

SUSTAINABLE DESIGN THROUGH BUILDING INFORMATION MODELLING

Seminar and Workshop at the University of Malaya

BIM PERFORMANCE & MEASUREMENT & IMPROVEMENT

Bilal Succar, Change Agents
Kuala Lumpur | Apr 23, 2013

- What is BIM performance?
- How to measure BIM performance
focus of this presentation
- How to improve BIM performance
introductory principles

presentation outline

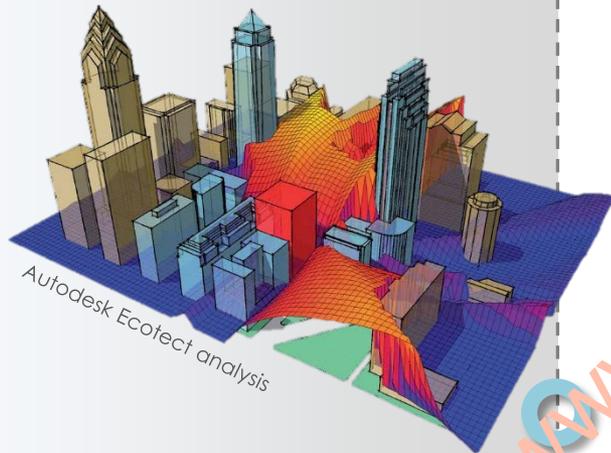
Building Information Modelling is a set of **technologies, processes and policies** enabling multiple stakeholders to **collaboratively design, construct and operate** a facility in virtual space

SECTION 1

What is BIM Performance?

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what is BIM performance?



● it is the ability to deliver BIM-enabled outcomes:

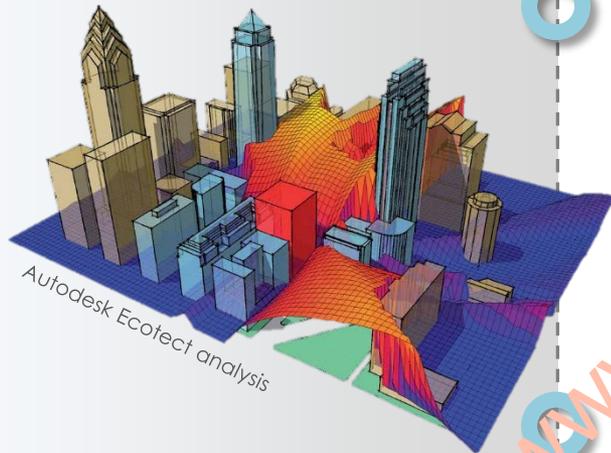
○ unique outcomes

- ▣ clash detection
- ▣ code checking
- ▣ constructability of complex geometries...

○ improved outcomes

- ▣ coordinated drawings
- ▣ improved prefabrication
- ▣ more accurate costs...

what is BIM performance?



It is the ability to generate more output with the same input

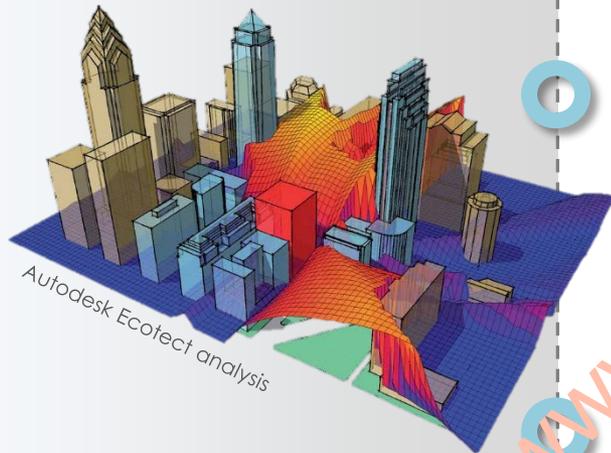
increase productivity

- ▣ better design
- ▣ better quality
- ▣ better service...

reduce waste

- ▣ less rework
- ▣ less physical waste
- ▣ less conflict → waste of time...

what is BIM performance?



it is the ability to improve certainty

- ▣ cost certainty
- ▣ time certainty...

enable fast tracking

- ▣ construction sequencing
- ▣ collaborative workflows...

reduce environmental impact

- ▣ thermal analysis
- ▣ carbon foot print...

SECTION 2
PERFORMANCE MEASUREMENT

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How do you measure
BIM PERFORMANCE?
and why it is important

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BIM performance measurement overview

measurement scales	what is measured	how are results used	who most benefits
Individuals	competency	for education & professional development	practitioners, students & educators
Organizations	capability & maturity	for developing implementation strategies	management, internal BIM leaders & HR
Markets	maturity	for developing guides, protocols & mandates	government & industry associations

what is and how to measure
INDIVIDUAL BIM COMPETENCY

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individual BIM competency

BIM Skill

the BIM tools
they know
how to use

easy to measure



BIM Knowledge

- construction knowledge,
- collaborative processes,
- model-based workflows,
- team dynamics,
- applicable standards,
- data exchange protocols,
- etc...

difficult to measure



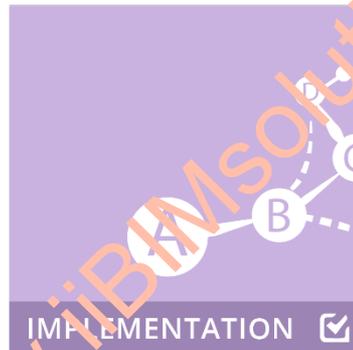
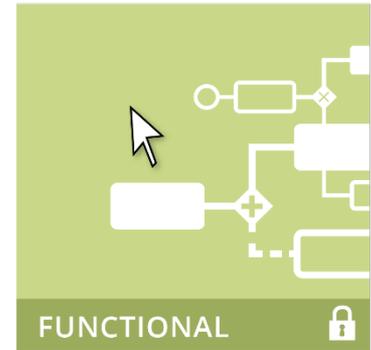
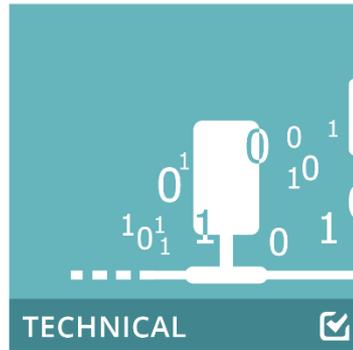
BIM Experience

