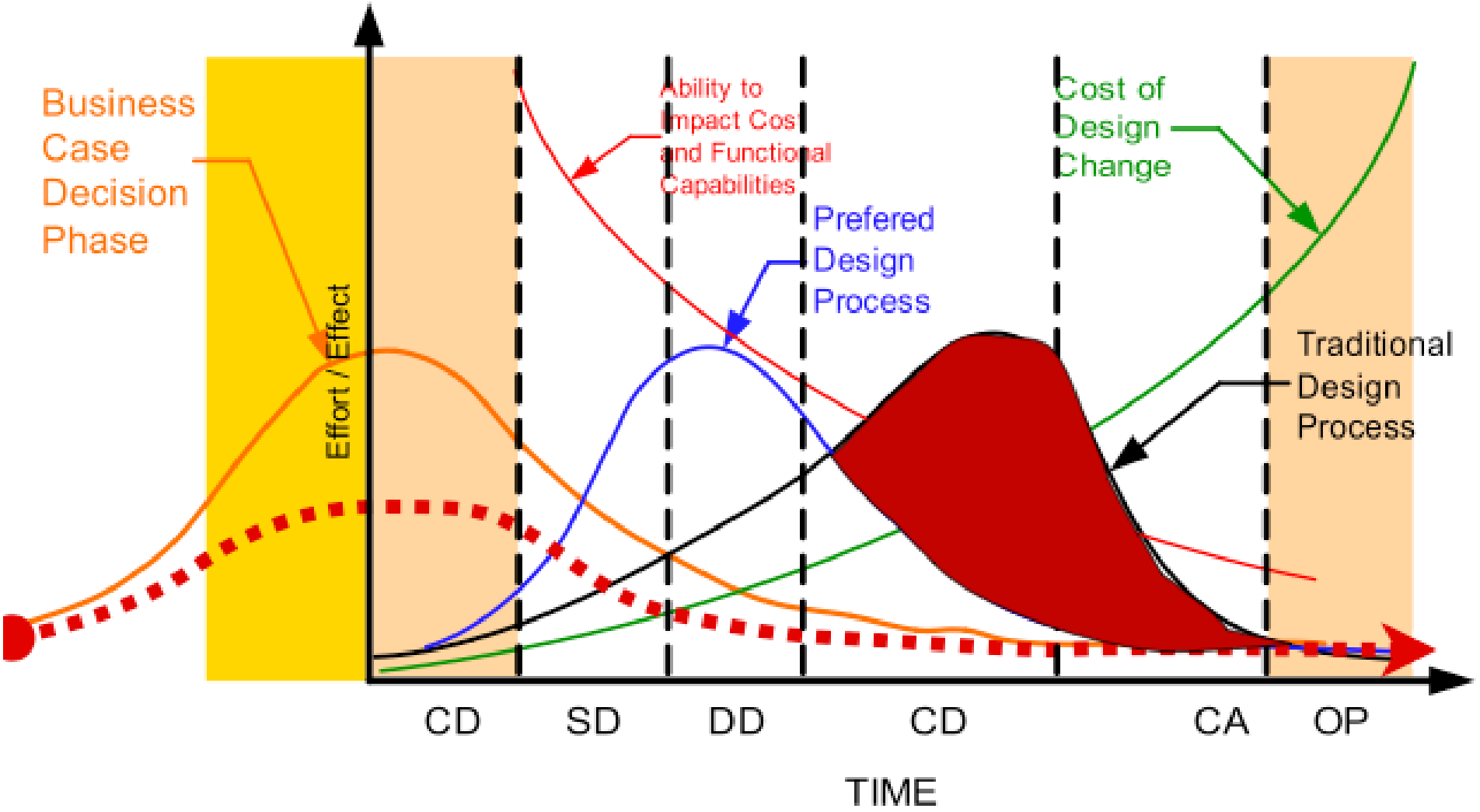
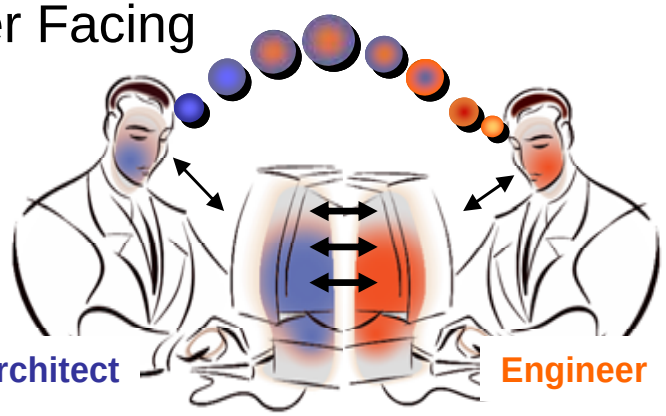
Aligning Content and Context



