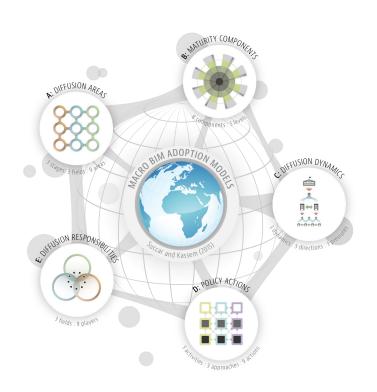


BIM adoption policies insights from across the world.

Dr. Bilal Succar | Director, Change Agents | Founder, BIMe Initiative Industry Research Fellow, University of Technology Sydney (UTS)

February 2, 2018 | at ÉTS, Montreal

In this presentation, I will briefly:



Explain what is meant by country-scale BIM adoption

Explain five ways for measuring BIM adoption.

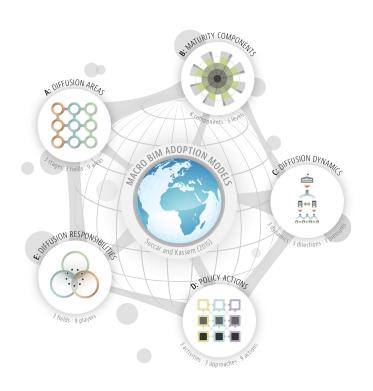
Compare the approaches taken by policy makers to encourage BIM diffusion.

Discuss the *BIM adoption data* collected from 21 countries and the interesting stories they tell.

Answer a few key questions that are typically asked when developing a BIM adoption strategy or roadmap.



Some of the questions that are typically asked:



What is the *best way* to encourage BIM adoption across a country?

How long does it take for BIM policies to take effect?

Does every country need a BIM mandate?

Can policy makers copy BIM adoption policies from other countries?

Should each country develop their own set of standards?

Who is responsible for leading BIM adoption efforts?





What is Macro BIM Adoption?

Macro

'Macro' refers to all adoption activities intended to affect a whole market, country or large region



BIM

'BIM' refers to the *current expression* of *digital innovation* within the construction industry

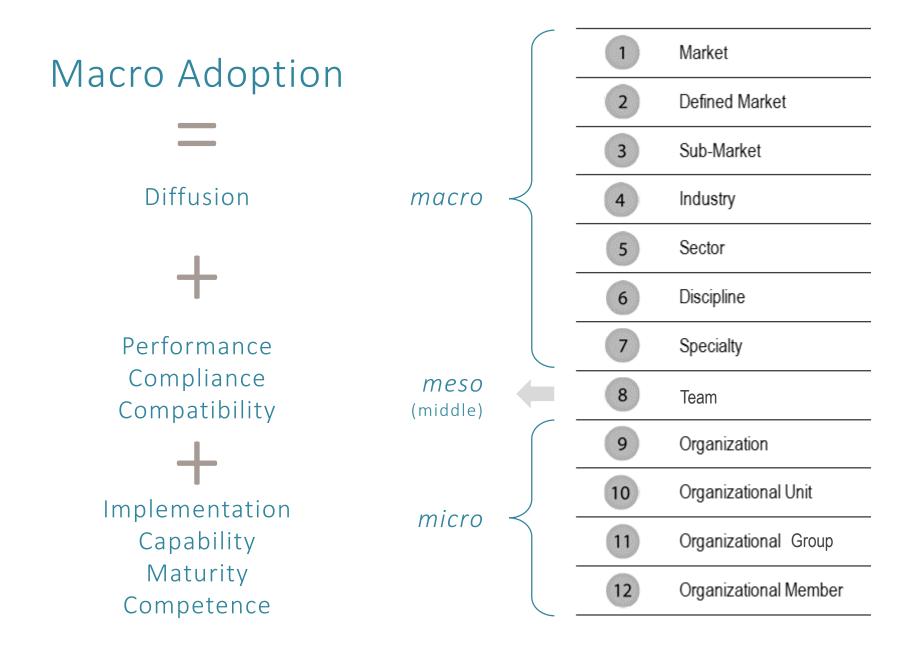
(no its not Revit)



ADOPTION

'Adoption' refers to the whole mix of implementation and diffusion activities: adoption within *organisations*, adoption on *projects*, and adoption by *individuals*







Background Research

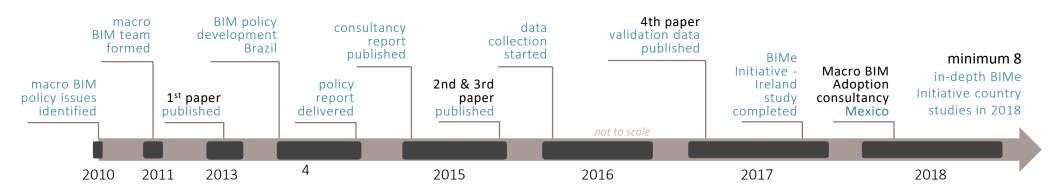
Dr. Bilal Succar

Industry Research Fellow, University

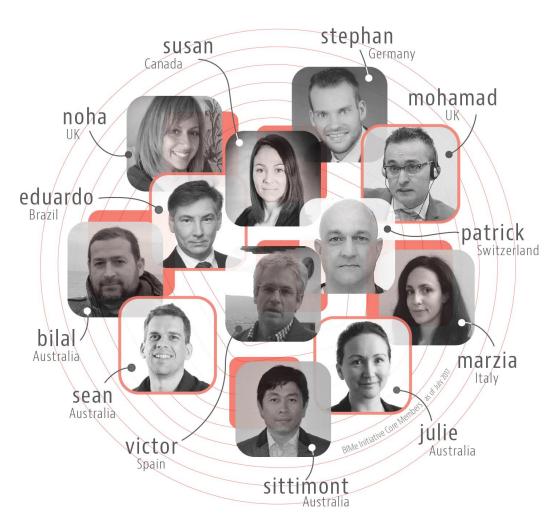
of Technology Sydney, Australia

bsuccar@changeagents.com.au

Dr. Mohamad Kassem Associate Professor at Northumbria University, United Kingdom mohamad.kassem@northumbria.ac.uk

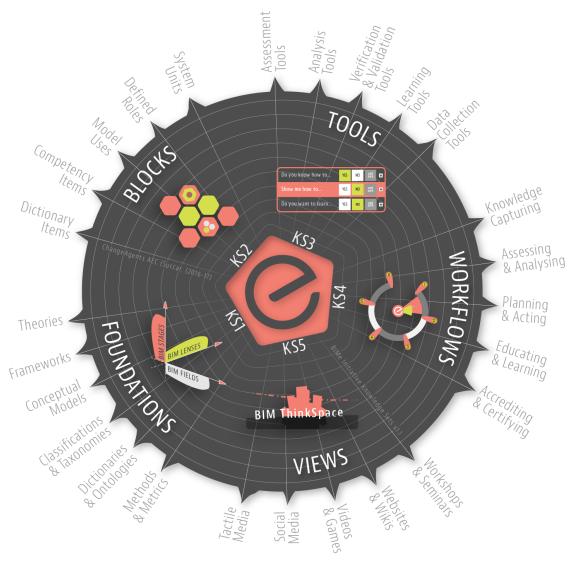






+ a large Community of Volunteers

Knowledge Network



Including five Knowledge Sets

Knowledge Structure



BIM Leadership Forum, 2015 | Brazil



Geospatial World Forum, 2015 | Portugal



Future BIM Implementation, 2015 | Qatar



Barcelona, Milan, Rome, Sao Paolo, Hannover, Cairo, Dublin ...