number/types
of BIM projects
involved in

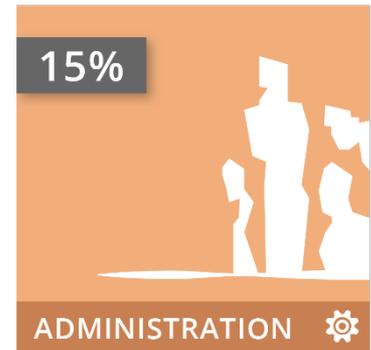
easy to measure

BIM COMPETENCIES

8
sets

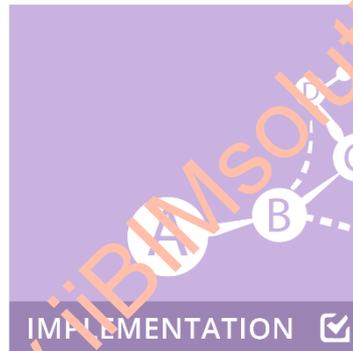


an integrated approach to BIM competency assessment, acquisition and application
(Succar et al., 2013)
image: BIMexcellence.net



8
sets

56
topics

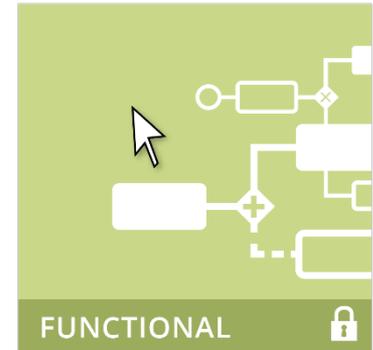


Component Development
Library Management
Standardization & Templates
Technical Training
System and Process Testing
Guides and Manuals

8
sets

56
topics

Collaboration
Facilitation
Project Management
Team Management
Workflow Management



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8
sets

56
topics

100s of
structured BIM
competencies

example 2

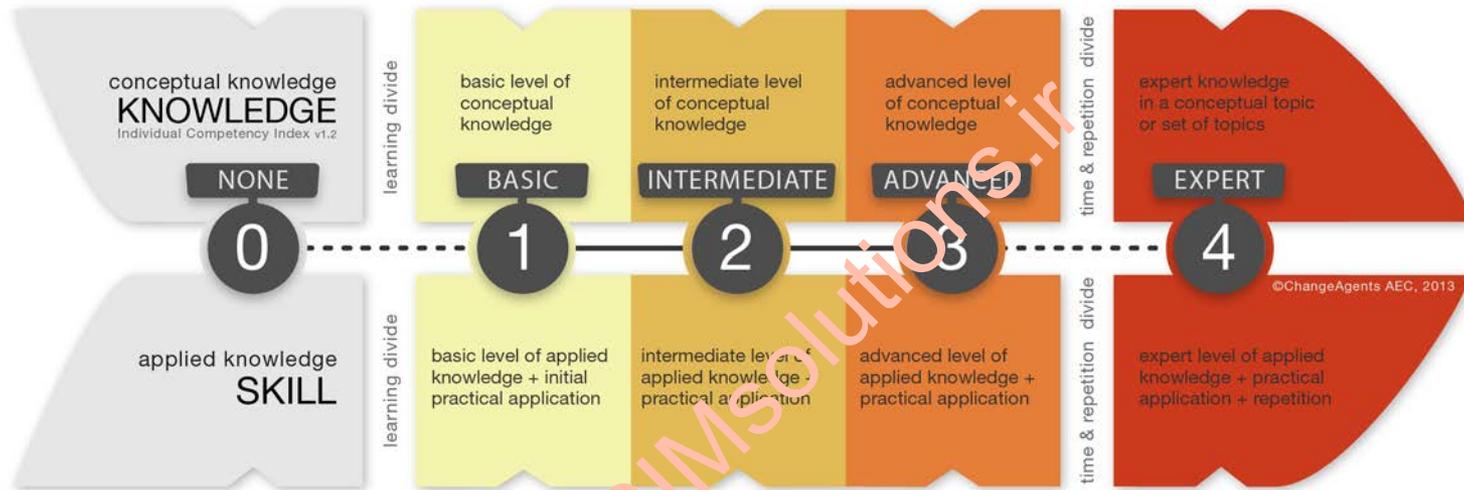
the ability to identify the business benefits of BIM Collaboration on a large project

example 1

the ability to develop a detailed BIM Implementation Strategy for an organization

Leadership
Strategic Planning
Organizational Management
Business Development
Client Management
Partnership and Alliancing





