

# 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*

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## presentation outline

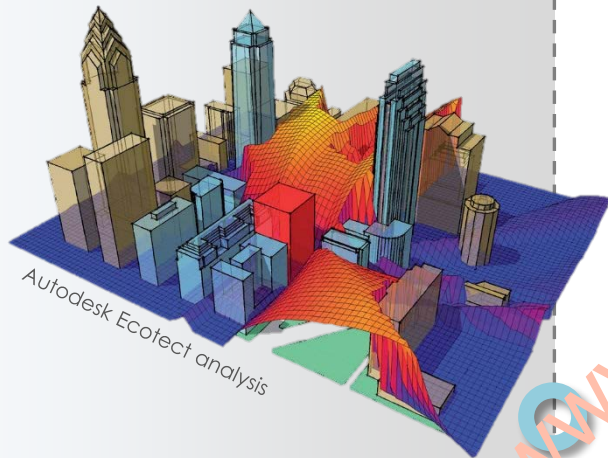
Building Information  
Modelling is a set of  
**technologies, processes  
and policies** enabling  
multiple stakeholders to  
**collaboratively design,  
construct and operate** a  
facility in virtual space

## SECTION 1

# What is BIM Performance?

[www.iBIMsolutions.ir](http://www.iBIMsolutions.ir)

what is BIM performance?



it is the ability to deliver BIM-enabled outcomes:

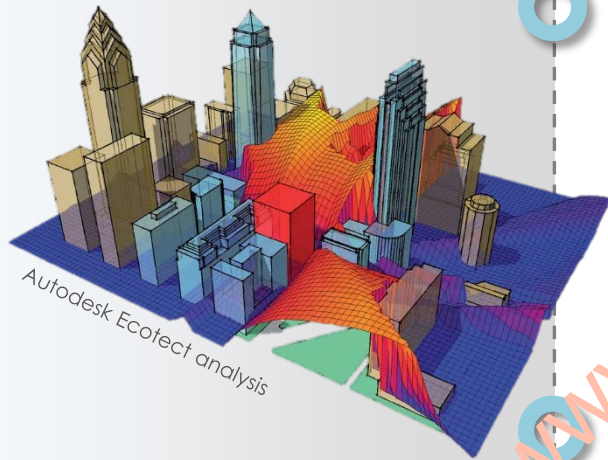
unique outcomes

- 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

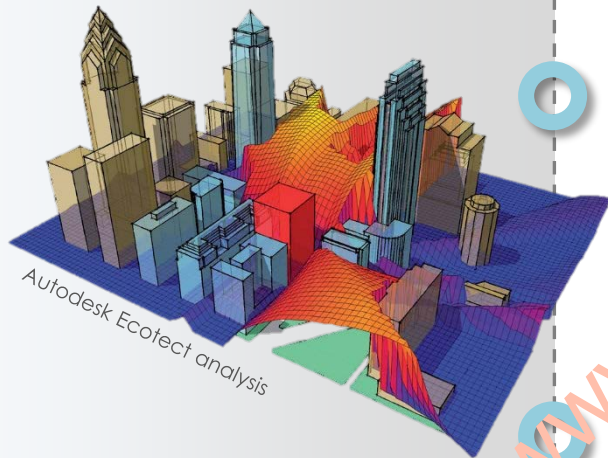
increase productivity

- ▣ 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

[www.iibmsolutions.ir](http://www.iibmsolutions.ir)



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

[www.iBIMsolutions.ir](http://www.iBIMsolutions.ir)

# BIM performance measurement overview

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

*what is* and *how to measure*  
INDIVIDUAL BIM COMPETENCY

[www.iBIMsolutions.ir](http://www.iBIMsolutions.ir)

# 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



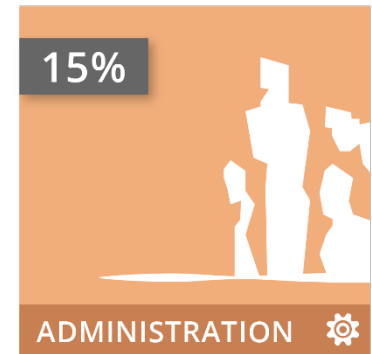
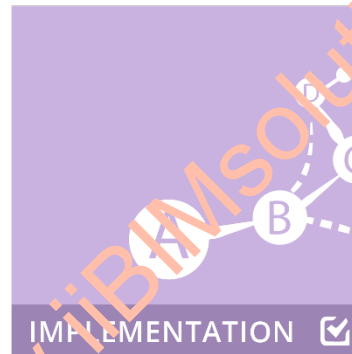
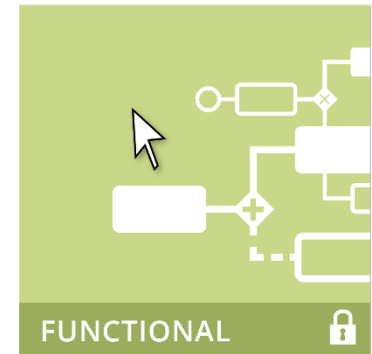
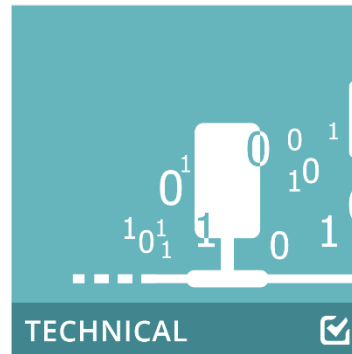
## BIM Experience