Scoping Responsibilities

- Stage 1 Strategies for NBIMS Implementation
  - Define BIM opportunities
  - Identify Needs and Requirements
  - Identify Synergies and Synergistic Groups
- Stage 2 Focus on North American Implementation
  - Define Information Concepts
  - Identify Structure for Content and Context of BIM
  - Identify Authoritative Reference Standards
- Develop Tools and Methods to Support Strategies
  - Develop Structure for Capturing Reliable Workflows
  - Deploy Repository
  - Deploy website for Knowledge Capture –User Facing Information Exchanges



Win-Win Business Strategies

ConsensusDOCS 300:

Tri-Party Collaborative Agreement

The first standard collaborative agreement in which an Owner, Designer, and Contractor all sign the same agreement. This LEAN construction approach is also known as alliancing or relational contracting. This innovative agreement creates a core team to make project decisions

Defined Inputs for Reliable Outcomes

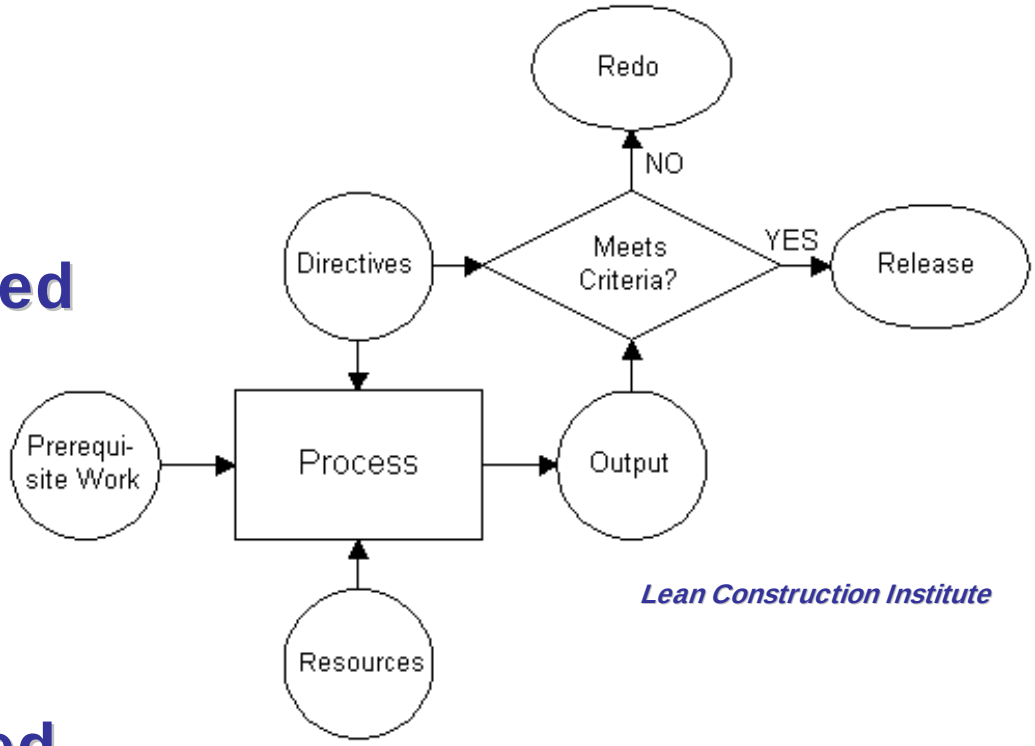
activity definition model (ADM)-Lean Construction Institute
An input-process-output representation of design tasks or construction processes. The model depicts the specification of directives (entering the process rectangle from above), prerequisites (including materials and information to be transformed into the desired output, entering the process rectangle from the left), and resources (entering the process rectangle from below). It also shows an inspection process resulting either in redo or release to the customer process. The model is used as a guide to exploding scheduled tasks into a level of detail at which their readiness for execution can be assessed and advanced.