EU BIM Summit, 2015 | Spain



GEOBIM, 2014 | Netherlands



A Proposed Approach To Comparing the BIM Maturity of Countries

Analyzing Noteworthy Publications of Eight Countries Using a Knowledge **Content Taxonomy**

Building

Information

Macro BIM Adoption: **Conceptual Structures**



Macro BIM adoption: Comparative Market **Analysis**



A PROPOSED APPROACH TO COMPARING THE BIM MATURITY OF COUNTRIES

Mohamad Kassem, Associate Professor, m.kassem@tees.ac.ul Bilal Succar, Director, bsuccar@changeagents.com.au Change Agents AEC, Melbourne, Australia Nashwan Dawood, Professor, n.n.dawood@tees.ac.uk

ABSTRACT
IMM onespets and tools have now proliferated across the construction industry. This is evidenced by the comparative coults of IRM adoption state spectral flowings have been defined unevery. Because we have been applied to the construction of IRM adoption and applied to the construction of IRM adoption and adoption and adoption that the matter than matter, and we unsuppored by the outset like IRM adoption and adoption IRM adoption and the control IRM matter) of control in these interestings the outset IRM adoption (IRMs and help established neveral IRM and analysis of control in these interestings the outsetwile, IRMs adoption, while IRMs are specialted labels (e.g. report, musua), and control under the describe IRM adoption, while it is the interesting and interesting and IRM adoption, while control interesting and IRM adoption, while control interesting and IRM adoption, and control in the control irreducer are applied in sevening the knowledge deficiently for the control irreducer and interesting and IRMs and interesting and IRMs adoption and Australia - down mention and inform polysis declement and identify matter which knowledge gets. metrics can inform policy development and identify market-wide knowledge gap

Keywords: Building Information Modeling (BIM), Country-scale BIM maturity, Noteworthy BIM Publications,

Dis spare adopts a wide-single approach to BM maturity as applicable to countries rather than organizations. Ascessing maturity at this large scale is conceptually supported by a published framework used as a basis for proposing new qualifative metrics to complement quantitatives surveys conductors. For the purpose of simplification and surjected exploration, we propose three- out of many possible -qualiforis metrics, from on three countries with mintar constraints or colless; and duer away from differentiating between BM readment, adoption, diffusion and naturity. Those tell-imposed immittees are intuded to fielding this explosion, of contributions, in the contribution of the

1.1 COUNTRY-SCALE BIM MATURITY

BIM maturity refers to the quality, repeatability and degrees of excellence in delivering a BIM-enabled service or BIM materity refers to the quality, reportability and degrees of conclinents in delivering a BIX-bandbel service or product (Seaze, 200). There are an instancing number of Holopooffic materity finemeters's (fed and loss, reported to the product of the service of the the performance of organizations and teams but are not applicable across all engometrization deader (Soccar, 2016), for example, there are several material products with all for an essenting exponentiated all the capability of (FNO, 2016) (NSE, 2007) (BIXE, 2013) (Soccar, 2016), filth project performance (IU, 2009) (Summun, Social and McChem, 2009) (BIXEsec, 2013) (Sille), 2013), and included Bid computers' (Soccar 2013) (BIMS, and McChem, 2009) (BIXEsec, 2013) (Sille), 2013), and included Bid computers' (Soccar 2013) (BIMS,

Modeling APPLICATIONS AND PRACTICES EDITED BY ASCE Raja R. A. Issa, Ph.D., J.D., P.E.

2015

Svetlana Olbina, Ph.D.

2015

2017

2013





Data Collection

Initial Benchmarking Data – collected in 2015 from

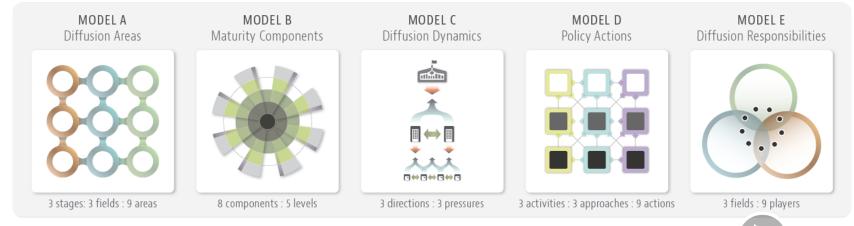
20 countries and 95 experts

Country	No.	Country	No.	Country	No.	Country	No.
Australia	4	New Zealand	3	Netherlands	4	Switzerland	2
China	3	Brazil	4	Portugal	9	UAE	3
Finland	5	Ireland	3	Qatar	6	United Kingdom	16
Hong Kong	3	Italy	5	Russia	2	USA	5
Malaysia	4	Mexico	3	Spain	7	South Korea	4





What data was collected?



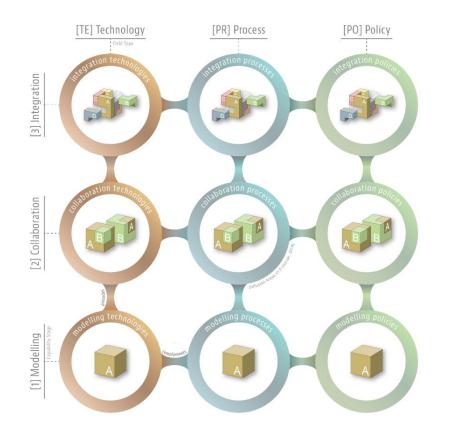
Macro Adoption Models







Diffusion Areas Model



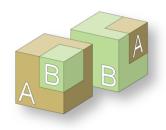
The Diffusion Areas Model clarifies how to measure the <u>Extent of BIM Diffusion</u> across markets

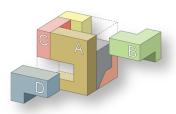
The model overlays **BIM Fields** (technology, process, and policy) and **BIM Stages** (modelling, collaboration, and integration)

[Applicable at OScales 1-10]





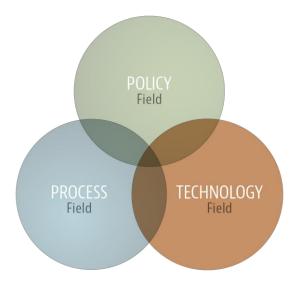


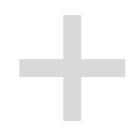


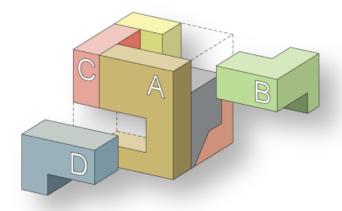
modelling

collaboration

integration







FIELDS

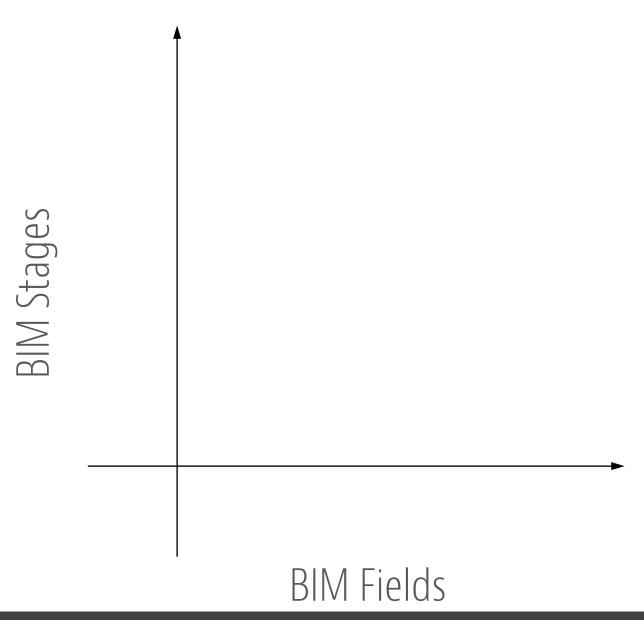
BIM Fields refer to all topics, activities, and actors across the BIM domain