COMPETENCY INDEX

FIVE COMPETENCY LEVELS

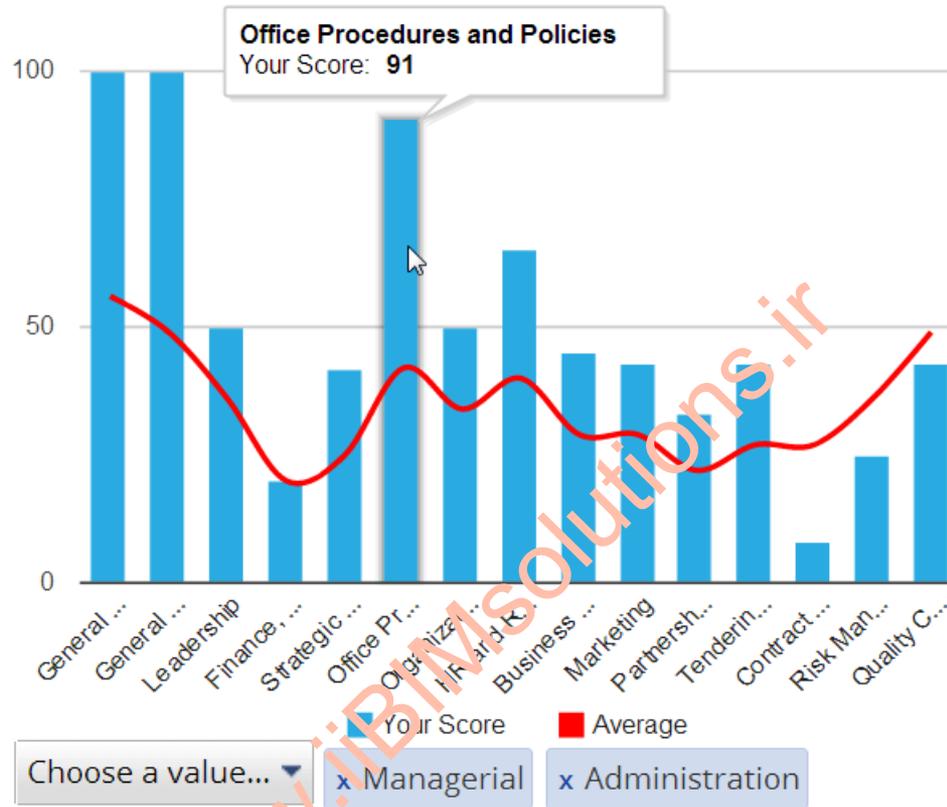
from none to expert

NONE	BASIC	INTER	ADV	EXPERT
General Admin...	General Model Use	Implementation F...	Strategy Develop...	Functional Basics
System and Proce...	Finance, Account...	General R&D	BIM Library Mana...	Collaboration
Risk Management	Office Procedures...	Software-specific...	Designing and Co...	
Quality Control	Strategic Planning	Leadership	Team and Workfl...	
	HR and Recruiting	Teaching and Coa...		
	Analysing & Simul...	Modelling and I...		
	Knowledge Engin...			
	and 7 more (show)			

COMPETENCY MATRIX

competency distribution
across the five levels

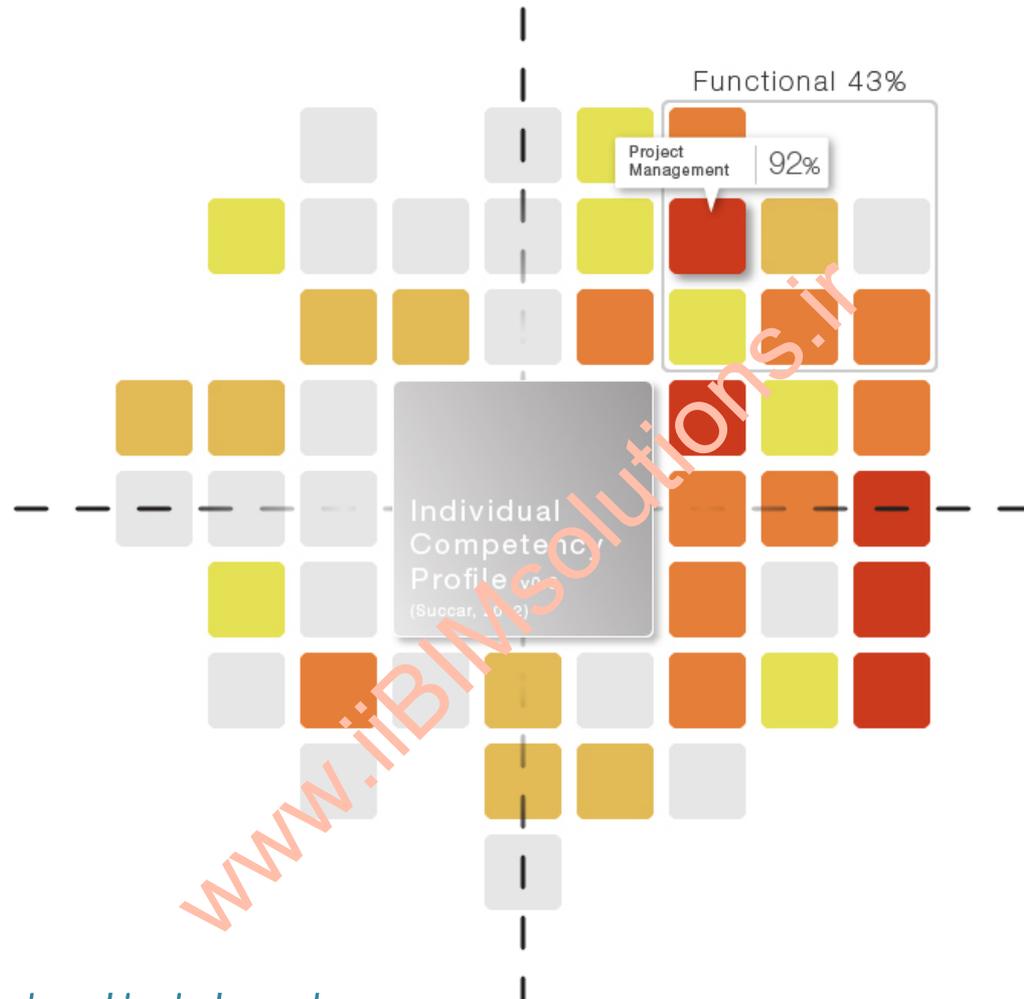
using BIMexcellence.net



SKILL BENCHMARKS

FILTERED BY TYPE & LOCATION

using BIMexcellence.net



individual

COMPETENCY MAP

using BIMexcellence.net

measuring
ORGANIZATIONAL
CAPABILITY & MATURITY

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the ability to perform a task or deliver a BIM service

