9 Dec 2008, 0900-1200

W106 - All About COBIE

the “06” series of sessions presents open-standard information exchange projects

E. William (Bill) East, PhD, PE
Research Civil Engineer
Engineering Research and Development Center

Information Technology, BIM & Interoperability Track

Monday, December 8

9:00am – 12:00pm

buildingSMART alliance™ International Symposium

1:00pm – 2:00pm

buildingSMART alliance™ Executive Committee Meeting *Closed to members only

2:00pm – 4:00pm

buildingSMART alliance™ Board of Directors Meeting
*Closed to members only

Tuesday, December 9

9:00am – 12:00pm

W106 All About Construction Operations Building Information Exchange (COBIE)

W108 Delving into the Details of the Industry Foundation Classes (IFC) Standards — Advanced Session

W109 BIM and Facility Management: What Every Owner and Facility Manager Needs to Know

W111 BIM & Specifications

W112 Benefiting from BIM in the Real World

1:30am – 4:30pm

W205 BIM Best Practices, Case Studies

W206 Architecture, Engineering, Construction, Owner & Operator Testbed: Integration Technologies & Software

W207 BIM in Education – Headliners

W208 Keys to Understanding ISO 16739 and IFC2x4 Standards

W209 BIM Implementation Strategies: Changes in Your Office

W211 BIM and Integrated Project Delivery: A Roadmap for Adoption and Implementation for the Federal Marketplace

W212 Exploring Design Options with Generative Components

Wednesday, December 10

8:00am – 5:00pm

FEDspec*

8:30am – 9:30am

S105 BIM and Facilities Management

S106 Code Compliance: BIM for Building Construction Regulations and e-Government Initiatives

S107 BIM in Education: An Information Exchange for Educators and Industry- Focus on West/ Midwest Universities

S108 3D Standards Enable Better Infrastructure Solutions

S109 Construction Management - Digital Review Process

S112 BIM Benefits Integrated Practice

S113 Introduction to Autodesk Green Building Studio

8:30am – 10:00am

Collaborative BIM Advocates
Special Registration Required (go to www.collaborativeconstruction.com for more info)

10:00am – 11:00am

S205 BIM 101 for Project Managers- Managing BIM Projects

S206 BIMStorm™ Washington

S207 BIM in Education: An Information Exchange for Educators and Industry- Focus on Southern Universities

S208 Overview of the National BIM Standard™

S209 Imaging: Trusted Data vs. Suspect Data in BIM

S212 BIM in Sustainable Design: Not Just a Check-list

S213 Introduction to EcoTect Energy Design

11:00am – 4:00pm

Exhibit Hall Open

4:00pm – 5:00pm

S305 Business Process Change

S306 agcXML Case Studies: Schemas for Transactional Data Exchange

why can’t they just use the approved submittals instead of specifying construction handover documents?

how can I eliminate the copying cost of handover documents?

how can I deliver the required as-built information at the least cost?

how can I get the benefit from my company’s IT investments?

Information Technology, BIM & Interoperability Track

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W105 BuildingSMARTalliance™ Basics - Introduction
W106 All About Construction Operations Building Information Exchange (COBIE)
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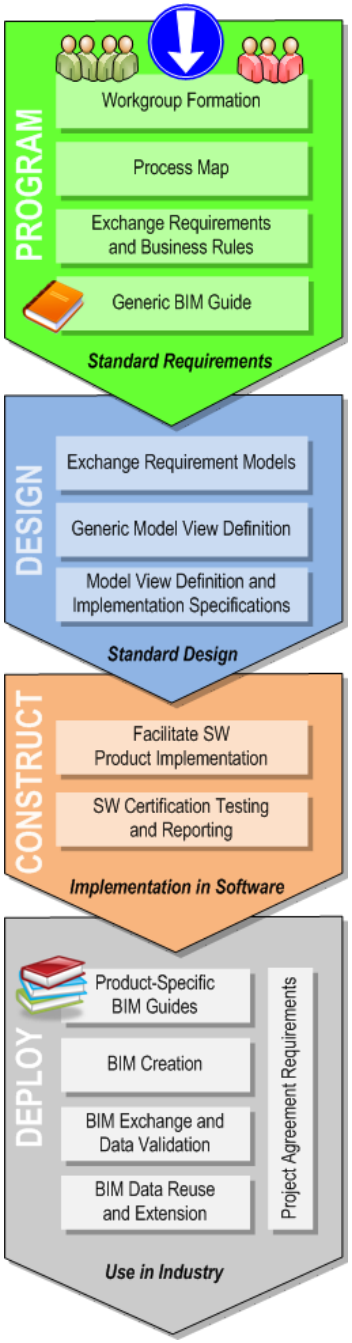
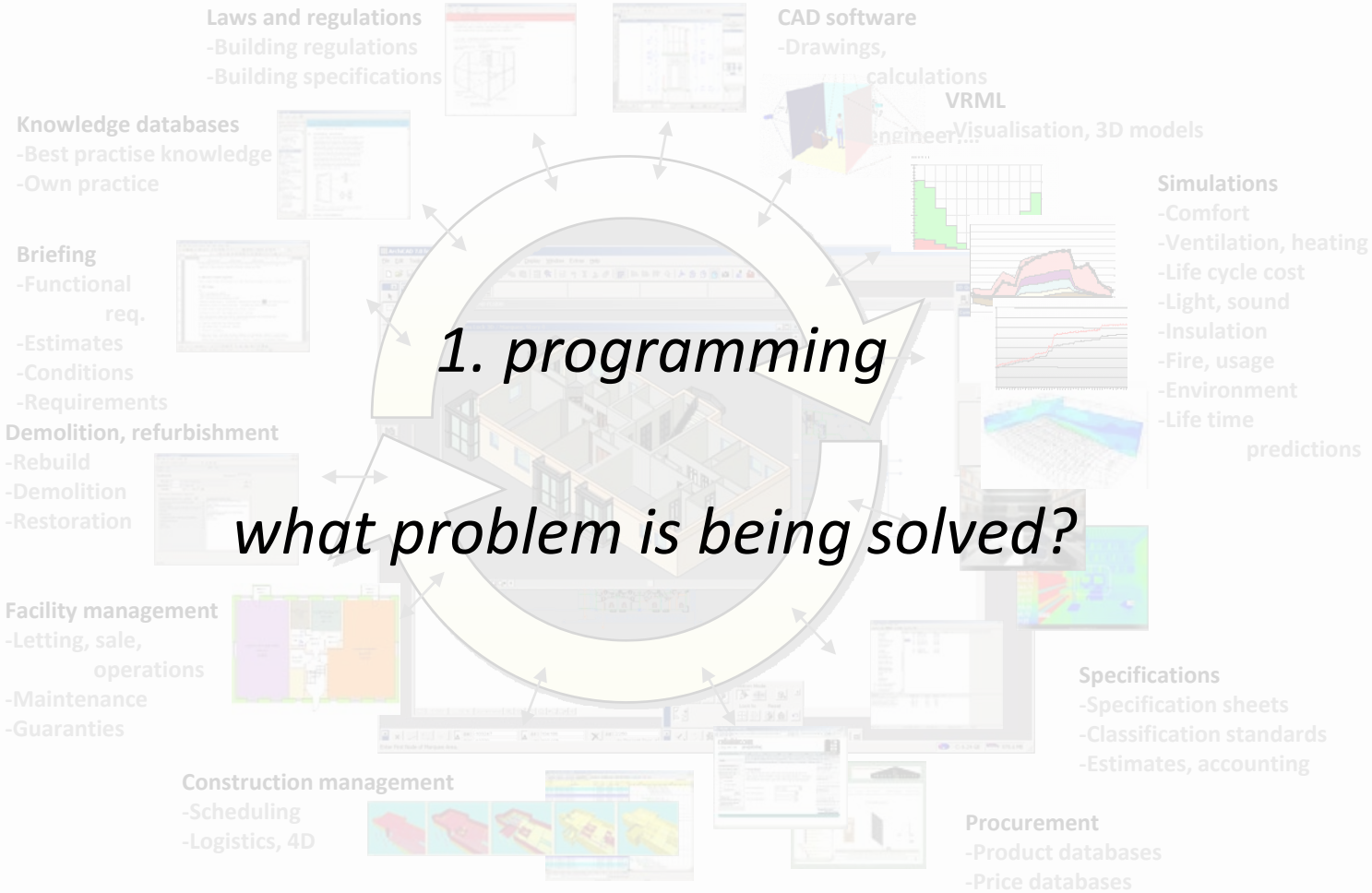
S306 agcXML Case Studies: Schemas for Transactional Data Exchange

how will these questions be answered?



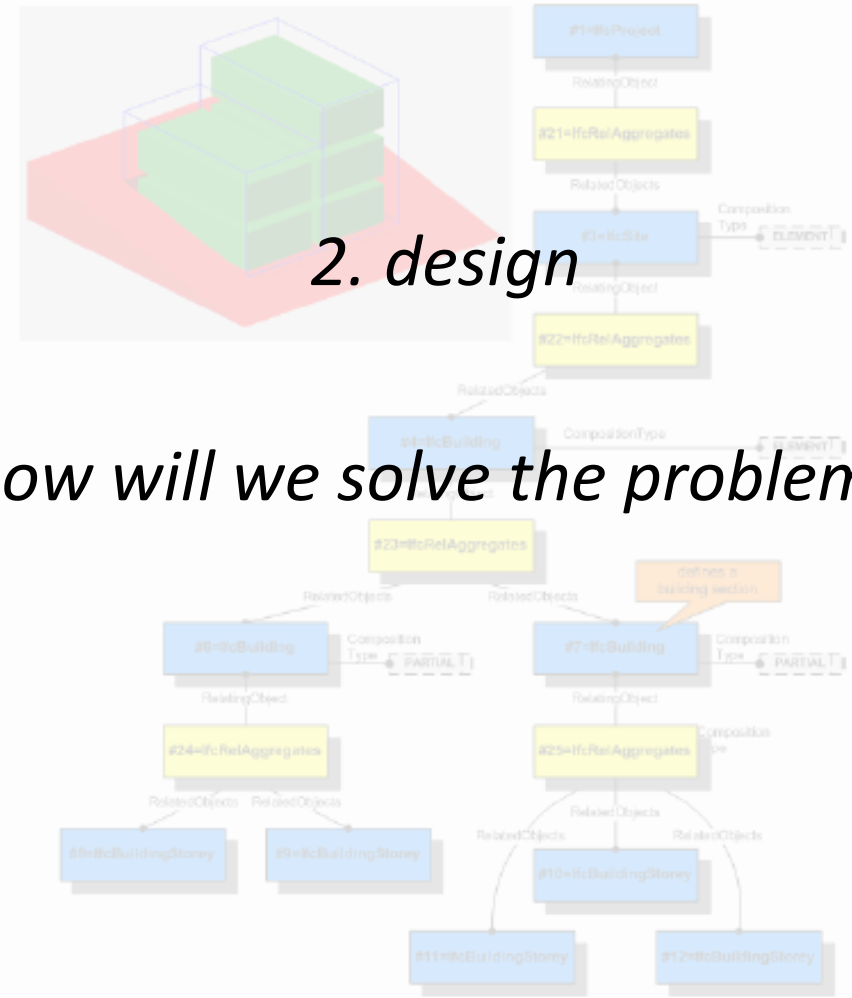
describing solution process



1. programming

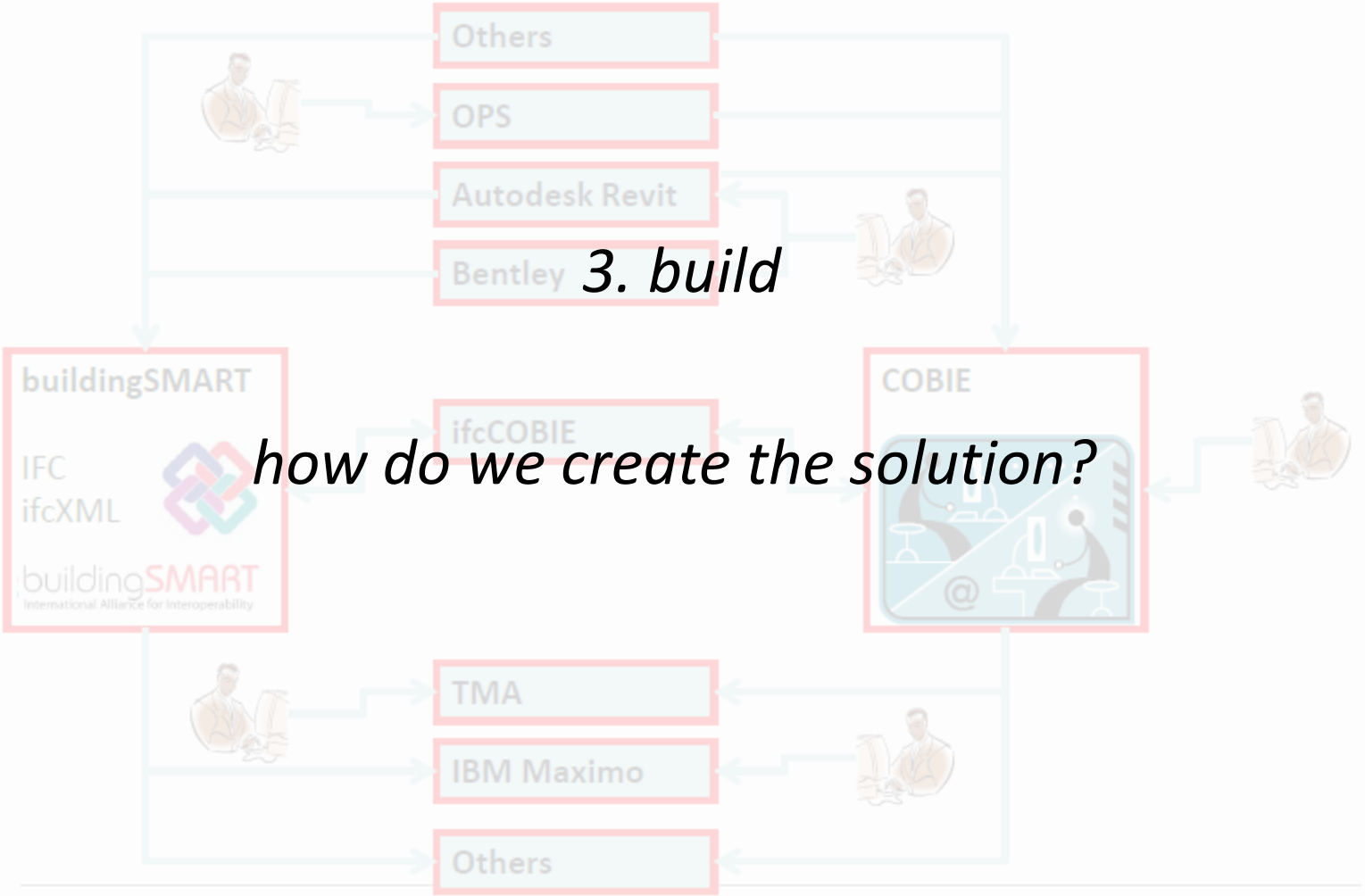
what problem is being solved?

(Lars Bjørkhaug, Norwegian Building Research Institute)



2. design

how will we solve the problem?



3. build

how do we create the solution?

4. deploy

how can I use it?

WBDG
WHOLE BUILDING DESIGN GUIDE

The Gateway to Up-To-Date Information on Integrated 'Whole Building' Design Techniques and Technologies

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Design Guidance | Project Management | Operations & Maintenance | Documents & References | Tools | Continuing Educa

RESOURCE PAGES

A–C | D–H | I–R | S–W

- Achieving Sustainable Site Design through Low Impact Development Practices
- Acoustic Comfort
- Aesthetic Challenges
- Aesthetic Opportunities
- Air Barrier Systems in Buildings
- Air Decontamination
- Archaeological Site Considerations
- Assessment Tools for Accessibility
- Balancing Security/Safety & Sustainability Objectives
- Blast Safety of the Building Envelope
- Building Information Models (BIM)
- Building Integrated Photovoltaics (BIPV)
- Changing Nature of Organizations, Work, and Workplace
- Chemical/Biological/Radiation (CBR) Safety of the Building Envelope
- Construction Operations Building Information Exchange (COBIE)
- Construction Phase Cost Management
- Construction Waste Management

Home > Construction Operations Building Information Exchange (COBIE)

Construction Operations Building Information Exchange (COBIE)

by E. William East, PE, Ph
Engineer Rese, and, U.S. Army, Corps of Engineers
Last updated: 06-

Introduction

Today, most contracts require the handover of paper documents containing equipment lists, product data sheets, warranties, spare part lists, preventive maintenance schedules, and other information. This information is essential to support the operations, maintenance, and the management of the facilities assets by the owner and/or property manager.

Ga, t the, lo, y's standard practice, is expensive, si, h, as, rd, om information created earlier. COBIE simplifies the work required to capture and record project handover data.

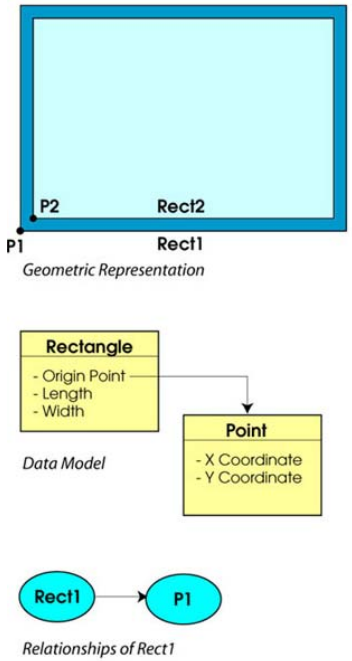
The COBIE approach is to enter the data as it is created during design, construction, and commissioning, see Figure 1. Designers provide floor, space, and equipment layouts. Contractors provide make, model, and serial numbers of installed equipment. Much of the data provided by contractors comes directly from product manufacturers who can also participate in COBIE. *Please see* Project Delivery Teams *for more information.*

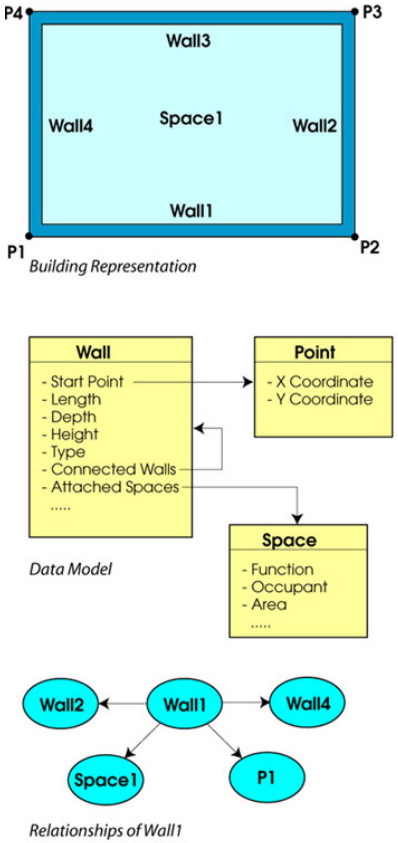
Fig. 1. COBIE Process Overview

the “I” in bim

Geometric descriptions are ‘meaningless’ outside very specific context

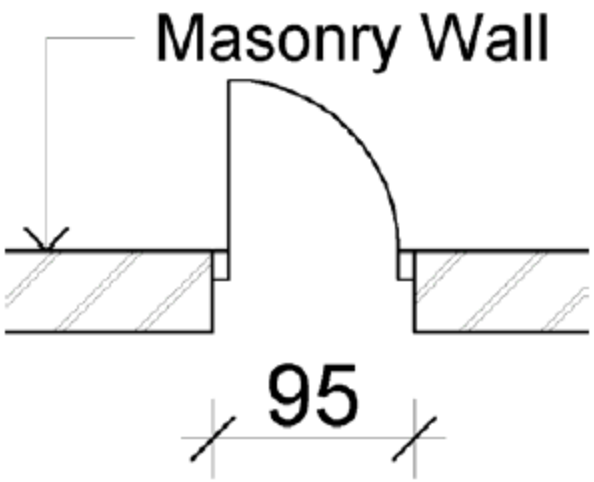
exchange of information about what the geometry creates provides cross-context meaning

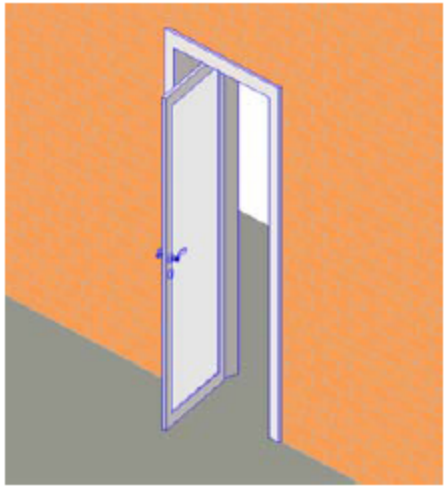


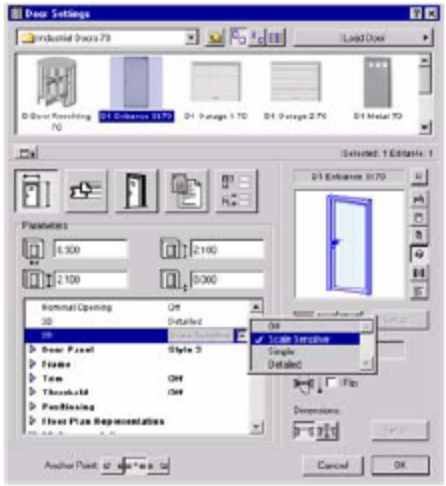


source: http://www.aecbytes.com/feature/2004/IFC-images/fig1.htmls

what are these diagrams about?







shared descriptions provide meaning & allow interoperability

source: ArchiCAD IFC Reference Guide, 2001

so let’s just all agree on a shared meaning…

- What kinds of ‘things’ are needed to define meaning?
- How do these resources combine to create meaning?
- How is meaning shared across different stakeholder perspectives?
- What unique kinds of information are needed?
- Who get’s to decide what’s shared and what’s unique?
- How and what information is shared when?
- Relatively minor issue of data format?

source: IFC Implementation Guide

what me worry?

when is a fan not a fan?

Ctrl	Dec	Hex	Char	Code	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
^@	0	00		NUL	32	20	sp	64	40	@	96	60	`
^A	1	01	☺	SOH	33	21	!	65	41	A	97	61	a
^B	2	02	☻	STX	34	22	"	66	42	B	98	62	b
^C	3	03	♥	ETX	35	23	#	67	43	C	99	63	c
^D	4	04	♦	EOT	36	24	$	68	44	D	100	64	d
^E	5	05	♣	ENQ	37	25	%	69	45	E	101	65	e
^F	6	06	♠	ACK	38	26	&	70	46	F	102	66	f
^G	7	07	•	BEL	39	27	'	71	47	G	103	67	g
^H	8	08	◘	BS	40	28	(	72	48	H	104	68	h
^I	9	09	○	HT	41	29	)	73	49	I	105	69	i
^J	10	0A	◙	LF	42	2A	*	74	4A	J	106	6A	j
^K	11	0B	♂	VT	43	2B	+	75	4B	K	107	6B	k
^L	12	0C	♀	FF	44	2C	,	76	4C	L	108	6C	l
^M	13	0D	♪	CR	45	2D	-	77	4D	M	109	6D	m
^N	14	0E	♫	SO	46	2E	.	78	4E	N	110	6E	n
^O	15	0F	☼	SI	47	2F	/	79	4F	O	111	6F	o
^P	16	10	►	SLE	48	30	0	80	50	P	112	70	p
^Q	17	11	◄	CS1	49	31	1	81	51	Q	113	71	q
^R	18	12	↕	DC2	50	32	2	82	52	R	114	72	r
^S	19	13	‼	DC3	51	33	3	83	53	S	115	73	s
^T	20	14	¶	DC4	52	34	4	84	54	T	116	74	t
^U	21	15	§	NAK	53	35	5	85	55	U	117	75	u
^V	22	16	▬	SYN	54	36	6	86	56	V	118	76	v
^W	23	17	↨	ETB	55	37	7	87	57	W	119	77	w
^X	24	18	↑	CAN	56	38	8	88	58	X	120	78	x
^Y	25	19	↓	EM	57	39	9	89	59	Y	121	79	y
^Z	26	1A	→	SUB	58	3A	:	90	5A	Z	122	7A	z
^[	27	1B	←	ESC	59	3B	;	91	5B	[	123	7B	{
^\	28	1C	∟	FS	60	3C	<	92	5C	\	124	7C	|
^]	29	1D	↔	GS	61	3D	=	93	5D	]	125	7D	}
^^	30	1E	▲	RS	62	3E	>	94	5E	^	126	7E	~
^_	31	1F	▼	US	63	3F	?	95	5F	_	127	7F	△†