number/types  
of BIM projects  
involved in

easy to measure

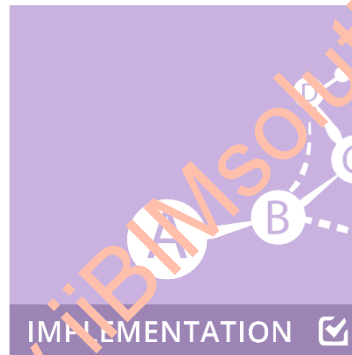
# BIM COMPETENCIES

8  
sets



8  
sets

56  
topics



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

56  
topics

Team Manag  
Workflow Manag



8  
sets

56  
topics

100s of  
structured BIM  
competencies

### *example 2*

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

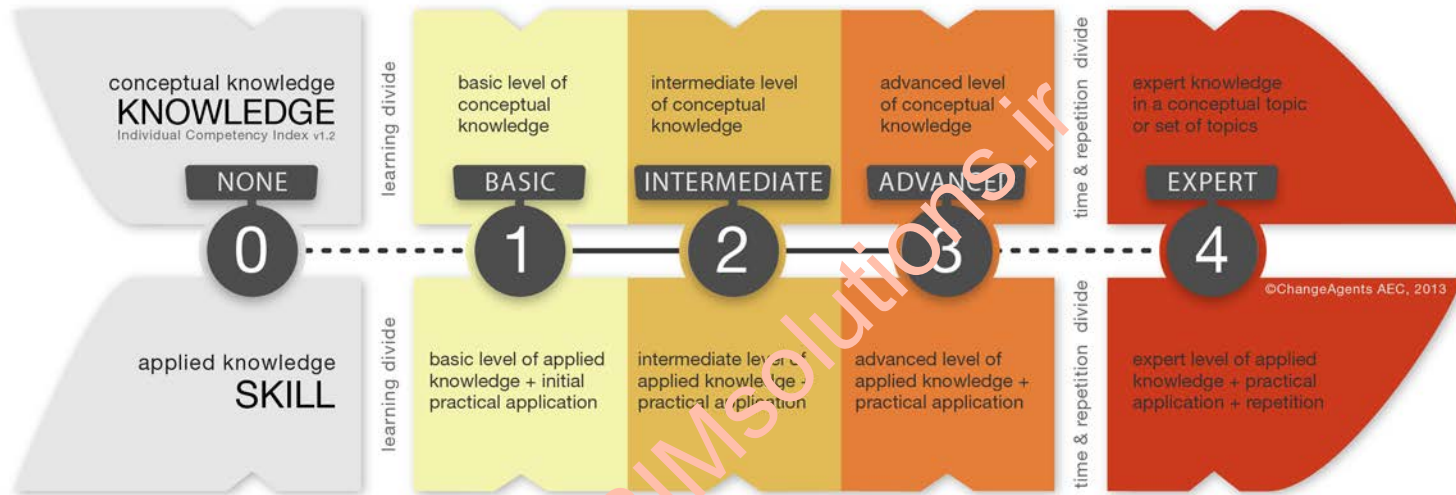
### *example 1*

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

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