the degree of excellence in performing a task or delivering a BIM service

BIM capability + BIM maturity =

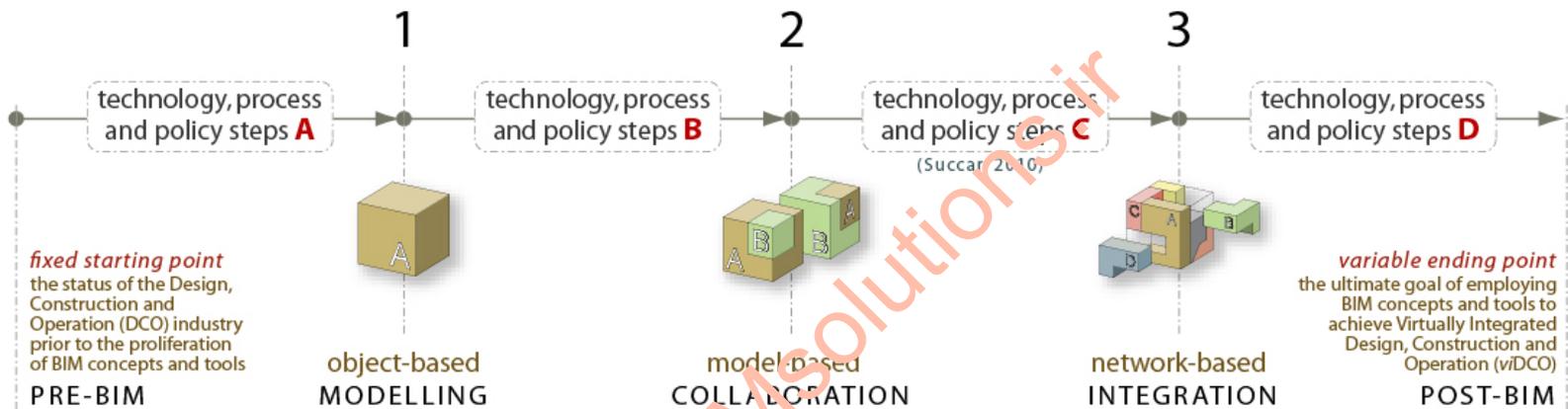
Organization Ability

staff competency

organizational systems

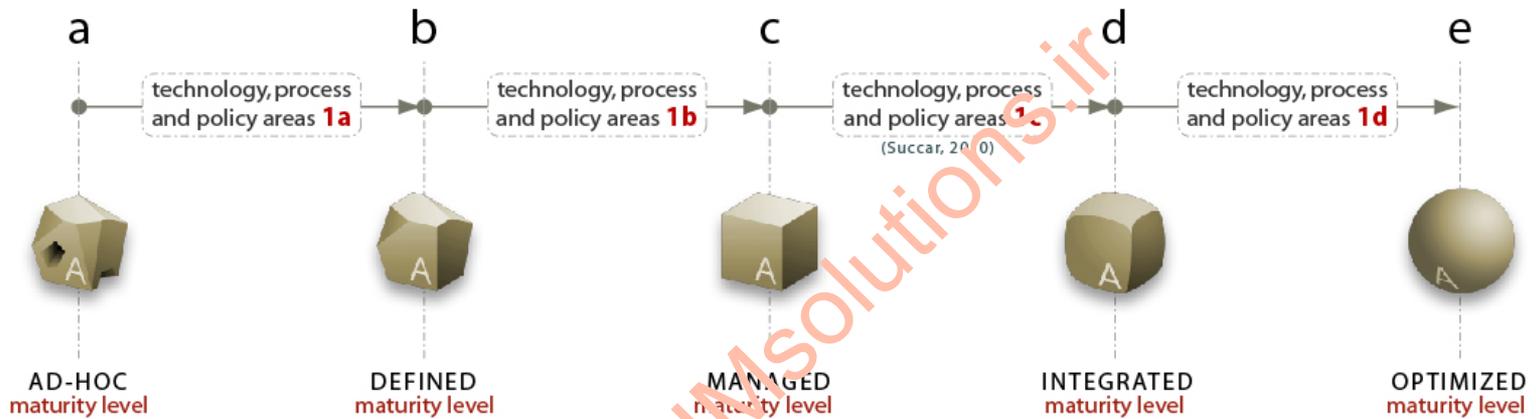
model-based abilities

past performance



measuring BIM Capability

three stages based on minimum ability



measuring BIM Maturity

five levels of excellence
within each capability

There are tens of organizational systems that can be assessed

SOFTWARE



TECHNICAL

EQUIPMENT



TECHNICAL

PARTNERSHIP & ALLIANCING



MANAGERIAL

LIBRARY MANAGEMENT



IMPLEMENTATION

slide 1 of 3
BIMexcellence.net

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There are tens of organizational systems that can be assessed

TEAM AND WORKFLOW MANAGEMENT



FUNCTIONAL

COLLABORATION MANAGEMENT



FUNCTIONAL

HUMAN RESOURCE MANAGEMENT



ADMINISTRATION

MODEL MANAGEMENT



TECHNICAL

slide 2 of 3

BIMexcellence.net

There are tens of
organizational
systems that can
be assessed

IMPLEMENTATION
FUNDAMENTALS



IMPLEMENTATION

CHANGE
FACILITATION



RESEARCH AND...

QUALITY
MANAGEMENT



ADMINISTRATION

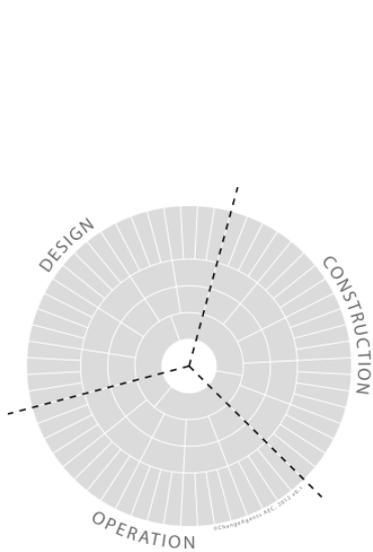
TENDERING AND
PROCUREMENT



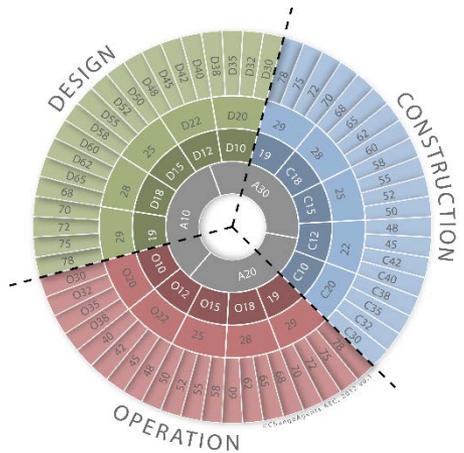
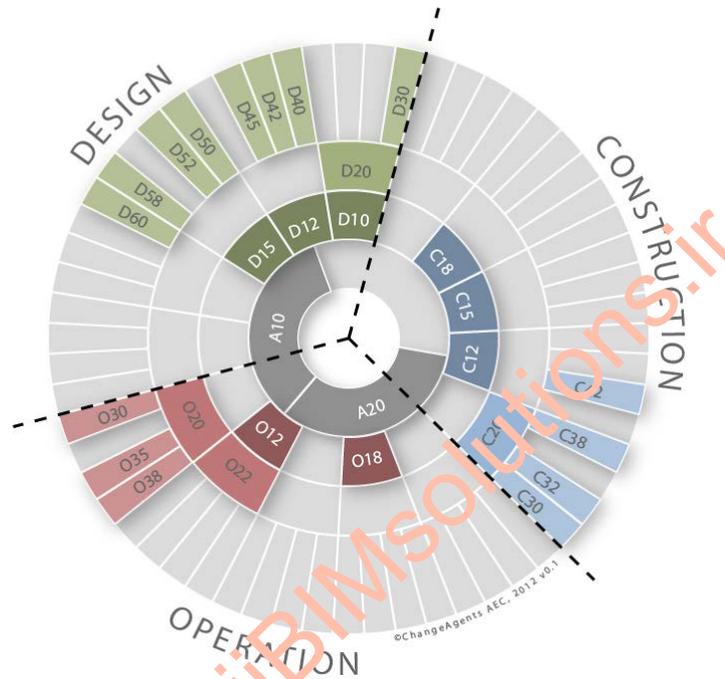
ADMINISTRATION