industry foundation class

ISO 10303 “Standard Exchange of Product Data Models,” Part 21 is SPFF

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/* time_stamp */ '2003-12-27T11:57:53',
/* author */ ('Lothar Klein'),
/* organization */ ('LKSoft'),
/* preprocessor_version */ ' ',
/* originating_system */ 'IDA-STEP',
/* authorisation */ ' ');
FILE_SCHEMA (('AUTOMOTIVE_DESIGN { 1 0 10303 214 2 1 1}'));
ENDSEC;
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#14=PRODUCT_DEFINITION('0',$,#15,#11);
#15=PRODUCT_DEFINITION_FORMATION('1',$,#16);
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ENDSEC;
END-ISO-10303-21;
```

iai-tech.org

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buildingSMART

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Welcome

This website is the source of all information about the technical specifications issued by buildingSMART International (formerly International Alliance for Interoperability, IAI). The website is managed by the Model Support Group, MSG established by buildingSMART to develop and maintain the technical specifications with the Industry Foundation Classes IFC being the main standard deliverable. The IFC specifications and related materials are copyrighted by buildingSMART.

Short introduction to the website

The site is intended to be a source of information for the technical specifications of buildingSMART and particularly the IFC specification. This includes

- the buildingSMART interoperability specifications
  - the IFC release specifications
  - the ifcXML release specifications
  - the Property Set definitions
  - the IFC View definitions
- accompanying documentations
  - development schedule and development news
  - frequently asked questions
- services and guidelines
  - implementation guidelines, supporting tools and information
  - implementation examples and source code

Short introduction to MSG

The www.iai-tech.org site is managed by the Model Support Group MSG within buildingSMART international. The MSG is established as a technical group and is responsible for the IFC development. It provides services for

- IFC extension integration (developing new releases of IFC
- IFC specification documentation (editorial work for the IFC release)
- IFC maintenance (continuous improvement of the specification and running the issue database)
- IFC property set content development and publishing the property set XML definitions
- IFC implementation support (supporting the Implementer Support Group and certification process)
- ifcXML development (converting the IFC specification into XSD)

News

FAQ published
Sep 15, 2008

XML Property Set Schema published
Sep 15, 2008

"Hello Wall" IFC tutorial
Aug 25, 2008

IFC2x4 alpha available
Jun 20, 2008

IFC2x3 TC1 available
Jul 11, 2007

More news...

Upcoming Events

MSG 2009 Feb Meeting
Delft, Netherlands (TNO Bouw),
Feb 26, 2009

Previous events...

Upcoming events...

« December 2008 »

Mo Tu We Th Fr Sa Su

buildersnet.org/IFC-BIM

vBulletin

IFC-BIM Exchange Support Forum

Welcome, BillEast.
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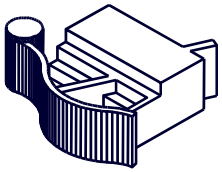
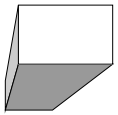
Forum	Last Post	Threads	Posts
Frequently Asked Questions !Forum description			
About this Forum Who can join? How much does it cost?	Where Do I Post a Question? by Bill East 03-29-2007 10:36 AM	4	4
Getting Started with IFC Background information, test files, and compatible software.	ArchiCAD to EnergyPlus... by AnaRuiOliveira 11-06-2008 09:03 AM	12	39
IFC-BIM Exchange Questions !Forum description			
Architectural/Structural Models	Archicad 12 - IFC not... by PaulinaWilkowska 11-26-2008 07:34 AM	23	62
MEP Models	MEP Classification by BillEast 08-26-2008 09:49 AM	3	7
Construction Models	Phased Construction Models? by PatrickSuermann 12-18-2007 09:48 AM	1	1
Facility Management Models	Making Contact for FM by BillEast 08-26-2008 09:52 AM	3	8
Cost Models	Possible AACE Project by BillEast 09-26-2008 09:36 AM	1	2

scope

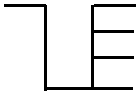
Shape (explicit)



Shape (extrusions)
beams, pipes, ducts, walls etc.

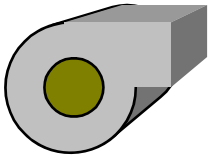


Shape (topology)
line representations for pipe, duct, etc.

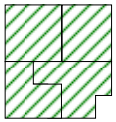


Building Elements
wall, door, window, roof, stairs, etc.

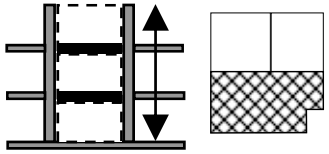
HVAC Equipment
chillers, fans, pumps, boilers, coils, cooling towers, heaters, heat exchangers, etc..



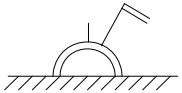
Spaces, Space Structure
space, storey, part, building, site



Zones, Compartments
fire, workstation, rising ducts, shafts

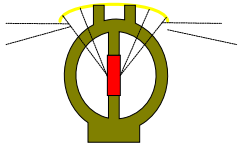


Electrical Elements
transformers, motors, generators, switches, protective devices, power and communication outlets panels, cubicles

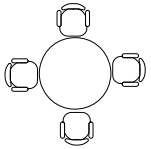


Sanitary Elements
WC's, urinals, baths, bidets, traps gulleys

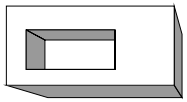
Fire Protection Elements
sprinklers, hose reels, hydrants, wet/dry rising mains



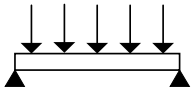
Furniture
inc. system furniture



Relations Between Elements
holes, chases, voids, zones



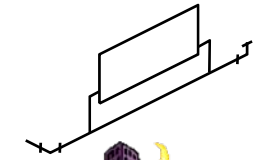
Structural analysis:
structural members, boundary conditions, connections, supports, loads, etc.



Structural Elements
members, profiles, rebars, properties, joints, features, surface

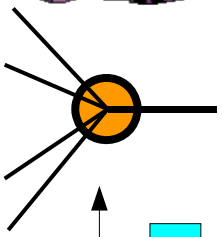
scope

Systems
piping, ducting, cable, structural

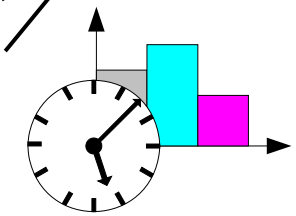


Lighting
fittings, rendering, photo-accurate lighting

Manholes
manholes, inspection chambers, access chambers, meter chambers, valve chambers



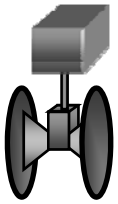