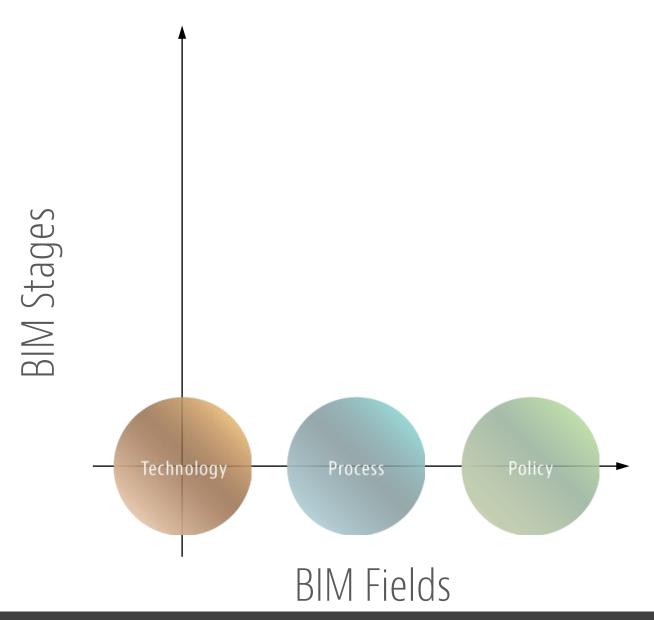


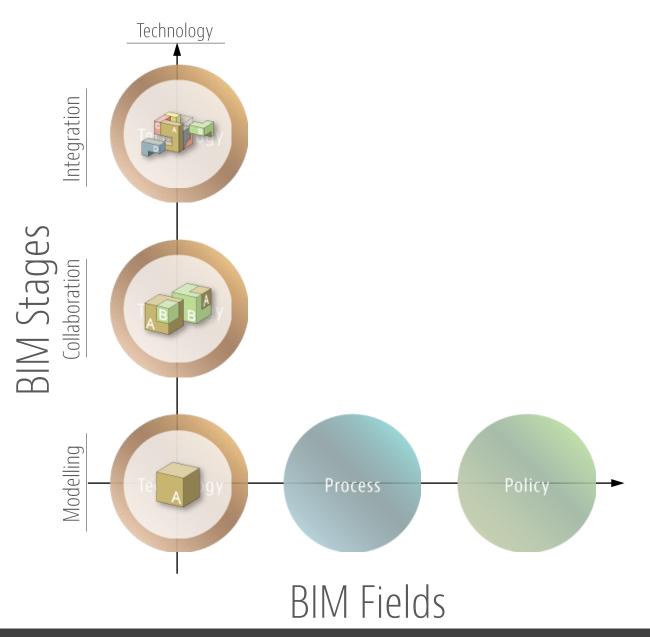
STAGES

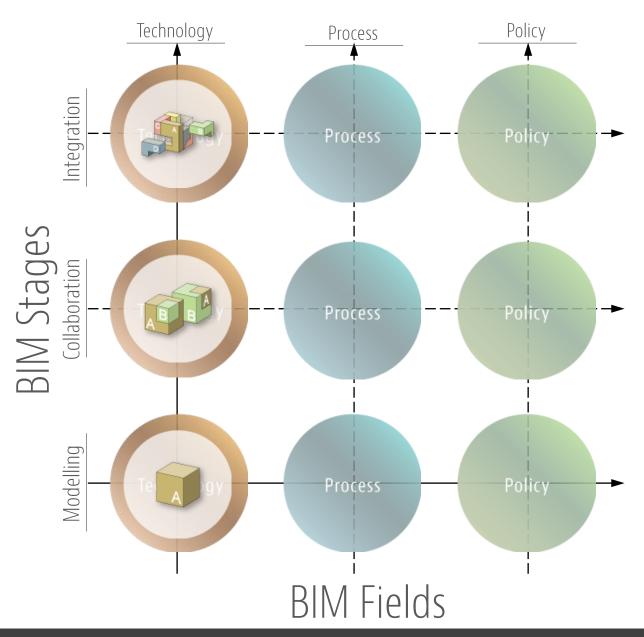
BIM Stages refer to the performance milestones to be crossed across the BIM domain

