National Institute of
Building Sciences
National Building Information Model Standard

Based on and supporting buildingSMART International Alliance for Interoperability
Industry Foundation Classes
Information Delivery Manuals
and International Framework for Dictionaries

BIM: Pushing Standards To The Edge

National Building Information Model Standard

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Federal Facilities Council

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This presentation is a collaborative product of the NIBS NBIMS Project Committee.

National Building Information Model Standard

Building Information Model Definition

National BIM Standard Definition of BIM – buildingSMART

A Building Information Model (BIM) is a digital representation of physical and functional characteristics of a facility. As such it serves as a shared knowledge resource for information about a facility forming a reliable basis for decisions during its life-cycle from inception onward.

A basic premise of BIM is collaboration by different stakeholders at different phases of the life cycle of a facility to insert, extract, update or modify information in the BIM process to support and reflect the roles of that stakeholder. The BIM is a shared digital representation founded on open standards for interoperability.

The National BIM Standard is part of the global buildingSMART Information Delivery Manual Initiative.

NBIMS Goals

1. Define expansive scope of BIM
   - Everyone starting from different points of view
   - Breaking down stovepipes
   - Developing awareness and appreciation of life-cycle approach
2. Define first and subsequent versions of the Standard
   - Can't boil the ocean
   - Need to know when and what information will be available
   - Need to identify authoritative sources and ensure accuracy

NBIMS

Groups Supporting NBIMS

National Building Information Model Standard

Status of Version 1.0

Based on our Charter we are working the following:

- BIM Scope
- Coverage of Version
- Reference Standards
- Business Processes
- Business Rules
- Data Structures and Models
- Implementation Guidance
- Maturity Model

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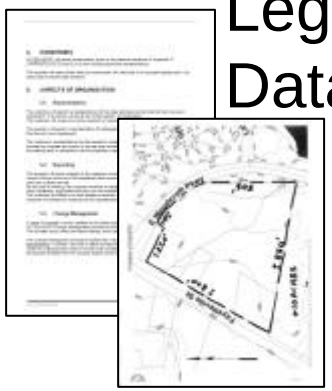
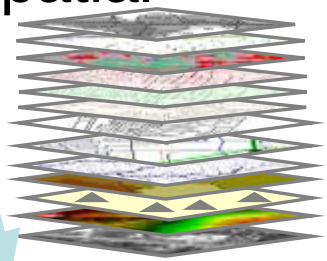
BIM's Business Data Types

Legal Data



Geospatial Data



Financial Data

Designer Data

Image Graphisoft

Specifier Data

Owner / Occupier Data

Sustainers Data

Environmentalist Data

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BIM Enabled Construction Industry

Facility Information Views

- Owners
- Planners
- Realtors
- Appraisers
- Mortgage Bankers
- Designers
- Engineers
- Cost & Quantity Estimators
- Specifiers
- Contracts & Lawyers
- Construction Contractors
- Sub-Contractors
- Fabricators
- Code Officials
- Facility Managers
- Maintenance & Sustainment
- Renovation & Restoration
- Disposal & Recycling
- Scoping, Testing, Simulation
- Safety & Occupational Health
- Environmental & NEPA
- Plant Operations
- Energy, LEED
- Space & Security
- Network Managers
- CIO's
- Risk Management
- Occupant Support
- First Responders