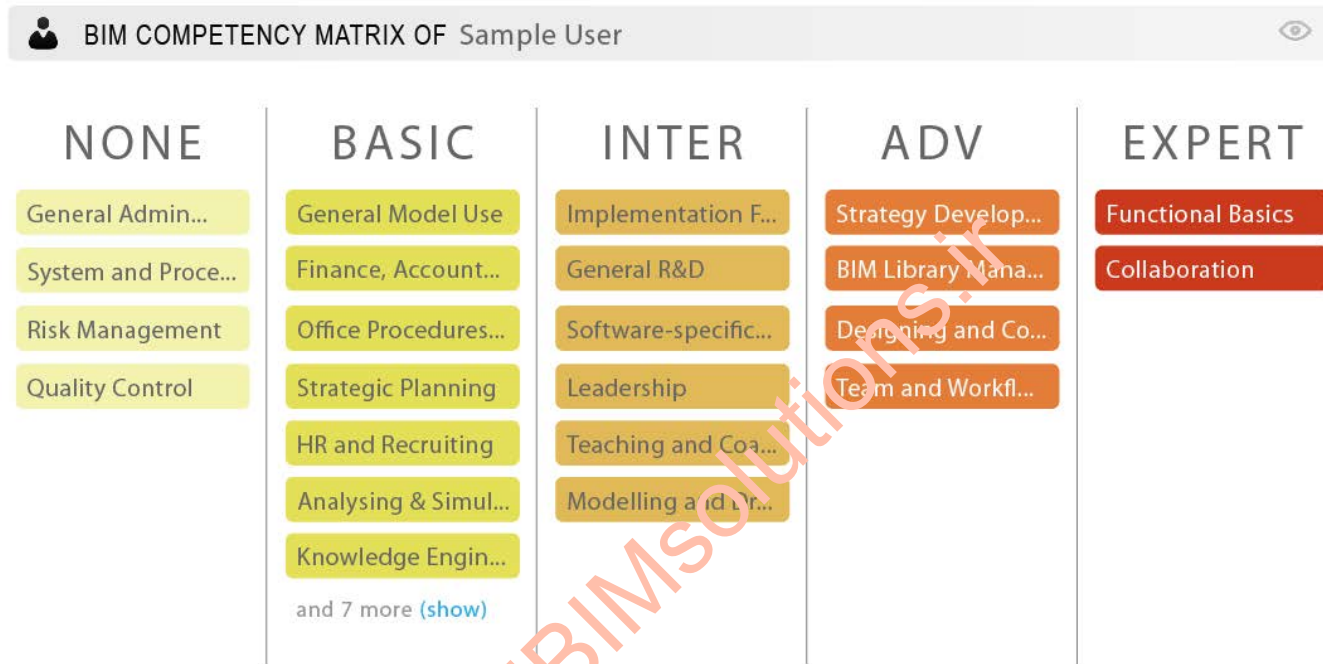




# COMPETENCY INDEX

## FIVE COMPETENCY LEVELS

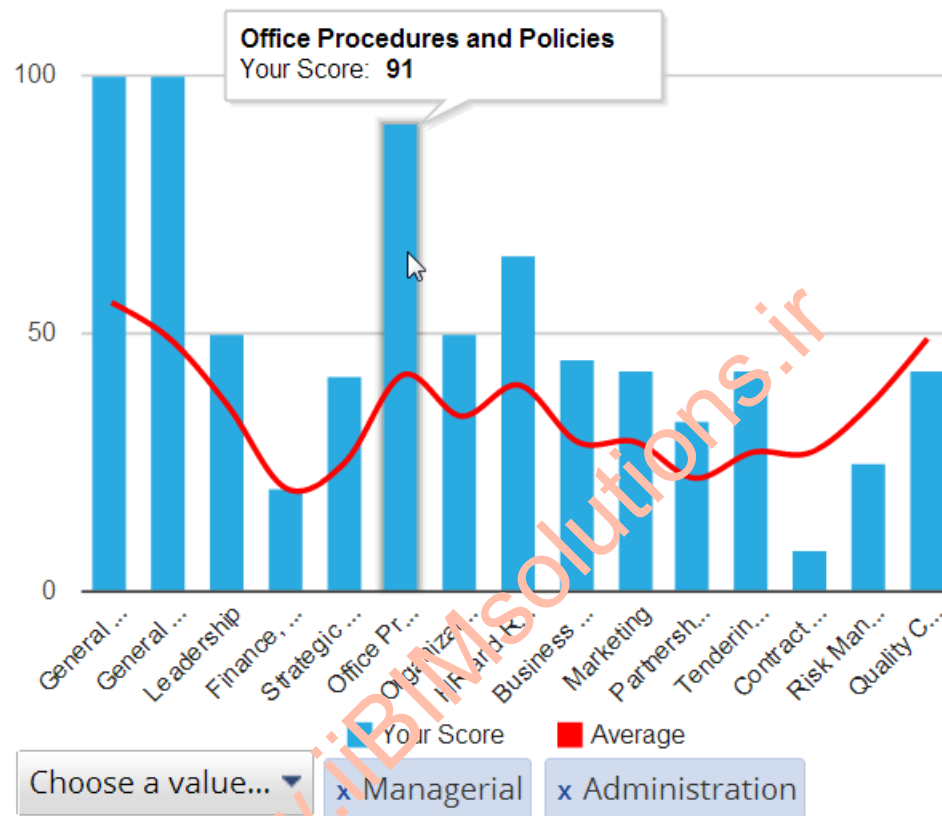
*from none to expert*



# COMPETENCY MATRIX

competency distribution  
across the five levels

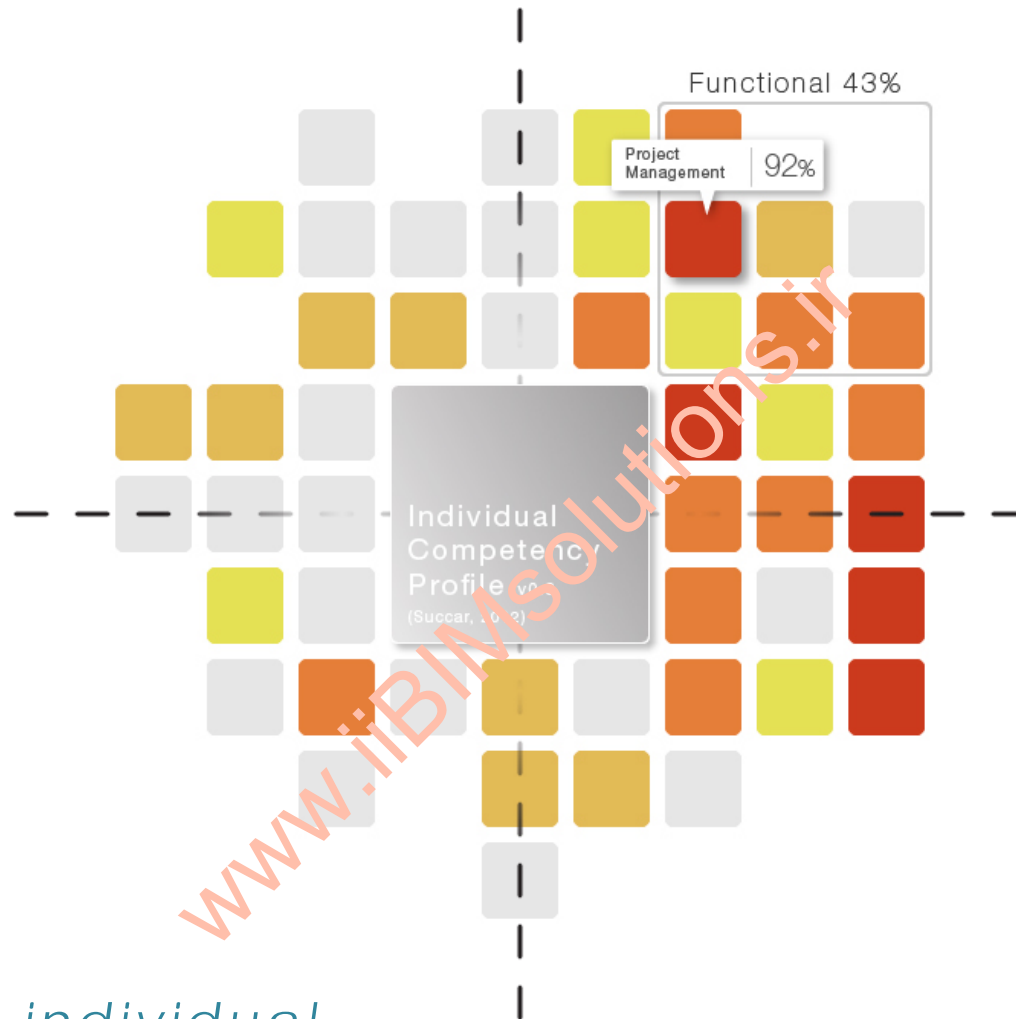
*using BIMexcellence.net*



# SKILL BENCHMARKS

## FILTERED BY TYPE & LOCATION

using BIMexcellence.net



*individual*

# COMPETENCY MAP

*using BIMexcellence.net*

*measuring*  
ORGANIZATIONAL  
CAPABILITY & MATURITY

[www.iibmsolutions.ir](http://www.iibmsolutions.ir)