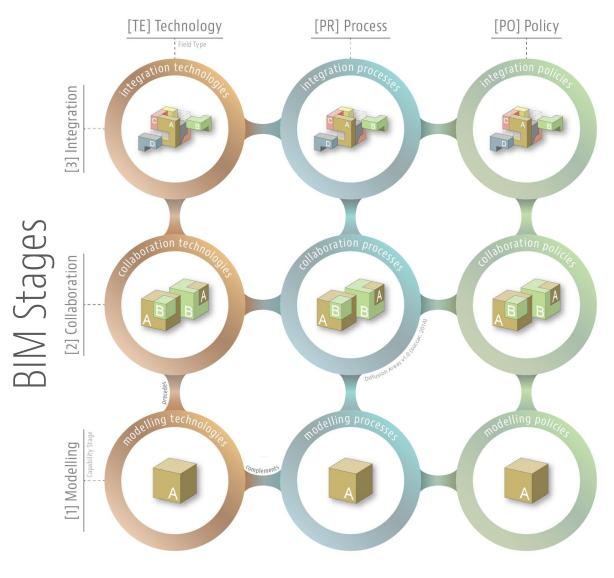








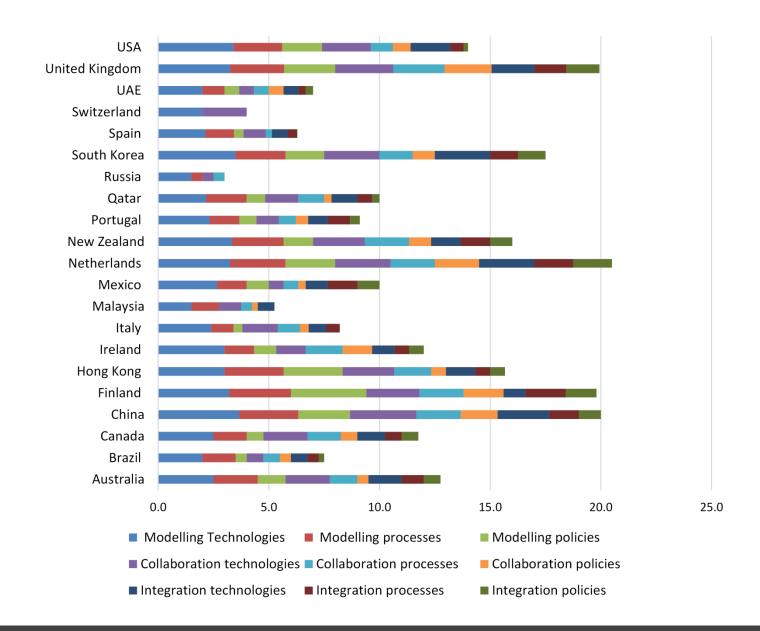




BIM Fields

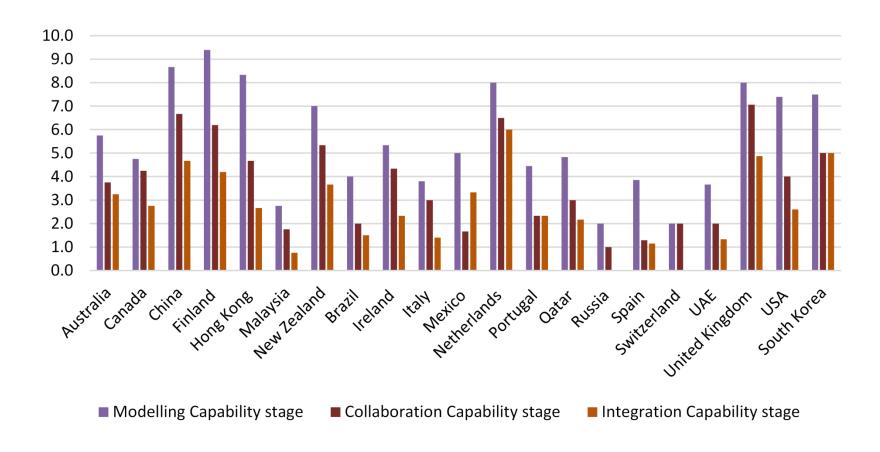
Diffusion Areas

Rating in 21 countries



Diffusion Areas

Trends

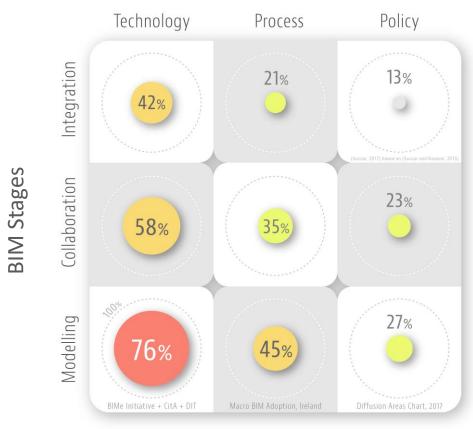


Diffusion Areas Chart clarifying BIM diffusion within a market

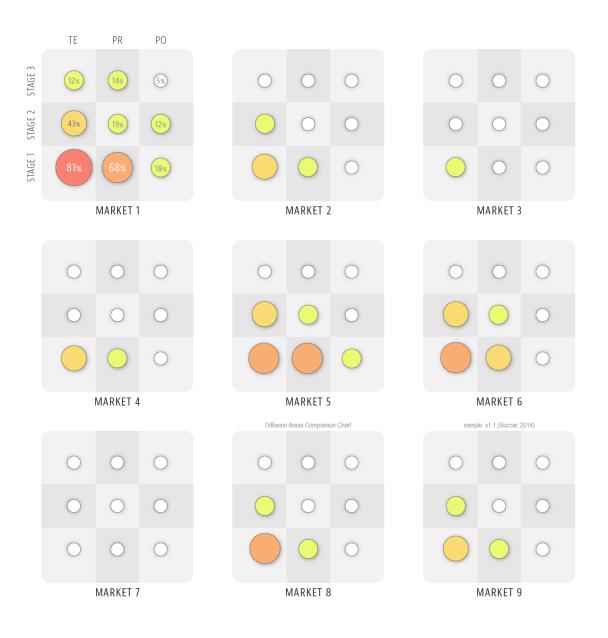
Ireland 2017

Macro BIM Adoption Snapshot conducted in collaboration with CitA and DIT

BIM Fields



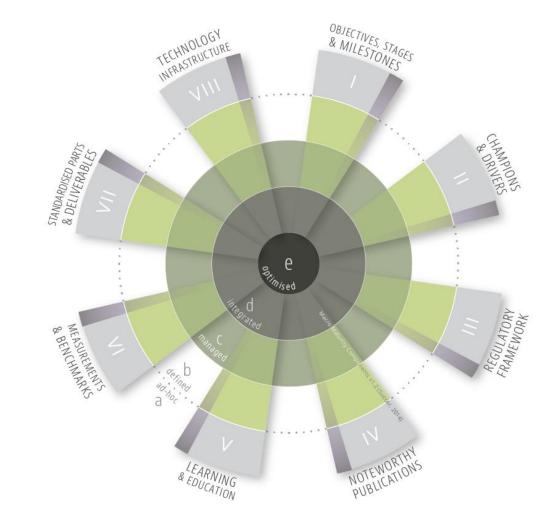






Maturity Components Model

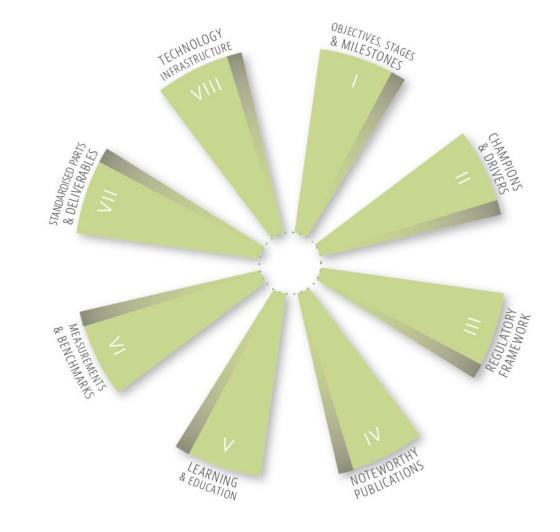
Measures BIM Maturity across markets using 8 maturity components and 5 maturity levels





the eight

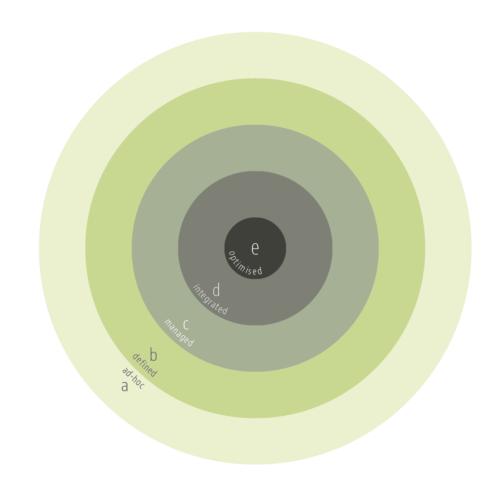
Maturity Components





the five

Maturity Levels





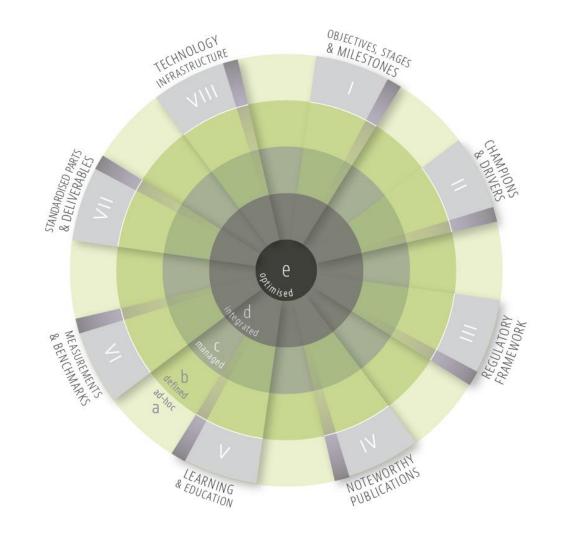
the eight

Maturity Components

+

the five

Maturity Levels





Component I

Objectives, stages and milestones

a (low maturity)

There are no marketscale BIM objectives or well-defined BIM implementation stages or milestones **b** (medium-low)

There are well-defined macro BIM objectives, implementation milestones and capability stages

C (medium maturity)

BIM objectives, stages and milestones are centrally managed and formally monitored **d** (medium-high)

BIM objectives and stages are integrated into policies, processes and technologies and manifest themselves within all other macro maturity components

e (high maturity)

BIM objectives and stages are continuously refined to reflect advancements in technology, facilitate process innovation, and benefit from international best practices

Other component-specific metrics include: The Availability of Long-term Objectives to Guide Market Adoption; Availability of Capability Stages to Guide Market Adoption; The Availability of Maturity Milestones to Guide Market Adoption; ...



Component V

Learning and education

a (low maturity)

BIM learning topics are neither identified nor included within legacy education/training programs; learning providers lack the ability to deliver BIMinfused education **b** (medium-low)

BIM learning topics are identified and introduced into education/training programs; BIM learning providers are available across a number of disciplines and specialties

C (medium maturity)

BIM learning topics are mapped to current and emergent roles; BIM learning providers deliver accredited programs across disciplines and specialties

d (medium-high)

BIM learning topics are integrated across educational tiers (tertiary, and vocational) and address the learning requirements of all industry stakeholders

e (high maturity)

BIM learning topics are infused (not separately identifiable) into education, training and professional development programs

Other component-specific metrics include: BIM Infusion into Tertiary Curricula; Multi-disciplinary Integration of Curricula; Use of Simulated Design, Construction and Operation Environments; Expertise of Learning Providers; ...



Component VII

Standardised parts and deliverables

latest version or additional information

a (low maturity)

There no marketspecific object libraries
(e.g. doors and
windows); service
delivery model uses
(e.g. clash detection)
and operational data
requirements (e.g.
COBie)

b (medium-low)

Object libraries are available yet follow varied modelling and classification norms; service delivery model uses and operational data requirements are informally defined and partially used

C (medium maturity)

Standardised object libraries are available and used; service delivery model uses and operational data requirements are formally defined and used across all project lifecycle phases

d (medium-high)

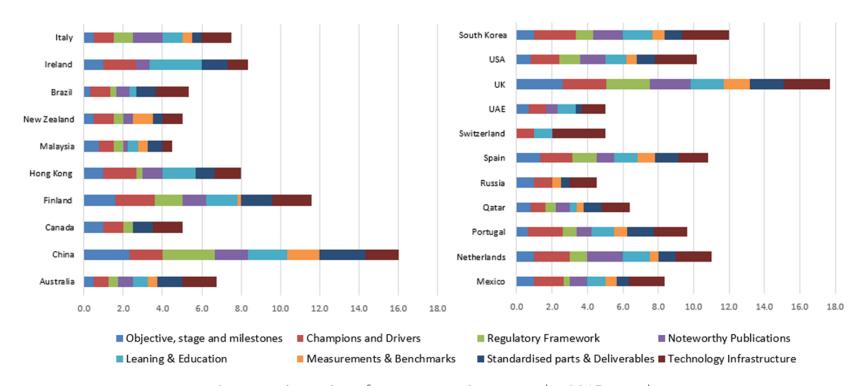
Standardised object libraries, service delivery model uses, and operational data requirements are integrated into, procurement mechanisms, project workflows and lifecycle facility operations

e (high maturity)

Standardised object libraries, service delivery model uses and operational data requirements are continuously optimised and realigned to improve usage, accessibility, interoperability and connectivity

Other component-specific metrics include: Availability of an Elemental Classification System; Availability of National Object Libraries; Availability of Standardised Model Uses; ...