Information definition model (IDM)-National BIM Standard
An input-process-output representation of an information exchange/s used to define information detail and content for BIM execution

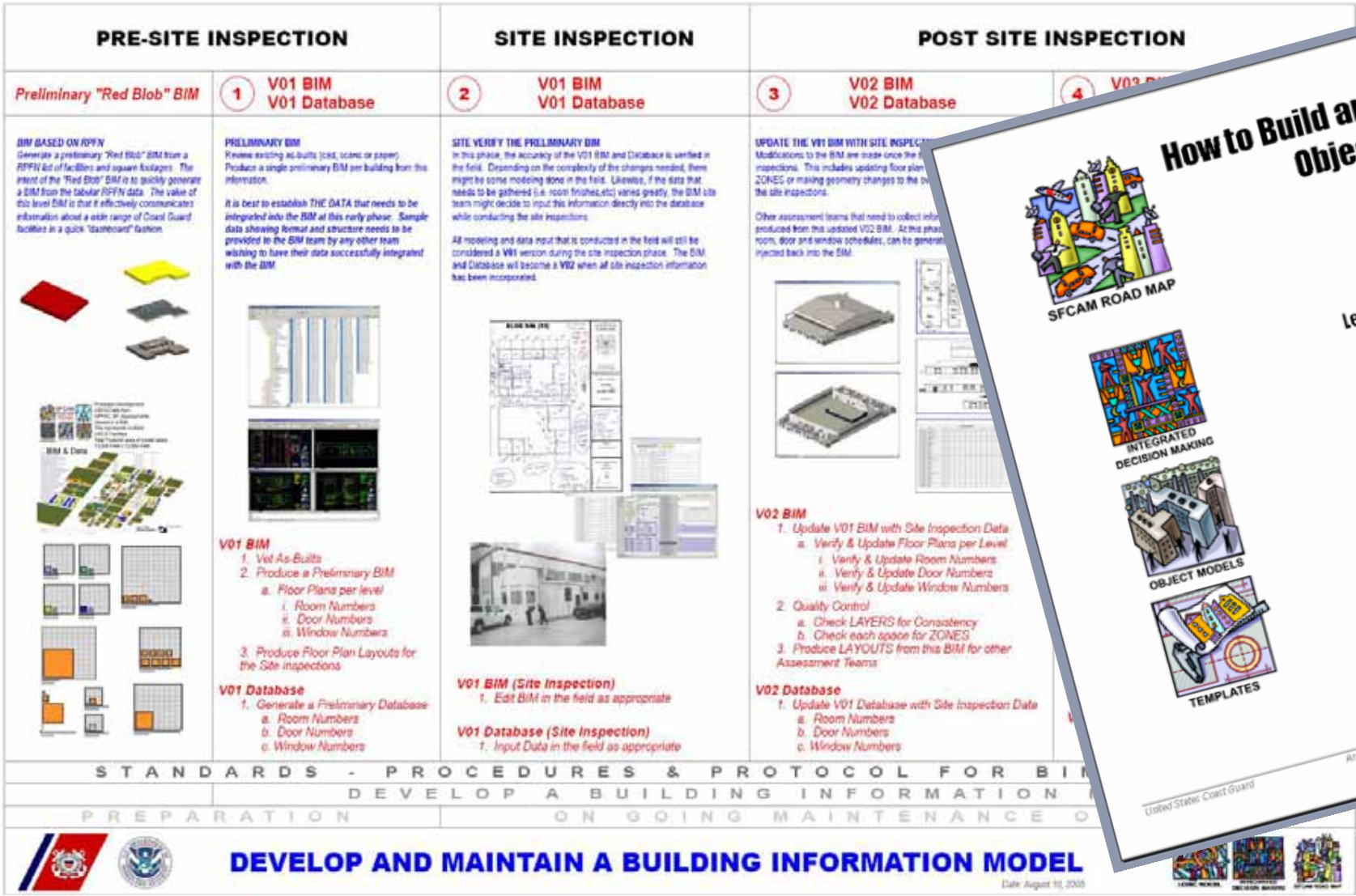
"Virtual Work Results"