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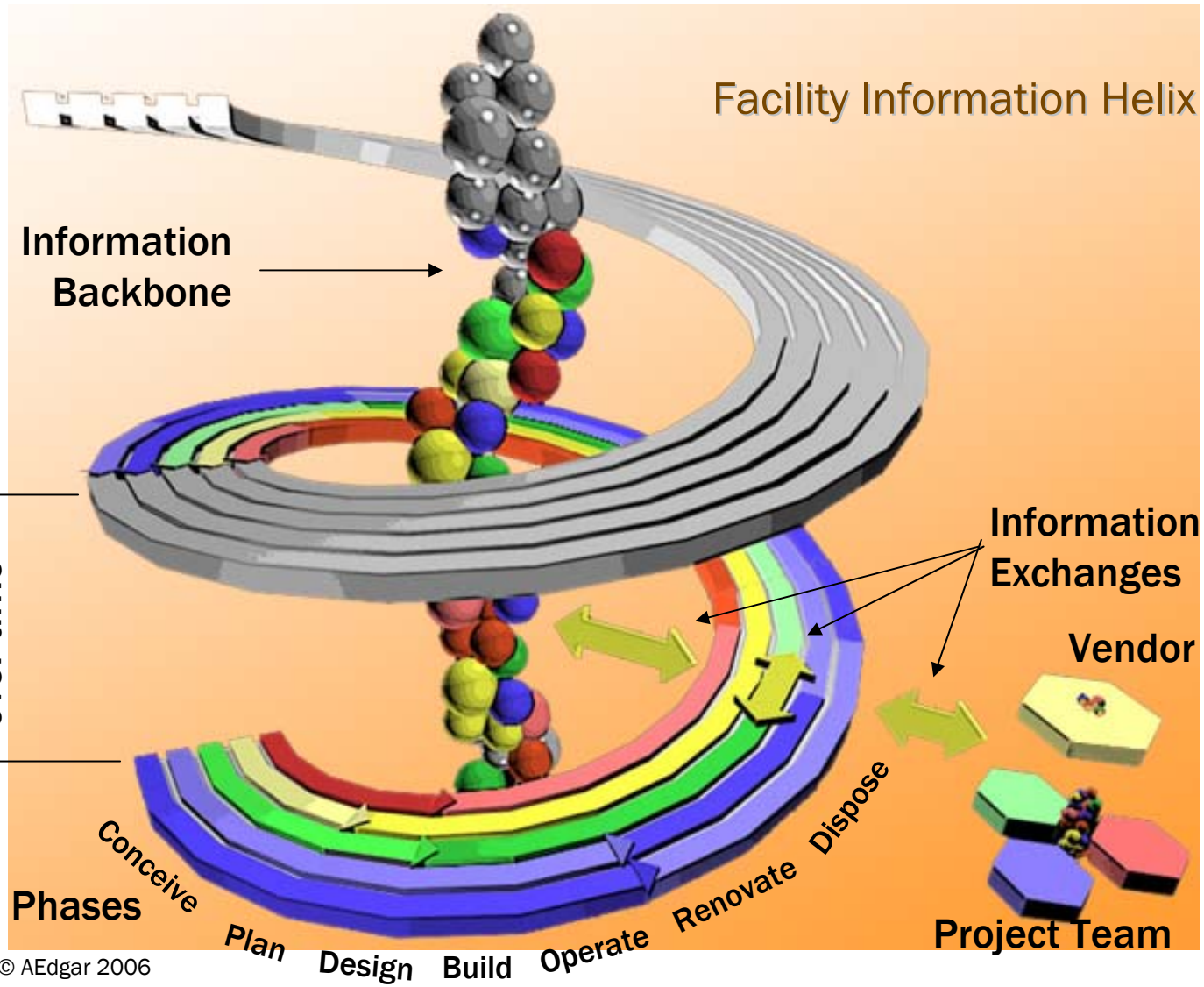
What does an NBIM Standard look like?