Time Series
time related events



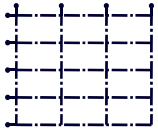
Constraints
rules, specifications, requirements trigger conditions

Environmental Impact
embodied energy, CO_2

Controls, Instruments
sensor, actuator, controller, gauge, meter

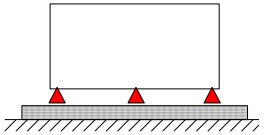


Grids

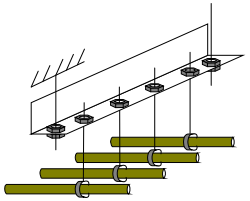


Draughting

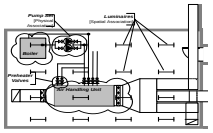
Holes and Bases
holes, sleeves, packing, framing, upstands, vibration isolation



Accessories
brackets, drop rods, steel sections, bracket assemblies, screws, bolts etc.



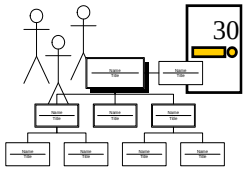
Asset Management
maintenance history, inventories



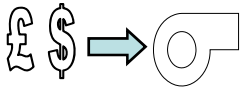
Help
request, action, permit, warranty, operation

scope

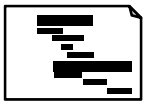
Actors
people, organizations, addresses



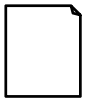
Costing
cost planning, estimates, budgets, whole life



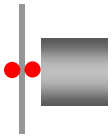
Work Plans and Schedules
inc. nested schedules, resource allocation



Orders
work orders, change orders, purchase orders

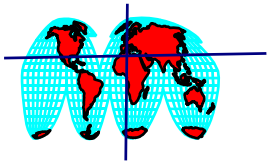


Connectivity
services, structure, building



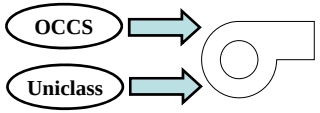
Geographical Elements
features, contours, regions

Coordinate Mapping
geodetic, cartesian

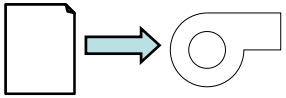


External Data

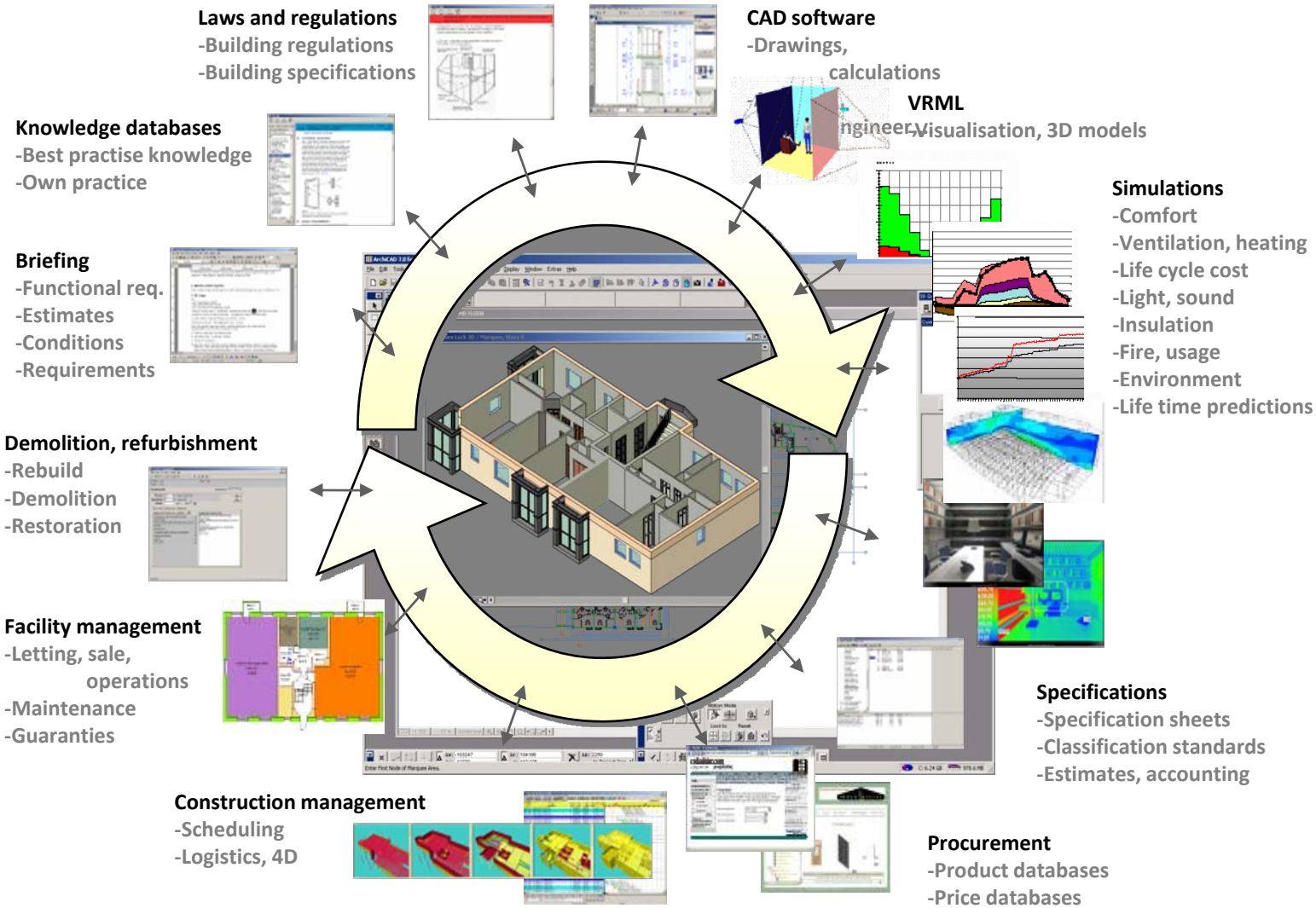
Classification



Associated Documents

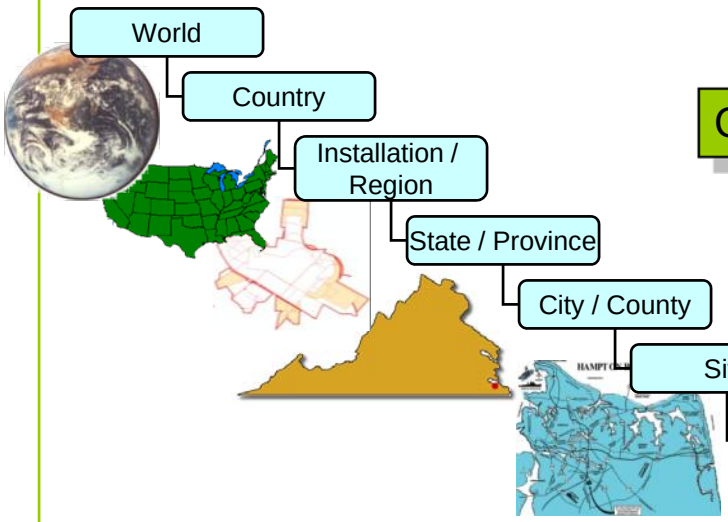


life-cycle

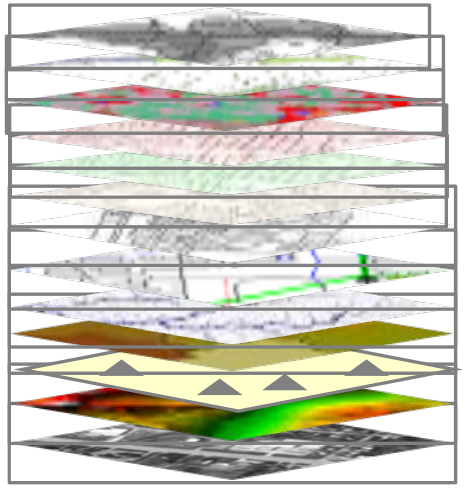


(Lars Bjørkhaug, Norwegian Building Research Institute)

scale

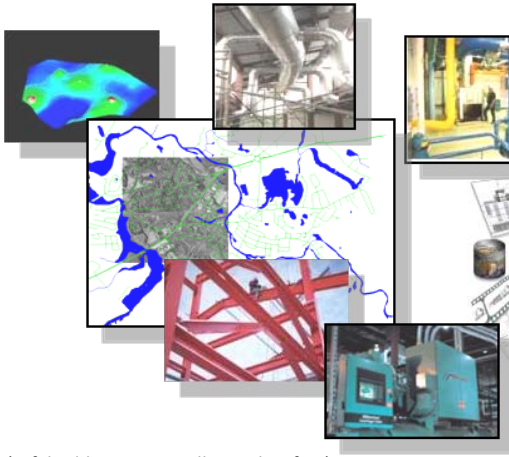


Geospatial Information



Facility

- Floor
  - Space
- System*
  - Types
    - Components



Building information Models

* structural systems
HVAC systems
utility systems

(ref: buildingSMART Alliance briefing)

what were we deciding about again?

- What kinds of ‘things’ are needed to define meaning?
- How do these resources combine to create meaning?
- How is meaning shared across different stakeholder perspectives?
- What unique kinds of information are needed?
- Who get’s to decide what’s shared and what’s unique?
- How and what information is shared when?
- Relatively minor issue of data format?

source: IFC Implementation Guide

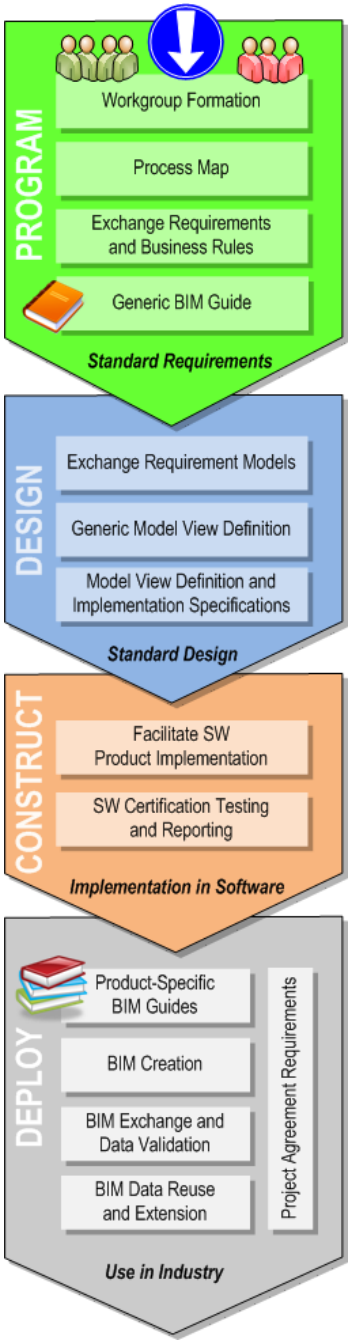
POP QUIZ…

can IFC solve all your problems?

what is really required to solve the problems?

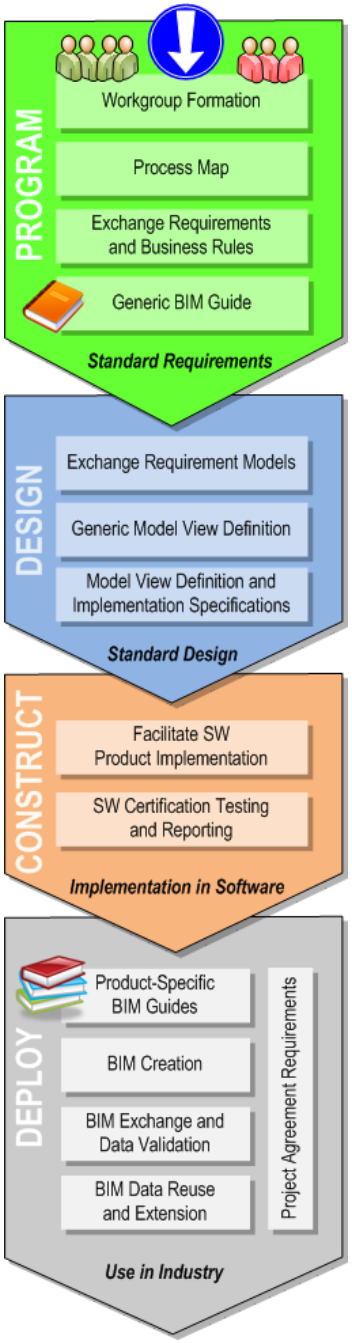
will these problems get solved by themselves?

what are you doing to help solve these problems?



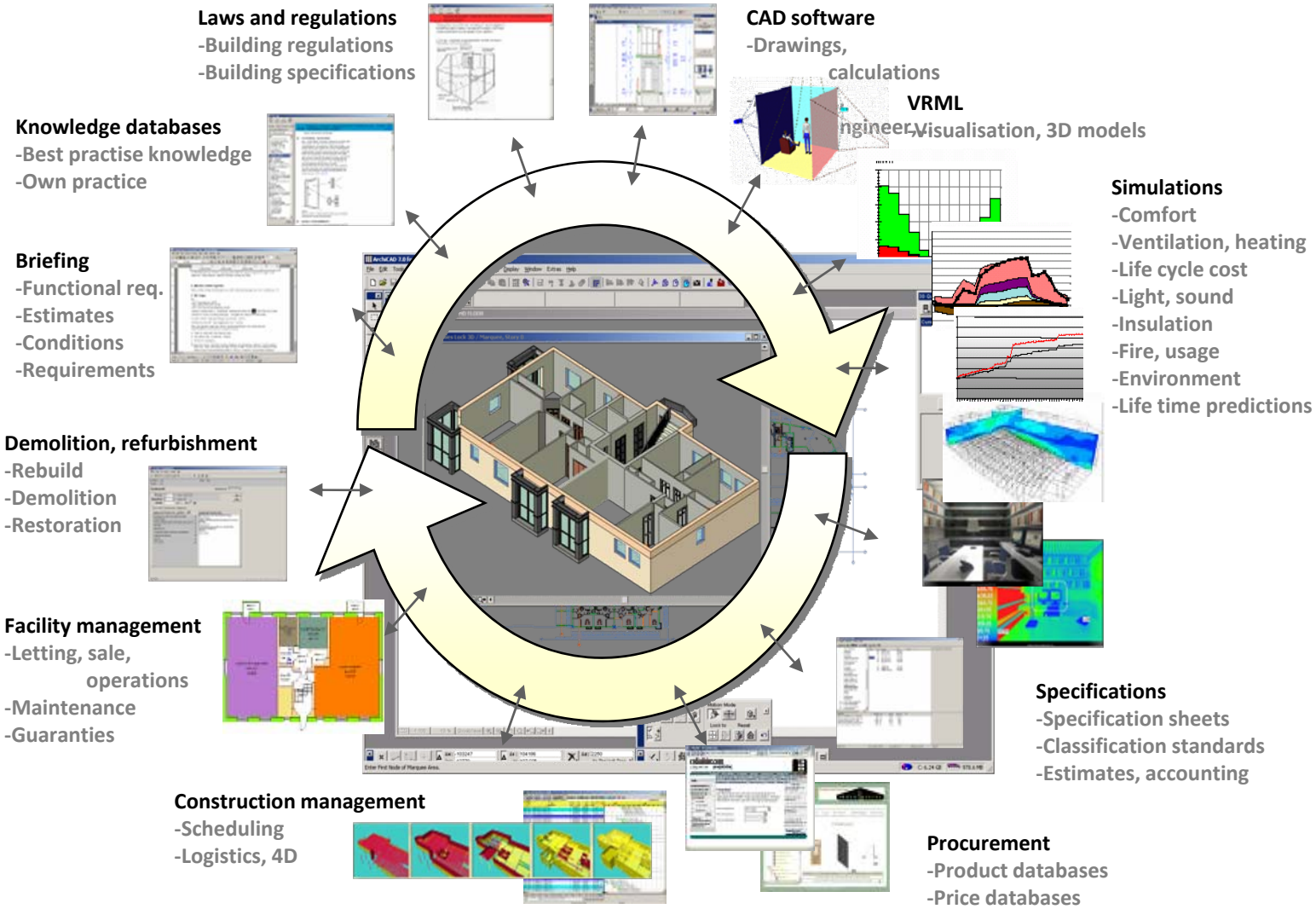
IFC = least common denominator

helps put the “I” in BIM by moving question from format to content and context

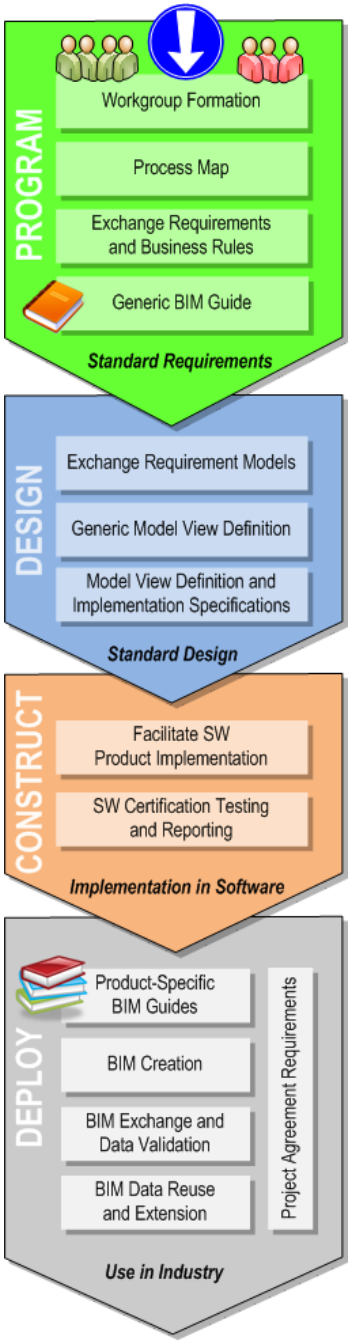


1. programming

what problem is being solved?



(Lars Bjørkhaug, Norwegian Building Research Institute)



1.1 workgroup formation

who is mad enough to do something?

Permafile
HEAVY DUTY STORAGE BOX
02225
TECH MANUALS

so what?

78,029 Paved Miles
(3 times around earth)

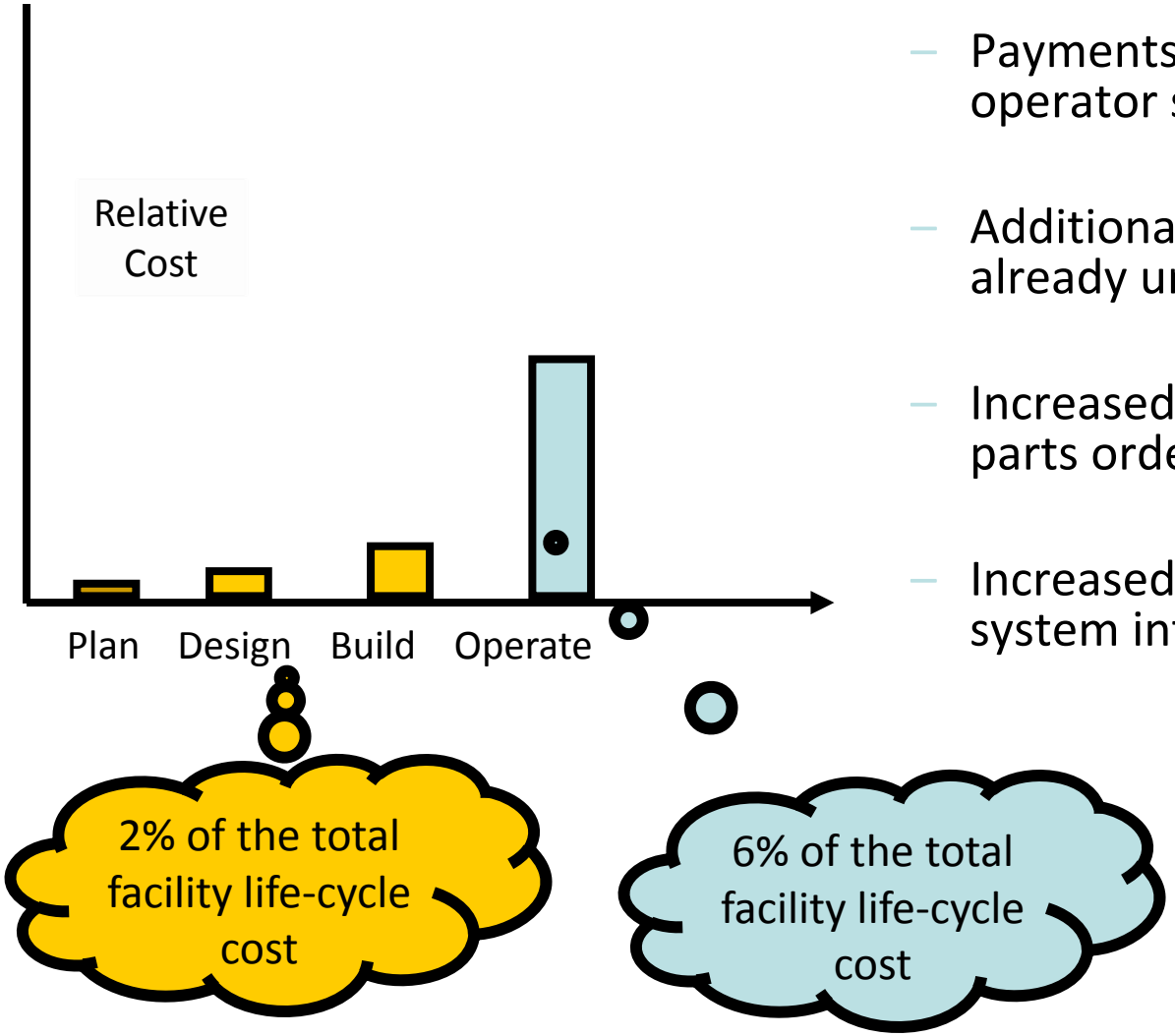
12.1 Million Acres
(NJ, Conn, Delaware, RI)

1.1 Billion Square Feet
(40 Sq. Miles Under One Roof)

Over 400 Boiler
Plants

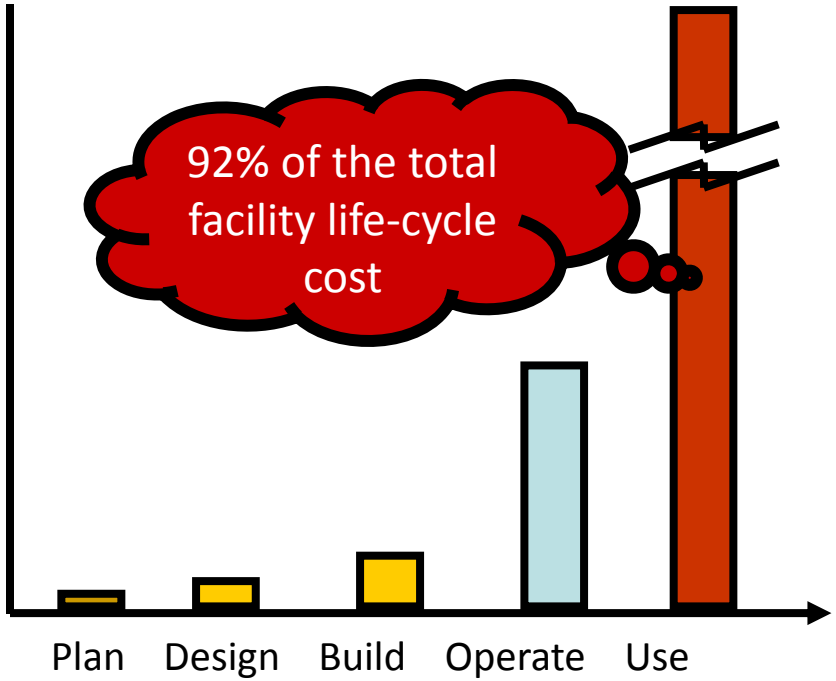
Replacement Value: $168.5 Billion
Over 150 Large Installations Worldwide
Approximately 40% of DoD

o&m costs



- Payments for supplemental operator survey
- Additional payments for items already under warranty
- Increased costs of replacement parts ordering
- Increased down time due to missing system information

cost of use



- Inappropriate utilization resulting in decreased performance or unneeded new construction
- Space underutilization resulting in over-building or higher energy costs
- Inability to optimize alternative facility use
- Inability to simulate contingency operations
- Inappropriate allocation of facility as overhead cost vs. means of production
- Lost worker productivity due to inefficient building operations

prior efforts

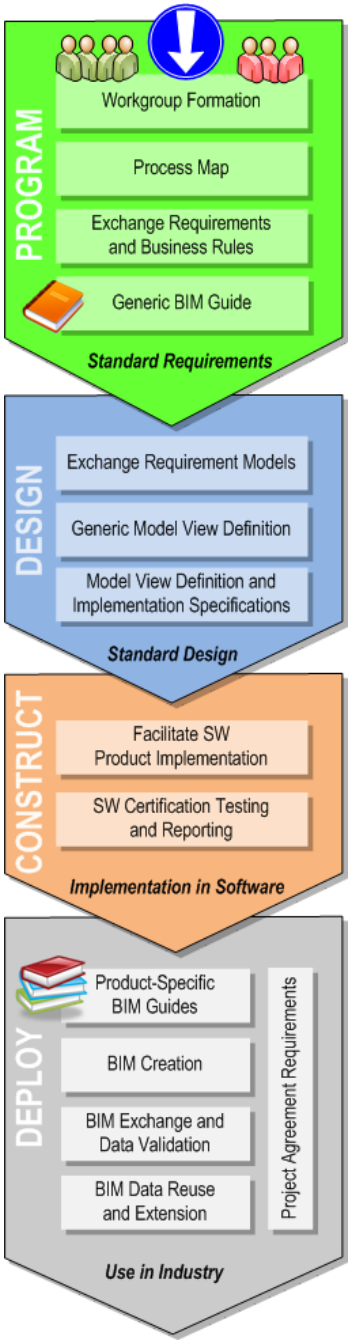
- **Operations & Maintenance System Information (OMSI) Specification**
  e-paper submission of O&M documents
- **U.S. Army, Department of Public Works, Fort Lewis, WA**
  Pockets of local, proprietary information exchange & expertise
- **Electronic construction submittal register**
  Construction Criteria Base, federal UFGS and UFC's. SpecsIntact software.

- **International Alliance for Interoperability (IAI)**
  FM Project has been proposed using Industry Foundation Classes (IFC)
- **FIATECH Automated Equipment information eXchange (AEX)**
  Exchange of supply chains information among tiered stakeholders

- **Machinery Information Management Open Systems Alliance (MIMOSA)**
  Exchange standard for equipment telemetry
- **Open Standards Consortium for Real Estate (OSCRE)**
  Asset management and valuation exchange
- **National Institute of Science and Technology (NIST)**
  Capital Facilities "Handover" Guide (Jan 2006) General Building Guide (2007)

who was mad enough to do something?

project invitation sent 01-Nov-2005

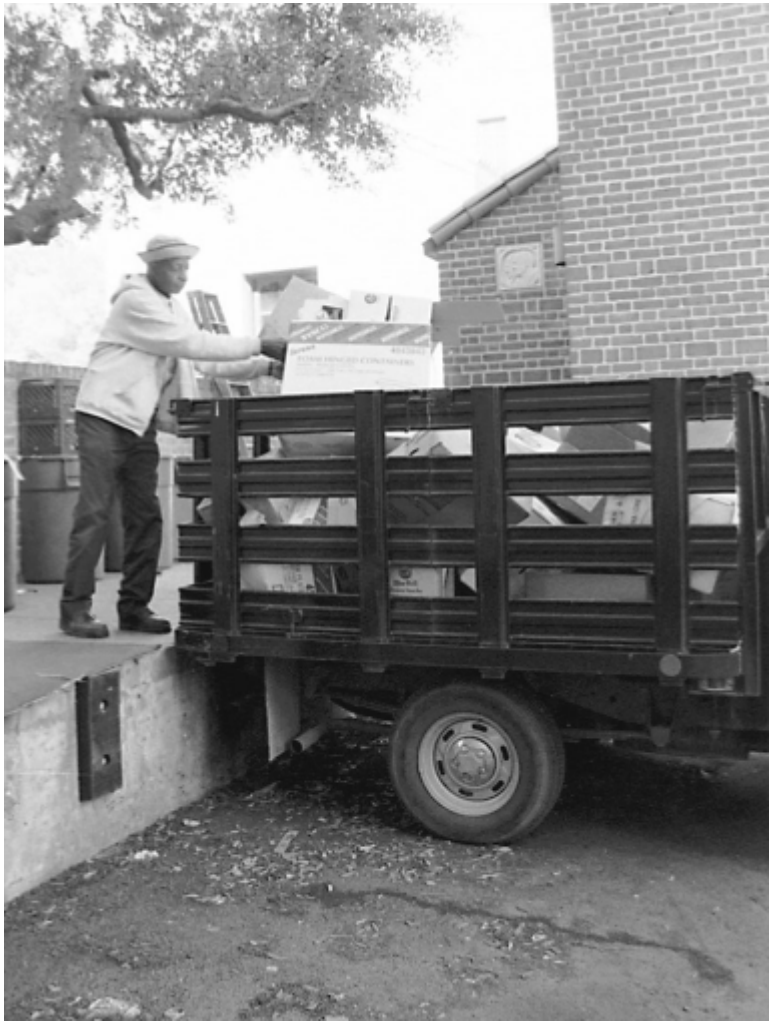


1.2 process map

who does what now?

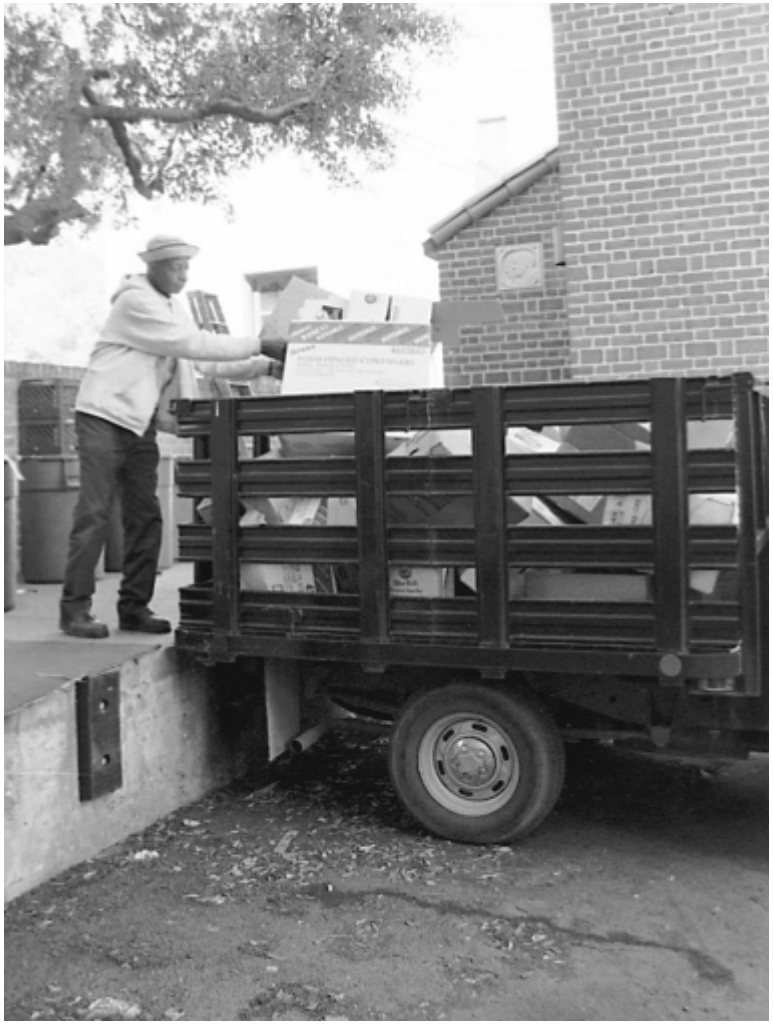
how does handover happen now?

- receives boxes full of paper
- questionable data accuracy
- owners pays two or three times
- full-time transcribers needed



when does handover happen now?

- data created upstream
- different parties create different sets of data
- manufacturers provide catalog cut sheets
- designers provide shop drawings for engineered components
- approval processes
- commissioning activities provide additional information

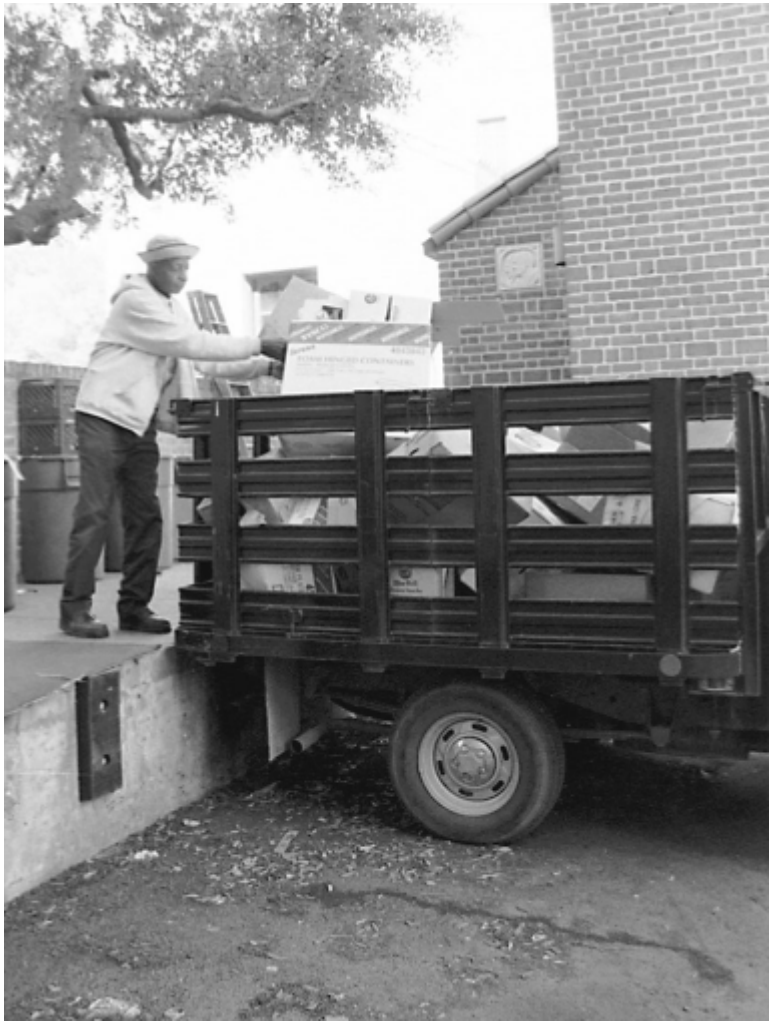