slide 3 of 3
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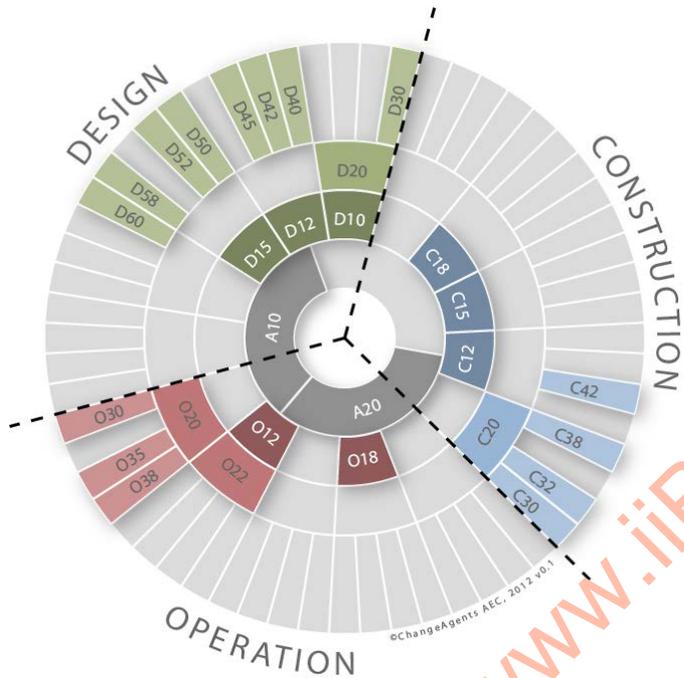
no BIM



utopian BIM

PROJECT PERFORMANCE

through Model-Use Metrics



D10 SPACE PROGRAMMING

D12 DESIGN AUTHORIZING

D15 DOCUMENTATION

C12 CONSTRUCTION LOGISTICS

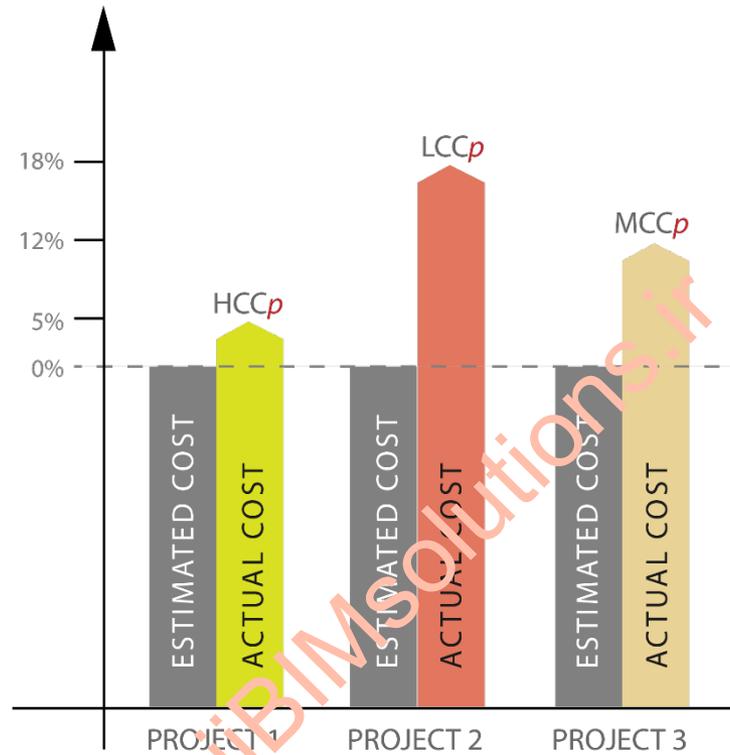
C42 OFFSITE MANUFACTURING

O12 ASSET MAINTENANCE

O30 PERFORMANCE MONITORING

A20 LEAN MODELLING

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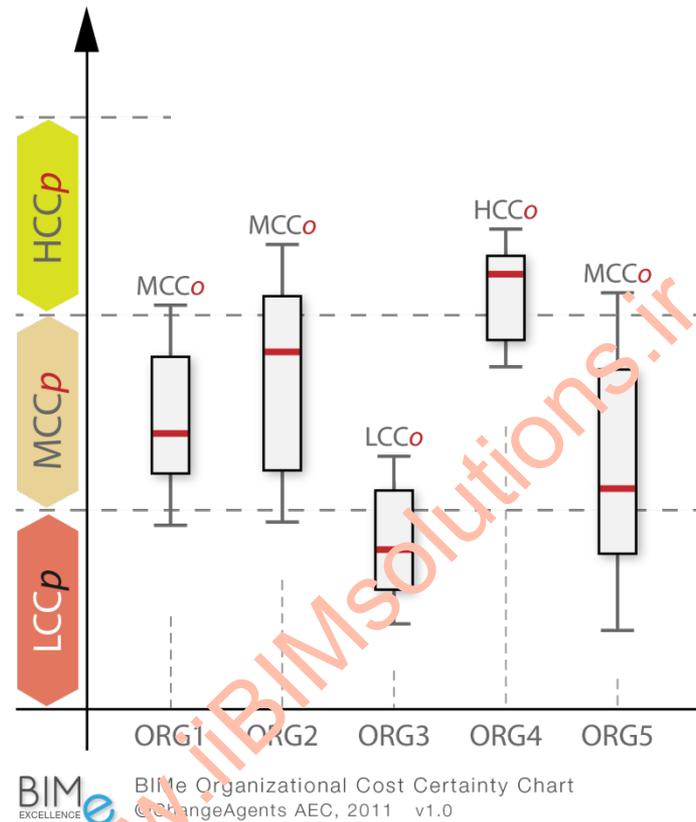
COMPARING
3 PROJECTS