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 =

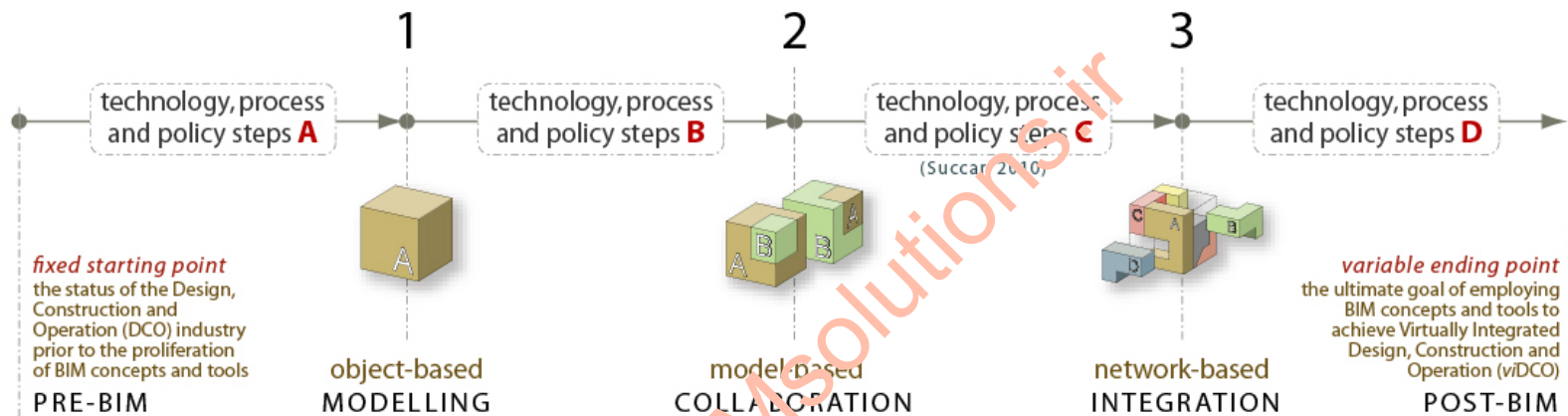
## Organization Ability

staff competency

organizational systems

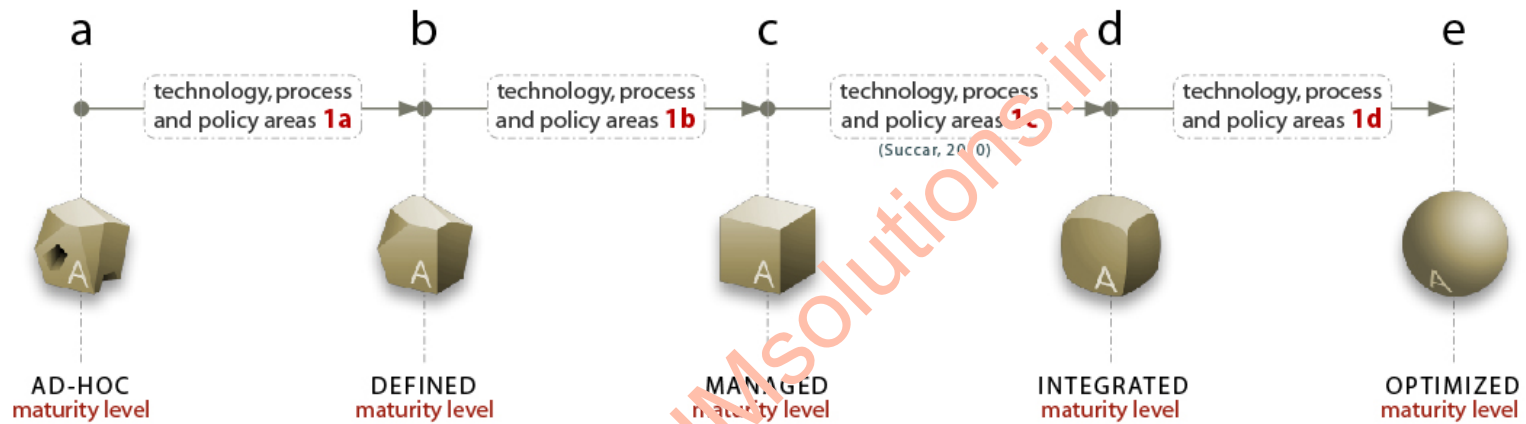
model-based abilities

past performance



# measuring BIM Capability

## three stages based on minimum ability



# measuring BIM Maturity

five levels of excellence  
within each capability

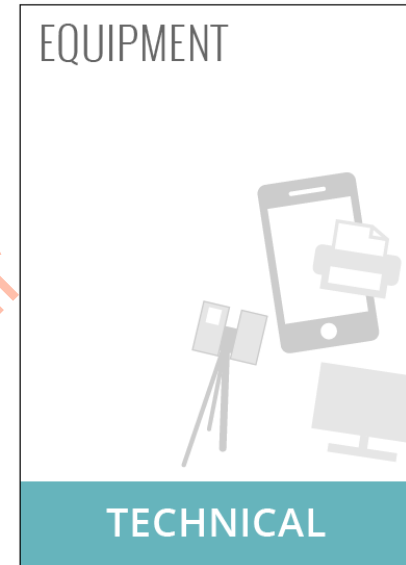


There are tens of  
organizational  
systems that can  
be assessed

slide 1 of 3

BIMexcellence.net

as presented by Bilal Succar at the  
University of Malaya, April 23, 2013  
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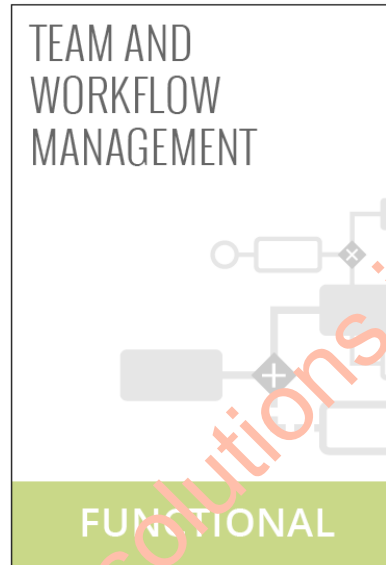


There are tens of  
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be assessed

slide 2 of 3

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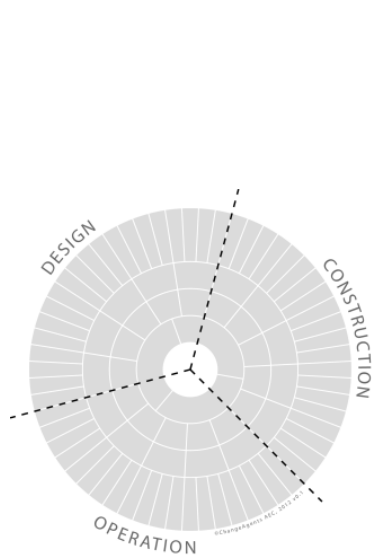
There are tens of  
organizational  
systems that can  
be assessed