clear definitions required…

who does what to whom,

when do they do it, and

how do they do it?



business process modeling notation

Date: January 2008

Business Process Modeling Notation, V1.1

OMG Available Specification

OMG Document Number: formal/2008-01-17
Standard document URL: http://www.omg.org/spec/B

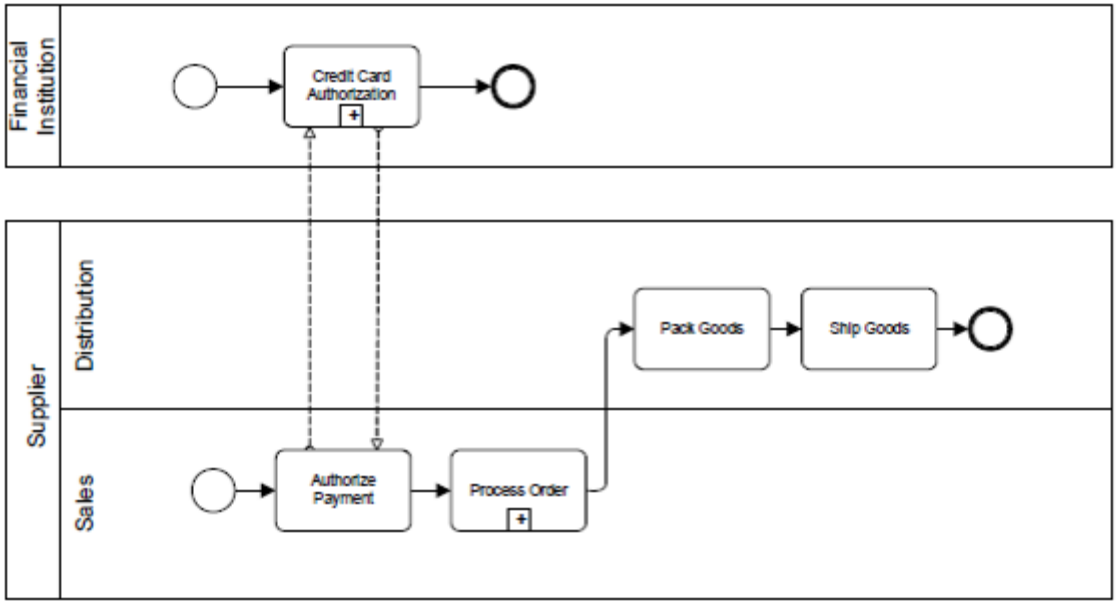


Figure 9.34 - Message Flow connecting to Flow Objects within two Pools

workflow management coalition – bpmn - xpdl

what did we discover?

maintenance

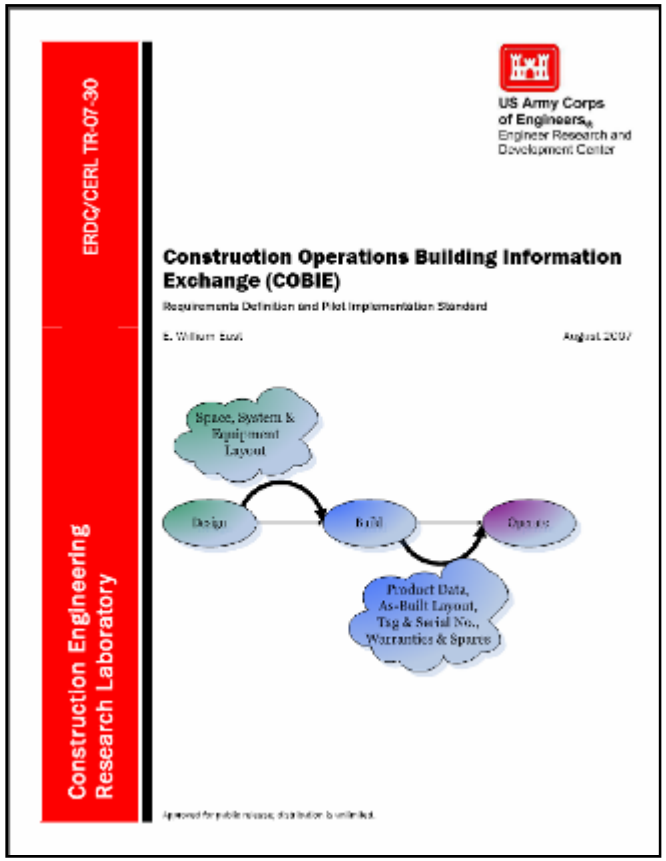
- warranties
- spare/replacement parts
- pm tasks
- resources

operations

- start-up/shut-down procedure
- trouble shooting procedures

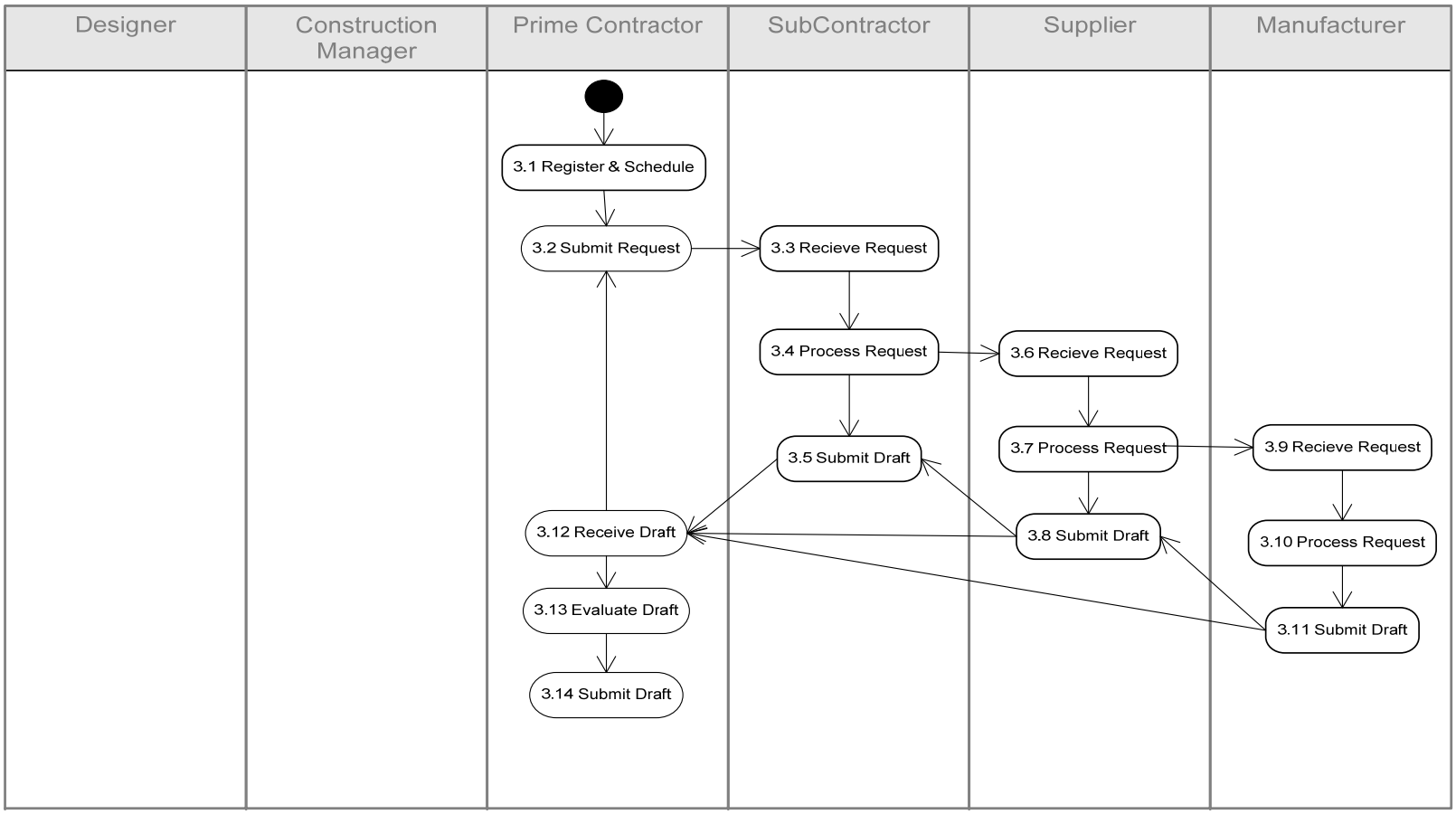
assets

- space measurement
- fixed or movable property
- space-function capabilities

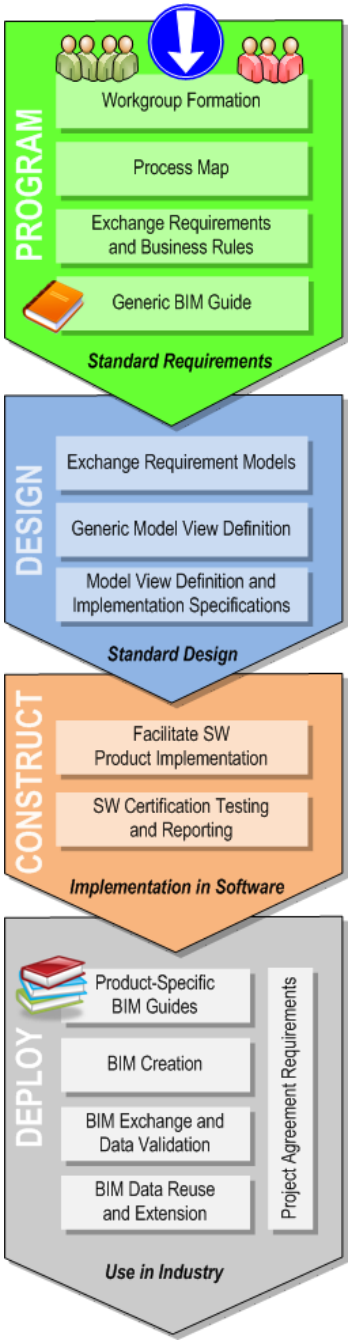


August 2007

mapping information exchange processes



COMPANY	BUSINESS PROCESS	
US Army Corps of Engineers	Provide Submittal	
	APPROVAL STATUS: Draft	DRAWING DATE: 3/10/2006
PREPARED BY: BILL EAST	FILENAME: VISIODOCUMENT	PAGE: 1 OF 1



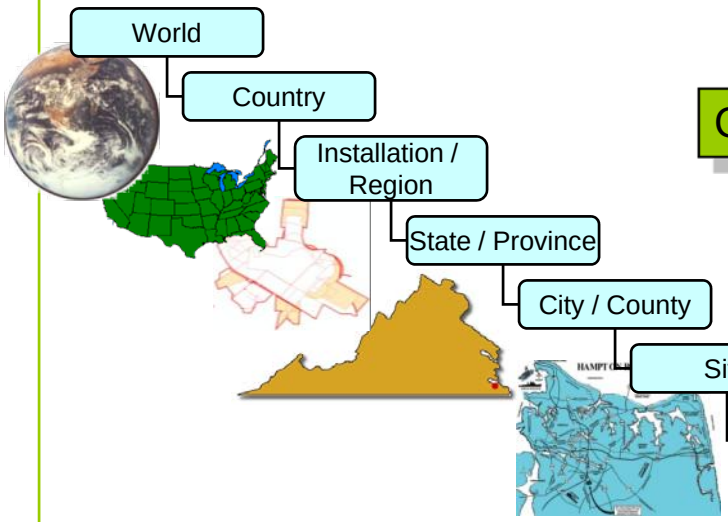
1.3 exchange requirements

what information is exchanged?

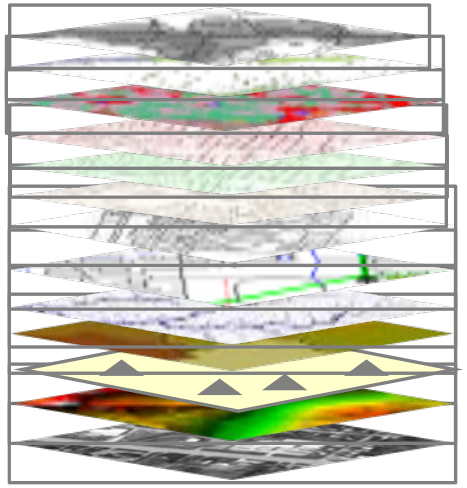
designers’ data

Facility	Identification of facilities referenced in a file
Floor	Description of vertical levels
Space	Spaces referenced in a project
System	Systems referenced in a project
Register	Material/equipment/etc. catalog (submittal register)
Component	Individually named materials and equipment

link to portfolio via. owner's facility id

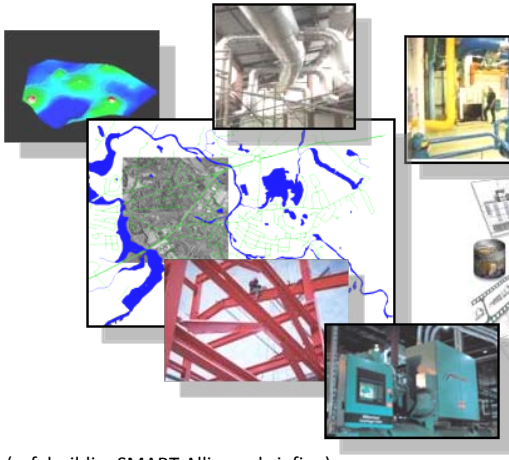


Geospatial Information



Facility

- Floor
  - Space
- System*
  - Types
    - Components



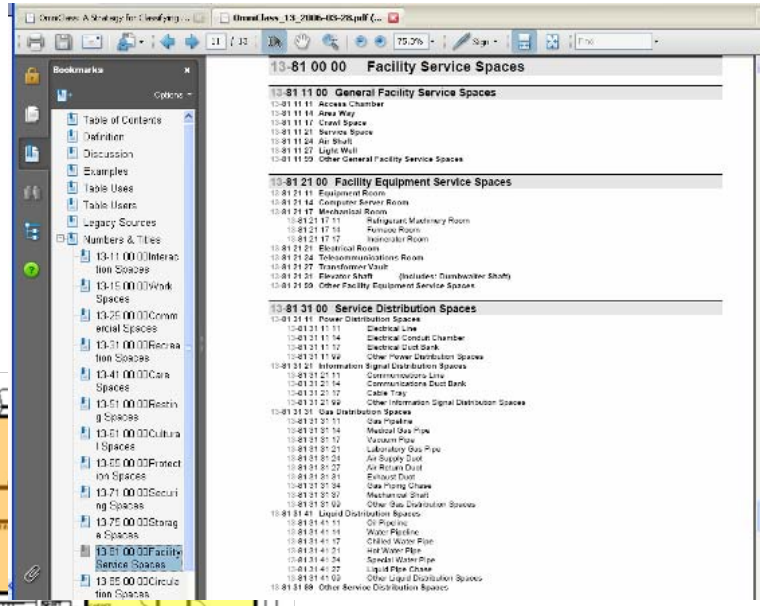
Building information Models

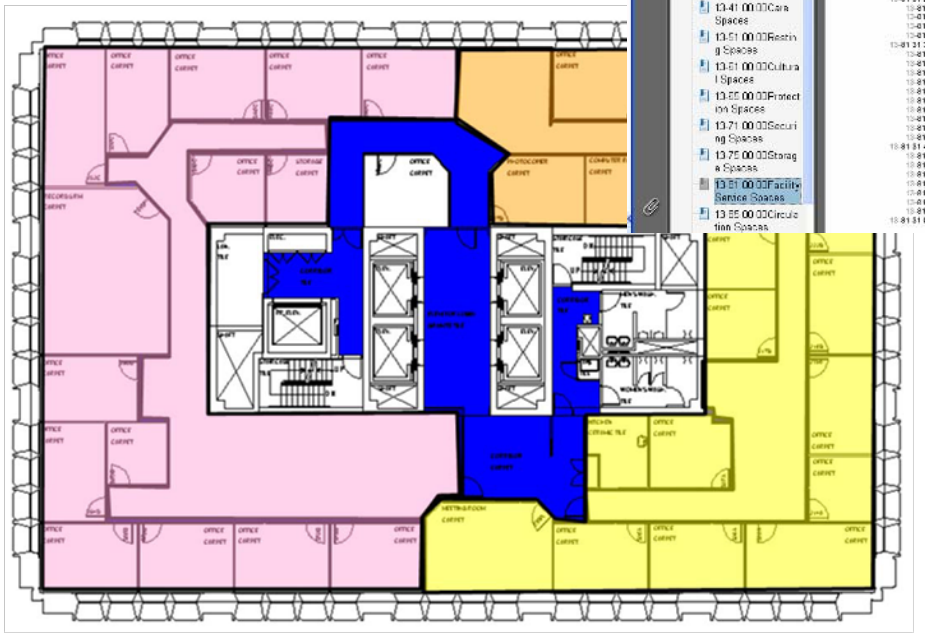
* structural systems
HVAC systems
utility systems

(ref: buildingSMART Alliance briefing)

space capabilities

OmniClass Table 13 “Spaces by Function”





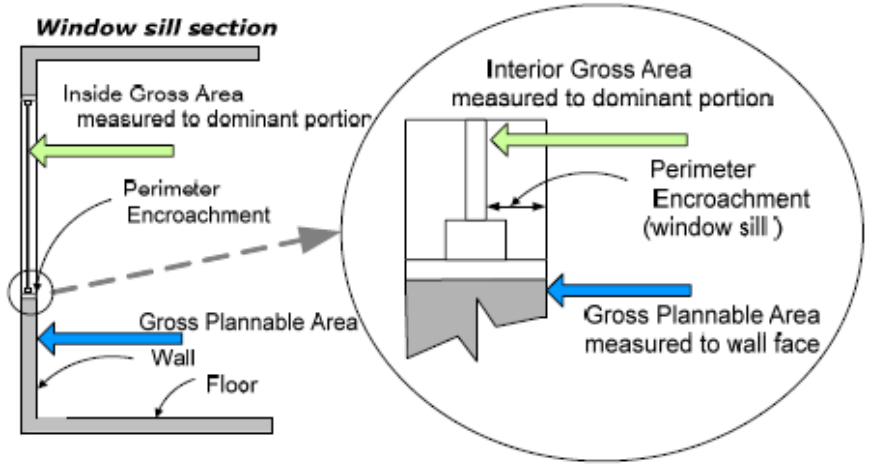
(ref: Re[prt tp ASTM Subcommittee E-6.25, by Subcommittee E06.25 Whole Buildings and Facilities, used by permission of Gerald Davis, Chair)

space measurement

IFMA and BOMA requirements for spatial measurement have been harmonized as represented in: ASTM E 1836-01 Standard Practice for Building Floor Area Measurements for Facility Management and ANSI standard being updated

Point of Contact: davis-gerald@icf-cebe.com

Interior Gross Area



Comprehensive measurement rules

Key to Measurement Rules for Facility Management

D1 = Defined boundary - Dominant Portion
D2 = Defined Boundary - Perimeter Encroachment and Plannable Gross Area
C = Measure area to the centre line of its enclosing walls
W = Measure area and include its enclosing walls
F = Measure area to the face of the finished surface of the adjacent area
OPT = Optional (Measurements needed for the ANSI BOMA Standard Z65.1)
N/A = Not applicable

			Interior Gross Area											
					Plannable Gross Area									
									Plannable Area					
			Dominant Portion	Perimeter Encroachment	Major Vertical Penetration	Void Area	Service Area	Primary Circulation	Restricted Area	Interior Encroachment	Occupant Void Area	Assignable Area	Unassignable Area	Secondary Circulation
Interior Gross Area		Dominant Portion	OPT	OPT	D1	D1	D1	D1	D1	N/A	D1	D1	D1	D1
Interior Gross Area		Perimeter Encroachment	OPT	OPT	D1	D1	D1	D1	D2	D2	D2	D2	D2	D2
Interior Gross Area	Plannable Gross Area	Major Vertical Penetration	D1	D1	C	W	W	W	W	W	W	W	W	W
Interior Gross Area	Plannable Gross Area	Void Area	D1	D1	F	C	W	W	W	W	W	W	W	W
Interior Gross Area	Plannable Gross Area	Service Area	D1	D1	F	F	C	W	W	W	W	W	W	W
Interior Gross Area	Plannable Gross Area	Primary Circulation	D1	D1	F	F	F	C	W	W	W	W	W	W
Interior Gross Area	Plannable Gross Area	Plannable Area: Restricted Area	D1	D2	F	F	F	F	C	W	W	W	W	W
Interior Gross Area	Plannable Gross Area	Plannable Area: Interior Encroachment	N/A	D2	F	F	F	F	F	C	W	W	W	W
Interior Gross Area	Plannable Gross Area	Plannable Area: Occupant Void Area	D1	D2	F	F	F	F	F	F	C	W	W	W
Interior Gross Area	Plannable Gross Area	Plannable Area: Assignable Area	D1	D2	F	F	F	F	F	F	F	C	W	W
Interior Gross Area	Plannable Gross Area	Plannable Area: Unassignable Area	D1	D2	F	F	F	F	F	F	F	F	C	W
Interior Gross Area	Plannable Gross Area	Plannable Area: Secondary Circulation	D1	D2	F	F	F	F	F	F	F	F	F	C

(ref: Re[prt tp ASTM Subcommittee E-6.25, by Subcommittee E06.25 Whole Buildings and Facilities, used by permission of Gerald Davis, Chair)

builders’ data

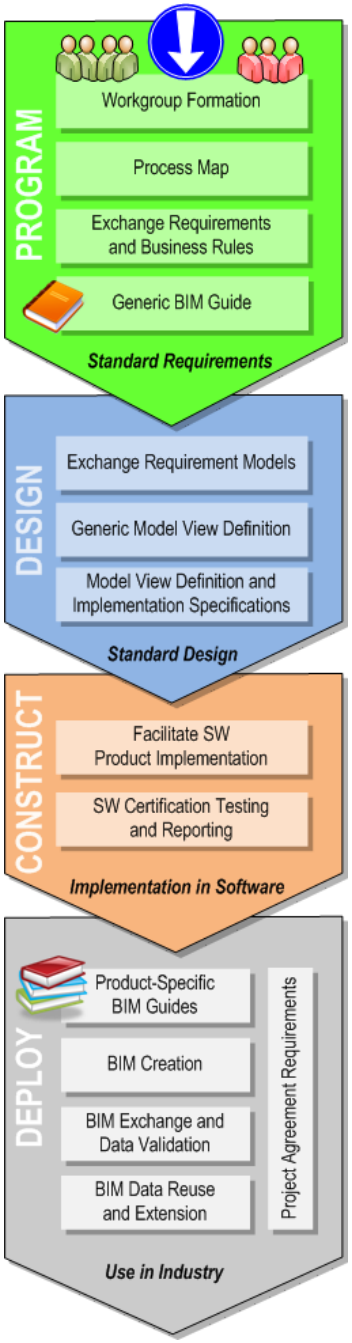
Installation	Location and serial no. of installed components
Manual	Instruction manuals for sets of/or components
Warranty	Warranty information for sets of/or components
Spare	Spare/parts reordering info for sets of/or components

Instruction	Installation/operating instructions
Test	System/component test results
Certification	Installation certifications

commissioning agents' data

PM	Identifies specific PM tasks and frequency
Safety	Identifies required safety tasks
Trouble	Maintenance trouble shooting procedures
Start-Up	Start-up procedures
Shut-Down	Shut-down procedures
Emergency	Emergency operating procedures

Material	Special materials needed for a given Job Plan Task
Tool	Special tools needed for a given Job Plan Task
Training	Special training needed for a given Job Plan Task



1.4 generic "bim" guide

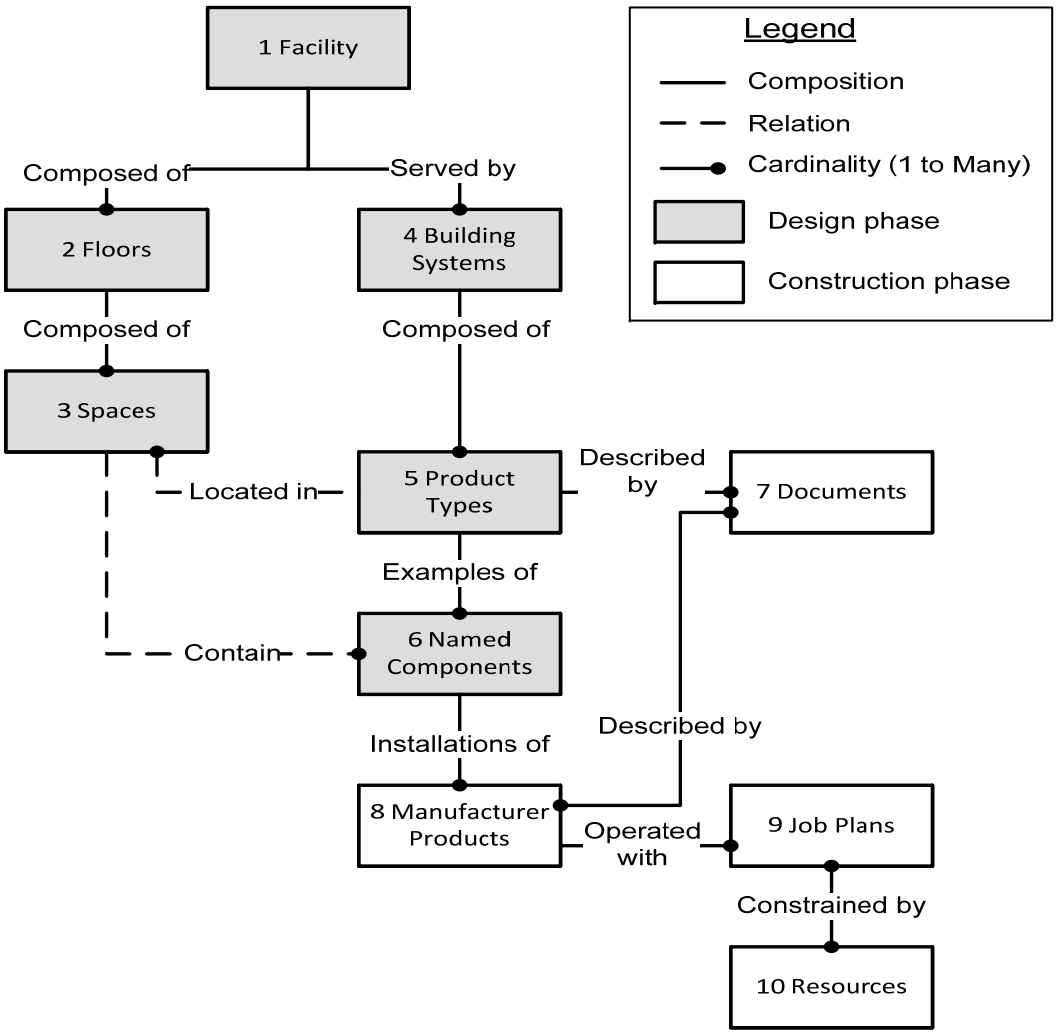
how is that information organized?

how is this information organized?

Requirements for information exchange directly match IFC model.

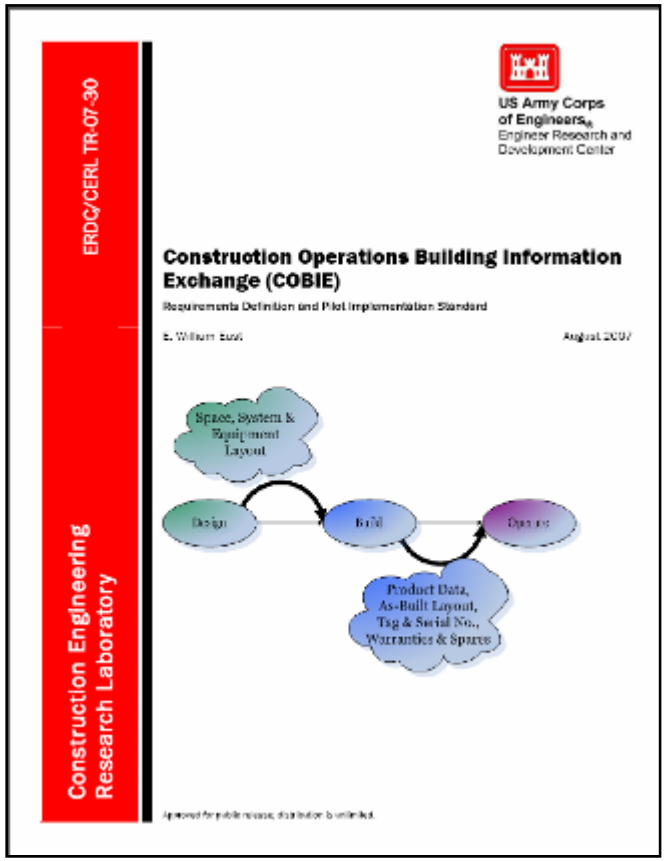
difficulties?

- specification for information delivery
