FUTURE OF THE BIM CAPABILITY MATURITY MODEL

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Capability Maturity Model

- History
  - First published in NBIMS Version 1 – Part 1
    - The Capability Maturity Model (CMM) and the definition of a Minimum BIM in NBIMS Version 1 – Part 1 were developed to be interrelated.
    - The definition of a Minimum BIM was based on select CMM categories.
    - The CMM was developed to provide industry with a tool to evaluate tangible capabilities by which to determine the current maturity of a BIM.
    - The intent of the CMM was that it would be used internally by organizations to map their current BIM implementation and establish targets for further developing internal capabilities

Background of the CMM

- Items considered when defining a Minimum BIM
  - Use type
  - Data complexity
  - Level of technical capability
  - Organizational maturity

- NBIMS version 2, Chapter 5.2, Minimum BIM includes two versions of the BIM Capability Maturity Model
  - Tabular CMM
  - Interactive CMM
  - Includes 11 Areas of Interests (categories) with 10 Levels of Maturity within each category

Background of the CMM

- Vision
  - Organizations implementing BIM will use the CMM to plot their current location and set goals for future operations based on the spectrum of interests and metrics for each
  - The CMM will be used to convert subjective analysis into an objective quantifiable analysis

Overview of the CMM

TODAY:	June 1, 2011			
© NIBS 2011	The Interactive BIM Capability Maturity Model			
	Area of Interest	Weighted Importance	Choose your perceived maturity level	Credit
	1. Spatial Capability	94%	Not Spatially Located	0.9
	2. Roles or Disciplines	90%	Two Roles Partially Supported	2.7
	3. Data Richness	84%	Expanded Data Set	1.7
	4. Delivery Method	92%	Network Access w/ Basic IA	2.8
	5. Change Management	90%	No ITIL Implementation	0.9
	6. Business Process	91%	Few Bus Processes Collect Info	1.8
	7. Information Accuracy	95%	Initial Ground Truth	1.9
	8. Life-cycle Views	84%	No Complete Project Phase	0.8
	9. Graphical Information	93%	NCS 2D Non-Intelligent As Designed	2.8
	10. Timeliness/ Response	91%	Most Response Info manually re-collected	1.8
	11. Interoperability/ IFC Support	96%	Forced Interoperability	1.9
			Credit Sum	20.1
			Maturity Level	Minimum BIM