Comparative rating of macro maturity across the 2015 sample



Macro Maturity Components Charts

Compares BIM Maturity across sample markets using the 8 maturity components and 5 maturity levels



latest version: http://bit.ly/MacroMC





Diffusion Dynamics Model

Diffusion Dynamics Model

clarifies the *how* BIM diffuses within and across markets

The model includes:

3 Diffusion Dynamics:

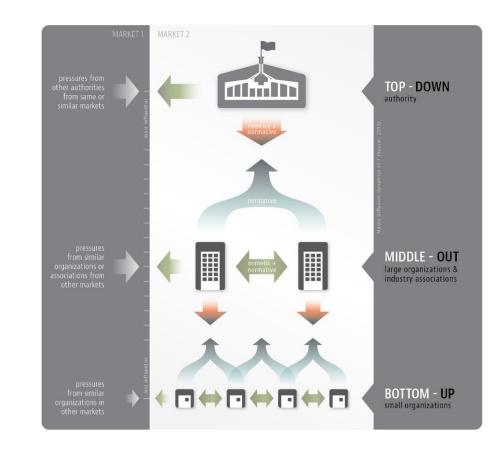
Top-Down, Middle-Out & Bottom-Up.

3 Pressure Mechanisms:

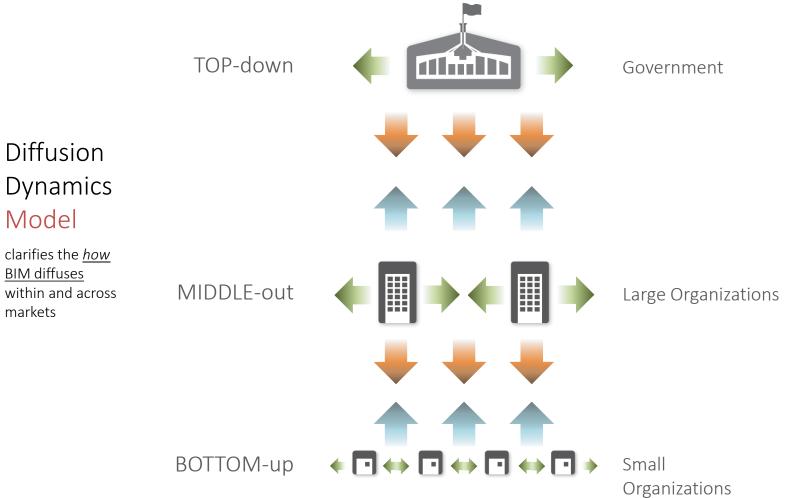
Downwards, Upwards & Horizontal; and

3 Pressure Types:

Coercive, Normative, & Mimetic









Diffusion Dynamics

Model

clarifies the *how* **BIM** diffuses within and across markets



Government

Downwards Pressures coercive pressures





Large Organizations











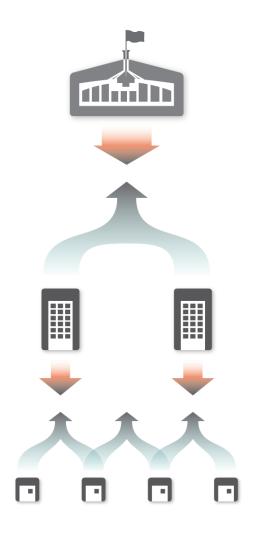
Small Organizations



Diffusion Dynamics

Model

clarifies the *how* **BIM** diffuses within and across markets



Government

normative pressures

Upwards Pressures

Large Organizations

normative pressures **Upwards Pressures**

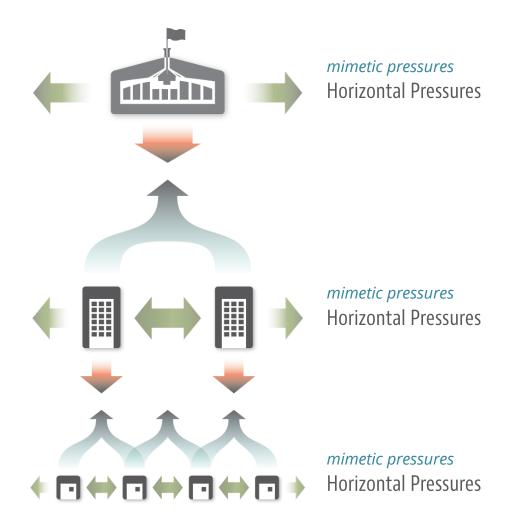
Small Organizations



Diffusion Dynamics

Model

clarifies the *how* BIM diffuses within and across markets





	Тор	Middle-	Bottom-
	Down	out	up
Australia		•	
Brazil		•	
Canada		•	
China		•	
Finland		•	
Hong Kong	•		
Ireland		•	
Italy		•	
Malaysia		•	
Mexico		•	
Netherlands		•	

	Top Down	Middle- out	Bottom- up
New Zealand			•
Portugal		•	
Qatar		•	
Russia		•	
South Korea		•	
Spain			•
Switzerland		•	
UAE	•		
UK	•		
USA		•	

Diffusion dynamics across the 2015 sample





Policy Actions Model

Policy Actions Model

clarifies how different Policy Makers have <u>different Policy Approaches</u> to influencing BIM Adoption

The model includes

3 Policy Approaches:

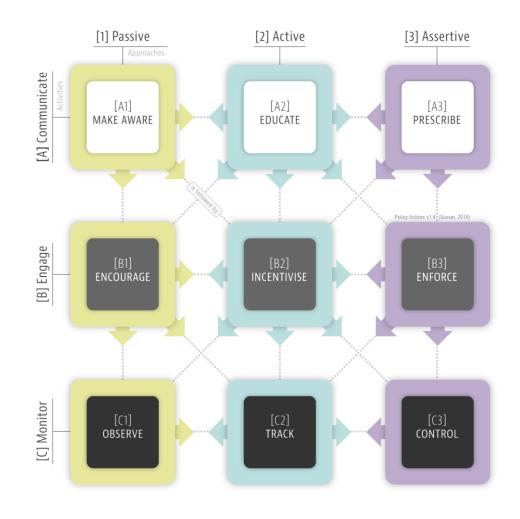
Passive, Active, &

Assertive; and

3 Policy Activities:

Make Aware, Encourage

& Observe





Policy Approaches

Make Aware

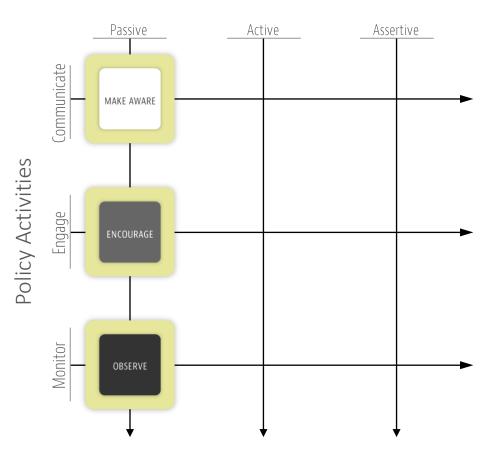
policy player informs stakeholders of the importance of a new system/process

Encourage

policy player conducts networking events to encourage stakeholders to adopt the system/ process