- insuring consistent nomenclature across domains
- implementation of cobie model view definition in commercial software



how should the information be exchanged?

- different software types provide/ use different sets/subsets
- ultimately need “file > save-as cobie” and “file > import cobie” wherever needed but…
- spreadsheet provides common-ground until software companies in each sector provide routines
  - widely useful by all
  - IFC / spreadsheet translation rules provided free of charge
  - can be created by hand, CADD, BIM, and other software
  - extend value of BIM ideas to widest possible stakeholders



August 2007

draft cobie specification

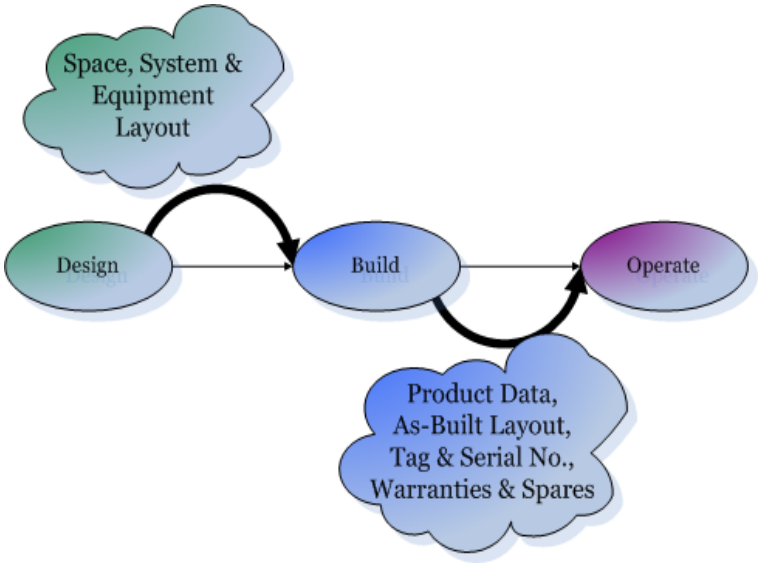
specifications must follow existing facility delivery process

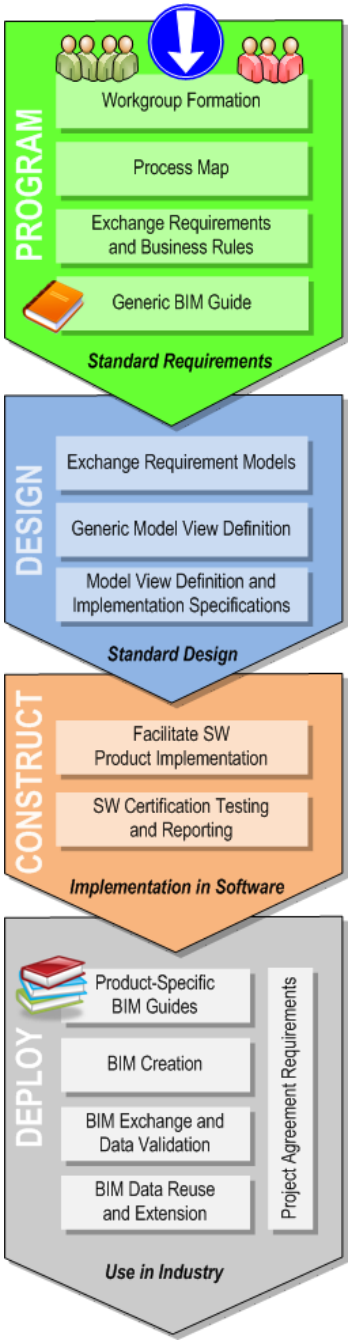
performance-based specifications should allow any team to create the needed data

specifications must reflect real cost to owners of failure to receive this data

designer submits “pre-built” cobie information

builder submits “as-built” cobie information





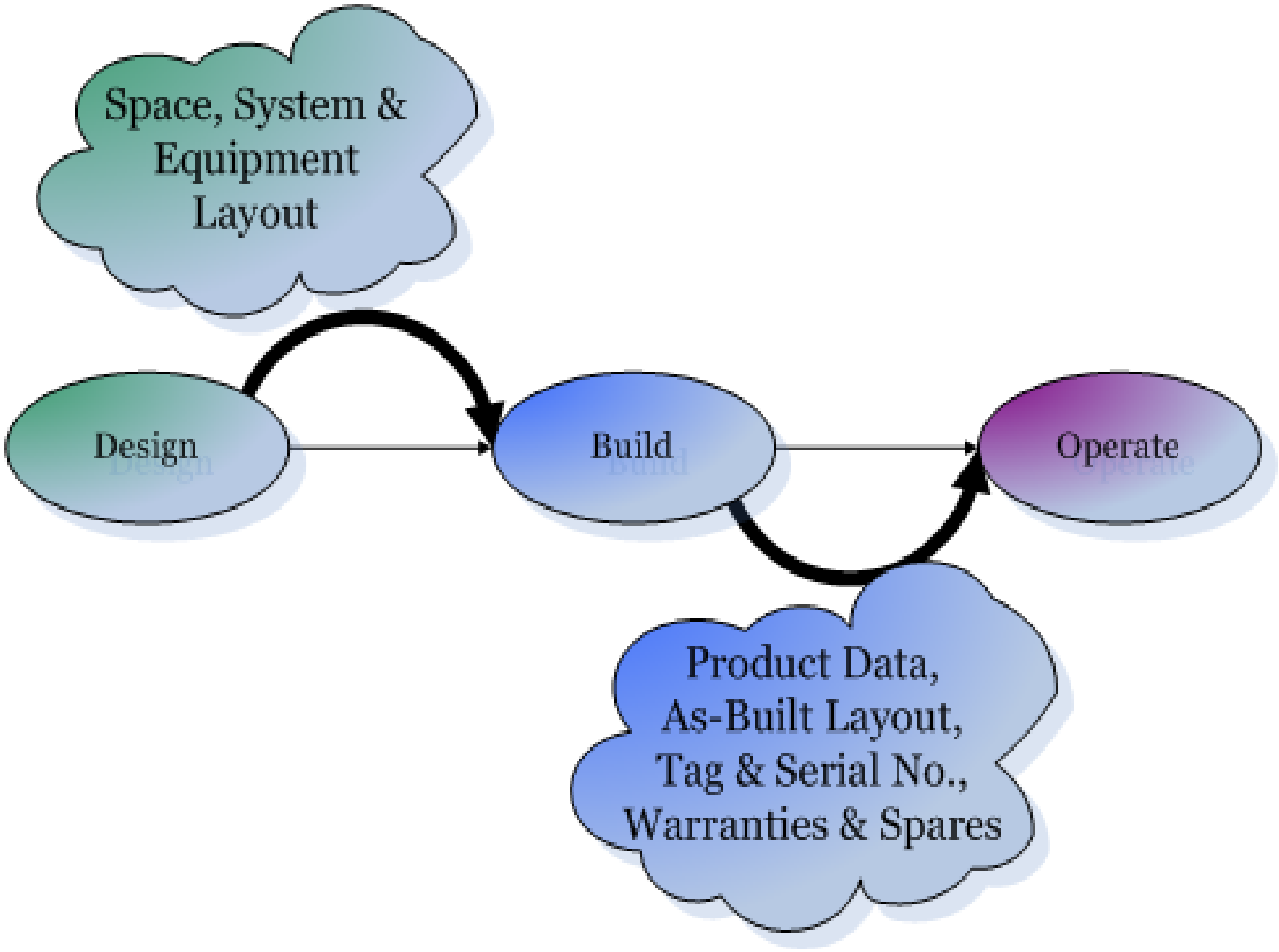
1. programming

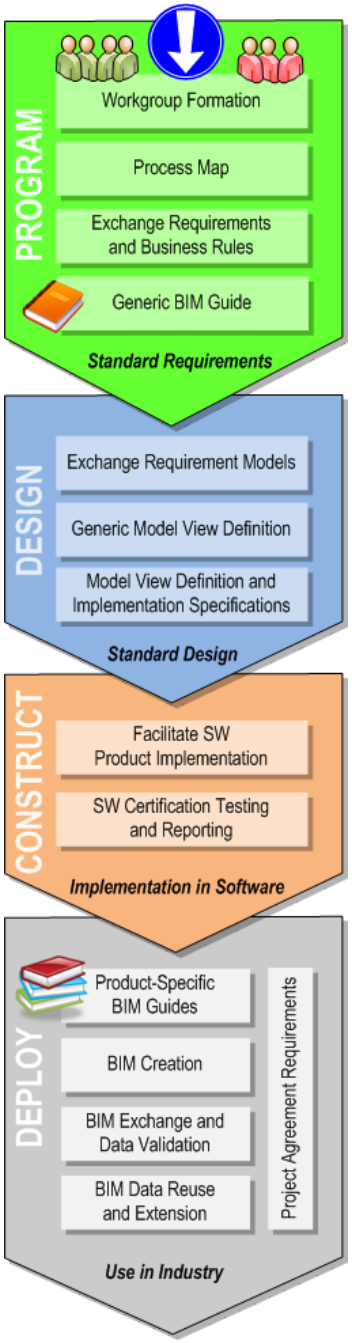
what problem is being solved?

&

how can we solve it?

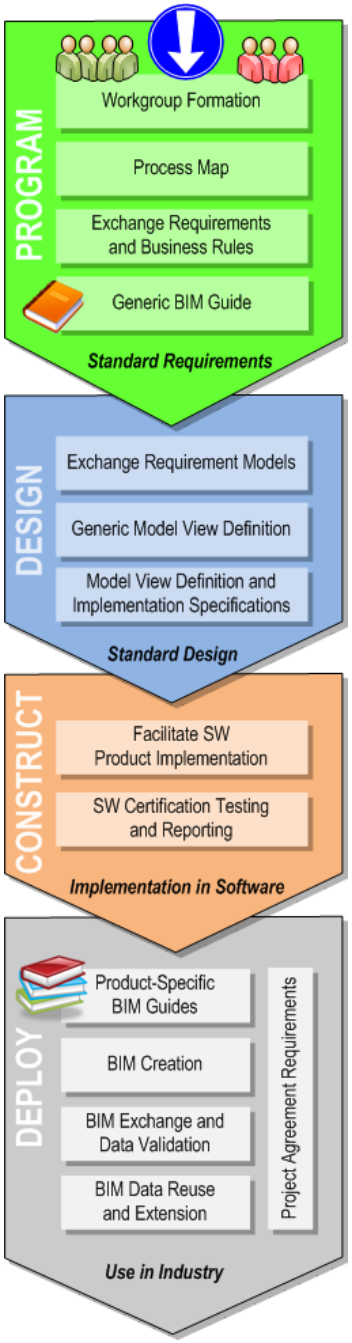
Permafile
Heavy Duty Storage Box
02225
TECH MANUALS


Space, System & Equipment Layout
Design
Build
Operate
Product Data, As-Built Layout, Tag & Serial No., Warranties & Spares



2. design

how will we solve this problem?



2.1 exchange requirement models

identify exactly what is required when

idm.buildingsmart.no

Name	Exchange COBIE Design
Identifier	xxx

Change Log		
2008-02-12	Recreated from fp_exchange_building_model(basic)	nn@aec3.com

Project Stage			
	0	Portfolio requirements	
	1	Conception of need	
	2	Outline feasibility	
	3	Substantive feasibility	
	4	Outline conceptual design	✓
	5	Full conceptual design	✓
	6	Coordinated design and procurement	✓
	7	Production information	✓
	8	Construction	
	9	Operation and maintenance	✓
	10	Disposal	

Overview

A basic building model is defined as "the set of information that provides both a graphical representation of the design of a building and key pieces of information about the build-
analyse building performance" (see
spac_main/files/4525079_BIM_A_Key_to_Performance-

asic building model is to provide information about a
am analyses (including handover and operation to be un-
odel provides information about the building, the layout of
uilding elements of which it is constructed.

equired with the basic building model to support COBIE

identification purposes) and the units generally used
ditionally, the current phase of the project may be given

hich a building is located including the geographical loca-
d elevation above sea level for the site datum) and shape

a site may be provided including land title number and

Dashboard

Welcome to Confluence

Confluence is the enterprise wiki designed to make it easy for you and your team to share information with each other, and with the world.

Where do I start?

All content in Confluence is organised into *spaces*. So to start browsing content, simply click on one of the spaces listed below.

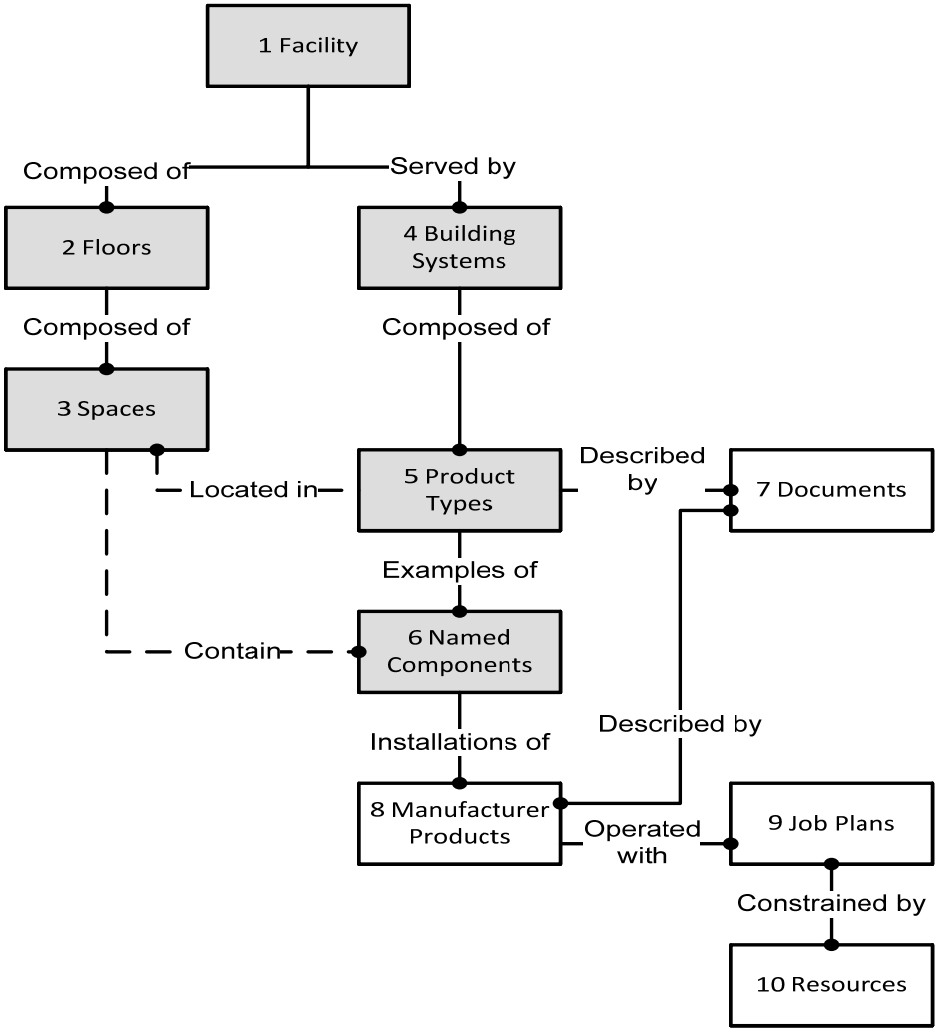
Spaces: **All**

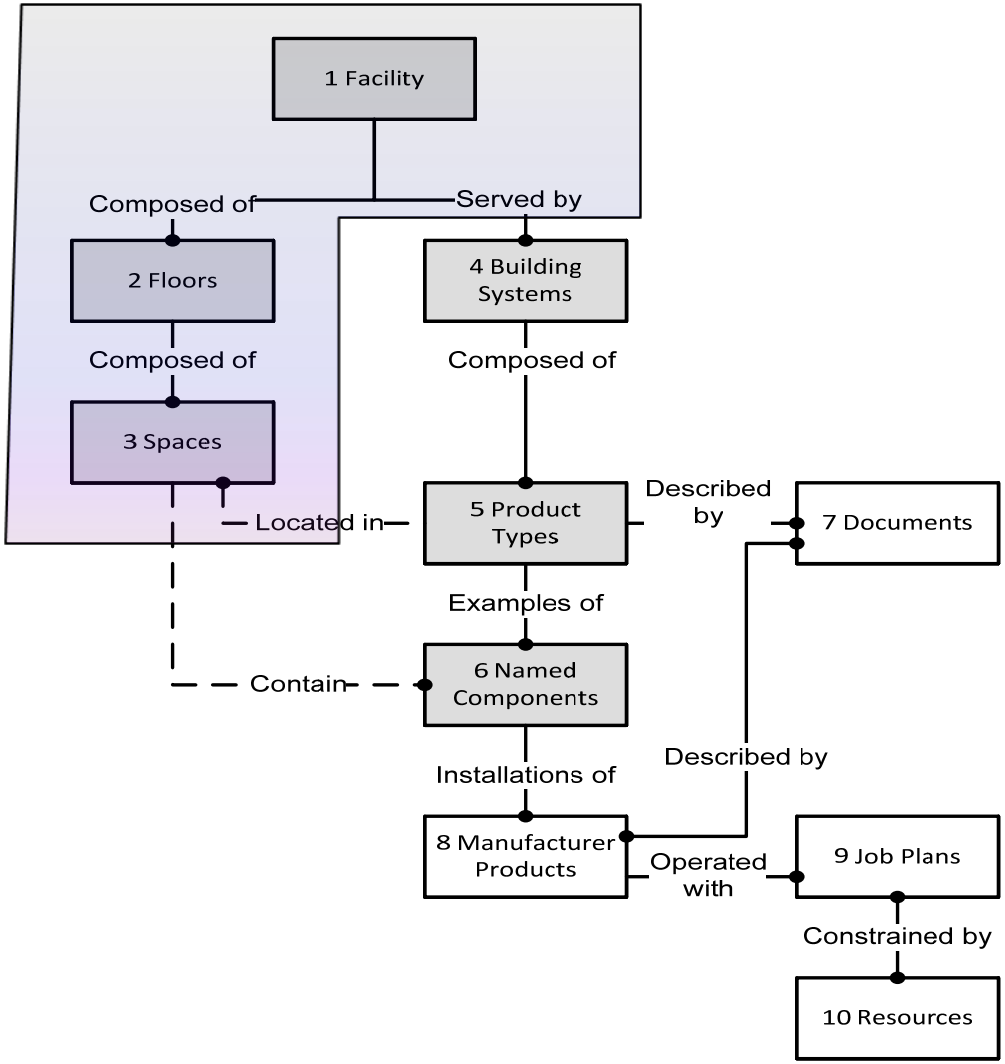
Information Delivery Manual (IDM) (IDM)

Feed Builder - create your custom RSS feed.

Recently Updated

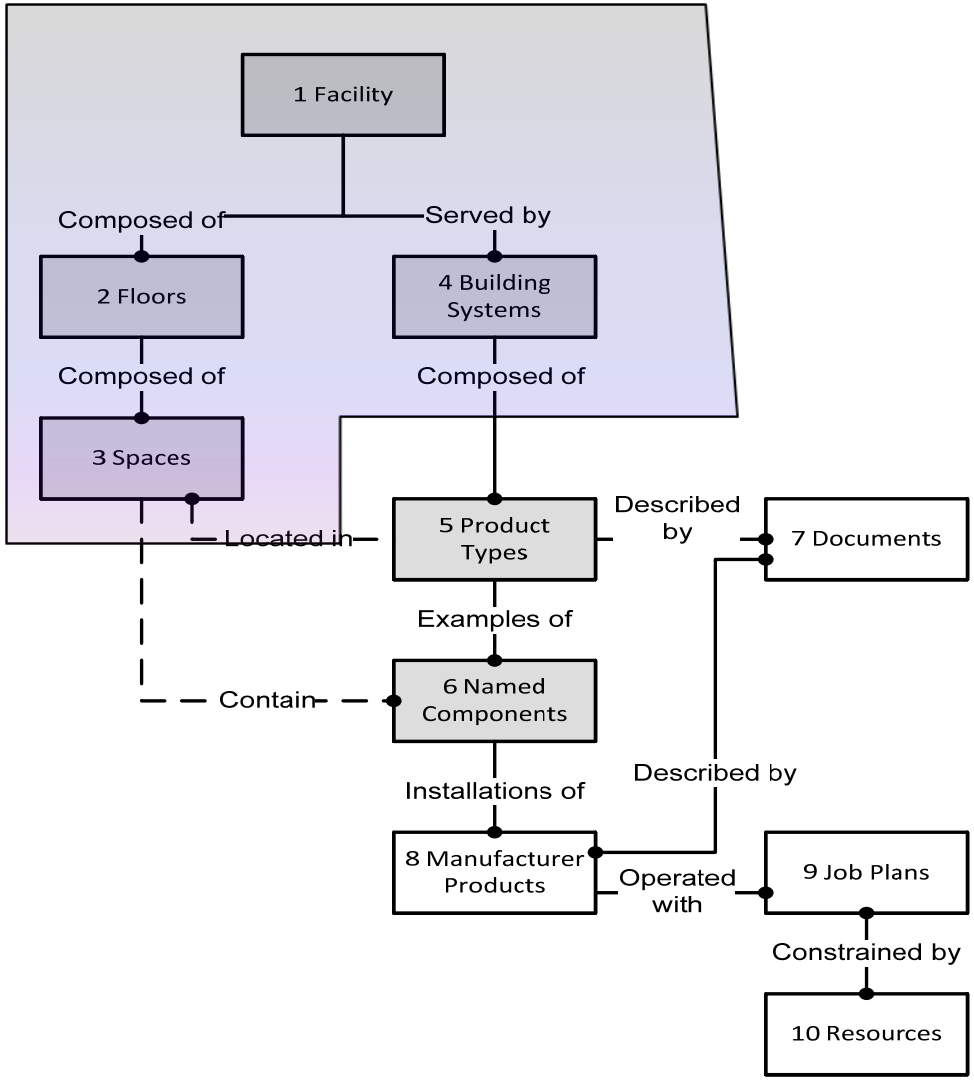
- Facilities Management (Information Delivery Manual (IDM)) by Jeffrey Wix (27 May)
- Home (Information Delivery Manual (IDM)) by Kjetil Espedokken (11 Jan)
- Configure Load Bearing System (FP) (Information Delivery Manual (IDM)) by Jeffrey Wix (25 Jul)
- bpmn_fm_plan_maintenance_2.png (Information Delivery Manual (IDM)) by Jeffrey Wix (23 Jul)
- Plan Maintenance (Information Delivery Manual (IDM)) by Jeffrey Wix (23 Jul)
- FM Exchange Requirement Data Objects (Information Delivery Manual (IDM)) by Jeffrey Wix (23 Jul)
- FM Coordination Gateways (Information Delivery Manual (IDM)) by Jeffrey Wix (23 Jul)
- FM Data Objects (Information Delivery Manual (IDM)) by Jeffrey Wix (23 Jul)
- Facilities Management (PM) (Information Delivery Manual (IDM)) by Jeffrey Wix (23 Jul)
- bpmn_fm_top_1.png (Information Delivery Manual (IDM)) by Jeffrey Wix (23 Jul)


1 Facility
Composed of
Served by
2 Floors
4 Building Systems
Composed of
Composed of
3 Spaces
Located in
5 Product Types
Described by
7 Documents
Examples of
Contain
6 Named Components
Installations of
Described by
8 Manufacturer Products
Operated with
9 Job Plans
Constrained by
10 Resources



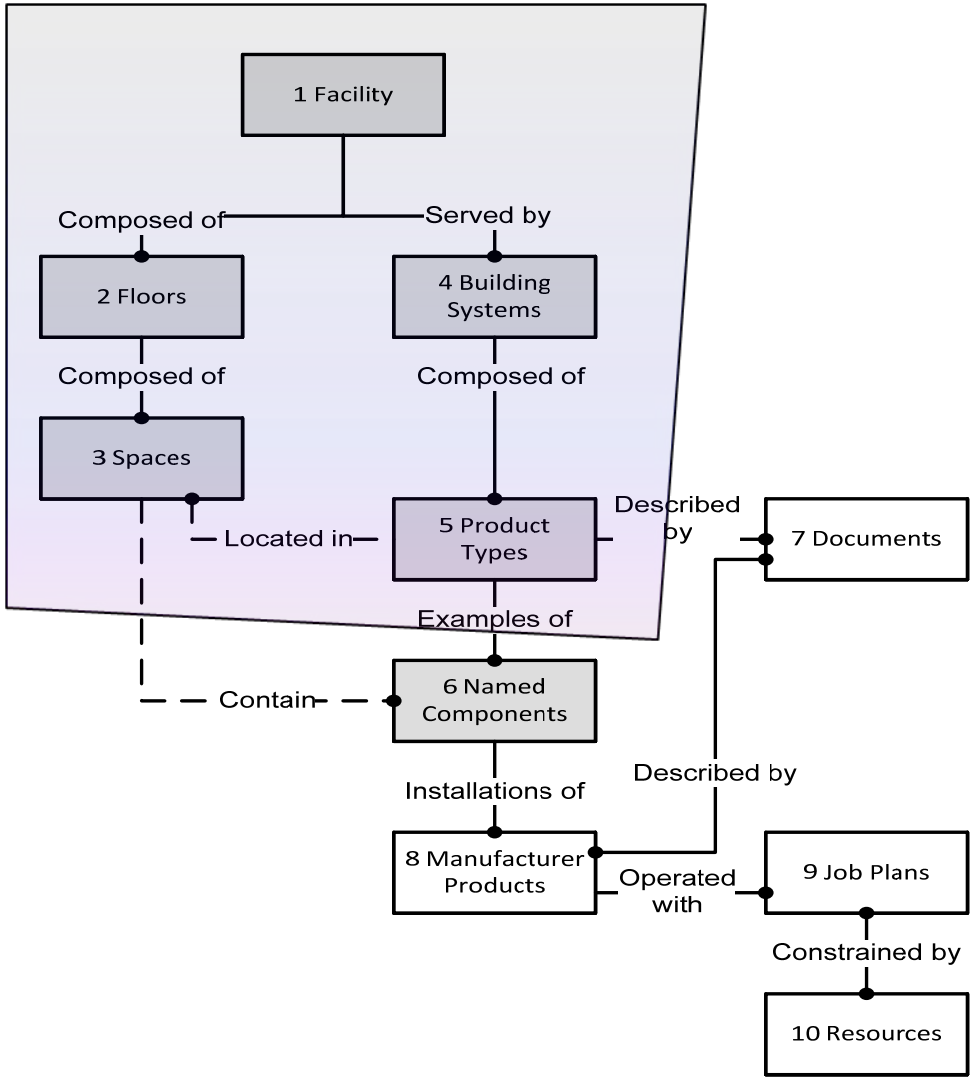
COBIE info at:

concept design



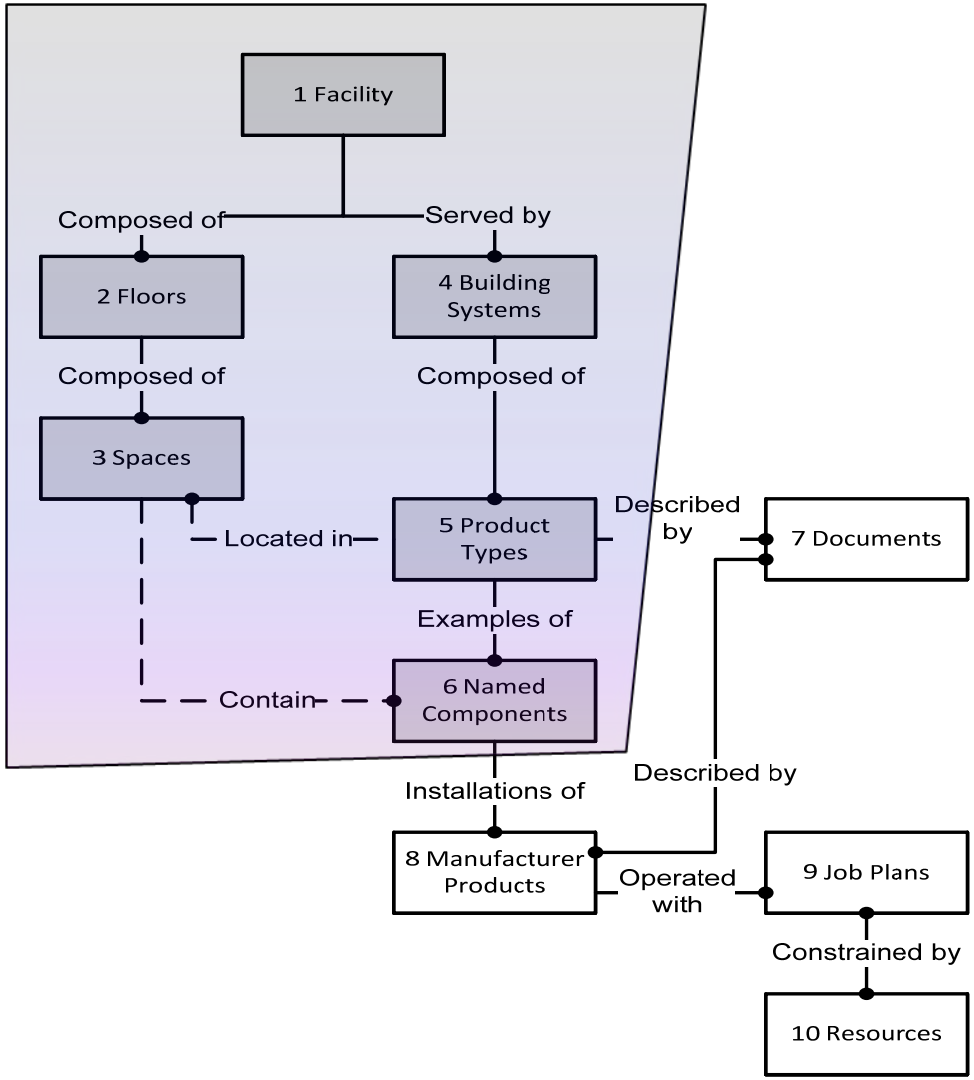
COBIE info at:

early design stages



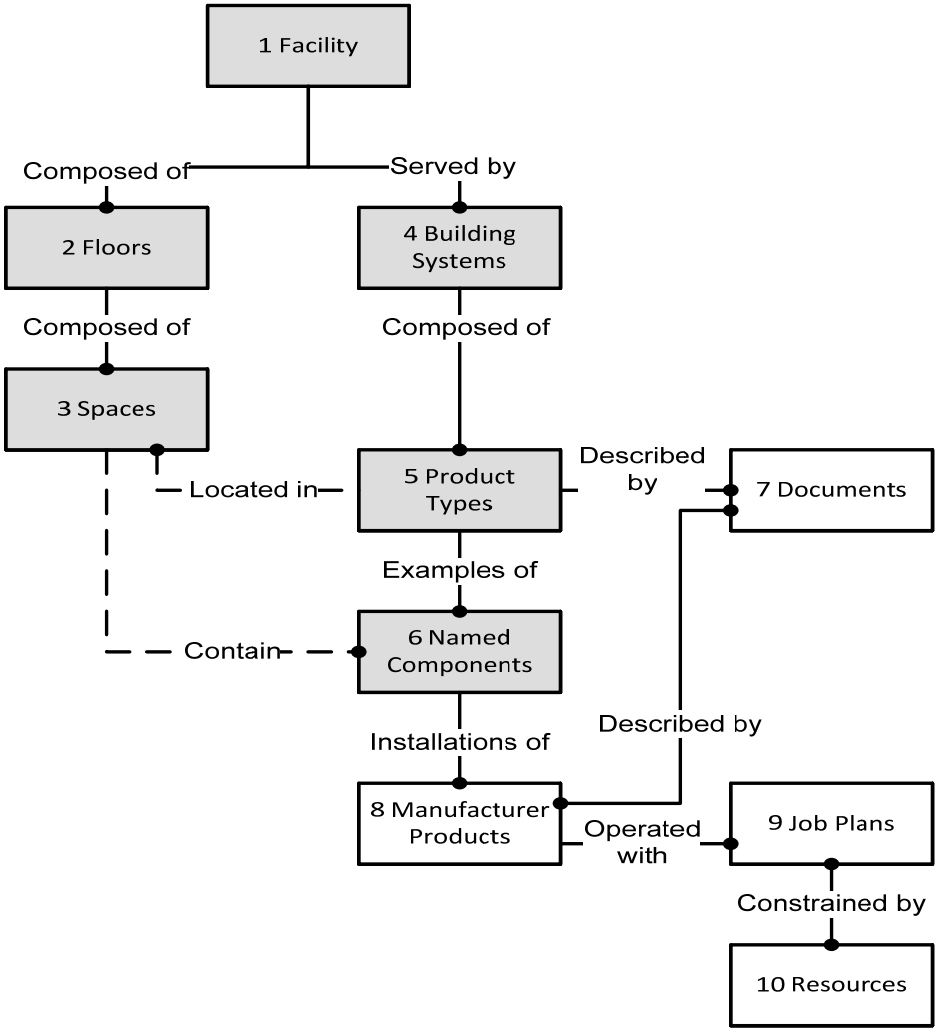
COBIE info at:

mid-design stages



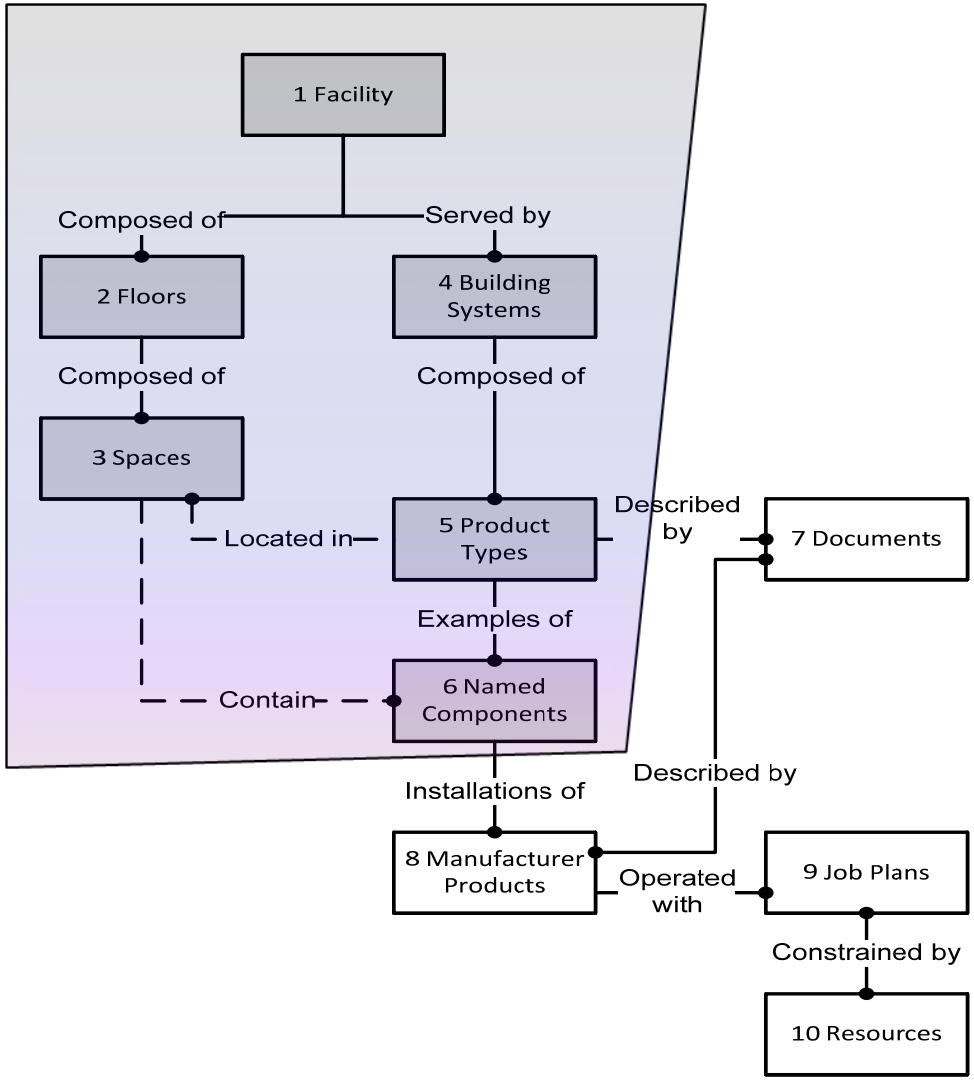
COBIE info at:

preconstruction stage



Pop quiz….

is the designer providing anything new here?

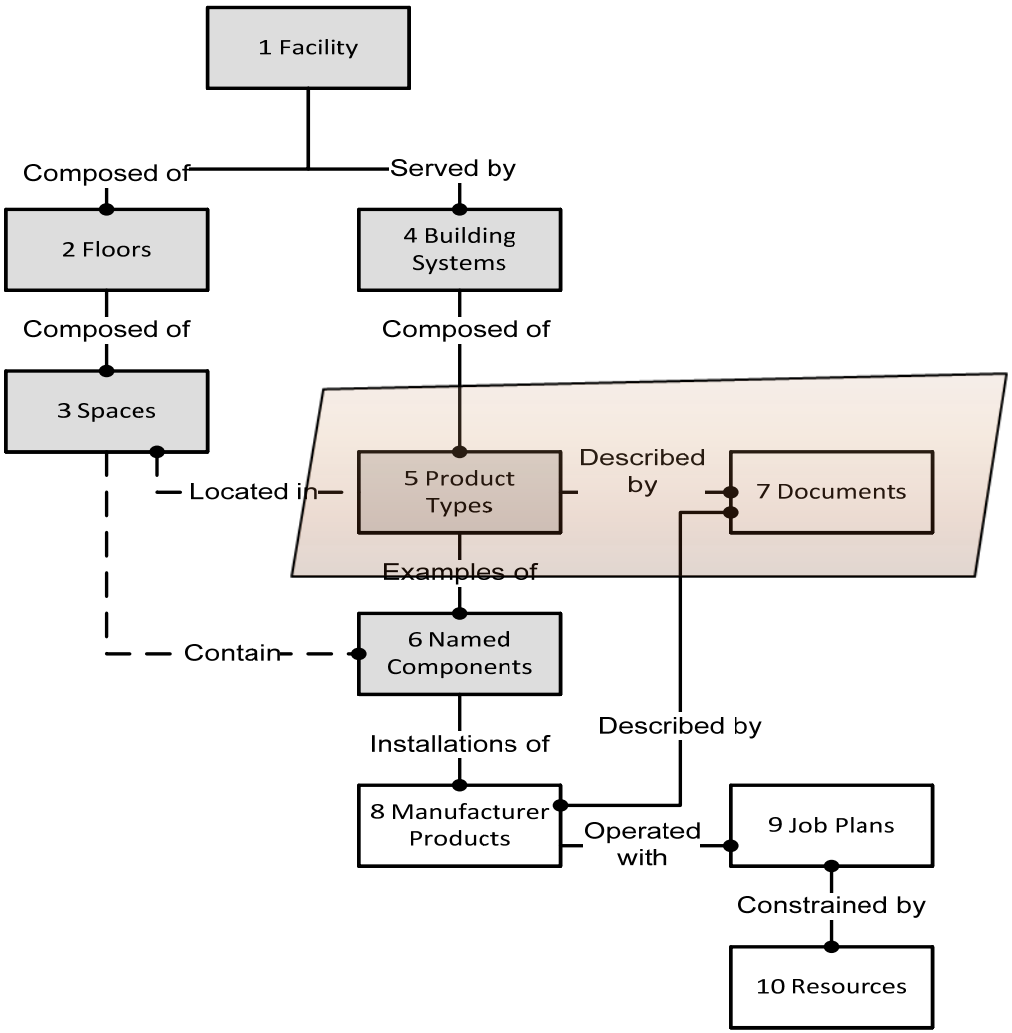


COBIE provided as

owner furnished data

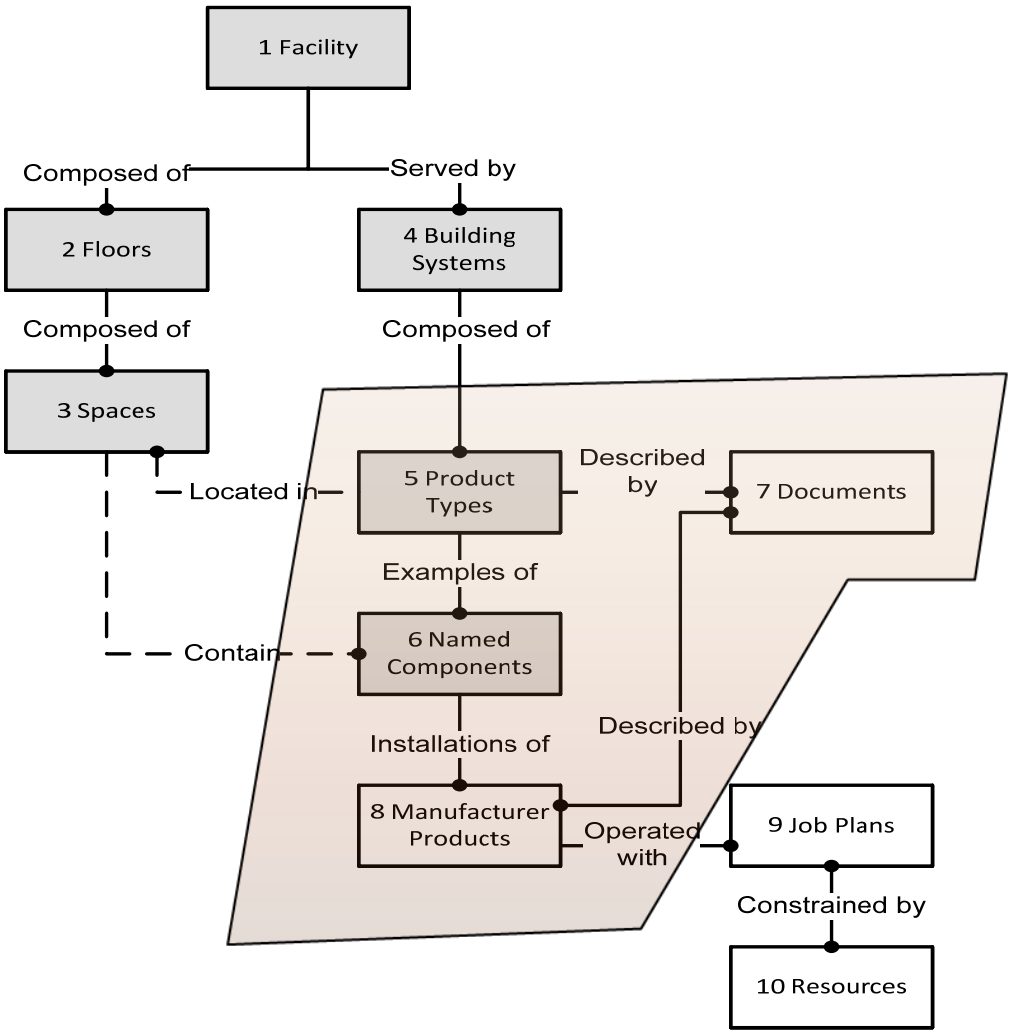
COBIE from contractor:

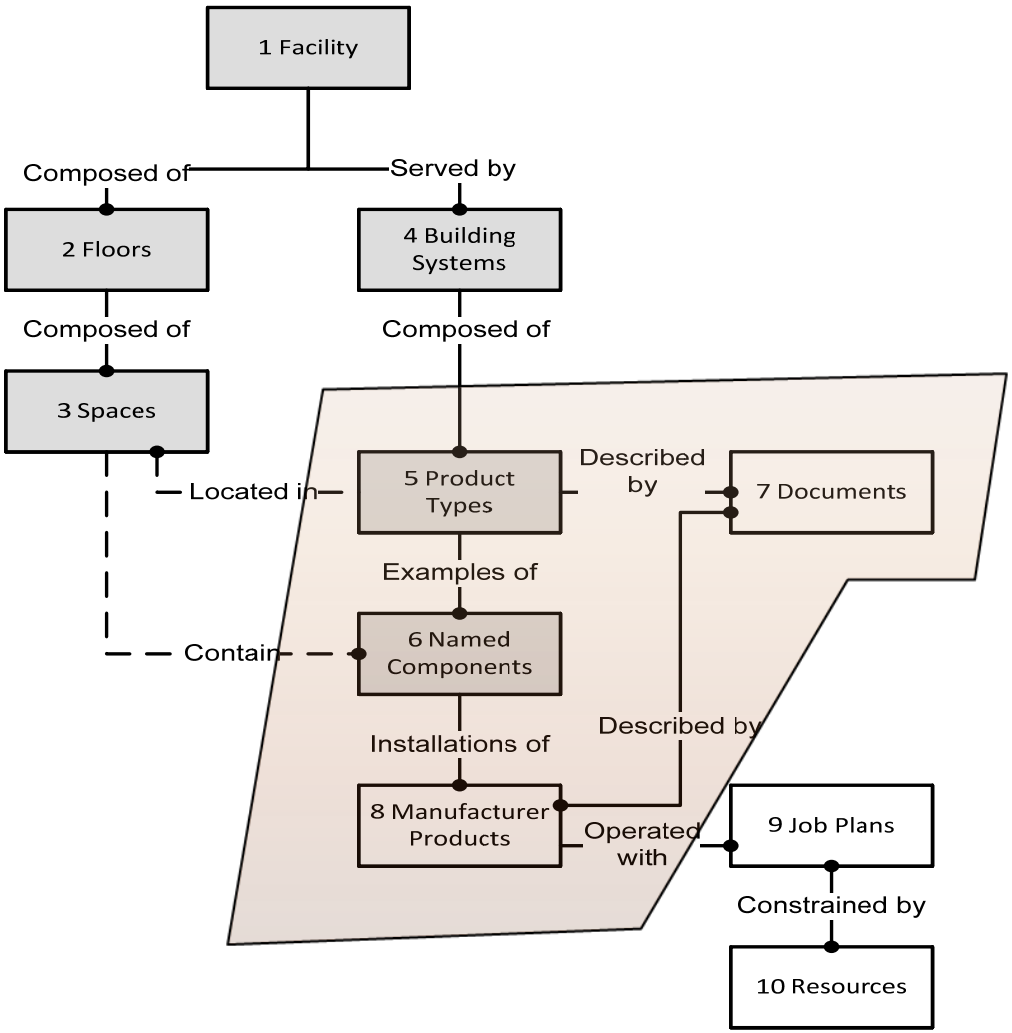
submittals



COBIE from contractor:

make, model, serial no., tags

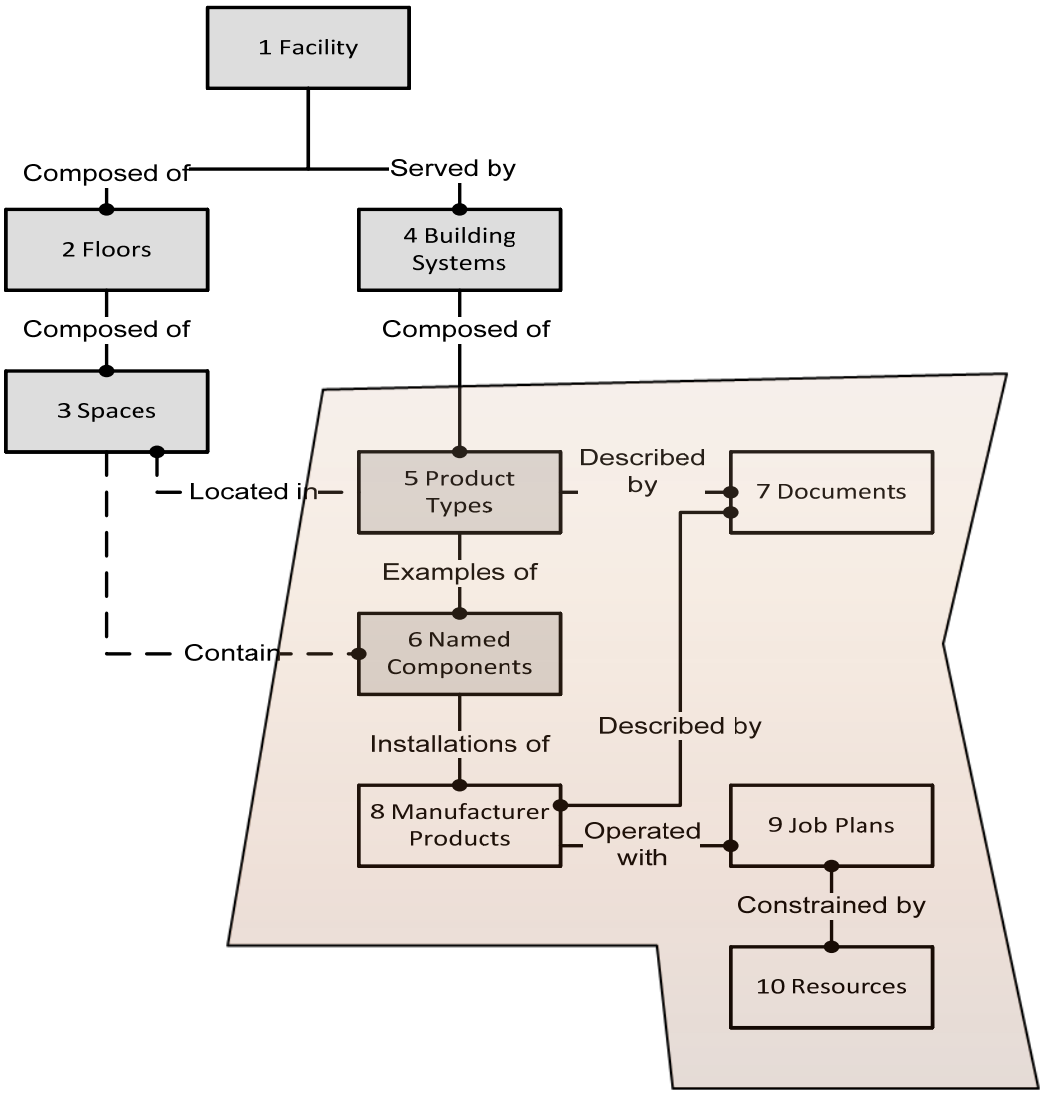




COBIE from contractor:

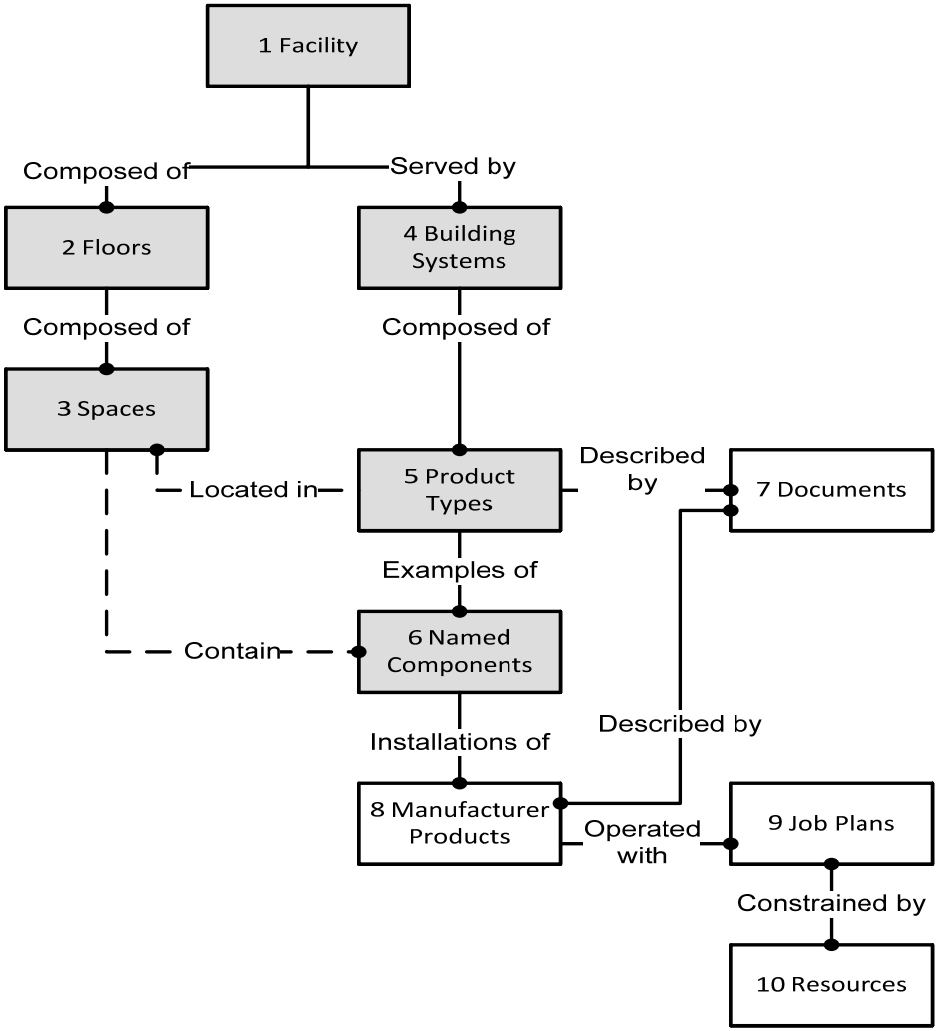
holder of warranty

parts providers



COBIE from contractor:

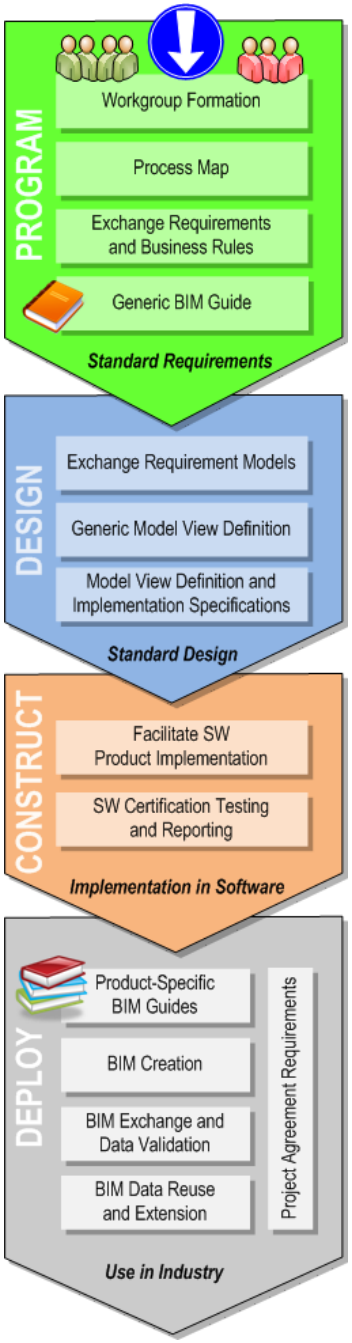
tests, certifications,
O&M manuals, job plans



Pop quiz….

is the contractor providing anything new here?

COBIE is already in contracts you just format it so people can re-use it?



2.2 generic MVD

IFC components needed to implement

mvd.buildingSMART.com

Interesting yes,

but can we please move on…