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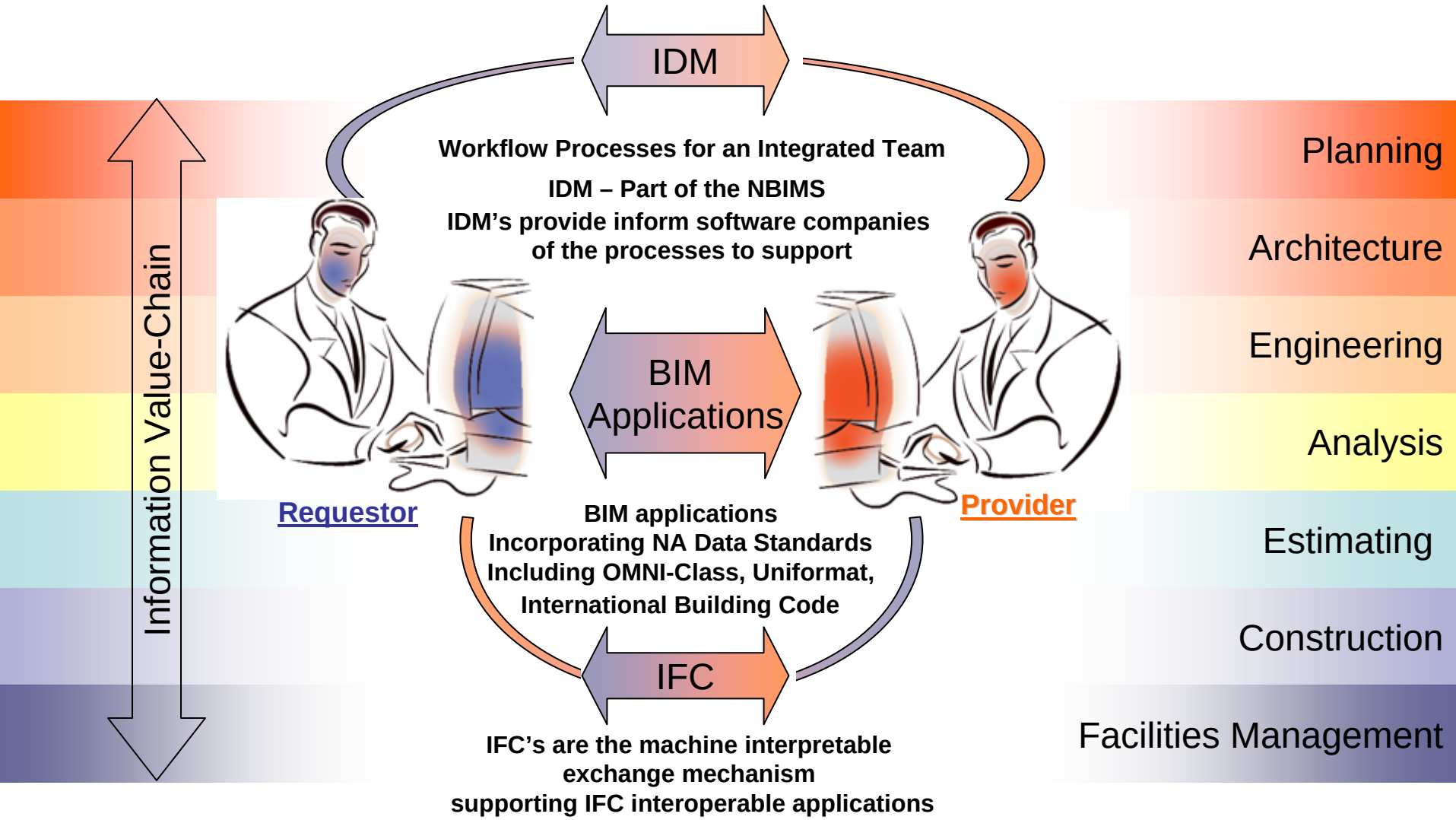
Developing the BIM Value-Chain



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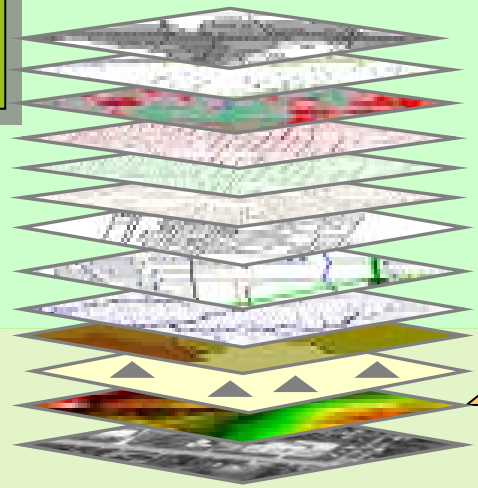
Hierarchical Information Relationships

Theatre / World
Country
Installation / Region
State / Province
County
City
Site

Geospatial Information (GIS)