BIMe Project Cost Certainty Chart
© ChangeAgents AEC, 2011 v1.0

PAST PERFORMANCE

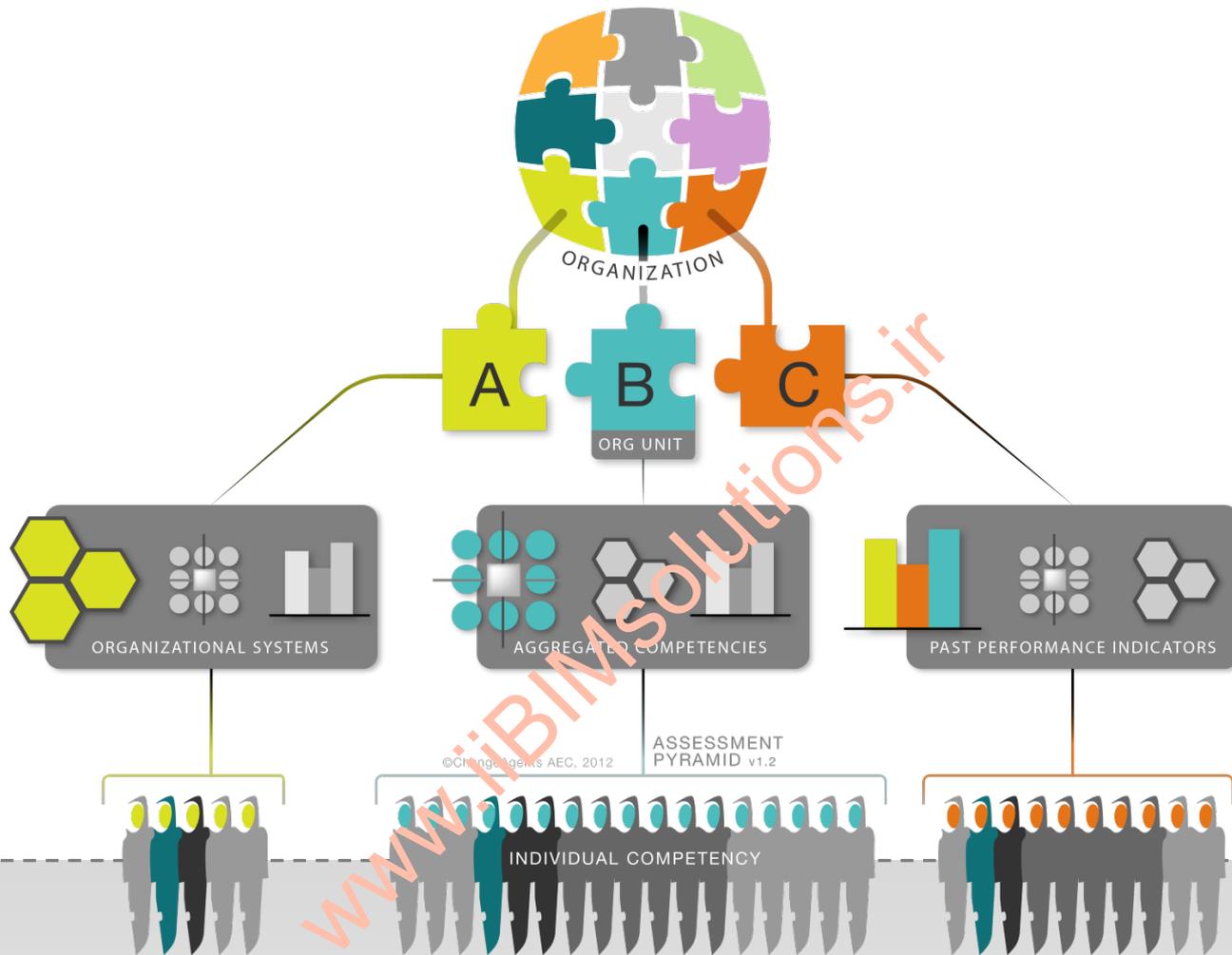
e.g. Cost Certainty
across projects



COMPARING
5 ORGANIZATIONS

BIM EXCELLENCE | BIM Organizational Cost Certainty Chart
© ChangeAgents AEC, 2011 v1.0

PAST PERFORMANCE
e.g. Cost Certainty
across organizations or units



integrated BIM performance
through an assessment pyramid



a Malaysian perspective

Organisational Readiness to Implement Building Information Modelling: A framework for design consultant in Malaysia, Ahmad Tarmizi Haron

measuring
MARKET MATURITY

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how to measure
Market Maturity
three methods

● Conduct surveys covering
BIM adoption
current practice

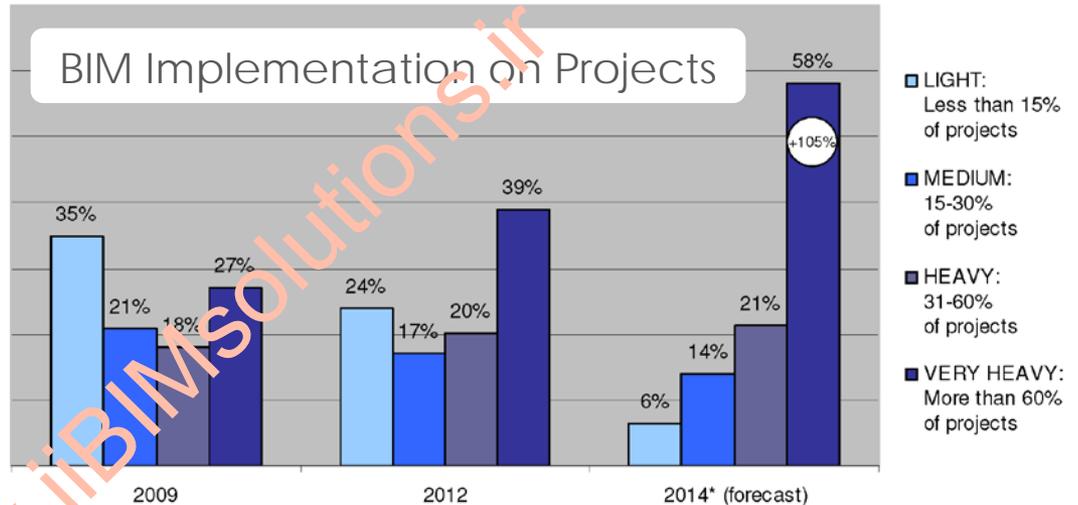
● Assess the contents of
important BIM guides and
other publications
new complementary method

● Assess whether BIM guides,
protocols and mandates
are available and enforced
another complementary method

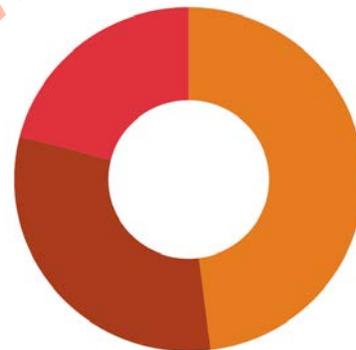
how to measure Market Maturity *method 1*