slide 3 of 3

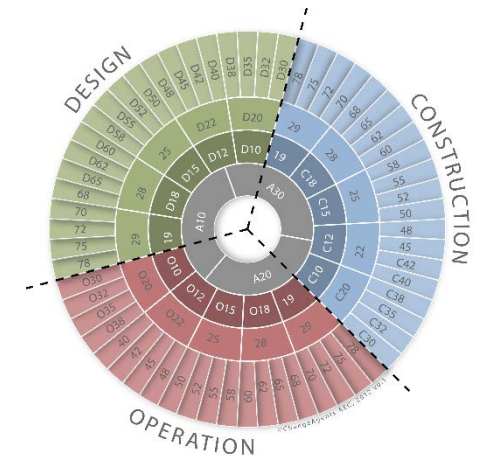
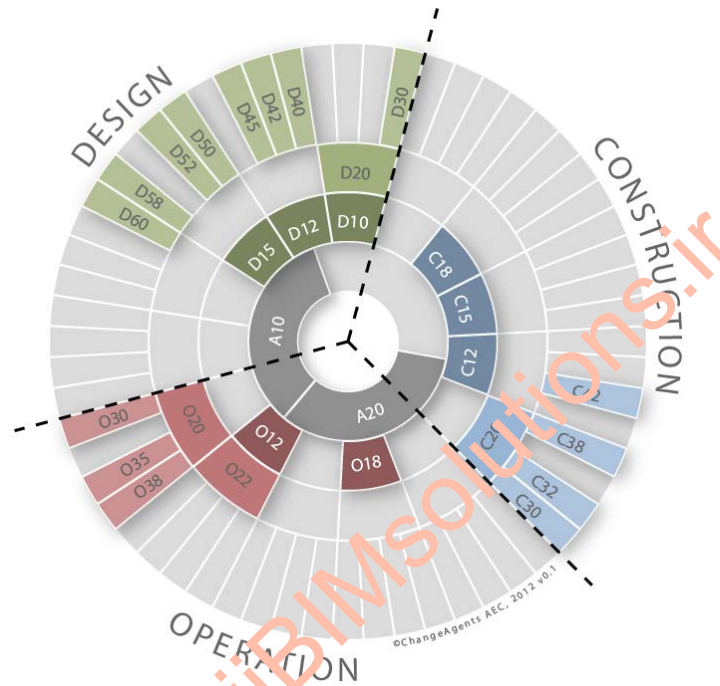
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no BIM