```
      IsClassifyingItemIn : SET [0:1]
OF IfcClassificationItemRelationship
FOR RelatingItem;
  END_ENTITY;

  ENTITY IfcClassificationNotation-
Facet;
      NotationValue : IfcLabel;
  END_ENTITY;

  ENTITY IfcClassificationItemRela-
tionship;
      RelatingItem : IfcClassifica-
tionItem;
      RelatedItems : SET [1:?] OF
IfcClassificationItem;
  END_ENTITY;

  ENTITY IfcMaterial;
      Name : IfcLabel;
  END_ENTITY;

  ENTITY IfcPropertyListValue
    SUBTYPE OF(IfcSimpleProperty);
      ListValues : OPTIONAL LIST
[1:?] OF IfcValue;
      Unit       : OPTIONAL IfcUnit;
    WHERE
      WR21 : SIZEOF(QUERY(temp <*
SELF.ListValues |

NOT(TYPEOF(SELF.ListValues[1]) =
TYPEOF(temp))
                }) = 0;
  END_ENTITY;

  ENTITY IfcPropertyDependencyRela-
tionship;
      DependingProperty : IfcProp-
erty;
      DependantProperty : IfcProp-
erty;
      Name              : OPTIONAL
IfcLabel;
      Description       : OPTIONAL
IfcText;
      Expression        : OPTIONAL
IfcText;
    WHERE
      WR1 : DependingProperty :<>:
DependantProperty;
  END_ENTITY;

  ENTITY IfcServiceLifeFactor
    SUBTYPE
OF(IfcPropertySetDefinition);
      PredefinedType : IfcService-
LifeFactorTypeEnum;
      UpperValue     : OPTIONAL If-
cParameterValue;
      MostUsedValue  : IfcParameter-
Value;
      LowerValue     : OPTIONAL If-
cParameterValue;
    WHERE
      WR31 : NOT(PredefinedType =
IfcServiceLifeFactor-
TypeEnum.USERDEFINED)
              OR
EXISTS(SELF\IfcObject.ObjectType);
  END_ENTITY;

  ENTITY IfcElementQuantity
    SUBTYPE
OF(IfcPropertySetDefinition);
      Quantities          : SET [1:?]
OF IfcPhysicalQuantity;
      MethodOfMeasurement : OPTIONAL
IfcLabel;
  END_ENTITY;

  ENTITY IfcPhysicalQuantity
    ABSTRACT SUPERTYPE OF
(ONEOF(IfcPhysicalComplexQuantity,
IfcPhysicalSimpleQuantity));
      Name        : IfcLabel;
      Description   : OPTIONAL
IfcText;
    INVERSE
      PartOfComplex : SET [0:1] OF
IfcPhysicalComplexQuantity FOR
HasQuantities;
  END_ENTITY;

  ENTITY IfcPhysicalComplexQuantity
    SUBTYPE OF(IfcPhysicalQuantity);
      HasQuantities  : SET [1:?] OF
IfcPhysicalQuantity;
      Discrimination : IfcLabel;
      Quality        : OPTIONAL If-
cLabel;
      Usage          : OPTIONAL If-
cLabel;
    WHERE
      WR21 : SIZEOF(QUERY(temp <*
HasQuantities | SELF :=: temp)) = 0;
  END_ENTITY;

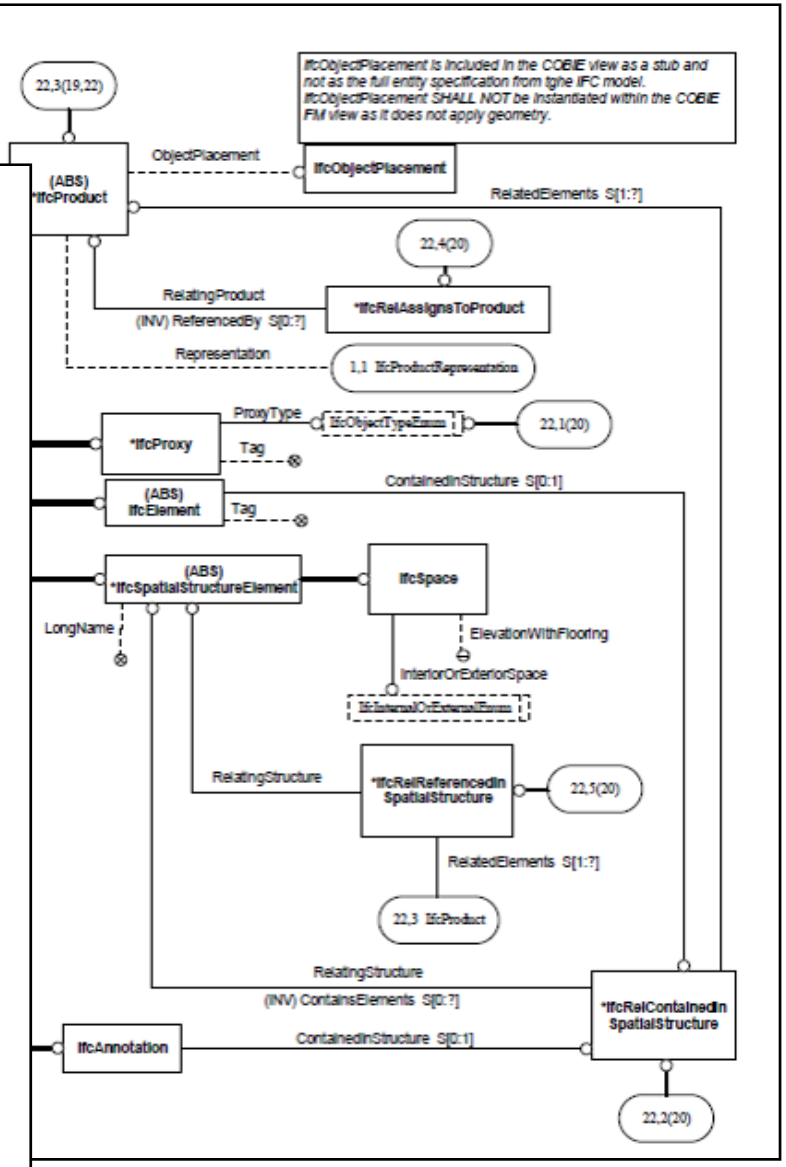
  ENTITY IfcPhysicalSimpleQuantity
    ABSTRACT SUPERTYPE OF
(ONEOF(IfcQuantityArea, IfcQuantity-
Count, IfcQuantityLength, IfcQuanti-
tyTime, IfcQuantityVolume, IfcQuanti-
tyWeight))
    SUBTYPE OF(IfcPhysicalQuantity);
      Unit : OPTIONAL IfcNamedUnit;
  END_ENTITY;

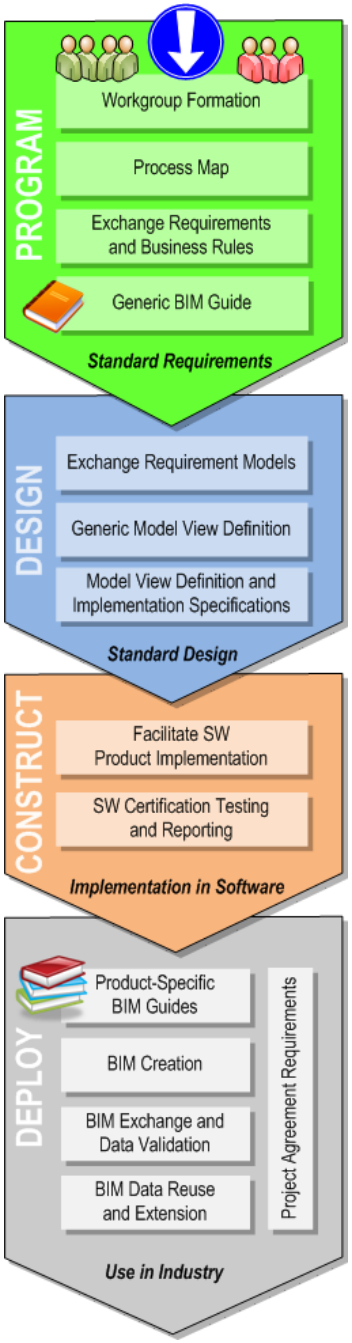
  ENTITY IfcQuantityArea
    SUBTYPE
OF(IfcPhysicalSimpleQuantity);
      AreaValue : IfcAreaMeasure;
    WHERE
      WR21 :
NOT(EXISTS(SELF\IfcPhysicalSimpleQuan
tity.Unit)) OR

(SELF\IfcPhysicalSimpleQuantity.Unit.
UnitType = IfcUnitEnum.AREAUNIT);
      WR22 : AreaValue >= 0;
  END_ENTITY;

  ENTITY IfcQuantityCount
    SUBTYPE
OF(IfcPhysicalSimpleQuantity);
      CountValue : IfcCountMeasure;
    WHERE
      WR1 : CountValue >= 0;
  END_ENTITY;