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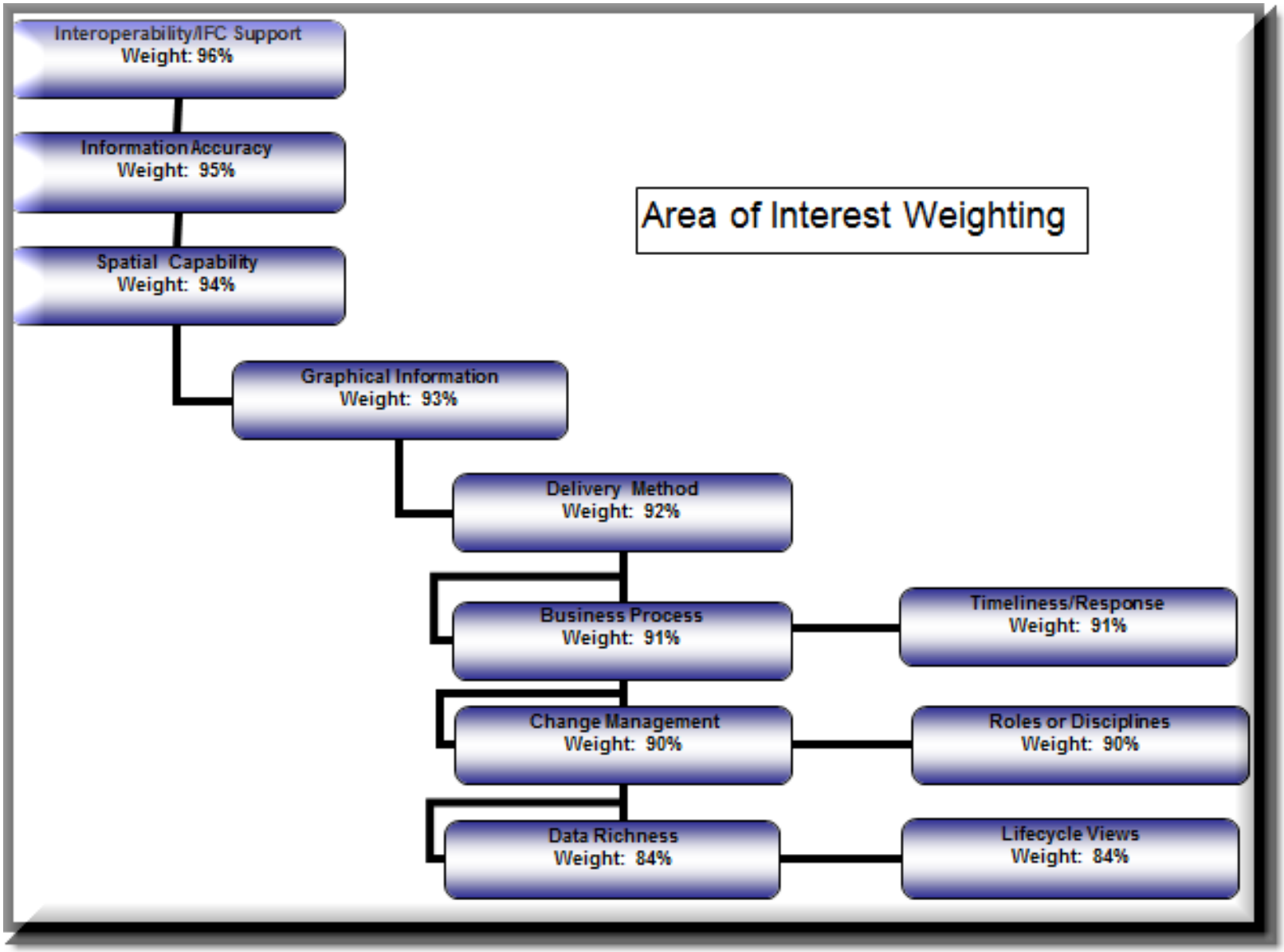
Facilities Information Council
National BIM Standard

http://www.nationalbimstandard.org/nbims-us-v2/chapter.php?id=26

Overview of the CMM



Overview of the CMM - Category Descriptions

Title	Description
Data Richness	Identifies the completeness of the building Information Model from initially very few pieces of unrelated data to the point of it becoming valuable information and ultimately corporate knowledge about a facility
Life-cycle Views	Views refer to the phases of the project and identifying how many phases are to be covered by the BIM. One would start as individual stove pipes of information and then begin linking those together and taking advantage of information gathered by the authoritative source of the information. This category has high cost reduction, high value implications based on the elimination of duplicative data gathering. The goal would be to support functions outside the traditional facility management roles, such as first responders.
Roles Or Disciplines	Roles refer to the players involved in the business process and how the information flows. This is also critical to reducing the cost of data re-collection. Disciplines are often involved in more than one view as either a provider or consumer of information. Our goal is to involve both internal and external roles as both providers and consumers of the same information so that data does not have to be re-created and that the authoritative source is the true provider of the information.
Change Management	Change Management identifies a methodology used to change business processes that have been developed by an organization. If a business process is found to be flawed on in need of improvement, one institutes a "root cause analysis" of the problem and then adjusts the business process based on that analysis. Since this is related to the following item, business processes it should come after it.
Business process	The business process defines how business is accomplished. If the data and information is gathered as part of the business process then data gathering is a no cost requirement. If data is gathered as a separate process then the data will likely not be accurate. The goal is to have data both collected and maintained in a real time environment, so as physical changes are made they are reflected for others to access in their portion of the business process.
Timeliness/ Response	While some information is more static than other information it all changes and up to the minute accuracy may be critical in emergency situations. The closer to accurate real time information you can be the better quality the decisions that are made. Some of those decisions may be life saving in nature.
Delivery Method	Data delivery is also critical to success. If data is only available on one machine then sharing can not occur other than by email or hard copy. In a structured networked environment if information is centrally stored or accessible then some sharing will occur. If the model is a systems oriented architecture (SOA) in a web enabled environment the nentcentricity will occur and information will be available in a controlled environment to the appropriate players. Information assurance must be engineered into all phases.