utopian BIM

# PROJECT PERFORMANCE

*through Model-Use Metrics*



D10 SPACE PROGRAMMING

D12 DESIGN AUTHORIZING

D15 DOCUMENTATION

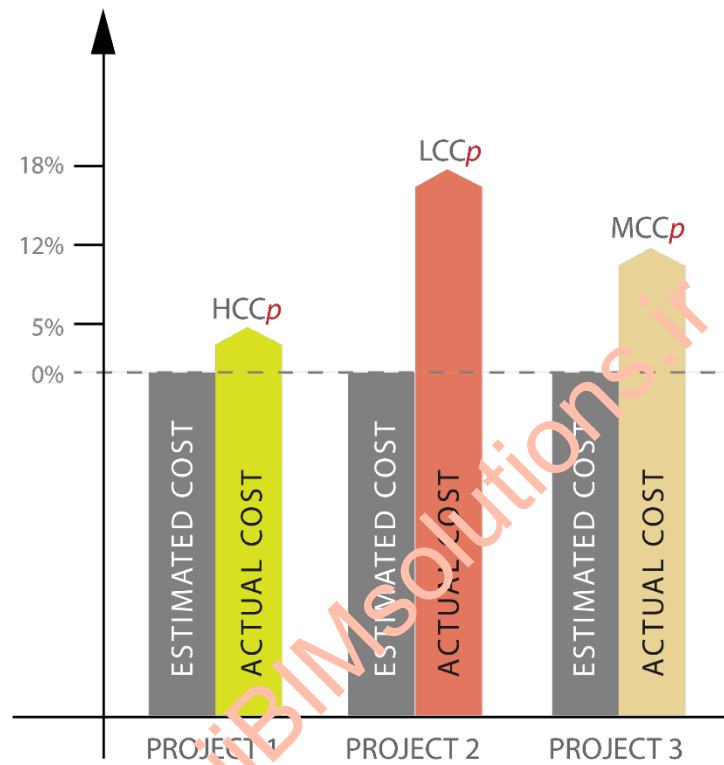
C12 CONSTRUCTION LOGISTICS

C42 OFFSITE MANUFACTURING

O12 ASSET MAINTENANCE

O30 PERFORMANCE MONITORING

A20 LEAN MODELLING

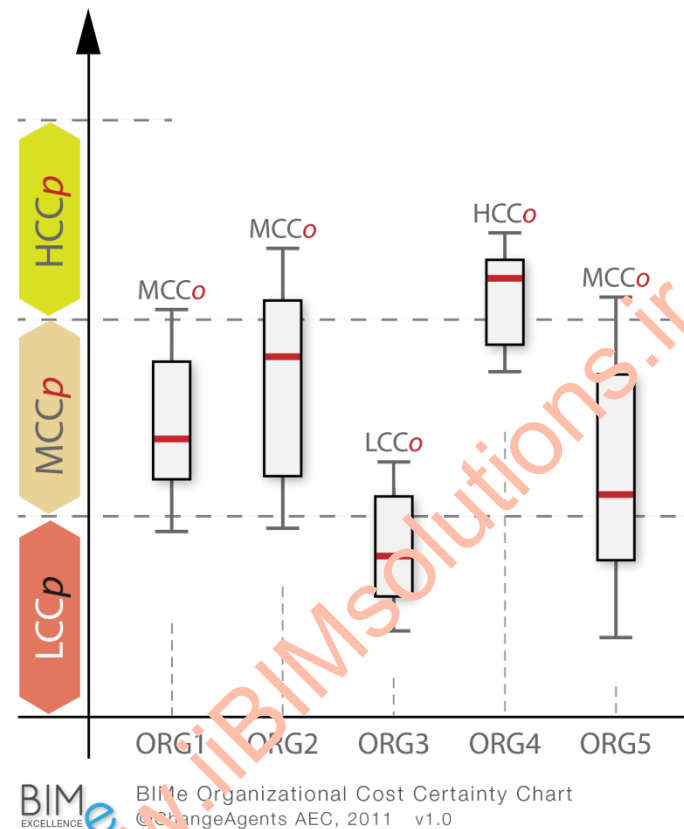


COMPARING  
3 PROJECTS



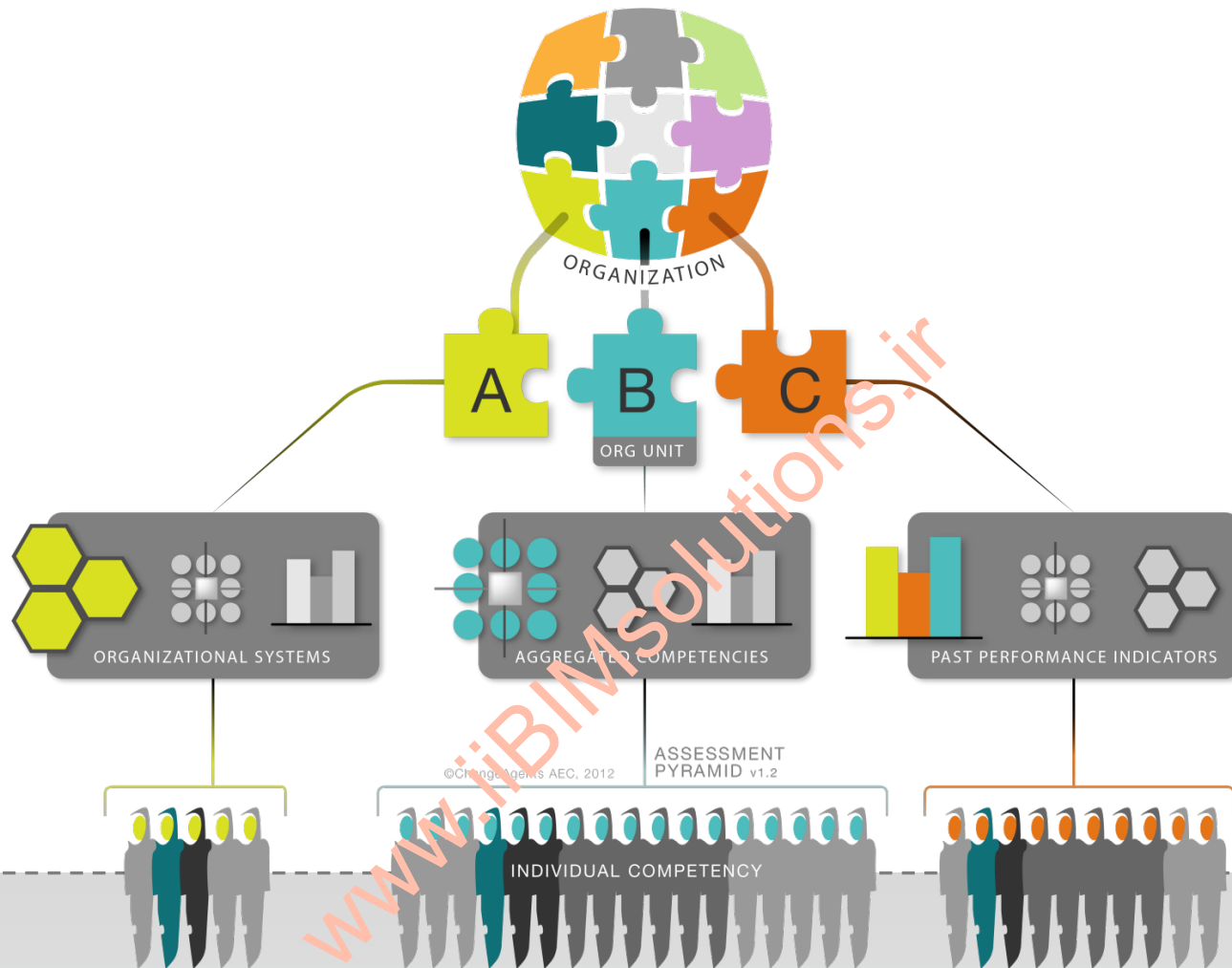
BIMe Project Cost Certainty Chart  
© ChangeAgents AEC, 2011 v1.0

PAST PERFORMANCE  
e.g. Cost Certainty  
*across projects*



COMPARING  
5 ORGANIZATIONS

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

[www.iBIMsolutions.ir](http://www.iBIMsolutions.ir)

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*

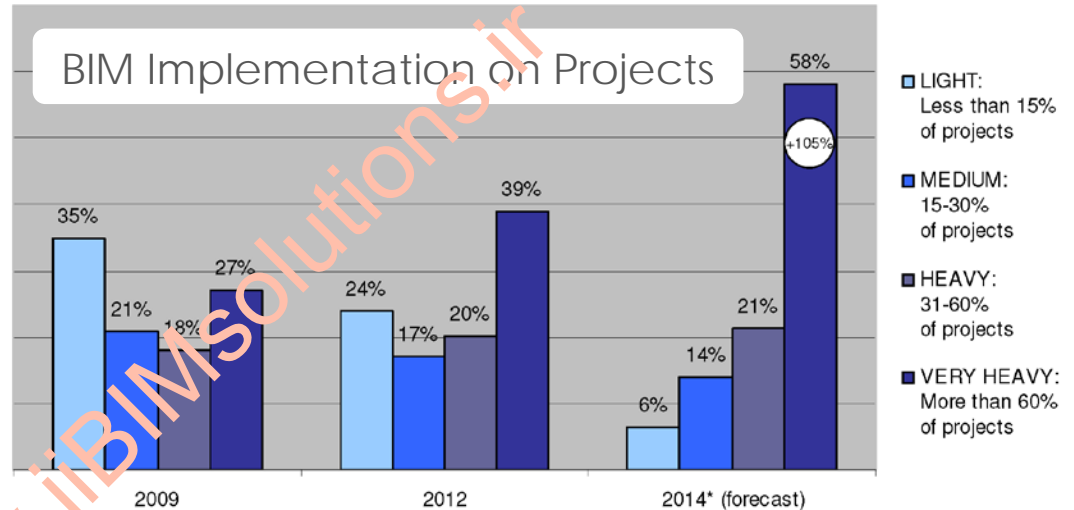
# how to measure Market Maturity *method 1*

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

UK National  
BIM Survey by  
NBS, 2013

as presented by Bilal Succar at the  
University of Malaya, April 23, 2013  
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## Conduct surveys covering BIM adoption *samples*



### Awareness and use of BIM

Just aware of BIM	48%	<span style="color: orange;">●</span>
Aware and currently using BIM	31%	<span style="color: darkorange;">●</span>
Neither aware nor using	21%	<span style="color: red;">●</span>

