

**CitA**  
BIM GATHERING



# Building Capabilities in Complex Environments

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CitA BIM Gathering 2017, Croke Park, November 23rd & 24th, 2017

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BIM GATHERING



# BIM adoption policies insights from across the world.

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CitA BIM Gathering 2017, Croke Park, November 23rd & 24th, 2017



## In this presentation, I will briefly:

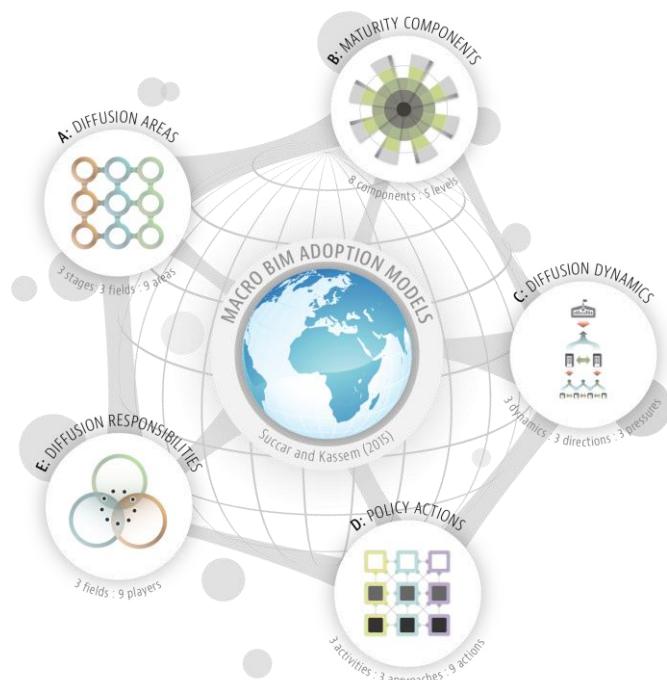
Explain what is meant by *country-scale* BIM adoption

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?

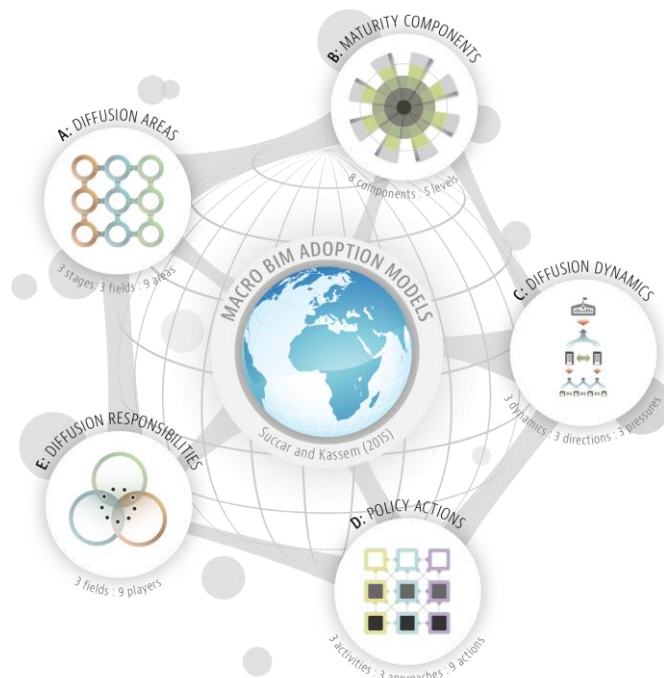
How long does it take for BIM policies to take effect?

Does every country need a BIM mandate?

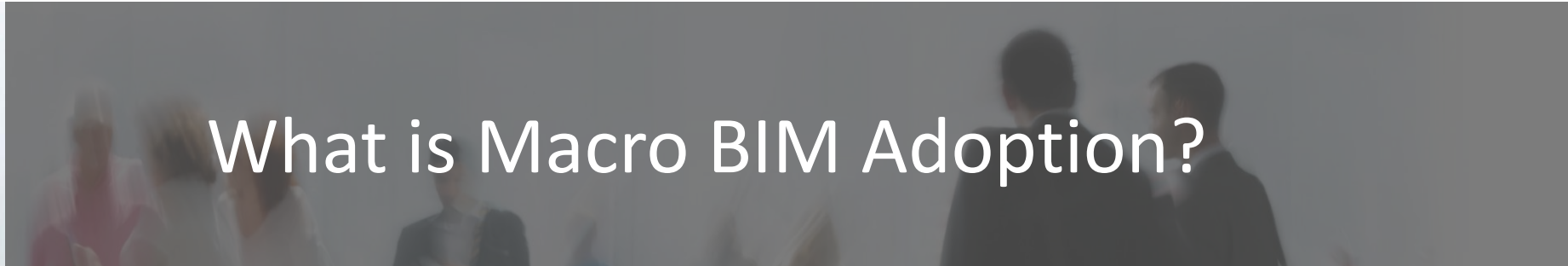
Can policy makers copy BIM adoption policies from other countries?