Natural Asset
Air / Space
Underground
Water / Sea

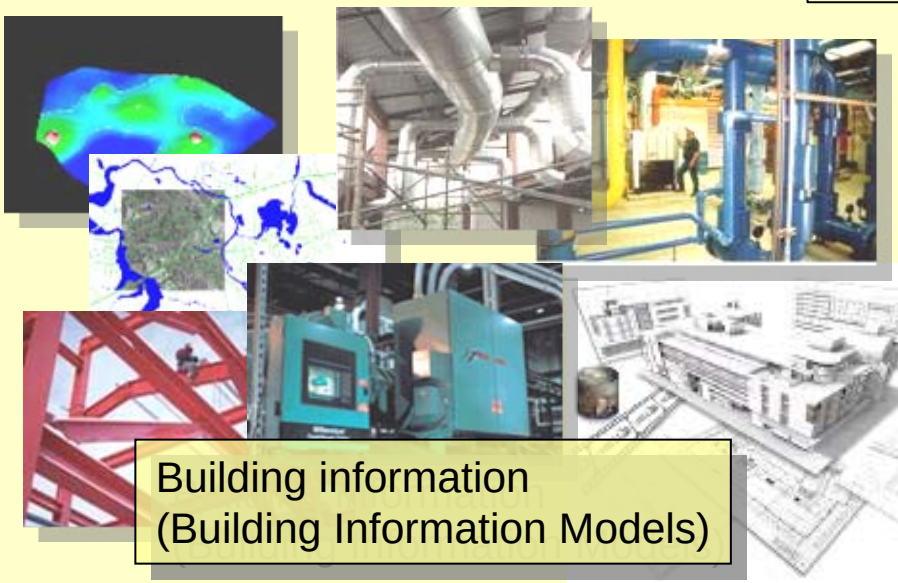
Real Property Asset
Land / Parcel

Facility / Built
Building
System
Space
Overlay
Sub-Systems
Level
Components
Room

Structure
System
Space
Overlay
Sub-Systems
Level
Components
Room

Linear Structure
Node
Segment

IAI-IFC Usage



Building information (Building Information Models)

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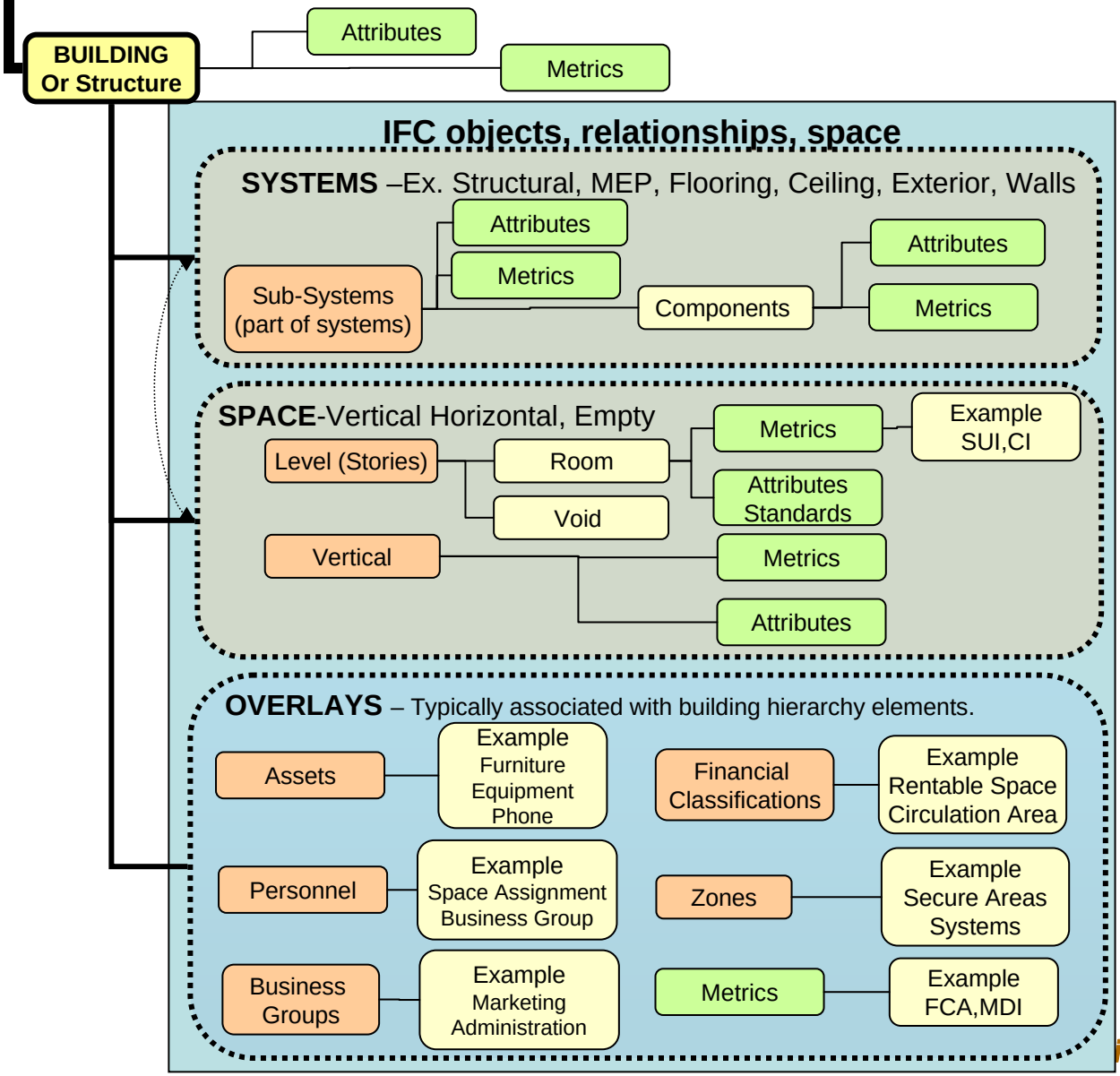
Hierarchical Building Information Relationships