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
	Strategy or Vision
Protocols	Taxonomy or Classification
	Metric or Benchmark
	Manual
	Plan
	Procedure or workflow
	Protocol or Convention
	Specification or Prescription
Mandates	Standard or Code
	Contract or Agreement
	Programme or Schedule
	Requirement, Rule or Policy

cont'd 

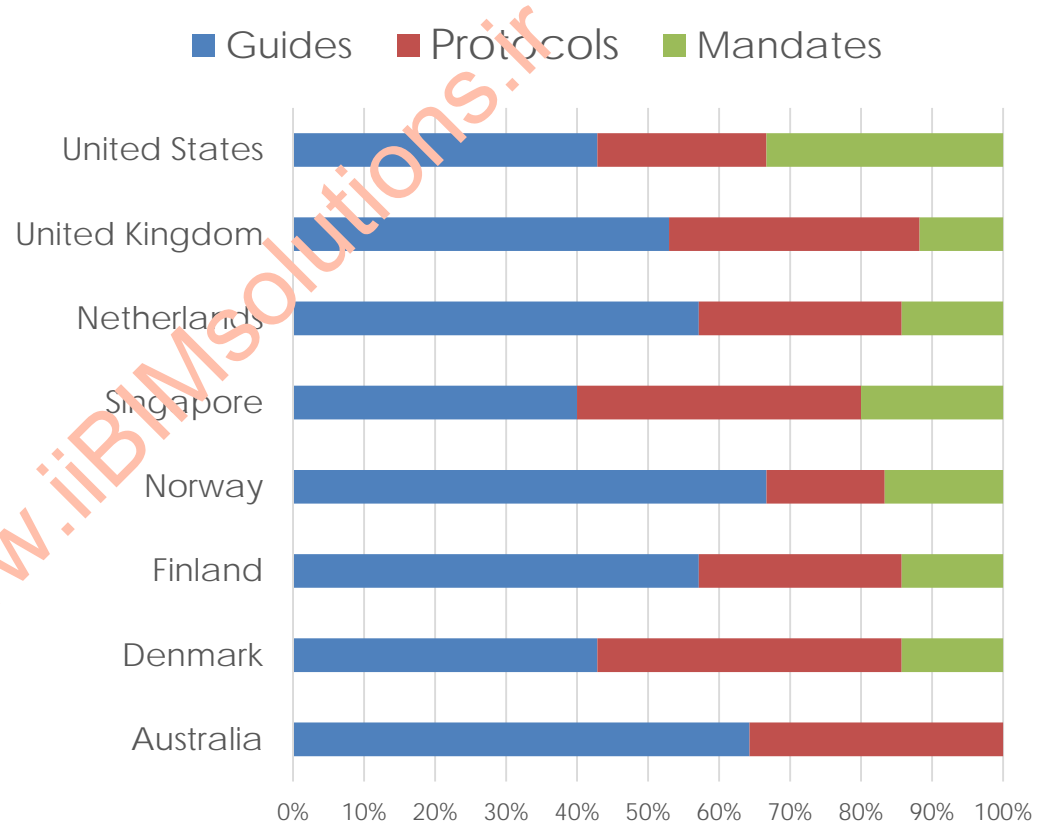
## how to measure Market Maturity *method 2*

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## results based on contents of these publications

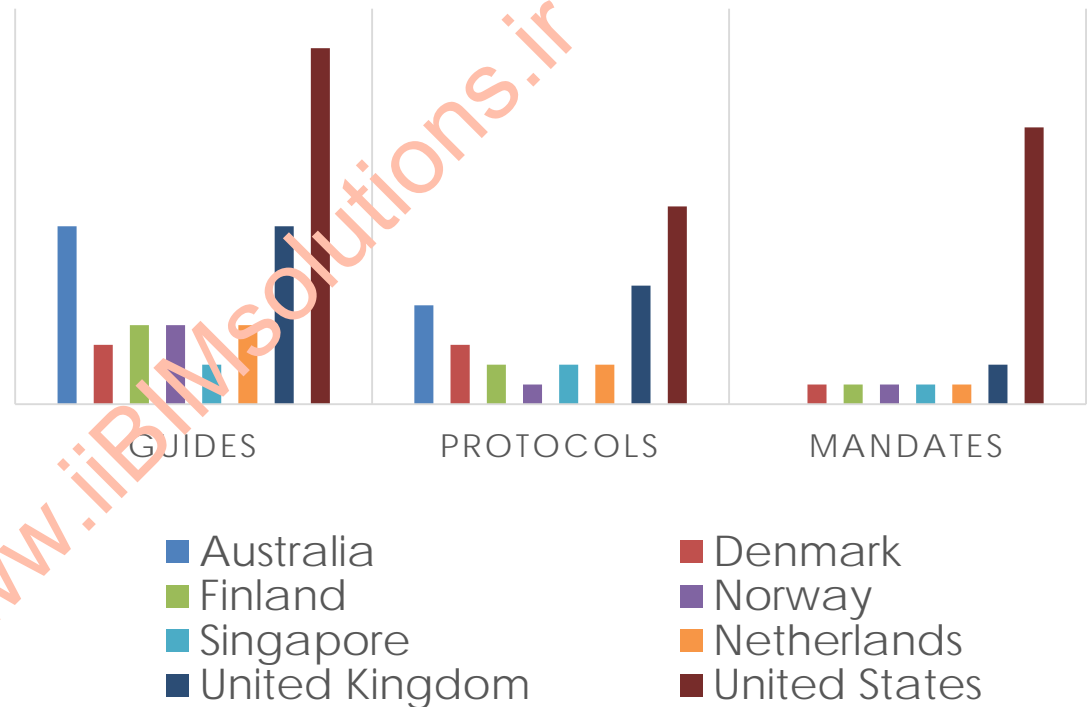


*tentative results as of April 23, 2013*

*cont'd* ➡

## how to measure Market Maturity *method 2*

## Assess the contents of noteworthy BIM publications



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

as based on  
the PhD Thesis  
(Succar, 2013)

*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

[www.iibmsolutions.ir](http://www.iibmsolutions.ir)