Observe

policy player observes if stakeholders adopt the system/process





Policy Approaches

Educate

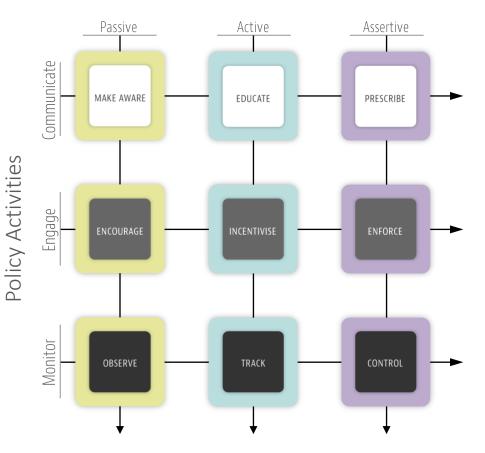
policy player generates informative guides to educate stakeholders of the system/process

Incentivise

policy player provides incentives and to stakeholders adopting the system/process

Track

policy player tracks how the system/process is adopted by stakeholders



Prescribe

policy player details the exact system/ process to be adopted by stakeholders

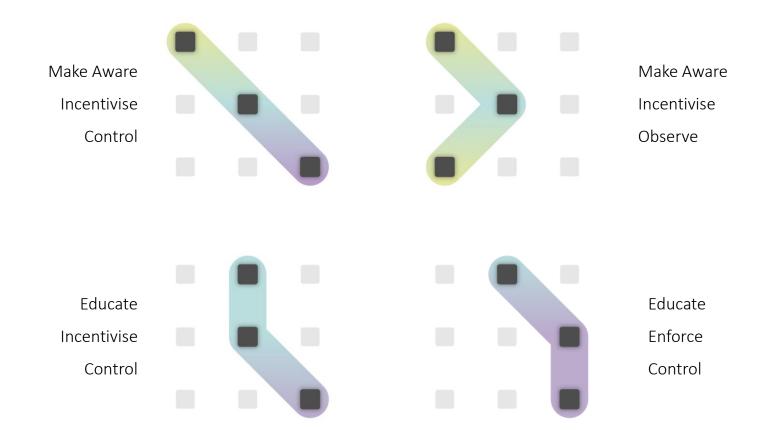
Enforce

Policy player favours or penalises stakeholders based on their adoption of the system/process

Control

policy player establishes compliance gates and mandatory standards for the prescribed system/process







Policy

Actions

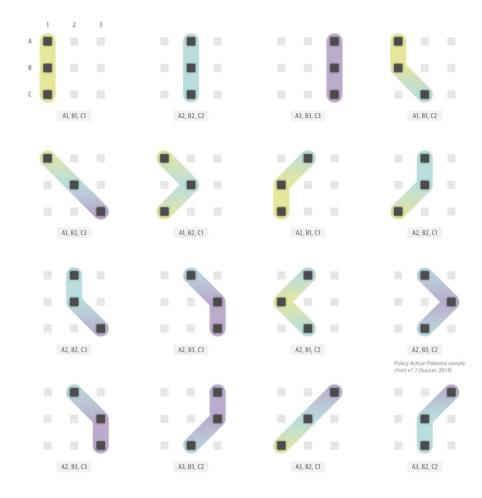
Charts

comparative sample charts

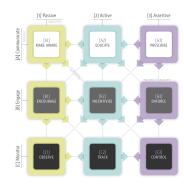
Policy Actions

Charts

comparative sample charts







Policy Action types across the 2015 sample

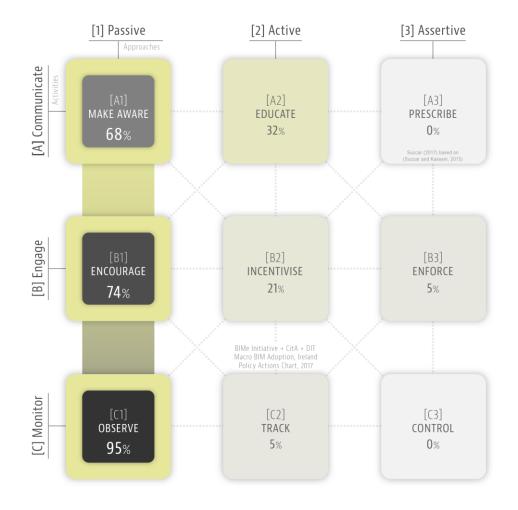
	Communicate - Passive Make Aware	Communicate - Active Educate Communicate - Prescriptive Prescribe	Engage - Passive Encourage	Engage - Active Incentivise	Engage - Prescriptive Enforce	Monitor - Passive Observe	Monitor - Active Track	Monitor - Prescriptive Control
Australia	•		•			•		
Brazil	•		•			•		
Canada	•		•			•		
China		•	•			•		
Finland		•	•			•		
Hong Kong		•	•			•		
Ireland	•		•			•		
Italy	•		•			•		
Malaysia	•		•			•		
Mexico	•		•			•		
Netherlands		•		•		•		
New Zealand	•		٠.			•		
Portugal	•		•			•		
Qatar	•		· •			•		
Russia	•		·			•		
South Korea		•	•			•		
Spain	•		•			•		
Switzerland	•		•			•		
UAE	•		•			•		
UK USA		•			•		•	
Frequency	14	7 0	20	1	1	20	1	0