Overview of the CMM - Matrix descriptions by category

Data Richness	Life-cycle Views	Roles Or Disciplines	Business process	Delivery Method	Timeliness/ Response
Choose this selection when you have established a BIM, but have only very basic data to load	Data is gathered as it is available but no single phase is authoritative nor complete	Roles apply to peoples jobs and at this level no ones role is fully supported through the BIM	Business processes are not defined and therefore not used to store information in the BIM	The BIM is only accessible from a single workstation and has no information assurance built-in	Information is re-collected when needed to respond to a question - the process is slow and un-automated and has to be re-invented each time a question is asked
As you become more advanced additional data will be available and be entered. This is still early in the maturity	Since basic initial data is collected during planning and design this is typically the first phase to be made available, but this can be any phase such as construction also	Roles apply to peoples jobs and at this level there is one persons role that is fully supported through the BIM	Few business processes are designed to collect information to maintain the BIM in the organization	The BIM is not on a network but there is control over who can access the BIM	Most of the information needed to respond to a question must be collected to respond to the question however there is awareness of how to obtain the information
At this point you are beginning to be at a point where you come to the model for basic data and there truly something there	An additional phase is available, typically construction, however the two phases do not necessarily need to be linked	Roles apply to peoples jobs and at this level there are at least two peoples roles that are partially supported through the BIM but they still do have to go to other products to accomplish their jobs	Some business processes are designed to collect information to maintain the BIM in the organization	The BIM is on a network and there is basic password control over data entry and retrieval	Most information is in the BIM however many responses to data calls involve collection of data which is then store in the BIM
This is the first stage when data is turned into information	A third phase is added although information does not have to be flowing, it is assumed that some is	Roles apply to peoples jobs and at this level there are at least two peoples roles that are fully supported through the BIM in that they do not have to go to other products to accomplish their jobs	Most business processes are designed to collect information to maintain the BIM in the organization	The BIM is on a network and there is control over data entry and retrieval	Information is stored in the BIM and many data calls can be answered with information that is already in the BIM
The data is beginning to be accepted as authoritative and the primary source	A forth phase of the facility lifecycle is added and some information is flowing	Peoples jobs in planning and design are fully supported through the BIM in that they do not have to go to other products to accomplish their jobs	All business processes are designed to collect information as they are performed	The BIM is in a limited web environment typically found in a single office environment, IA is not in place to control data entry or retrieval	A significant portion of the response information related to a facility is stored in the BIM

Overview of the CMM - Category Descriptions

Title	Description
Data Richness	Identifies the completeness of the building Information Model from initially very few pieces of unrelated data to the point of it becoming valuable information and ultimately corporate knowledge about a facility

1	***Data Richness***
2	Choose this selection when you have established a BIM, but have only very basic data to load
3	As you become more advanced additional data will be available and be entered. This is still early in the maturity
	At this point you are beginning to be at a point where you come to the model for basic data and there truly something there

4	
5	This is the first stage when data is turned into information
6	The data is beginning to be accepted as authoritative and the primary source
	Some metadata is stored and information is typically best available

7	
8	Most users rely on information as reliable and authoritative, little additional data checking is required
9	The information has metadata and is the authoritative source
	Limited Knowledge Management implies that KM strategies are in place and authoritative information is beginning to be linked

10	
	Full Knowledge Management implies a robust data rich environment with virtually all authoritative information is loaded and linked together

Overview of the CMM - Category Descriptions by Maturity Level

Title	Description
Data Richness	Identifies the completeness of the building Information Model from initially very few pieces of unrelated data to the point of it becoming valuable information and ultimately corporate knowledge about a facility

Maturity Level	A Data Richness
1	Basic Core Data
2	Expanded Data Set
3	Enhanced Data Set