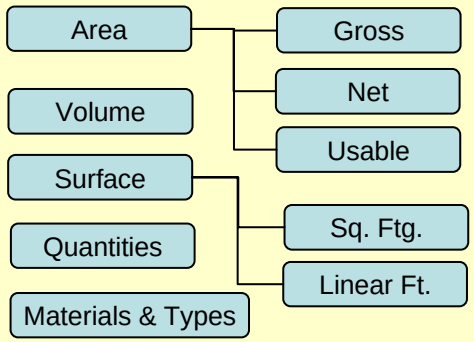
Systems represent the physical entities of the building. Systems use NA classifications such as Omni-Class and Uniformat and are transported/exchanged via IFCs

Space is physical in nature, but can be unbounded (have no or cross physical boundaries) but it will always be tied to the physical structure or systems in some way

Overlays are more abstract data - organizational, operational, functional, financial, non-fixed assets, resources, personnel, etc. that is data tied to the Systems and Space

Reports or Extracted Data from BIM

(examples from all classifications)



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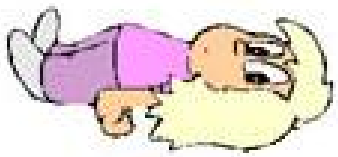
NBIMS Maturity Model

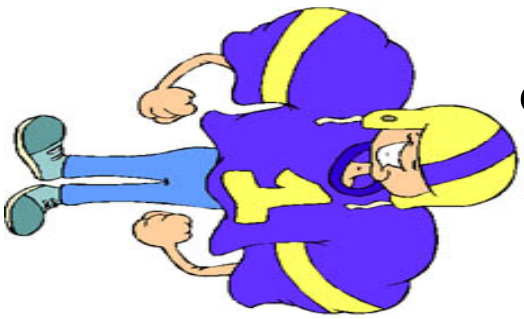
Maturity Level	A Data Richness	B Life-cycle Views	C Roles Or Disciplines	D Business process	E Delivery Method	F Timeliness/ Response	G ITIL Maturity Assessment	H Graphical Information	I Spatial Capability	J Information Accuracy	K Interoperability/ IFC Support
1	Basic Core Data	No Complete Project Phase	No Single Role Fully Supported	Separate Processes Not Integrated	Single Point Access No IA	Most Response Info manually re-collected - Slow	No ITIL Implementation	Primarily Text - No Technical Graphics	Not Spatially Located	No Ground Truth	No Interoperability
2	Expanded Data Set	Planning & Design	Only One Role Supported	Few Bus Processes Collect Info	Single Point Access w/ Limited IA	Most Response Info manually re-collected	Initiation	2D Non-Intelligent As Designed	Basic Spatial Location	Initial Ground Truth	Forced Interoperability
3	Enhanced Data Set	Add Construction/ Supply	Two Roles Partially Supported	Some Bus Process Collect Info	Network Access w/ Basic IA	Data Calls Not In BIM But Most Other Data Is	Limited Awareness	NCS 2D Non-Intelligent As Designed	Spatially Located	Limited Ground Truth - Int Spaces	Limited Interoperability
4	Data Plus Some Information	Includes Construction/ Supply	Two Roles Fully Supported	Most Bus Processes Collect Info	Network Access w/ Full IA	Limited Response Info Available In BIM	Full Awareness	NCS 2D Intelligent As Designed	Located w/ Limited Info Sharing	Full Ground Truth - Int Spaces	Limited Info Transfers Between COTS
5	Data Plus Expanded Information	Includes Constr/Supply & Fabrication	Partial Plan, Design&Constr Supported	All Business Process(BP) Collect Info	Limited Web Enabled Services	Most Response Info Available In BIM	Limited Control	NCS 2D Intelligent As-Builts	Spatially located w/Metadata	Limited Ground Truth - Int & Ext	Most Info Transfers Between COTS