Policy Actions Chart

Ireland 2017

Macro BIM Adoption Snapshot conducted in collaboration with CitA and DIT

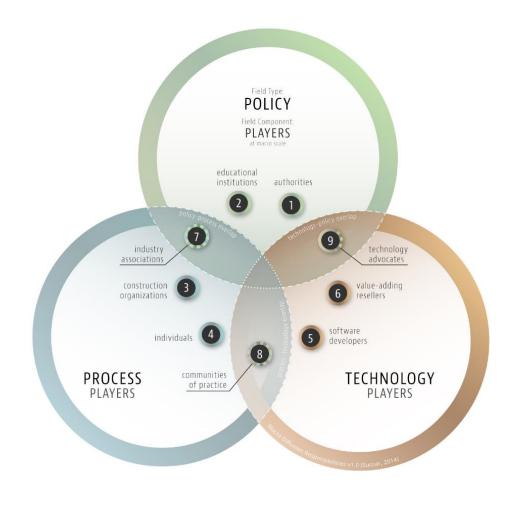






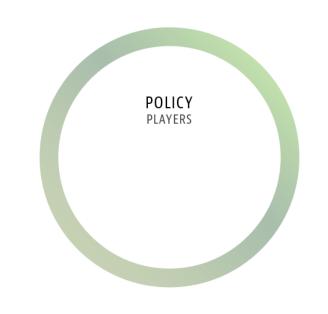
Diffusion Responsibilities Model

Model





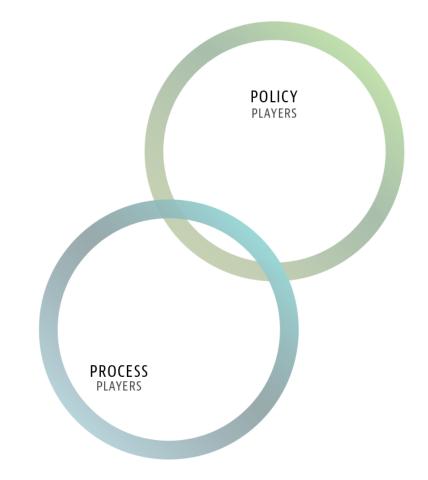
Model







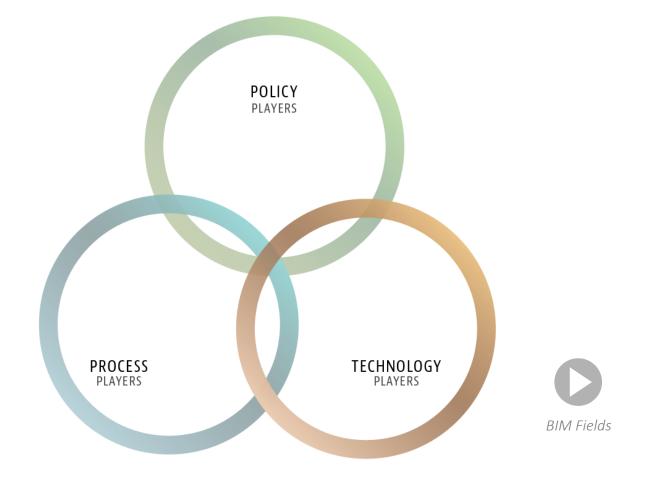
Model





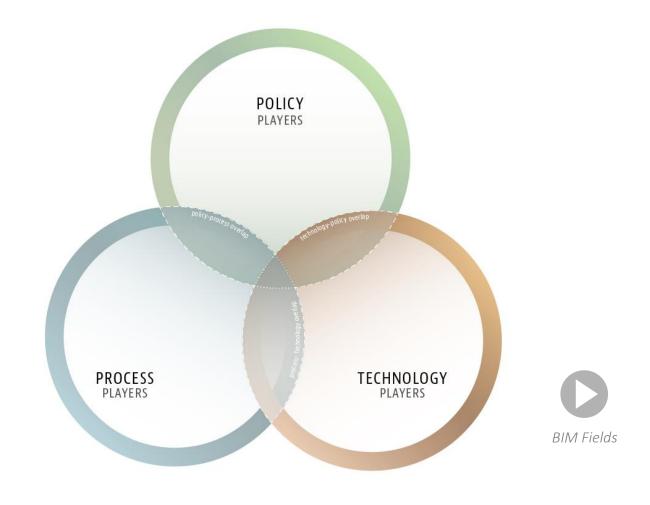


Model

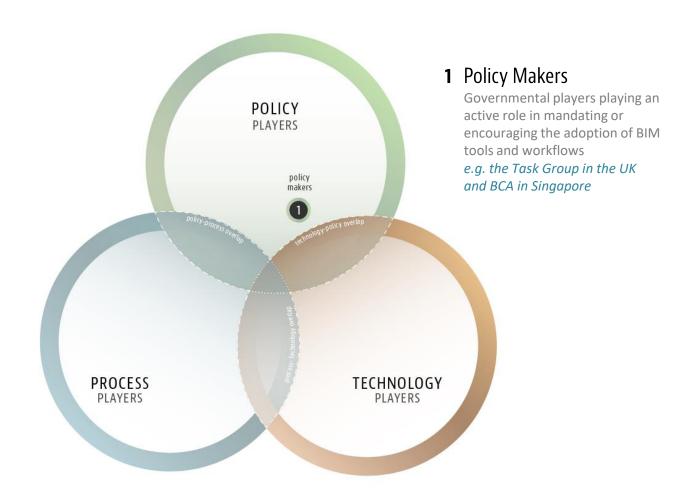




Model



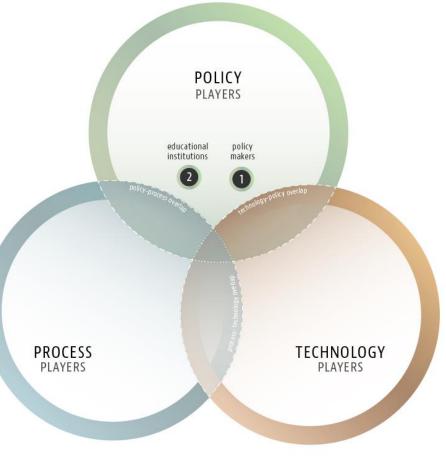






2 Educational Institutions

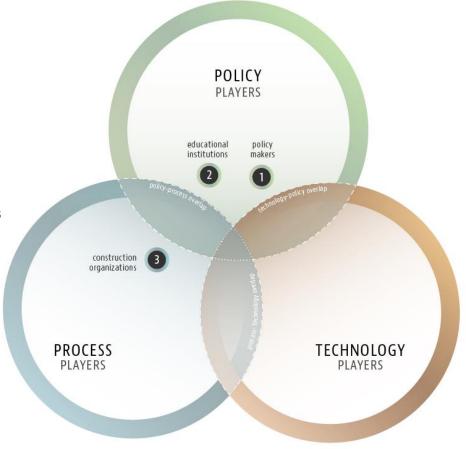
The universities and not-for-profit technical institutions developing and delivering learning programs and materials





3 Construction Organizations

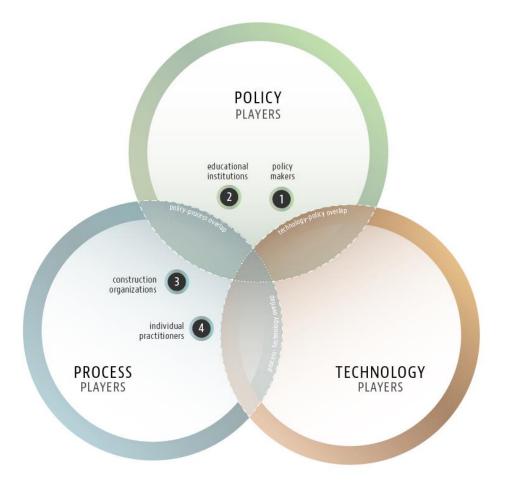
Designers, contractors, owners, operators and other organizational players involved in deploying BIM tools and workflows, training their staff and delivering BIM-enabled outcomes



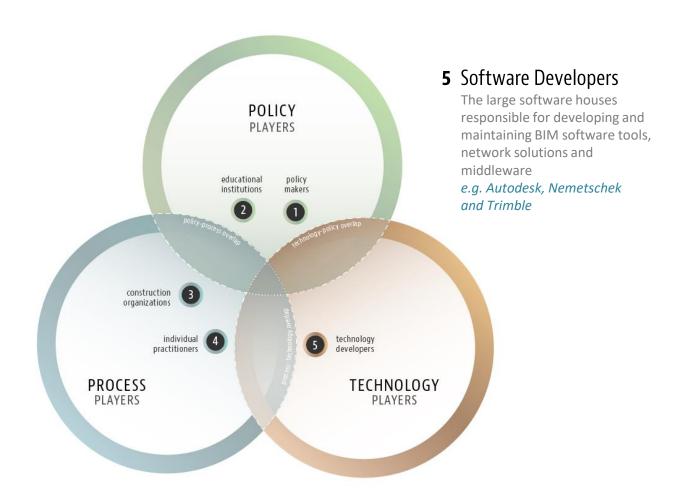


4 Individuals

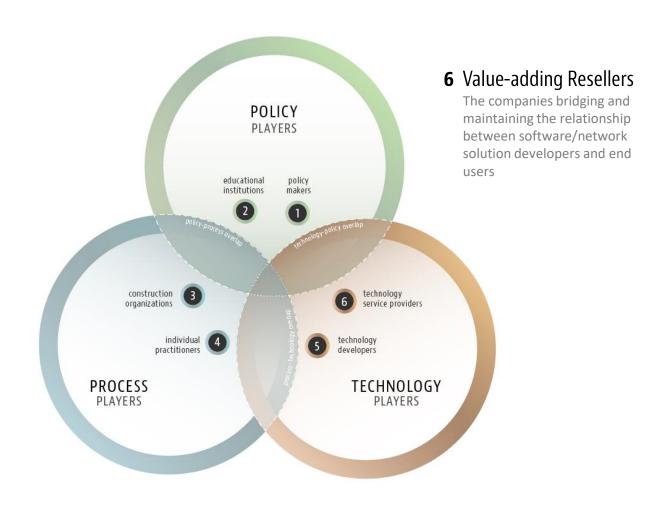
The individual practitioner, researcher, lecturer and student involved in learning, or actively implementing BIM tools and workflows







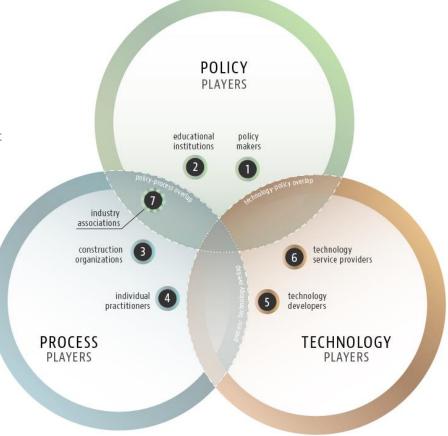






7 Industry Associations

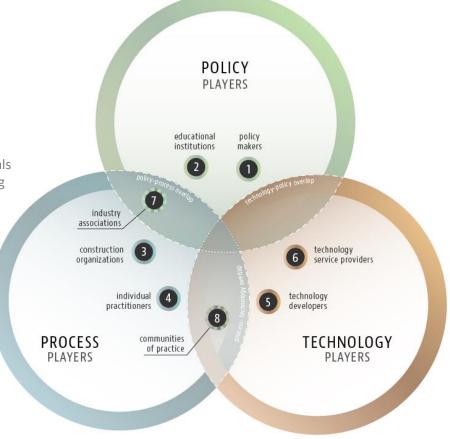
Associations dedicated to represent the interests of their individual and organizational members e.g. AMCA in Australia