In a BIM world there are work results produced from the virtual model.

Ex. Simulation and the information from these Activities will become a described and prescribed work result.



Process Workflow and BIM



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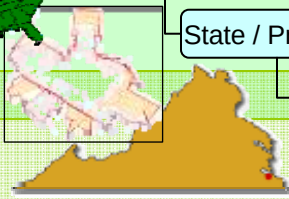
Taxonomy

Theatre / World

Country

Installation / Region

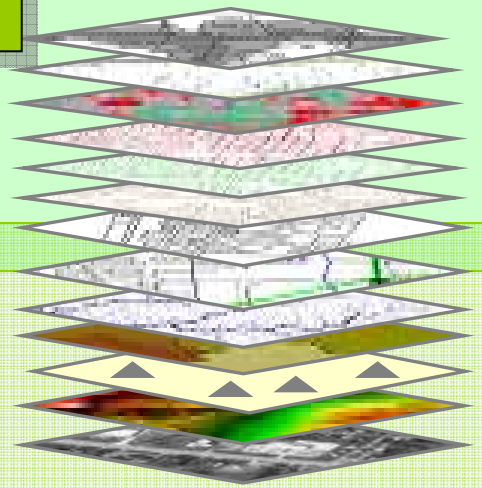
State / Province



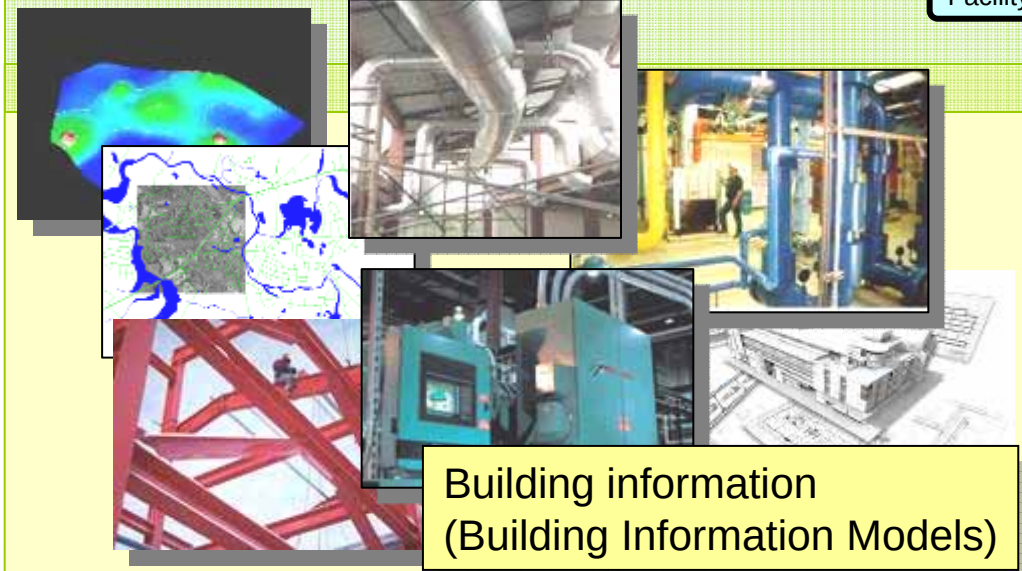
City / County

Site

Geospatial Information (GIS)