6	Data w/Limited Authoritative Information	Add Limited Operations & Warranty	Plan, Design & Construction Supported	Few BP Collect & Maintain Info	Full Web Enabled Services	All Respoinse Info Available In BIM	Full Control	NCS 2D Intelligent And Current	Spatially located w/Full Info Share	Full Ground Truth - Int And Ext	Full Info Transfers Between COTS
7	Data w/ Mostly Authoritative Information	Includes Operations & Warranty	Partial Ops & Sustainment Supported	Some BP Collect & Maintain Info	Full Web Enabled Services w/IA	All Response Info From BIM & Timely	Limited Integration	3D - Intelligent Graphics	Part of a limited GIS	Limited Comp Areas & Ground Truth	Limited Info Uses IFC's For Interoperability
8	Completely Authoritative Information	Add Financial	Operations & Sustainment Supported	All BP Collect & Maintain Info	Web Enabled Services - Secure	Limited Real Time Access From BIM	Full Integration	3D - Current And Intelligent	Part of a more complete GIS	Full Computed Areas & Ground Truth	Expanded Info Uses IFC's For Interoperability
9	Limited Knowledge Management	Full Facility Life-cycle Collection	All Facility Life-Cycle Roles Supported	Some BP Collect&Maint InReal Time	Netcentric SOA Based CAC Access	Full Real Time Access From BIM	Limited Optimization	4D - Add Time	Integrated into a complete GIS	Comp GT w/Limited Metrics	Most Info Uses IFC's For Interoperability
10	Full Knowledge Management	Supports External Efforts	Internal and External Roles Supported	All BP Collect&Maint In Real Time	Netcentric SOA Role Based CAC	Real Time Access w/ Live Feeds	Full Optimization	nD - Time & Cost	Integrated into GIS w/ Full Info Flow	Computed Ground Truth w/Full Metrics	All Info Uses IFC's For Interoperability

BIM Tools to create 3D Model – Designer or Builder Only



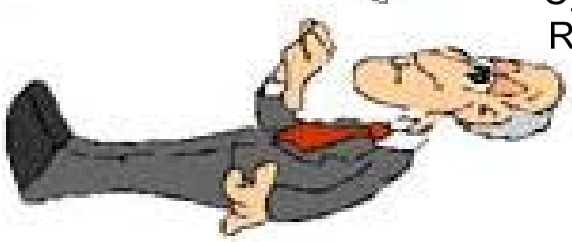
Added Information and/or Integrated Collaboration, Limited Web Enabled Info

Downstream Business Processes Supported, Full Web Enabled Services, Add Cost and/or Time Data



Limited Knowledge Management, Add Operations and Warranty inof, Business Process data maintained, Spatially located with GIS, Initial Ground Truth, Limited Interoperability, Limited Awareness of ITIL

Limited Integration ITIL, Part of a more complete GIS, Full Computed Areas and Ground Truth, Most Info uses IFC's, Limited Real Time Access from BIM, Secure Web enabled Services Full Facility Life-Cycle Collection



Full Knowledge Management, Full Life Cycle Supported, Internal and External Roles Supported, Business Processes Supported in Real Time, Full Net centric Delivery, Real Time Access, Fully Optimized ITIL, nD Time and Cost Included Integrated to GIS, Information Accuracy Verifiable, All Info Uses IFC's