Conduct surveys covering BIM adoption *samples*

The Business Value of BIM in North America, McGraw-Hill, 2012



UK National BIM Survey by NBS, 2013



Awareness and use of BIM

Just aware of BIM	48%	●
Aware and currently using BIM	31%	●
Neither aware nor using	21%	●

how to measure
Market Maturity
method 2

Assess the contents of
noteworthy BIM publications
new research - description:

50 noteworthy publications
from across eight countries
where assessed:

- Australia
- Denmark
- Finland
- Norway
- Singapore
- Netherlands
- United Kingdom
- United States

to be published in
(Kassem, Succar &
Dawood, 2013a)

as based on
the PhD Thesis
(Succar, 2013)

how to measure Market Maturity *method 2*

to be published in
(Kassem, Succar &
Dawood, 2013a)

as based on
the PhD Thesis
(Succar, 2013)

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then they were analysed
using 18 labels in three sets:

Content Cluster	Content Label
Guides	Best Practice
	Case Study
	Framework or Model
	Guideline
	Learning Module or Material
	Report
Protocols	Strategy or Vision
	Taxonomy or Classification
	Metric or Benchmark
	Manual
	Plan
	Procedure or workflow
Mandates	Protocol or Convention
	Specification or Prescription
	Standard or Code
	Contract or Agreement
	Programme or Schedule
	Requirement, Rule or Policy

cont'd 

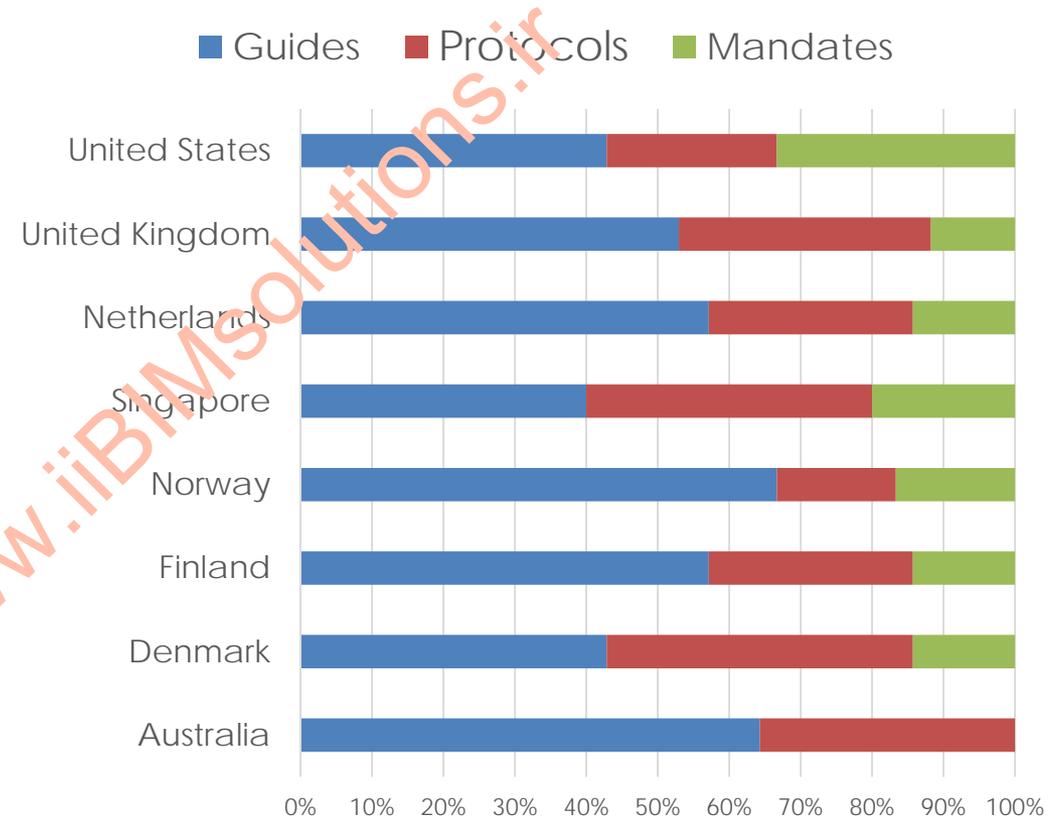
how to measure Market Maturity *method 2*

results based on contents of these publications

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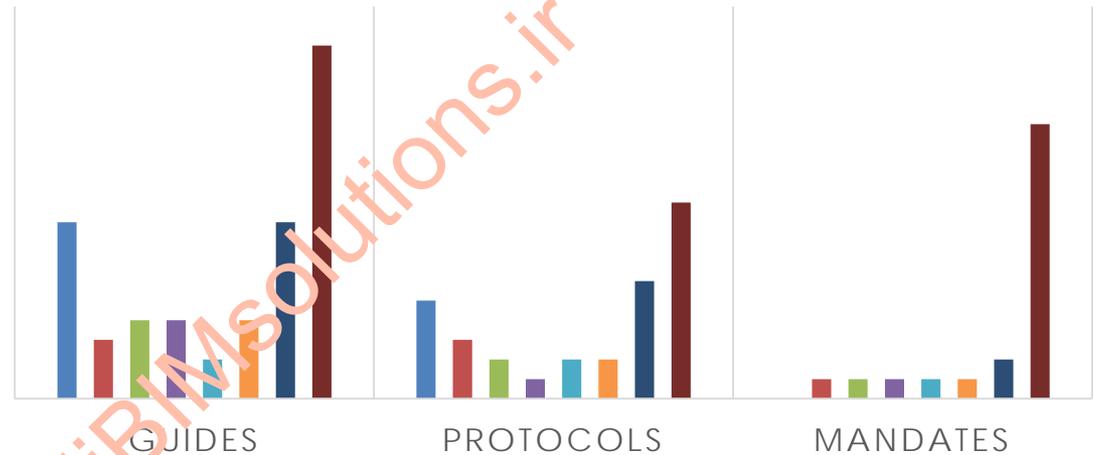


tentative results as of April 23, 2013

cont'd →

how to measure Market Maturity *method 2*

Assess the contents of noteworthy BIM publications



to be published in
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Dawood, 2013a)

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the PhD Thesis
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tentative results as of April 23, 2013

how to measure
Market Maturity
method 3

Assess whether BIM guides,
protocols and mandates are
available and enforced

high market maturity



optimised



integrated | mandated



prescribed



defined | recommended



ad hoc

low market maturity

to be published in
(Kassem, Succar &
Dawood, 2013b)

as based on
the PhD Thesis
(Succar, 2013)