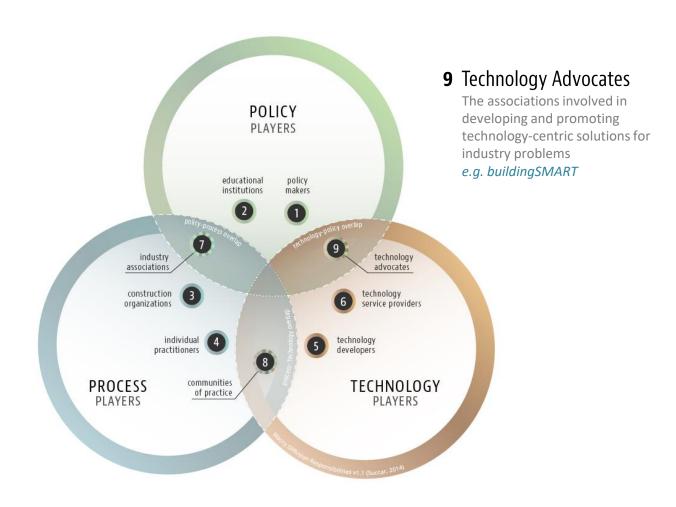


8 Communities of Practice

The informal grouping of individuals with a shared interest in improving their own BIM performance e.g. Revit user groups

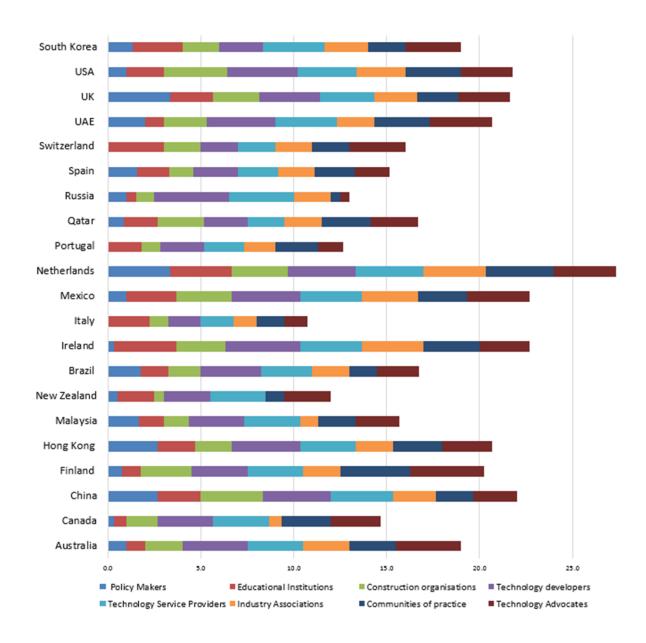








Comparing contribution of player groups within the <u>same country</u>



Comparing contribution of player groups <u>across countries</u>

Index Legend

75 - 100%	High
50 - 74%	Medium-high
25 - 49%	Low-medium
1 - 24%	Low
0	inexistent

	Policy Makers	Educational Institutions	Construction Organisations	Technology Developers	Technology Service Providers	Industry Associations	Communities of Practice	Technology Advocates
Australia	25	25	50	88	75	63	63	88
Canada	8	18	43	75	75	18	68	68
China	68	58	83	93	83	58	50	58
Finland	20	25	70	75	75	50	95	100
Hong Kong	68	50	50	93	75	50	68	68
Malaysia	43	33	33	75	75	25	50	58
New Zealand	13	50	13	63	75	0	25	63
Brazil	45	38	45	83	70	50	38	58
Ireland	8	83	68	100	83	83	75	68
Italy	0	58	25	45	45	33	38	33
Mexico	25	68	75	93	83	75	68	83
Netherlands	83	83	75	93	93	83	93	83
Portugal	0	45	25	58	55	43	58	33
Qatar	20	45	63	58	50	50	68	63
Russia	25	13	25	100	88	50	13	13
Spain	40	43	33	60	53	50	53	48
Switzerland	0	75	50	50	50	50	50	75
UAE	50	25	58	93	83	50	75	83
UK	85	58	63	83	73	58	55	70
USA	25	50	85	95	80	65	75	70
South Korea	33	68	50	58	83	58	50	75

		Macro Ma ⁻	turity Com	ponents	Diffusion-Role Matrix v1.0 sample shown at GLevel 1 (Succar, 2015)				
		Objectives , Stages and	Champions & Drivers	Regulatory Framework	Noteworthy Publications	Learning & Education	Measurements & Benchmarks	Standardised Parts and	Technology Infrastructure
S	Policy Makers	A	A	A	В	В	A	В	C
	Educational Institutions	В	В	A	A	A	В	C	
	Construction Organizations	В	A	В	В	В	A	A	В
	Individual Practitioners	C		C	C	A	C	C	
Group	Technology Developers	C		C	C	В	C	В	A
	Technology Service Providers	C		C	В	A	C	В	A
Player	Industry Associations	В	В	A	A	В	A	C	
	Communities of Practice	C	В	С	В	В	C	A	
Macro	Technology Advocates	A	A	В	A	В	В	A	В







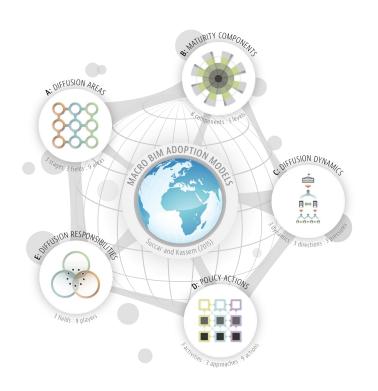
Developing a roadmap (sample)

			2018	2019	2020	2021	20xx
OBJECTIVES STAGES & MILESTONES	Objectives, Stages & Milestones	Establish basic strategic objectives		ents for projects pr	efine minimum capability r oject deliverables for all ot zes of projects		
Sometime and the second	Champions & Drivers	Establish a high-lev group to develop a national strategy	task group	mid-level, regional or spec os to implement the natio etailed protocols	nal strategy and s	ncourage the formation of pecialised Communities of P CoP)s	Practice
PEGUATORY FRAMEWORK	Regulatory Framework		egulatory framework early involvement of delivery	f contractors and fram	uct pilot projects using the ework. Refine the framewo s market-wide adoption	e new regulatory ork and establish a strategy	Mandate the use of the new regulatory framework
NOTEWORTHY PUBLICATIONS	Noteworthy Publications	Establish a list of noteworthy publication be developed	ations to set of guid	or coordinate the developr des, protocols and manda tion across the market	ces that facilitate st	evelop or coordinate the detailed the detailed the detailed the detailed the deliverables across the suppl	quality of project
LEARNING & EDUCATION	Learning & Education		ency inventory, an edu g modules. Conduct a hain	wareness sessions Enco	lop learning modules for te urage the development of Educate the educators.	ertiary, vocational, and prof e-learning material coverin	essional settings. g all disciplines and
E discontinuation (Measurements & Benchmarks		r assessing and prequizations and the comp	perfo	lop a market-wide benchm rmance. Develop a perforr fication framework		Establish a market-wide pre-qualification register
STANDARDISCO RIGGES	Standardised Parts & Deliverables	Develop a protocol standardized components		standardized components and mechanical elements	for most-used architectur	al,	
TECHNOLOGY MENSTRUCTURE	Technology Infrastructure	Develop a protocol min hardware specifications	for Develop a environme	protocol for common info ent		evelop a protocol of a share nvironment	ed modelling



In Summary

Some of the questions that are typically asked:



What is the *best way* to encourage BIM adoption across a country?

How long does it take for BIM policies to take effect?

Does every country need a BIM mandate?

Can policy makers copy BIM adoption policies from other countries?

Should each country develop their own set of standards?

Who is responsible for leading BIM adoption efforts?



THANK YOU

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BIM ThinkSpace industry blog



BIM Framework



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BIM Framework



Professional profile