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BIM Maturity Model

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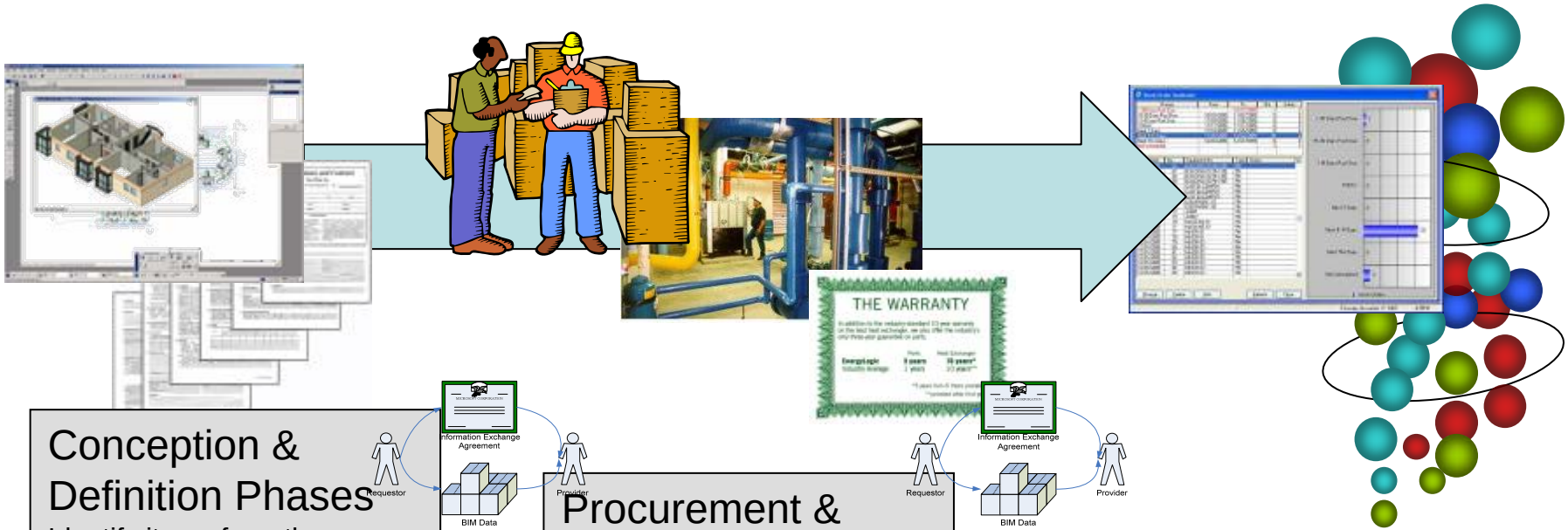
The COBIE Example

Construction Operations Building Information Exchange



Conception & Definition Phases

Identify items from the specifications that will require warranty information

Procurement & Execution Phases

Collect information as items are ordered and delivered such as who is warranting, when the warranty starts, how long is the warranty period, what preventive maintenance is required to keep the warranty in force

Utilization & Closure Phases

Read the information collected directly into your CMMS software to ensure that the warranties are supported

COBIE will demonstrate the flow of information through the phases of a facility something that is not yet happening yet Is critical to realize the total potential ROI

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NBIMS Today & Tomorrow

- Goal of version 1.0 is to establish baseline and make some initial recommendations – It is only a starting point
  - Define Overall Scope of BIM
  - Identify Industry/International Foundation Classes (IFC's) as a key element
  - Identify OmniClass Tables as key elements
  - Creation of Information Delivery Manuals w/Limited Information Exchange Samples (COBIE)
  - Identify International Framework for Dictionaries as a key element
  - Introduce a Capability Maturity Model & Define a Minimum BIM
  - Introduce the World View to BIM View Taxonomies
  - Present Guidelines from several sources (GSA, NIST, USCG)
- Version 2.0 – January 2008
  - Focus on Gaining Consensus on Additional Information Delivery Manuals (PCI, AISC, Others)
  - Introduce Data Models & Structures
  - Provide Initial Business Rules
  - Include Additional IFC's to Fill Gaps
  - Provide Initial Harmonization of Guidelines
  - Support More Comprehensive Business Views
- Version 3.0 – January 2009
  - Expanded Robust Data Model and Structure
  - Expanded Information Delivery Models
  - Additional IFC's