## strategies for improving BIM performance

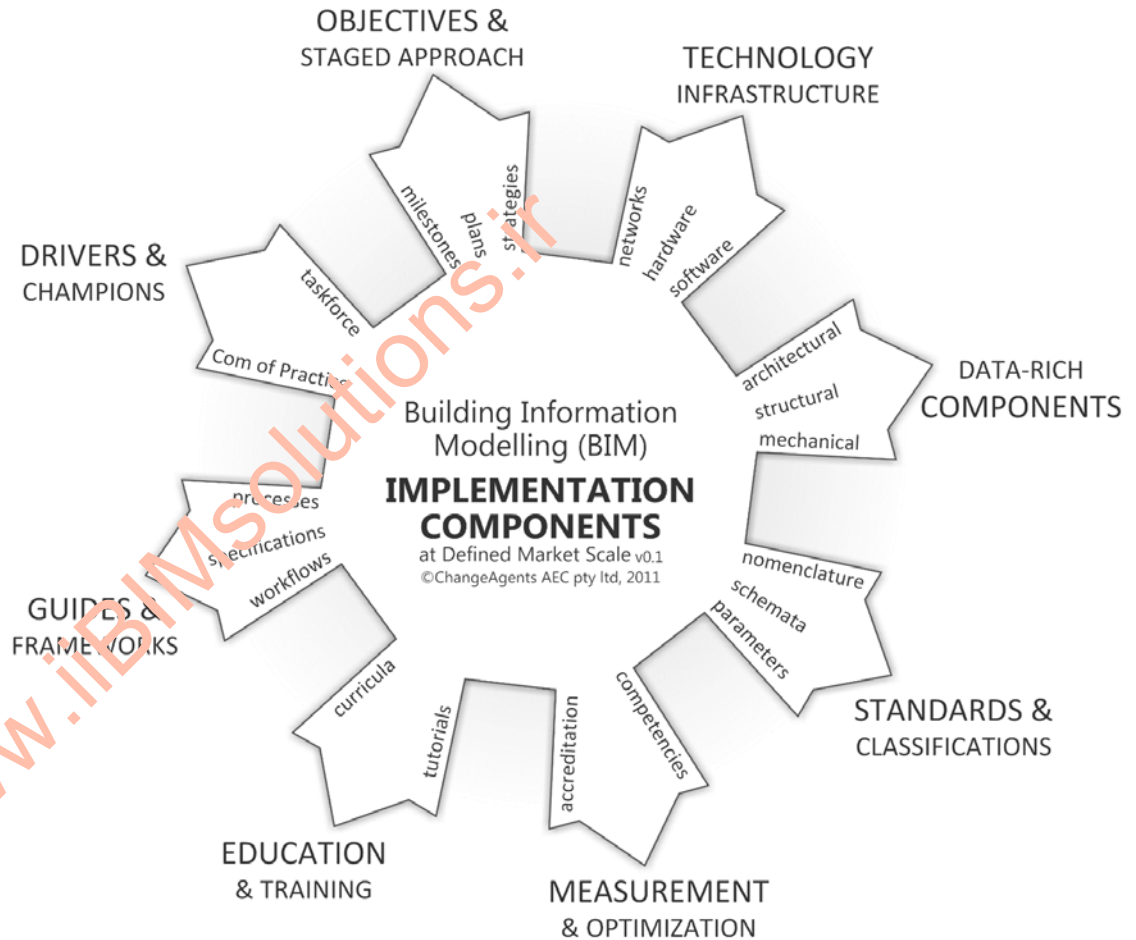
- Develop a vision and hope others will share it

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

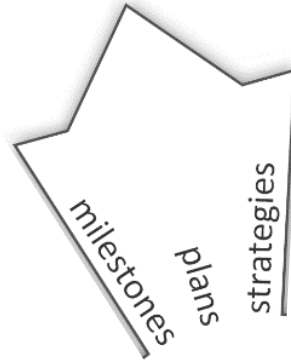
- ...all of the above *plus* incentivise, invest in change and actively assist adopters

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

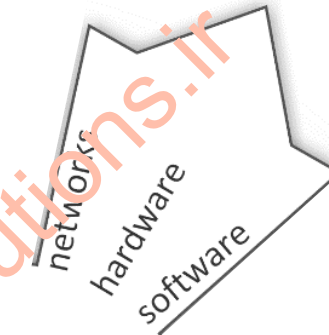
# components of BIM performance improvement



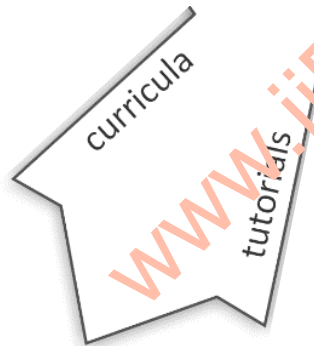
## OBJECTIVES & STAGED APPROACH



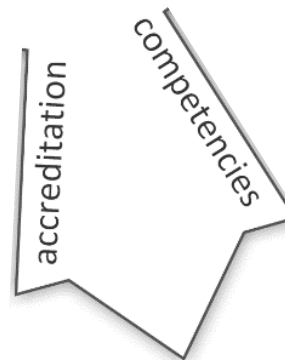
## TECHNOLOGY INFRASTRUCTURE



## EDUCATION & TRAINING



## MEASUREMENT & OPTIMIZATION

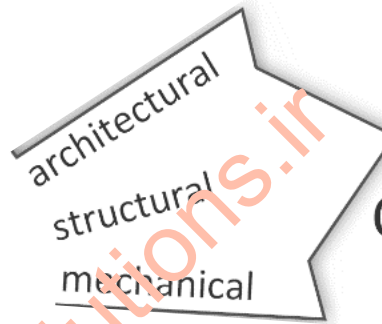


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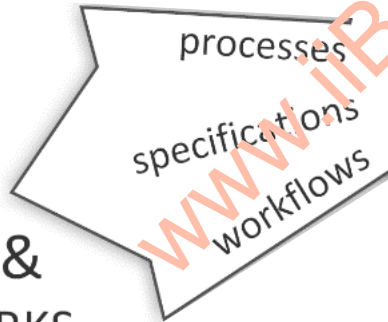
DRIVERS &  
CHAMPIONS



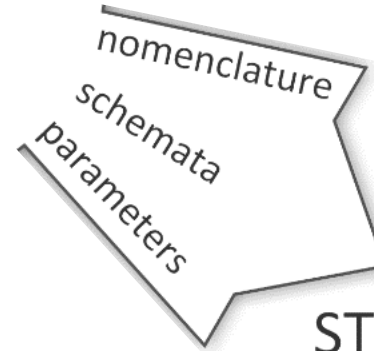
DATA-RICH  
COMPONENTS



GUIDES &  
FRAMEWORKS



STANDARDS &  
CLASSIFICATIONS





THANKYOU

bsuccare@ChangeAgents.com.au

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