- Natural Asset
  - Air / Space
  - Underground
  - Water / Sea
- Real Property Asset
  - Land / Parcel
  - Facility / Built
    - Building
      - System
        - Sub-Systems
          - Components
      - Space
        - Level
          - Room
      - Overlay
    - Structure
      - System
        - Sub-Systems
          - Components
      - Space
        - Level
          - Room
      - Overlay
    - Linear Structure
      - Node
      - Segment



Building information (Building Information Models)

BIM Content

OmniClass Table 11
Construction Entities by Function
(Building Type/Purpose)
WHAT

OmniClass Table 12
Construction Entities by Form
(Building Type/Form)
WHAT

OmniClass Table 21
Elements (legacy UniFormat)
WHAT

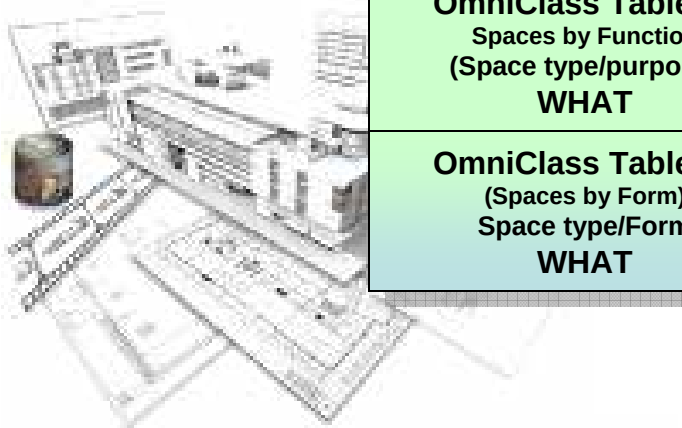
OmniClass Table 41
Materials
WHAT

OmniClass Table 23
Products
WHAT

OmniClass Table 49
Properties/Defining
WHAT

OmniClass Table 13
Spaces by Function
(Space type/purpose)
WHAT

OmniClass Table 14
(Spaces by Form)
Space type/Form
WHAT



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BUILDING
- Attributes
- Metrics

IFC objects, relationships, space

SYSTEMS/assemblies –Ex. Structural, MEP, Flooring, Ceiling, Exterior, Walls
- Attributes
- Metrics
- Sub-Systems (part of systems)
  - Attributes
  - Metrics
  - Components
    - Attributes
    - Metrics

SPACE-Vertical Horizontal, Empty
- Level (Stories)
  - Room
    - Metrics
      - Example SUI,CI
    - Attributes Function
  - Void
- Vertical
  - Metrics
  - Attributes

OVERLAYS – Typically associated with building hierarchy elements.
- Assets
  - Example Furniture Equipment Phone
- Personnel
- Business Groups
  - Example Space Assignment Business Group
  - Example Marketing Administration
- Financial Classifications
  - Example Rentable Space Circulation Area
- Zones
  - Example Secure Areas Systems
- Metrics
  - Example FCA,MDI