SECTION 3

PERFORMANCE IMPROVEMENT

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strategies for
improving BIM
performance

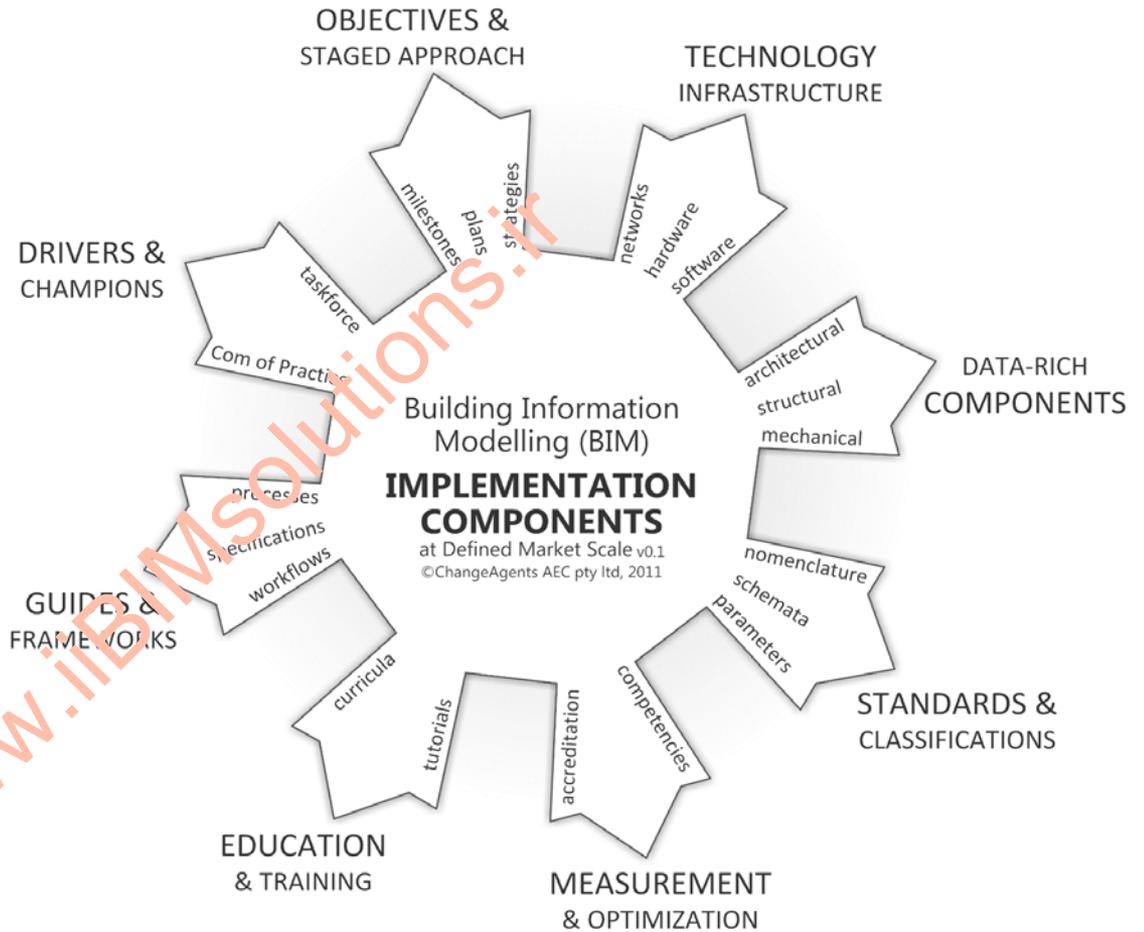
● Develop a vision and hope others will share it

● Develop a vision, identify a target and mandate a staged approach

● ...all of the above *plus* incentivise, invest in change and actively assist adopters

● ...all of the above *plus* measure, certify and continuously improve

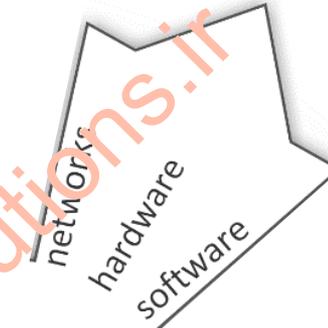
components of BIM performance improvement



OBJECTIVES &
STAGED APPROACH



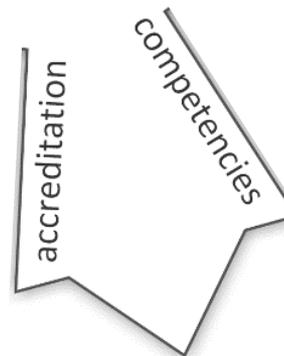
TECHNOLOGY
INFRASTRUCTURE



EDUCATION
& TRAINING



MEASUREMENT
& OPTIMIZATION

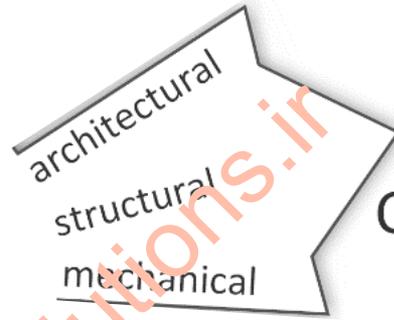


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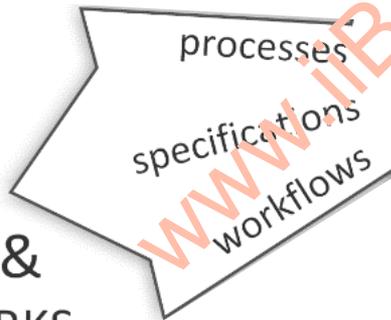
DRIVERS &
CHAMPIONS



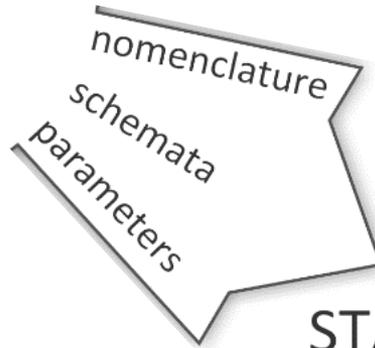
DATA-RICH
COMPONENTS



GUIDES &
FRAMEWORKS



STANDARDS &
CLASSIFICATIONS



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THANKYOU

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