  ENTITY IfcQuantityLength
```





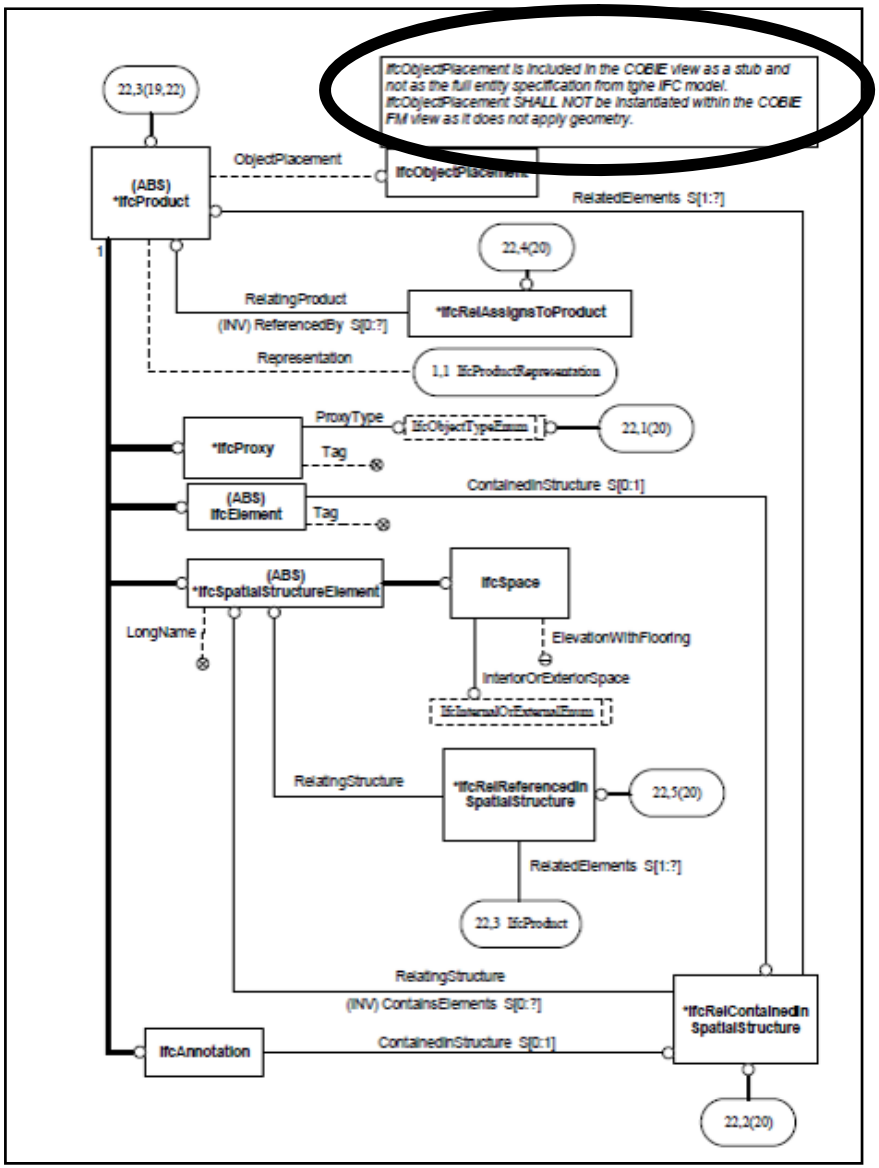
2.3 implementation specs

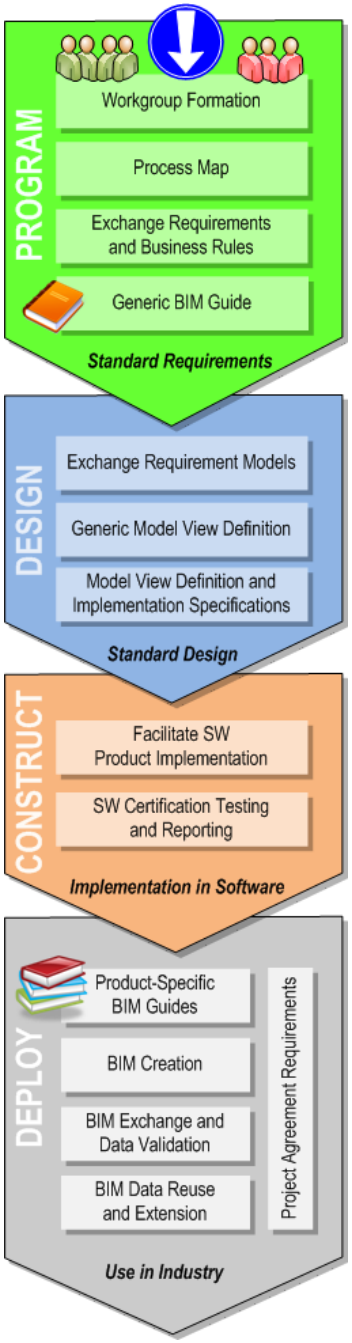
expected implementation rules

Interesting yes,

but can we please move on…

Each named component will be identified by it's component type. We would expect, therefore, that the ratio of individual items to types would be well greater than one.



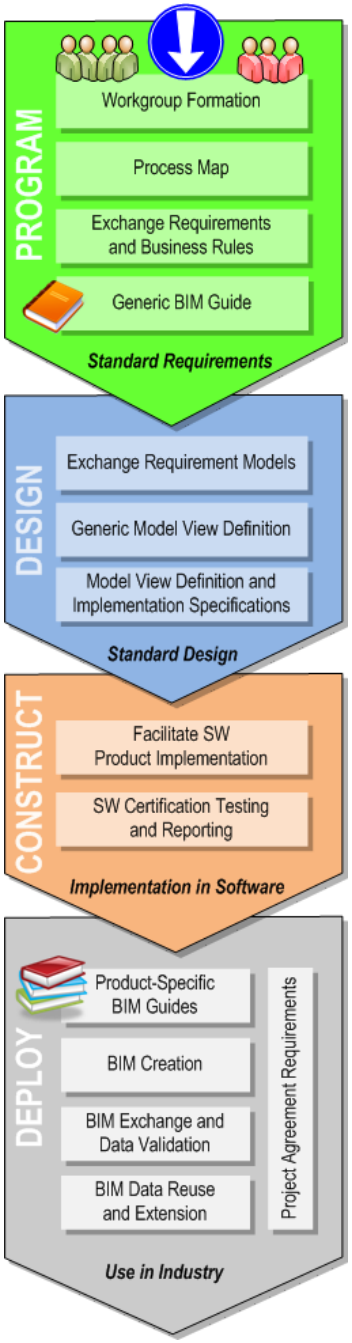


2. design

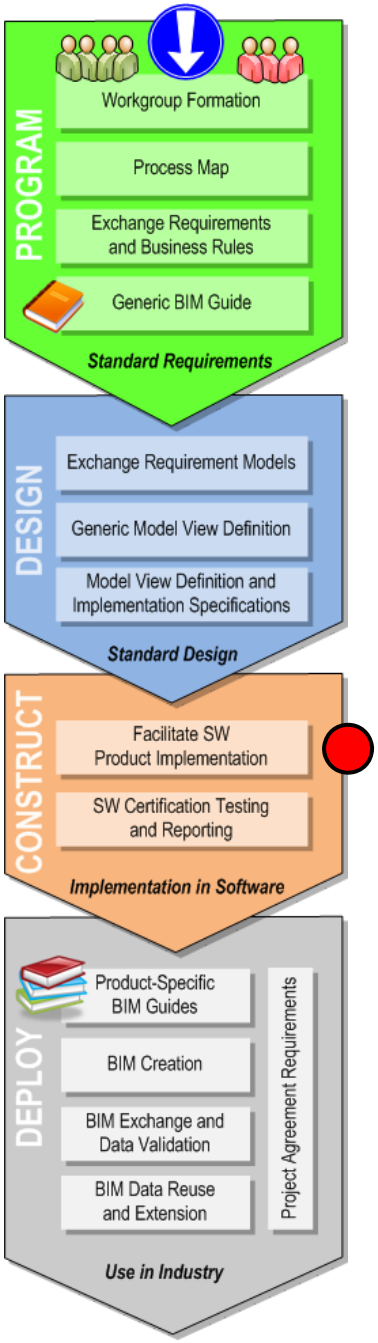
how will we solve this problem?

who is "We" in this question?

a detailed technical standard for software engineers to implement IFC within their own products.


PROGRAM
Workgroup Formation
Process Map
Exchange Requirements and Business Rules
Generic BIM Guide
Standard Requirements
DESIGN
Exchange Requirement Models
Generic Model View Definition
Model View Definition and Implementation Specifications
Standard Design
CONSTRUCT
Facilitate SW Product Implementation
SW Certification Testing and Reporting
Implementation in Software
DEPLOY
Product-Specific BIM Guides
BIM Creation
BIM Exchange and Data Validation
BIM Data Reuse and Extension
Project Agreement Requirements
Use in Industry

3. construct



3.1 facilitate implementation

- *how much can be reasonably achieved?*
- *is there a order of implementation?*
- *what is the "low hanging fruit"*

COBIE implementation

- *equipment lists*
- *warranty guarantors*
- *replacement part suppliers*

RESOURCE PAGES
A–C D–H I–R S–W

- Achieving Sustainable Site Design through Low Impact Development Practices
- Acoustic Comfort
- Aesthetic Challenges
- Aesthetic Opportunities
- Air Barrier Systems in Buildings
- Air Decontamination
- Archaeological Site Considerations
- Assessment Tools for Accessibility
- Balancing Security/Safety & Sustainability Objectives
- Blast Safety of the Building Envelope
- Building Information Models (BIM)
- Building Integrated Photovoltaics (BIPV)
- Changing Nature of Organizations, Work, and Workplace
- Chemical/Biological/Radiation (CBR) Safety of the Building Envelope
- Construction Operations Building Information Exchange (COBIE)
- Construction Phase Cost Management
- Construction Waste Management
- Cool Metal Roofing
- Cost Impact of the ISC Security Design Criteria

Construction Operations Building Information Exchange (COBIE)

by E. William East, PE, PhD
Engineer Research and Development Center, U.S. Army, Corps of Engineers

Last updated: 08-14-2008

Introduction

Today, most contracts require the handover of paper documents containing equipment lists, product data sheets, warranties, spare part lists, preventive maintenance schedules, and other information. This information is essential to support the operations, maintenance, and the management of the facilities assets by the owner and/or property manager.

Gathering this information at the end of the job, today's standard practice, is expensive, since most of the information has to be recreated from information created earlier. COBIE simplifies the work required to capture and record project handover data.

The COBIE approach is to enter the data as it is created during design, construction, and commissioning, see Figure 1. Designers provide floor, space, and equipment layouts. Contractors provide make, model, and serial numbers of installed equipment. Much of the data provided by contractors comes directly from product manufacturers who can also participate in COBIE. *Please see Project Delivery Teams for more information.*

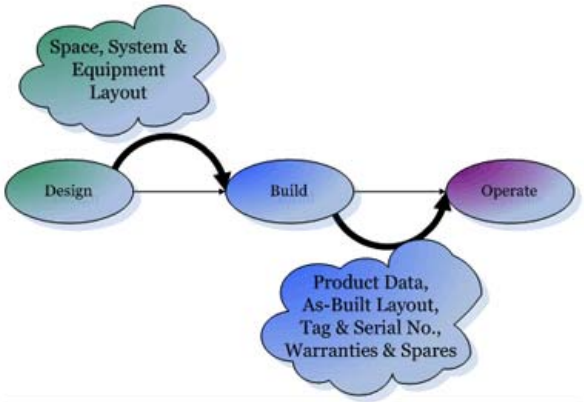


Fig. 1. COBIE Process Overview

While COBIE is designed to work with Building Information Models (BIMs), COBIE data may also be created and exchanged using simple spreadsheets. The COBIE team selected spreadsheets so that the benefits of the COBIE approach can be widely used throughout the facility acquisition industry, not just on large, high-visibility projects. By allowing the exchange of COBIE data using spreadsheets even small homebuilders can provide a

project description

This is a general description of COBIE. Detailed information and a step-by-step guide (PDF 481 KB, 38 pgs) may be found through documents identified in the Reference section of this document.

A. Early Design Stage

As the design begins the vertical and horizontal spaces that are necessary to fulfill the owner's requirements for the building, facility, or infrastructure project are defined. Within these buildings, facilities, or projects are also defined the different types of systems that are needed to satisfy the owner's requirements. *Please see* Project Planning & Development *for more information.*

Figure 2 illustrates how this information is provided through COBIE. COBIE data begins with the listing of one or more **Facilities** (i.e. buildings or projects). Each of these facilities has one or more **Floors**. Within each floor there are Spaces. In buildings, these spaces will typically have room numbers. Outside the building, spaces can be referenced by function, such as "parking lot" or "patio seating." For non-building projects COBIE users can create "floors" and "spaces" that provide the most meaningful partition of the physical regions that comprise those projects.

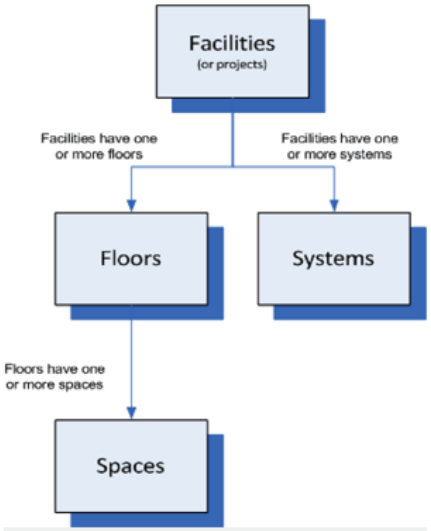


Fig. 2. Early Design Stage Information

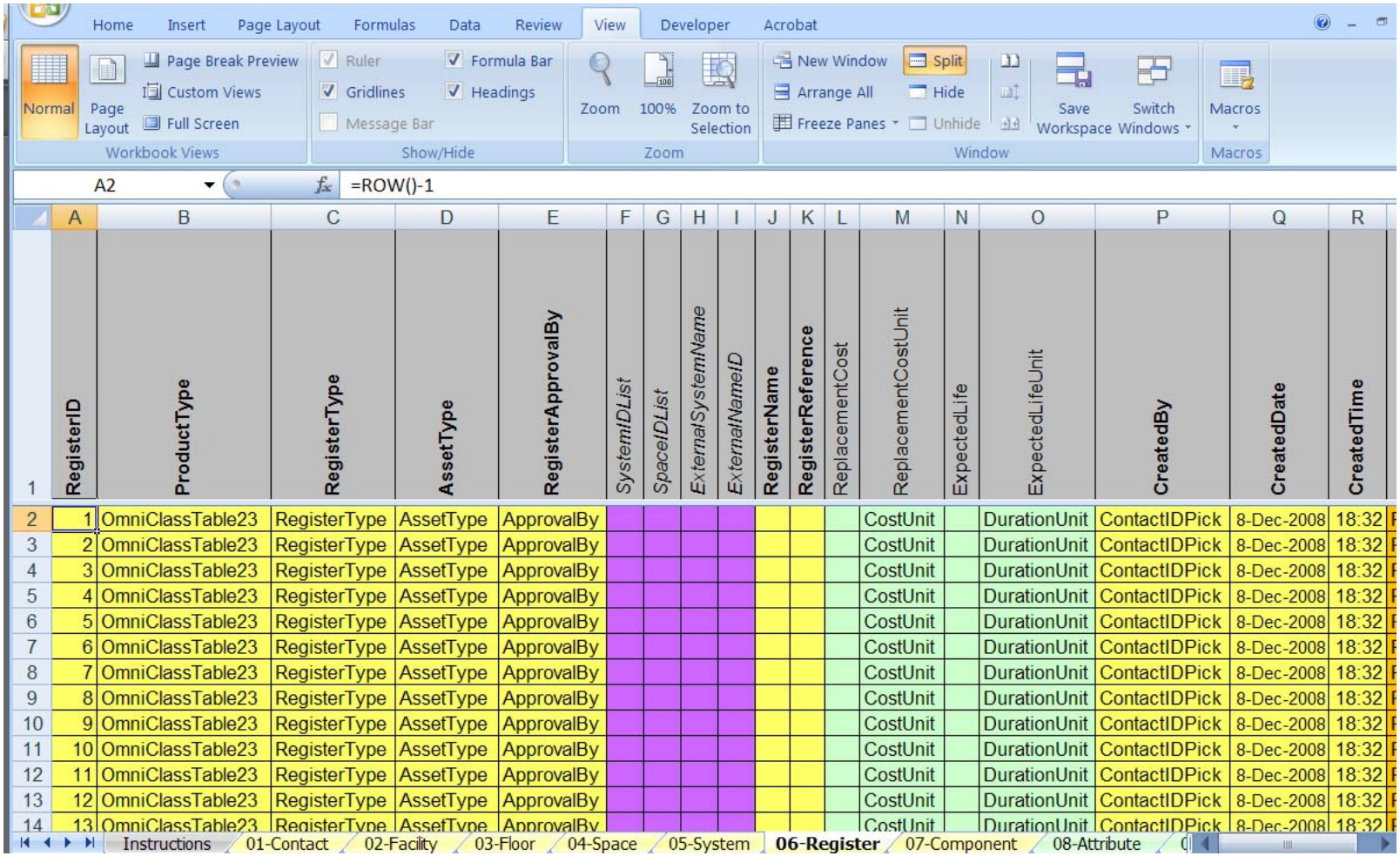
Early in the design, projects are developed by listing spaces and identifying specific functions required to meet the owner's requirements. To allow these spaces to perform as intended, specific building **Systems**, are also required for all projects. For buildings, these systems include: electrical, heating, ventilating and air conditioning (HVAC), potable water, wastewater, fire protection, intrusion detection and alarms and other systems. In COBIE, there must be at least one **System** for each **Facility**.

Since a significant benefit can be achieved for Asset Managers, COBIE allows the exchange of space function and area calculations provided directly by the designers' CAD or BIM software.

B. Construction Documents Design Stage

As the design progresses the products (including materials and equipment) needed to create the systems are specified. Typical construction projects require the designer to create a "submittal register" listing these products and the necessary information that will ensure their installation. This list, the **Register**, is the catalog of all the types of items to be installed in the project.

clear explanations



A2 =ROW()-1

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	RegisterID	ProductType	RegisterType	AssetType	RegisterApprovalBy	SystemIDList	SpaceIDList	ExternalSystemName	ExternalNameID	RegisterName	RegisterReference	ReplacementCost	ReplacementCostUnit	ExpectedLife	ExpectedLifeUnit	CreatedBy	CreatedDate	CreatedTime
2	1	OmniClassTable23	RegisterType	AssetType	ApprovalBy								CostUnit		DurationUnit	ContactIDPick	8-Dec-2008	18:32
3	2	OmniClassTable23	RegisterType	AssetType	ApprovalBy								CostUnit		DurationUnit	ContactIDPick	8-Dec-2008	18:32
4	3	OmniClassTable23	RegisterType	AssetType	ApprovalBy								CostUnit		DurationUnit	ContactIDPick	8-Dec-2008	18:32
5	4	OmniClassTable23	RegisterType	AssetType	ApprovalBy								CostUnit		DurationUnit	ContactIDPick	8-Dec-2008	18:32
6	5	OmniClassTable23	RegisterType	AssetType	ApprovalBy								CostUnit		DurationUnit	ContactIDPick	8-Dec-2008	18:32
7	6	OmniClassTable23	RegisterType	AssetType	ApprovalBy								CostUnit		DurationUnit	ContactIDPick	8-Dec-2008	18:32
8	7	OmniClassTable23	RegisterType	AssetType	ApprovalBy								CostUnit		DurationUnit	ContactIDPick	8-Dec-2008	18:32
9	8	OmniClassTable23	RegisterType	AssetType	ApprovalBy								CostUnit		DurationUnit	ContactIDPick	8-Dec-2008	18:32
10	9	OmniClassTable23	RegisterType	AssetType	ApprovalBy								CostUnit		DurationUnit	ContactIDPick	8-Dec-2008	18:32
11	10	OmniClassTable23	RegisterType	AssetType	ApprovalBy								CostUnit		DurationUnit	ContactIDPick	8-Dec-2008	18:32
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13	12	OmniClassTable23	RegisterType	AssetType	ApprovalBy								CostUnit		DurationUnit	ContactIDPick	8-Dec-2008	18:32
14	13	OmniClassTable23	RegisterType	AssetType	ApprovalBy								CostUnit		DurationUnit	ContactIDPick	8-Dec-2008	18:32

Instructions / 01-Contact / 02-Facility / 03-Floor / 04-Space / 05-System / **06-Register** / 07-Component / 08-Attribute

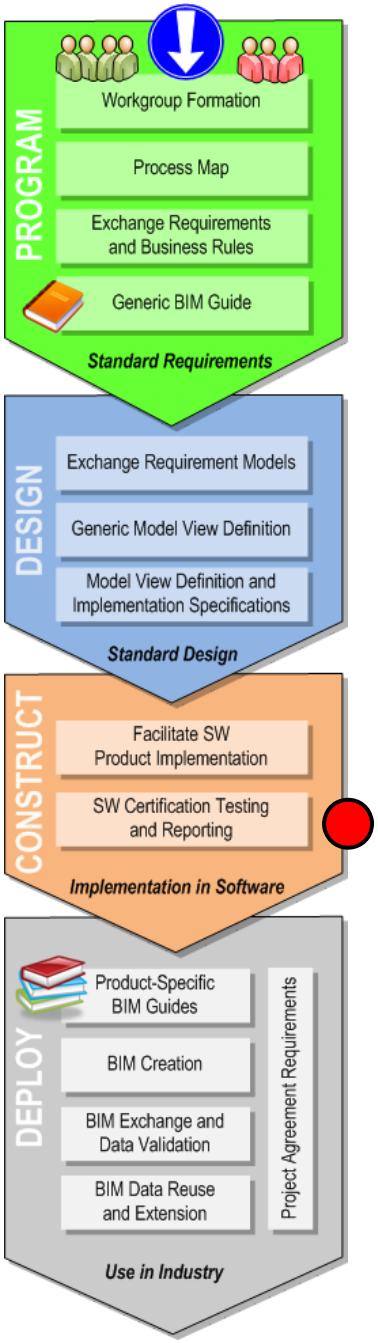
example data sets template

- *how much can be reasonably achieved?*
- *is there a order of implementation?*
- *what is the "low hanging fruit"*

the answers to these questions also directly impact what specific items should be checked.

e.g. COBIE:
equipment lists hinge on describing individual products as instances of product types

allow vendor identified space calculation method



3.2 certification and testing

transparency of live demo in large public venu

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BIM Information Exchange Demonstration

July 23-25, 2008 - Washington, DC

Executive Summary (PDF 56 KB)
Attendee List (PDF 83 KB)
Result Summary (PDF 68 KB)

Contracted Information Exchanges – July 23,2008 (PM)

- Meeting Purpose and Objectives – Bill East (PDF 84 KB)
- U.S. Army, Corps of Engineers Welcome – James Dalton, MG Temple
- Federal Facility Council Welcome – Kevin Lewis (PDF 432 KB)
- buildingSMART Alliance Welcome – Peter Smeallie (PDF 916 KB)
- NASA Welcome – Bill Brodt
- International BIM Efforts – Nick Nisbet (PDF 304 KB)
- Information Exchange Process – Bill East (PDF 1.7 MB)
- Live COBIE Export Challenge – Nick Nisbet (PDF 2.2 MB)
  - Autodesk - Revit (PDF 2.3 MB)
  - Bentley - Bentley Architecture (PDF 7.3 MB)
  - Onuma - Onuma Planning System (PDF 4 MB)

Spatial Compliance Information Exchange – July 24, 2008 (AM)

- Introduction – Bill East
  - Business case (PDF 2.1 MB)
  - Draft specifications (PDF 52 KB)
  - SCIE Project
- Demonstration of SCIE supporting tools
  - Autodesk - Revit
  - Bentley - Bentley Architecture (AVI 11.7 MB)
  - Onuma - Onuma Planning System
- Testing Rules and Results Nick Nisbet (PDF 396 KB)

Coordination View Information Exchange – July 24, 2008 (Midday)

- Introduction – Bill East
  - Business case (PDF 944 KB)
  - Draft specifications (PDF 24 KB)
  - CVIE Project
- Demonstration of CVIE supporting tool
  - Autodesk - Revit & Navisworks
  - Bentley - Bentley Architecture or ProjectWise Navigator, Hard Collisions (PDF 4.1 MB) and Soft Collisions (PDF 776 KB)
  - Solibri - Solibri Model Checker
- Testing Rules and Results Nick Nisbet (PDF 376 KB)

“what happened?”

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BIM Information Exchange Demonstration

July 23-25, 2008 - Washington, DC

COBIE IMPLEMENTATION TESTING: NEMETSCHEK ROOMDATA AND CODEBOOK DIRECT EXPORT TO XML SPREADSHEET

by Nicholas Nisbet MA (Cantab) DipArch (UNL) - AEC3 and William East, PE, PhD - Engineer Research and Development Center, U.S> Army, Corps of Engineers

The following table provides the analysis conducted to evaluate software manufacturer compliance with the Construction Operations Building Information Exchange (COBIE) conducted for the 23-25 July 2008 Building Information Modeling Information Exchange Demonstration.

Evaluation of directly submitted IFC files into the specified COBIE spreadsheet format requires translation from IFCExpress to ifcXML and transformation of ifcXML to MS Excel 2003 XML Spreadsheet. This translation can be automatically accomplished using the ifcCOBIE program. ifcCOBIE is available free of charge through the IFC-BIM forum noted in the Reference section of this page. The translation and transformation routines in ifcCOBIE are freely distributed as part of the ifcCOBIE program.

The XML spreadsheet produced by the ifcCOBE creates default worksheet data for the required Warranty, Spare, and Installation worksheets that are required to be completed during facility construction.

Nemetschek COBIE File via IFC 2x3 Coordination View

Software Name	VectorWorks
Software Version	Not provided by vendor during the meeting.
Optional configuration(s)	Not provided by vendor during the meeting although the information was explicitly requested prior to the meeting. Please contact the vendor directly for this information.
IFC file submitted	Vectorworks_ifc.zip
COBIE XLS spreadsheet	Vectorworks_ifc_cobie.zip
Checker file results	Vectorworks_ifc_check.zip 1
Qualitative Evaluation	
05-System Worksheet	• None
06-Register Worksheet	• Same number of register and component entries. = 68 components / 68 register types
07-Component Worksheet	• Some doors and windows have no space • Some doors are allocated to three spaces
Other sheets provided	• 08-Attribute • 09-Coordinate • 14-Installation • 16-Warranty • 17-Spare
Additional Comments	The sample file submitted included architecture spaces, and equipment, and was shown as commercially available.

1 The web-based XML spreadsheet checker tested required designer-side worksheets only. Optional worksheets contained in the file such as detailed building geometry and default worksheet data created by the ifcCOBIE program for use by construction contractors, may have been removed to ensure the checker operates without Java memory errors.

“does it work?”

available at buildingSMARTalliance

System	Focus	Route	SCIE	CVIE	COBIE
OPS	Planning	direct	pass	n/a[1]	pass
Bentley	BIM Design	via IFC	pass	pass	pass
Revit	BIM Design	direct	fail	n/a[1]	fail[2]
Revit	BIM Design	via IFC	pass	pass	pass
Vectorworks	BIM Design	via IFC	pass	Pass	pass
ArchiCAD	BIM Design	via IFC	n/a[1]	n/a[1]	n/a[1]
PBL	2-D Design	direct	pass	n/a[1]	pass

[1] software not tested against this requirement.

[2] re-testing one week later showed sufficient compliance for this to be upgraded to “pass.”

“how good is it?”

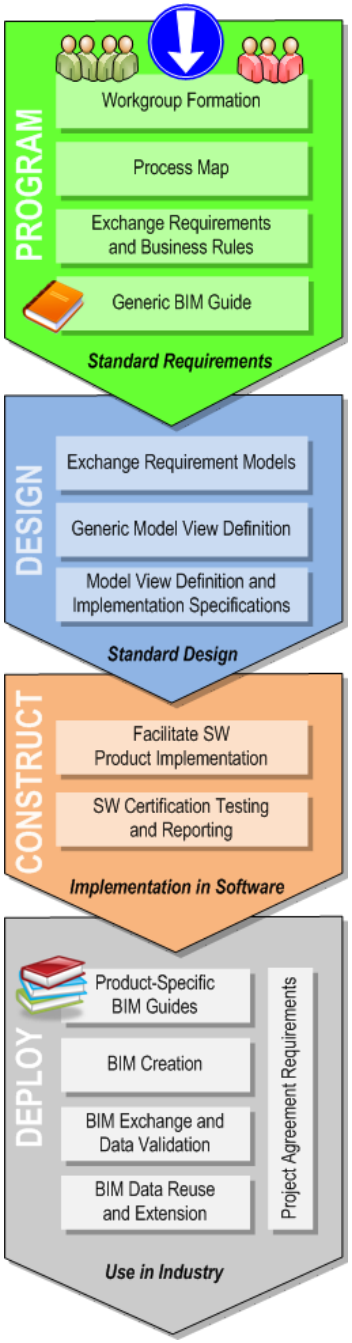
available at buildingSMARTalliance

- existence of “proxy” elements
- components per type

System	Focus	Route	SCIE	CVIE	COBIE
			Space areas	IFC Proxies	C/T ratio
OPS	Planning	direct	net only	n/a[1]	22.6
Bentley	BIM Design	via IFC	yes	2	4.1
Revit	BIM Design	direct	yes	n/a[1]	0.5
Revit	BIM Design	via IFC	yes	1820	5.5
Vectorworks	BIM Design	via IFC	none	0	1.0
ArchiCAD	BIM Design	via IFC	n/a[1]	n/a[1]	n/a[1]
PBL	2-D Design	direct	none	n/a[1]	4.3

[1] software not tested against this requirement.

“end of the beginning” not end



4 deploy

how can I use it?

contracted information exchange

lets look at the spec…

CONCENSUS COBIE SPECIFICATION SECTIONS (version 2.0)

****
SPECIFIER INSTRUCTION: Include the following section if COBIE data is required in any contract.