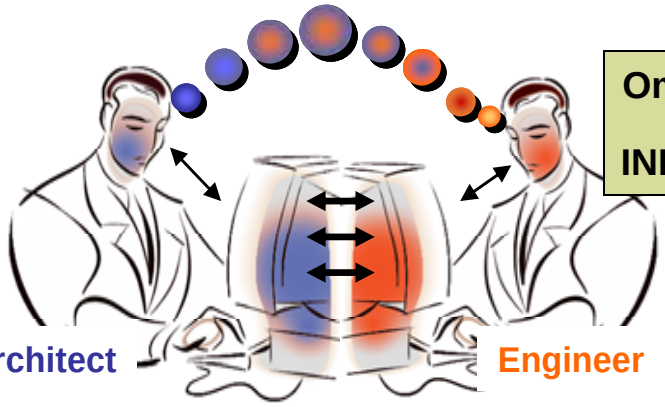
BIM in Context

Business Case Development

1. **WHO** (is requesting)
   Actor requesting information to support a process or decision
   (Authoritative Reference OMNI CLASS – Table 33 & 34)
2. **WHY** (project/process use or benefit)
   Why is this information important for a project activity
   (Authoritative Reference OMNI CLASS- Table 32)
3. **WHEN** (stage in project)
   (Authoritative Reference OMNI-CLASS-Table 31) Table 31 is tied to IFC Phases (Project Lifecycle)
4. **WHAT**
   Dataset in BIM that supports the request and benefit)
   Because BIM use aggregates information several tables support this activity .
   Authoritative Reference OMNI-CLASS Tables 11, 12,14, 21, 23, 41, 49
5. **To WHOM**
   Group/Actor that provides/fullfills the information need OMNI-Class 33 34
6. **HOW**
   Tools/formats/results Table 35 & 22
7. **INPUTS & OUTCOME**
   Information, Product or Service Delivered Omniclass 36

Data Sets to Support Business Case

- **Omniclass Table 33**
  Disciplines/expertise
  WHO/To WHOM
- **Omniclass Table 34**
  Organizational Roles/responsibility
  WHO/To WHOM
- **Omniclass Table 32**
  Services
  Activities/WHY
- **Omniclass Table 31**
  Phases
  WHEN
- **Omniclass Table 35**
  Tools/supporting
  HOW
- **Omniclass Table 22**
  Work Results/quality
  (Legacy MasterFormat)
  HOW
- **Omniclass Table 36**
  Information
  INPUT & OUTCOME



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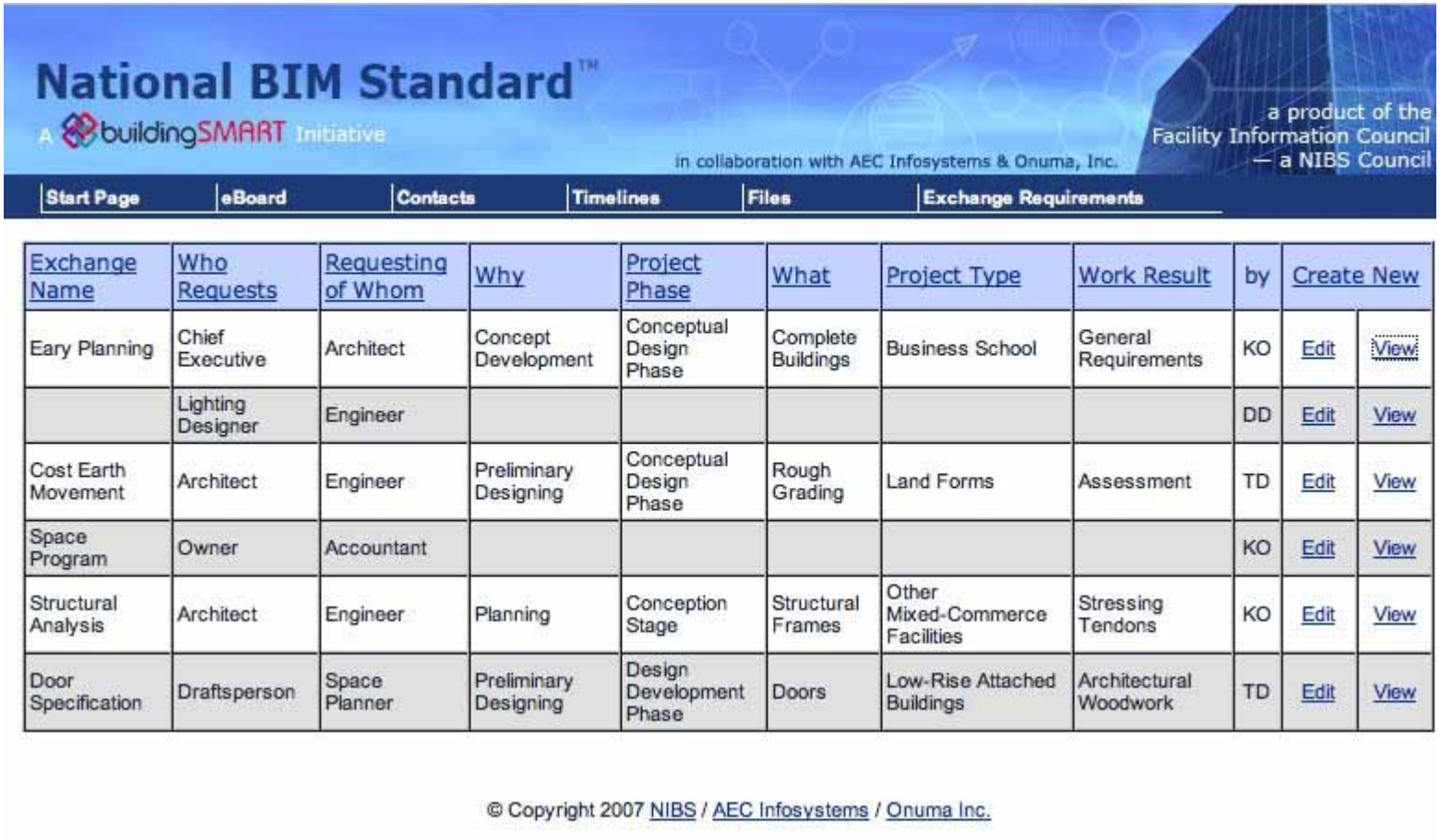
Using New Tools of Communication