	Data Richness
1	Choose this selection when you have established a BIM, but have only very basic data to load
2	As you become more advanced additional data will be available and be entered. This is still early in the maturity
3	At this point you are beginning to be at a point where you come to the model for basic data and there truly something there

4	Data Plus Some Information
5	Data Plus Expanded Information
6	Data w/Limited Authoritative Information

4	This is the first stage when data is turned into information
5	The data is beginning to be accepted as authoritative and the primary source
6	Some metadata is stored and information is typically best available

Overview of the CMM - Category Descriptions by Maturity Level

Title	Description
Data Richness	Identifies the completeness of the building Information Model from initially very few pieces of unrelated data to the point of it becoming valuable information and ultimately corporate knowledge about a facility

7	Data w/ Mostly Authoritative Information	7		
8	Completely Authoritative Information	8	7	Most users rely on information as reliable and authoritative, little additional data checking is required
9	Limited Knowledge Management	9	8	The information has metadata and is the authoritative source
		10	9	Limited Knowledge Management implies that KM strategies are in place and authoritative information is beginning to be linked
10	Full Knowledge Management	10		Full Knowledge Management implies a robust data rich environment with virtually all authoritative information is loaded and linked together

Applying the CMM - Results

- The CMM was validated in 2007 and 2008 with its use in a double-blind approach by the former NBIMS Testing Team Committee
  - Approach:
    - Separate team members used the CMM to evaluate the information management maturity level of AIA-TAP BIM Award winners.
    - Representatives from the firm/company of the BIM award winners were trained on how to use the CMM
    - Representatives used the CMM to evaluate the maturity level of their BIM independent of team members.
    - Comparison of the scores from the separate evaluations (minimum of 3) revealed a 1-5% variance in total points scored

CMM Use

- Intent of the CMM
  - Provide a tool to convert subjective analysis into an objective quantifiable analysis
  - Provide users with a tool to evaluate a BIM approach on a continuum of information management
  - Provide a tool with which organizations can set goals for increasing internal capabilities based on the defined maturity levels

CMM Use

- Expectations are that the maturity level of a Minimum BIM will increase on an annual basis.

- Re-evaluate the process used to update the CMM
  - Ensure that the increase in the level of maturity expected reasonably aligns with actual capabilities

  - Create a valid method for updating the CMM

CMM Use

Points Required for Certification Levels		
Low	**High**	
20	*29.9*	*Minimum BIM*
30	*39.9*	*Minimum BIM*
40	*49.9*	*Minimum BIM*
50	69.9	**Certified**
70	79.9	**Silver**
80	89.9	**Gold**
90	100	***Platinum***

Points according to CMM 1.8

Points Required for Certification Levels		
Low	**High**	**Not Certified**
40	*49.9*	*Minimum BIM*
50	69.9	**Certified**
70	79.9	**Silver**
80	89.9	**Gold**
90	100	***Platinum***

Points according to CMM v. 1.9

Is the increase in points required to achieve a Minimum BIM aligned with industry implementation and capabilities?

Discussion

- Advantages to using the CMM
  - Available for download from NBIMS
  - Simple design for ease of use by organizations
  - Provides a benchmark for companies beginning their implementation to understand initial capabilities
  - Useful for assessing the functional and organizational capacity of a particular implementation

- Challenges to using the CMM
  - Training on the tool categories, definitions, and functionality
  - Consistent application by organizations across projects
  - Accurate application of subjective analysis

Future of the CMM

- Identify a baseline in the industry and create a system for actively measuring and maintaining the baseline as the industry progresses.
  - What is the typical level of BIM in use?

- Continue developing a vision for more mature BIMs and develop a roadmap for raising the level of BIM robustness.
  - Identify deadlines for achieving higher level and more mature implementation in the future

Future of the CMM

- Evaluate the current level of capability of BIMs developed and used in industry
  - Verify that the categories and maturity levels defined mirror the capabilities available with current technology
  - Validate that the sequence of levels within each category are consistent and identify levels that may be interchangeable based on organizational development
- Establish a plan for future use of the CMM
  - Identify user group
  - Identify other opportunities?

THANK YOU

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