****

Electronic O&M Data

In lieu of the submission of paper handover documents, the contractor shall provide all required O&M data to the government electronically in the Construction Operations Building Information Exchange (COBIE) format. The specification of the COBIE format may be found on the "Tools" section of the Whole Building Design Guide (WBDG) (www.wbdg.org). Training and documentation materials, as well as sample files are also provided on the COBIE pages of the WBDG.

a. Four (4) copies of the COBIE data set shall be provided.

(1) The technology used for the data transmission shall be selected to ensure that the data is provided on one single "disk" or "drive." The contractor shall provide data on either disk-based (CD or DVD) or portable hard drive media. The selection of disk-based on drive-based media shall be made by the government.

(2) If disk-based media is provided, a printed label on the data disk shall list the name of the project, project location, contract number, prime contractor name, title of submission, and security classification. To insure that any problems with the data or media can be easily resolved the label shall also include the name and contact information of the individual who produced the

presentations and how-to guides

Implementation

COBIE allows the exchange of IFC-based facility management data. A meeting was held on February 20, 2008 at the U. S. Army, Corps of Engineers, Chicago District Office to discuss the implementation of COBIE. The linked files below document the results of that meeting and provide the presentations and handouts that might be of interest to those using COBIE.

- COBIE Meeting Report (PDF 44 KB)
- COBIE Introduction Presentation (PDF 860 KB)
- COBIE Overview Presentation (PDF 1 MB)
- Concensus COBIE Specification Sections (PDF 39 KB)
- COBIE HTML (ZIP 1.9 MB)

Relevant Codes and Standards

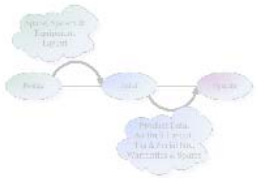
- National Building Information Model Standard, Version 1.0-Part 1 Appendix B, "Construction Operations Building Information Exchange Pilot Implementation Standard." (PDF 2.6 MB)
- COBIE Information Delivery Manual
- COBIE Requirements Analysis Report (PDF 1.1 MB, 201 pgs)
- COBIE and IAI FM-10 (PDF 74 KB, 1 pg)

Additional Resources

- COBIE Template Spreadsheet
- "Step-by-Step Guide to COBIE" (PDF 481 KB, 38 pgs)

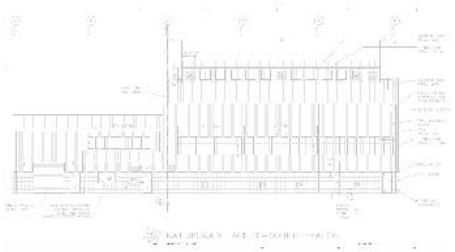
Briefings

- Overview (for managers) (PDF 588 KB, 26 pgs)
- Data Organization (for information modelers) (PDF 902 KB, 38 pgs)
- Spreadsheet Demo (for designers and contractors) (PDF 5.8 MB, 89 pgs)
- Designer-Side COBIE Worksheets (PDF 1.3 MB, 30 pgs)



loading COBIE designer-side data

a demonstration

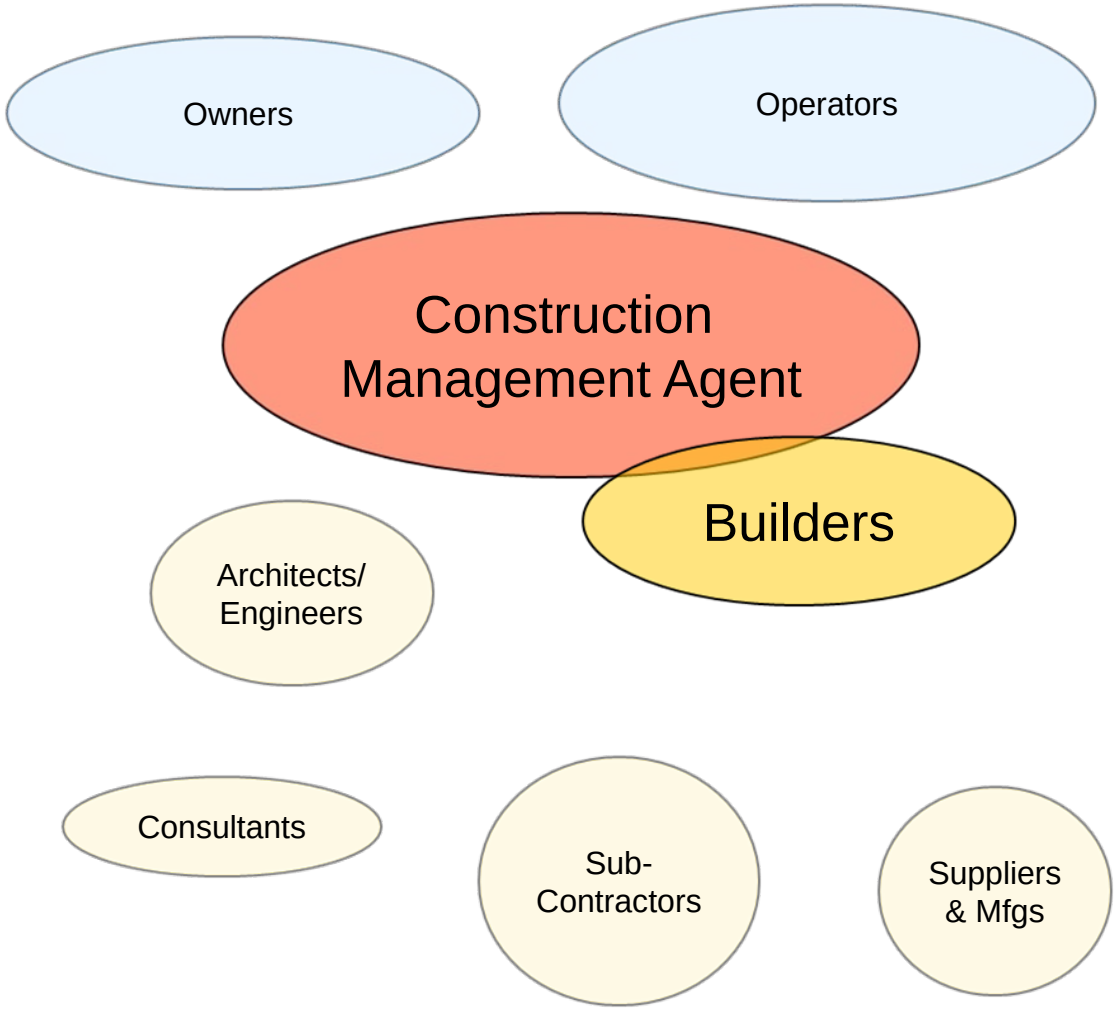


look at example project

pilot projects

- Maintenance Building, Ft. Lewis, WA
- All Army Reserve Projects
- CENTCOM HQ, McDill AFB
- Implementation guides for CMMS systems
- Integration w/Corporate IT systems

“inside the box”



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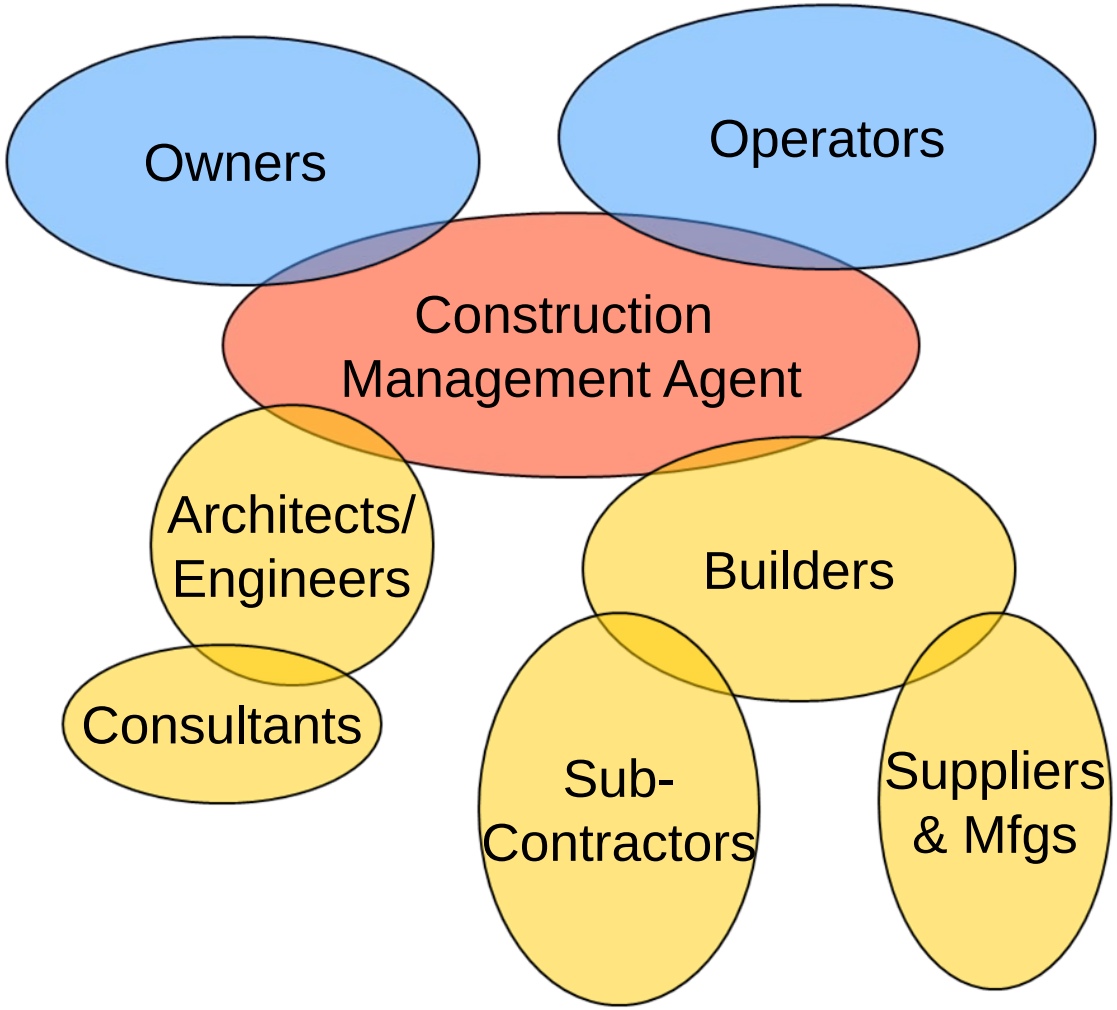
Owners
Operators
Construction Management Agent
Architects/ Engineers
Builders
Consultants
Sub-Contractors
Suppliers & Mfgs

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Project: **CLV ML (Structure)** Register: **Submittals**

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Select: My All **Type:** Please select from below **Status:** Please select from below **Keyword:** Search Reset

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Submittal Register				Status		
ID	Spec Section	Description	Type	Status	Date Of Status	Contains Variations
6085	05 12 00 1.6.1	Shop and Erection Drawings S62Rev.B, S64 to S67, S76Rev.B, A47 (Revision 4)	Shop Drawings	Pending QA Reply	20-Oct-08	No
6071	05 12 00 1.6.1	Shop Drawings 901Rev.A-909Rev.A, 1001Rev.B-1004Rev.B, ES61Rev.A & ES62Rev.D	Shop Drawings	Revise and Resubmit	10-Oct-08	No
6069	05 12 00 1.6.1	Corner and K Brace Connection Calculations 100-285	Shop Drawings	Revise and Resubmit	17-Oct-08	No
6039	05 12 00 1.6.1	Castellated Beam Shop Drawings (Revision 1)	Shop Drawings	Empty	-	No
6056	05 12 00 1.6.1	Shop and Erection Drawings S62Rev.B, S64 to S67, S76Rev.B, A47 (Revision 3)	Shop Drawings	Revise and Resubmit	03-Oct-08	No
6057	05 12 00 1.6.1	Shop and Erection Drawings for S62 and S76 (Revision 3)	Shop Drawings	Revise and Resubmit	10-Oct-08	No
6093	05 12 00 1.6.2.1	Revised Temporary Foundation Layout	Shop Drawings	Approve	17-Oct-08	No
6022	05 12 00 1.6.2.1	Erection Plan (Revision 1)	Shop Drawings	Pending QA Reply	21-Oct-08	No
5974	05 12 00 1.6.2.1	Temporary Foundation Layout	Shop Drawings	Approve as noted	11-Sep-08	No
5244	05 12 00 1.6.2.1	Erection Plan	Shop Drawings	Revise and Resubmit	12-Sep-08	No
5254	05 12 00 1.6.2.2	Welding procedures and qualifications	Certificates	Approve	26-Sep-08	No

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Please select from below
ID
Transmittal ID
Certificates
Closeout Submittals
Design Data
Manufacturer's Field Reports
Manufacturer's Instructions
Operational Maintenance Data
Preconstruction Submittals
Product Data
Samples
Shop Drawings
Test Reports

				Status		
ID	Spec Section		Type	Status	Date Of Status	Contains Variations
6085	05 12 00 1.6.1	62Rev.B, S64 on 4)	Shop Drawings	Pending QA Reply	20-Oct-08	No
6071	05 12 00 1.6.1	Rev.A, Rev.A &	Shop Drawings	Revise and Resubmit	10-Oct-08	No
6069	05 12 00 1.6.1	Corner and K Brace Connection Calculations 100-285	Shop Drawings	Revise and Resubmit	17-Oct-08	No
6039	05 12 00 1.6.1	Castellated Beam Shop Drawings (Revision 1)	Shop Drawings	Empty	-	No
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Select: My All **Type:** Please select from below **Status:** Please select from below **Keyword:** Search Reset

Please select from below
Approve
Approve as noted
Contains Variations
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DoR Deferred
Empty
Pending CQC Review
Pending DoR Review
Pending QA Reply
Receipt Acknowledged
Revise and Resubmit

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Submittal Register				Status		
ID	Spec Section	Description		Status	Date Of Status	Contains Variations
6085	05 12 00 1.6.1	Shop and Erection Drawings S62Rev.B, to S67, S76Rev.B, A47 (Revision 4)		Pending QA Reply	20-Oct-08	No
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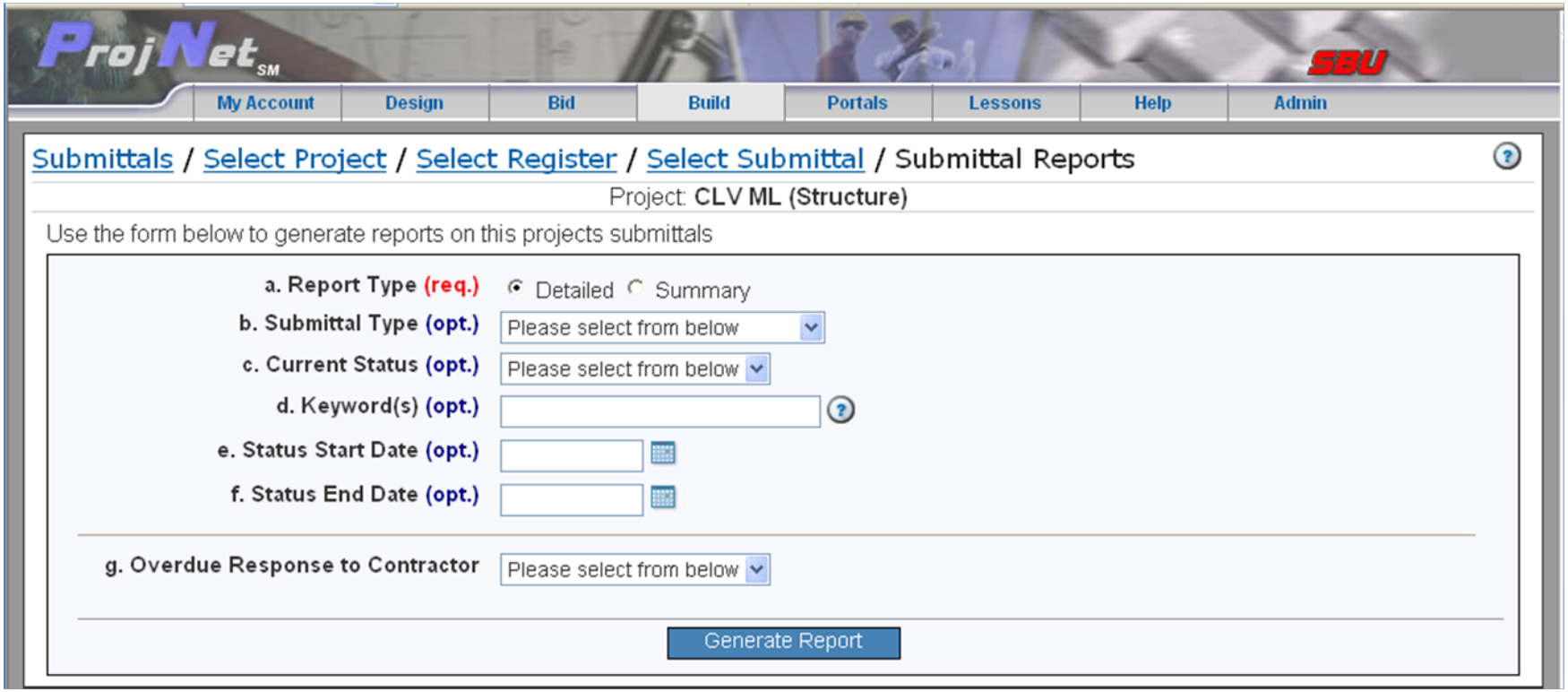
5254	05 12 00 1.6.2.2	Welding procedures and qualifications	Certificates	Approve	26-Sep-08	No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Project: CLV ML (Structure)
Use the form below to generate reports on this projects submittals
a. Report Type (req.)
Detailed
Summary
b. Submittal Type (opt.)
Please select from below
c. Current Status (opt.)
Please select from below
d. Keyword(s) (opt.)
e. Status Start Date (opt.)
f. Status End Date (opt.)
g. Overdue Response to Contractor
Please select from below
Generate Report

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Project: **CLV ML (Structure)**

Use the form below to generate reports on this projects submittals

a. Report Type (req.) ○ Detailed ◉ Summary

b. Submittal Type (opt.) Please select from below

c. Current Status (opt.) Pending CQC Review

d. Keyword(s) (opt.)

e. Status Start Date (opt.)

f. Status End Date (opt.)

g. Overdue Response to Contractor Please select from below

Generate Report

ID ▲	Type	Description	Reviewer	Spec	Section	Current Status	Status Date
5928	Certificates	AISC Quality Certification	Contractor	05 12 00	1.5	Pending CQC Review	
5937	Preconstruction Submittals	Submittal Register	Contractor	013300	J1A1	Pending CQC Review	
5963	Shop Drawings	Fabrication drawings	Contractor	05 12 00	1.6.1	Pending CQC Review	
6065	Product Data	Sauer Welding Electrodes and Rods	Government	05 12 00	2.3.1	Pending CQC Review	
6114	Shop Drawings	Lift Aluminum Handrail Shop Drawings	Government	05 50 00	2.4.2	Pending CQC Review	

5244	Shop Drawings	Contractor	05 12 00	1.6.2.1	Revise and Resubmit	12-Sep-08

Description: Erection Plan
Transmittals:

Id	Name	File Size	Status	Submitted By	SubmittedOn	Included in Submission
350	Erection Plan 70%	8,956.55 kb	Revise and Resubmit	John Baumeister (Hensel Phelps Construction Co.-Orlando, FL)	29-Aug-08	☑

Evaluation(s)

Status: Revise and Resubmit on 11-Sep-08 by Stephanie Jordan (Reynolds Smith and Hills-Merritt Island, FL)
Details: Revise and Resubmit

Contractor shall demonstrate compliance with Specification Section 05 12 00 Paragraph 1.6.2.1. It should be noted that this requires submittal of calculations as well as providing documentation that demonstrates a Florida Registered Professional Engineer developed the plan.

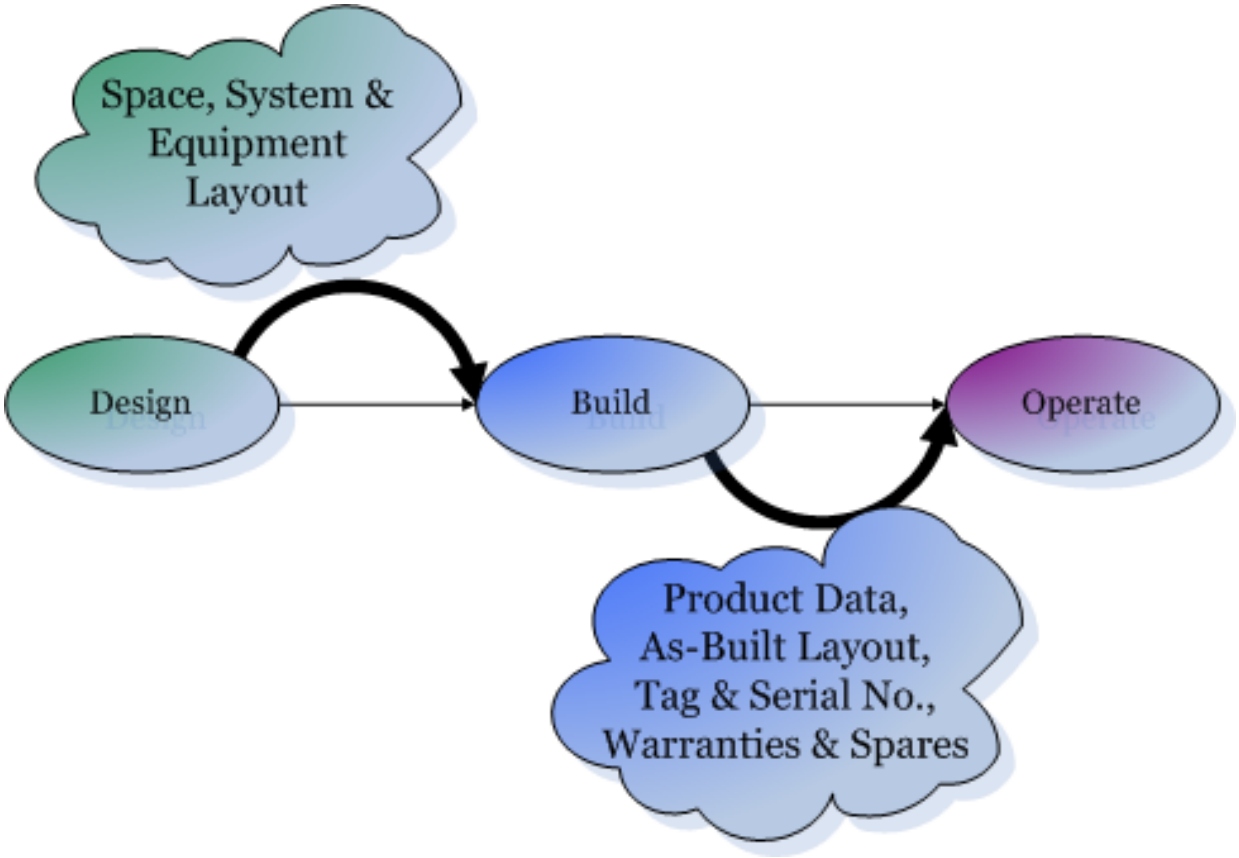
Additionally, the erection plan submittal can not be approved or approved as noted until it is a final document. This submittal is denoted as 70%-Issued for Approval. Interim coordination and review requires contracting officer authorization.

Future approval or approval as noted on the erection plan will not relieve contractor of the responsibility for error, omissions, and compliance with contract requirements. Future approval or approval as noted on the erection plan does not mean endorsement of the presented erection techniques and methodologies.

Agree with RS&H evaluation: ACL

Submitted by Michael Canicatti (KSC Constellation Project Office (NASA)) on 03-Jun-08 09:29 AM

COBIE using the ProjNet^{SM} Submittal Register

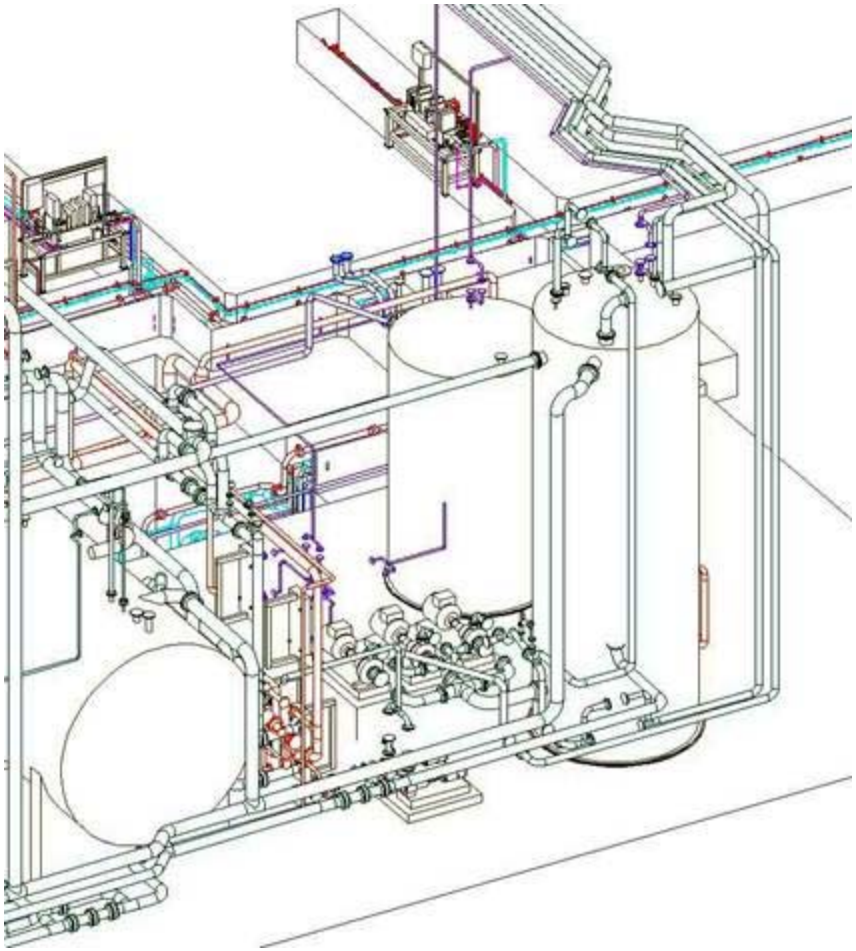


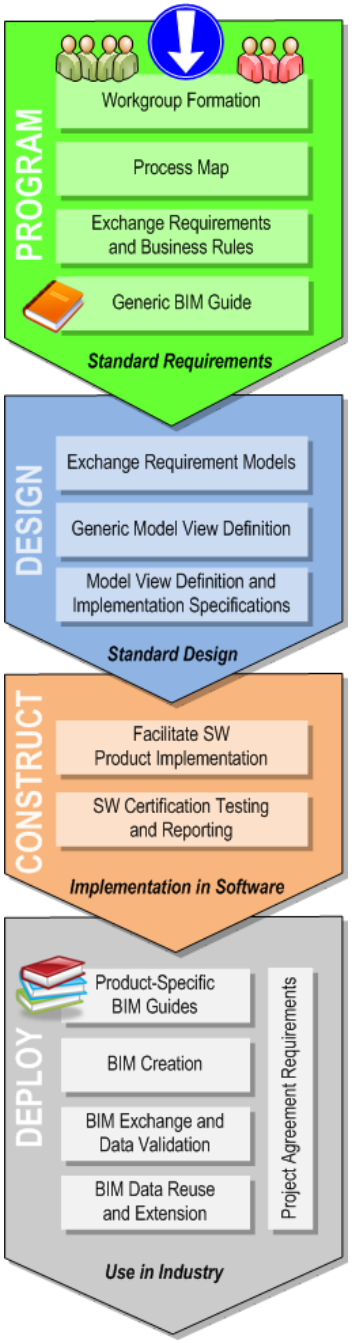
what’s next

standard properties allowing rapid product replacement

what’s next

equipment layout drawings





4 deploy

how can I use it?

or

cingular
9:41 AM
Text
Calendar
Photos
Camera
Calculator
Stocks
Maps
Weather
Notes
Clock
Settings

or

2020 United States Government Calendar

NSN 7510-01-450-5454
Wall Calendar, Large (2006)
For 2007 order NSN 7510-01-450-5447

Printed by UNICOR, FPI-SST

Printed on Recycled Paper

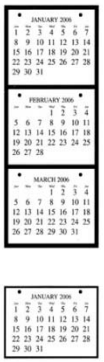
ONE CALENDAR PAD IS DESIGNED TO DISPLAY THREE CONSECUTIVE MONTHS…

Such an arrangement can show any three months desired. The most common use would show the past, current and following months.

Leaves are printed on both sides so that a *single* pad can be used to show three months on one board or six months on two boards.

Separate the leaves at the perforation and place on board or boards as desired.

Boards fitted with hooks for displaying the calendar in three-month increments may be ordered as seperate items. *Do not destroy the boards* as they may be used year after year.



OR SINGLE USE

For single use do not separate the leaves at the perforation or discard them after use as each leaf contains two months. Hang on nail or by thumbtack and fold leaves over.

or

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read instructions on the reverse side prior to initiating this form)

DATE

TRANSMITTAL NO.

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:

FROM:

CONTRACT NO.

CHECK ONE:
- ☐ THIS IS A NEW TRANSMITTAL
- ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL ____

SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)*

PROJECT TITLE AND LOCATION

CHECK ONE: THIS TRANSMITTAL IS FOR ☐ FIO ☐ GOV'T. APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number, etc.)* b.	MFG OR CONTR. PART NUMBER DRAWING OR BROCHURE NO. *(See instruction no. 8)* c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT: SPEC. PARA. NO. e.	CONTRACT REFERENCE DOCUMENT: DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION *(See instruction no. 9)* h.	FOR CE USE CODE i.

REMARKS

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

NAME AND SIGNATURE OF CONTRACTOR

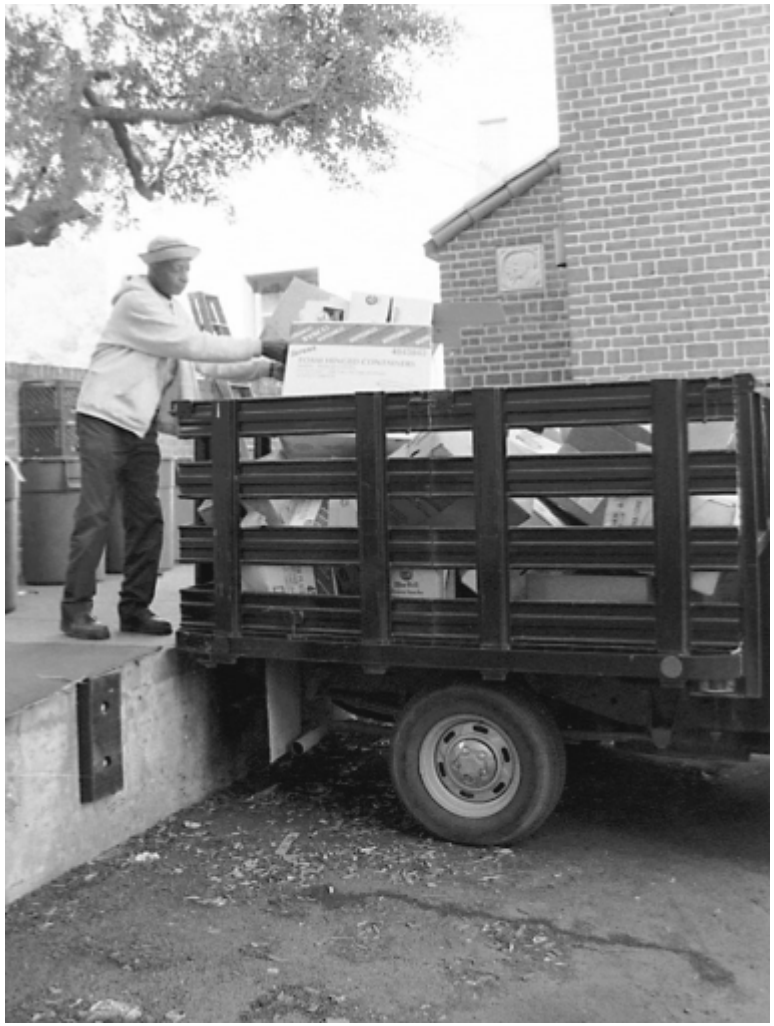
SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED *(List by item no.)*

NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY

DATE

ENG FORM 4025-R, MAR 95 *(ER 415-1-10)* EDITION OF SEP 93 IS OBSOLETE. SHEET ___ OF ___ *(Preparer: CEMP-CEI)*



please help my friend Lyle

Information Technology, BIM & Interoperability Track

Monday, December 8

9:00am – 12:00pm

buildingSMART alliance™ International Symposium

1:00pm – 2:00pm

buildingSMART alliance™ Executive Committee Meeting *Closed to members only

2:00pm – 4:00pm

buildingSMART alliance™ Board of Directors Meeting
*Closed to members only

Tuesday, December 9

9:00am – 12:00pm

[illegible] BuildingSMARTalliance™ Basics - Introd[illegible]

W106 All About Construction Operations Building Information Exchange (COBIE)

[illegible] BIM Education Baseline: What's H[illegible] in Colleges and Universities

W108 Delving into the Details of the Industry Foundation Classes (IFC) Standards — Advanced Session

W109 BIM and Facility Management: What Every Owner and Facility Manager Needs to Know

W111 BIM & Specifications

W112 Benefiting from BIM in the Real World

1:30am – 4:30pm

W205 BIM Best Practices, Case Studies

W206 Architecture, Engineering, Construction, Owner & Operator Testbed: Integration Technologies & Software

W207 BIM in Education – Headliners

W208 Keys to Understanding ISO 16739 and IFC2x4 Standards

W209 BIM Implementation Strategies: Changes in Your Office

W211 BIM and Integrated Project Delivery: A Roadmap for Adoption and Implementation for the Federal Marketplace

W212 Exploring Design Options with Generative Components

Wednesday, December 10

8:00am – 5:00pm

FEDspec®

8:30am – 9:30am

S105 BIM and Facilities Management

S106 Code Compliance: BIM for Building Construction Regulations and e-Government Initiatives

S107 BIM in Education: An Information Exchange for Educators and Industry- Focus on West/ Midwest Universities

S108 3D Standards Enable Better Infrastructure Solutions

S109 Construction Management - Digital Review Process

S112 BIM Benefits Integrated Practice

S113 Introduction to Autodesk Green Building Studio

8:30am – 10:00am

Collaborative BIM Advocates
Special Registration Required (go to www.collaborativeconstruction.com for more info)

10:00am – 11:00am

S205 BIM 101 for Project Managers- Managing BIM Projects

S206 BIMStorm™ Washington

S207 BIM in Education: An Information Exchange for Educators and Industry- Focus on Southern Universities

S208 Overview of the National BIM Standard™

S209 Imaging: Trusted Data vs. Suspect Data in BIM

S212 BIM in Sustainable Design: Not Just a Check-list

S213 Introduction to EcoTect Energy Design

11:00am – 4:00pm

Exhibit Hall Open

4:00pm – 5:00pm

S305 Business Process Change

S306 agcXML Case Studies: Schemas for Transactional Data Exchange

any questions?