National BIM Standard™

A buildingSMART Initiative

in collaboration with AEC Infosystems & Onuma, Inc.

a product of the Facility Information Council — a NIBS Council

Start Page | eBoard | Contacts | Timelines | Files | Exchange Requirements

Exchange Name	Who Requests	Requesting of Whom	Why	Project Phase	What	Project Type	Work Result	by	Create New	
Eary Planning	Chief Executive	Architect	Concept Development	Conceptual Design Phase	Complete Buildings	Business School	General Requirements	KO	Edit	View
	Lighting Designer	Engineer						DD	Edit	View
Cost Earth Movement	Architect	Engineer	Preliminary Designing	Conceptual Design Phase	Rough Grading	Land Forms	Assessment	TD	Edit	View
Space Program	Owner	Accountant						KO	Edit	View
Structural Analysis	Architect	Engineer	Planning	Conception Stage	Structural Frames	Other Mixed-Commerce Facilities	Stressing Tendons	KO	Edit	View
Door Specification	Draftsperson	Space Planner	Preliminary Designing	Design Development Phase	Doors	Low-Rise Attached Buildings	Architectural Woodwork	TD	Edit	View

Descriptive Name for Exchange Requirement:

Eary Planning

Description:

Create early planning diagram

Added by: Kimon Onuma on Dec 5, 2007 / modified on Dec 5, 2007

Update Exchange Requirement

Develop the context of a business case for an exchange

- Search for terms by starting to type in each field. (Hint: ta
- Setting the fields from left to right filters the fields to the rig
- Entering values in the fields on the right will automatically
- Green values are already "SET" - red values have to be

Streamline Activity to Key Information

Normalize Naming for Data Entry & Mining

Support Consensus

Educate by Doing

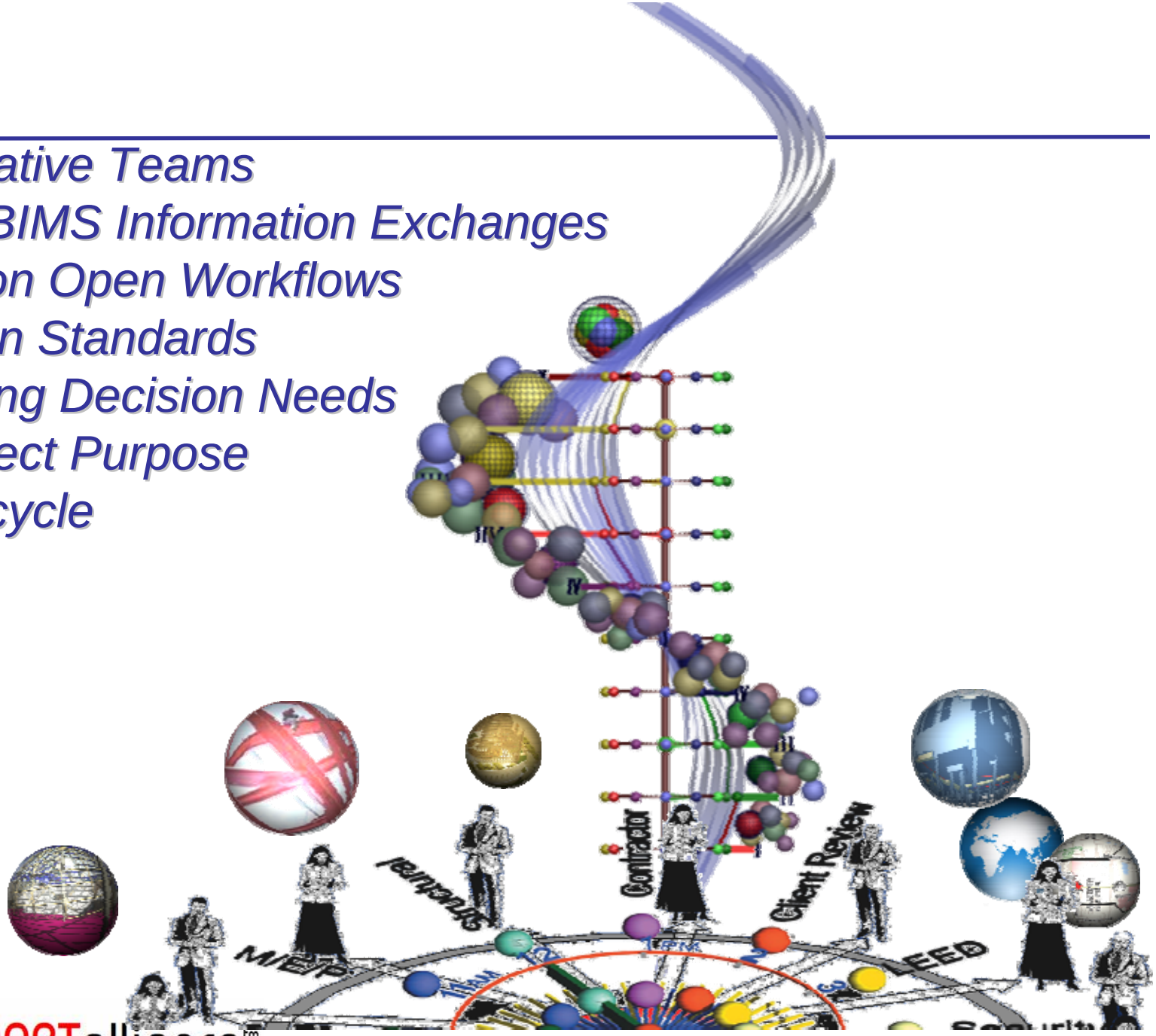
Supports ratio of technical teams to user community

- **Who is requesting / Requirements: (34)**
  Management > Executive Management > Chief Executive (OmniClass: 34-11 11 11)
- **Requesting Of Whom / Organizational Roles: (34)**
  Design Roles > Architect (OmniClass: 34-25 21)
- **Why is this information important for a project activity: (32)**

Level 1:		Level 2:		Level 3:	
Conception Services	SET	Planning	SET	Concept Development	SET

- **Project Phase ('When'): (31)**
  Design Stage > Preliminary Project Description Phase > Conceptual Design Phase (OmniClass: 31-20 10 14)
- **Dataset in BIM that supports the request and benefit ('What'): (21/23)**
  Manufactured Structures > Complete Buildings (OmniClass: 23-55 30)
- **Project Type: (11/12)**
  Learning Facilities > Higher Education Facilities > Business School (OmniClass: 11-12 24 13)
- **Work Result / Quality: (22)**
  General Requirements (OmniClass: 22-01)

Collaborative Teams
Using NBIMS Information Exchanges
Built Upon Open Workflows
and Open Standards
Supporting Decision Needs
and Project Purpose
and Lifecycle



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