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*



# Macro Adoption

=

Diffusion

+

Performance  
Compliance  
Compatibility

+

Implementation  
Capability  
Maturity  
Competence

*macro*

*meso*  
(middle)

*micro*

- |    |                       |
|----|-----------------------|
| 1  | Market                |
| 2  | Defined Market        |
| 3  | Sub-Market            |
| 4  | Industry              |
| 5  | Sector                |
| 6  | Discipline            |
| 7  | Specialty             |
| 8  | Team                  |
| 9  | Organization          |
| 10 | Organizational Unit   |
| 11 | Organizational Group  |
| 12 | Organizational Member |



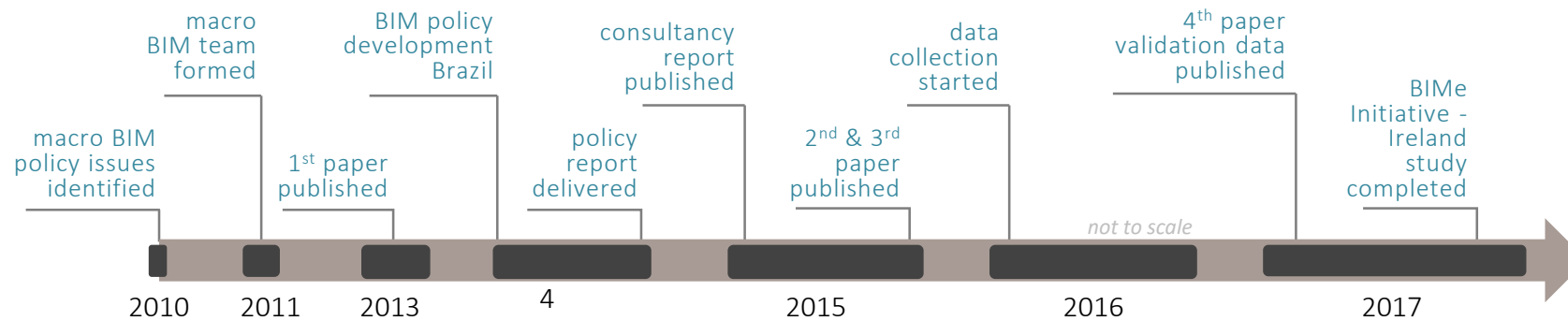
# Background Research



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BIM Leadership Forum, 2015 | Brazil



Future BIM Implementation, 2015 | Qatar



EU BIM Summit, 2015 | Spain



Geospatial World Forum, 2015 | Portugal

2016, 2017...

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



GEOBIM, 2014 | Netherlands



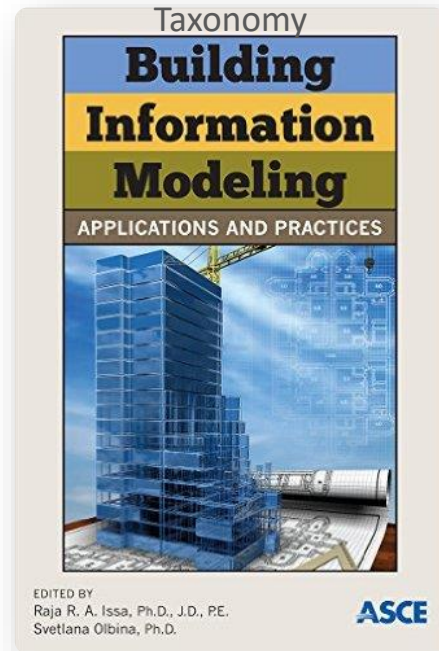


## A Proposed Approach To Comparing the BIM Maturity of Countries



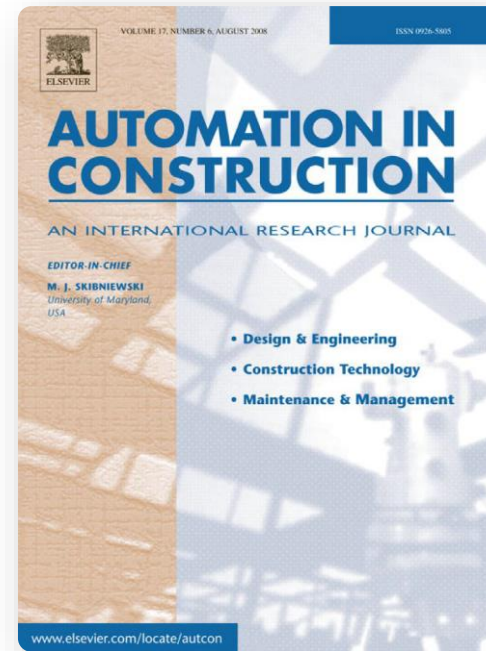
2013

## Analyzing Noteworthy Publications of Eight Countries Using a Knowledge Content



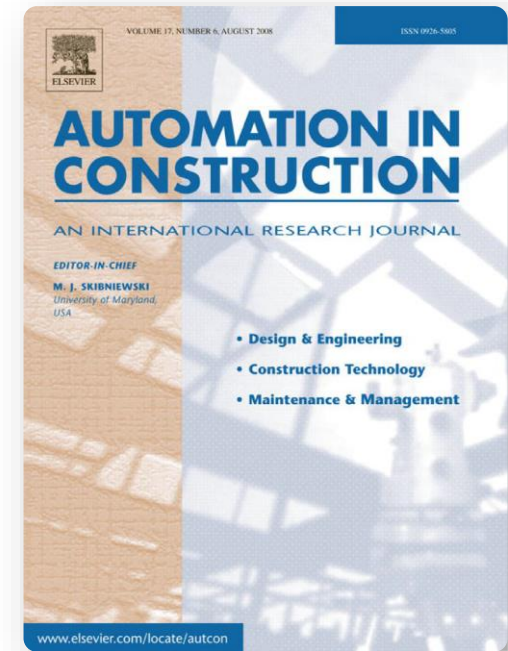
2015

## Macro BIM Adoption: Conceptual Structures



2015

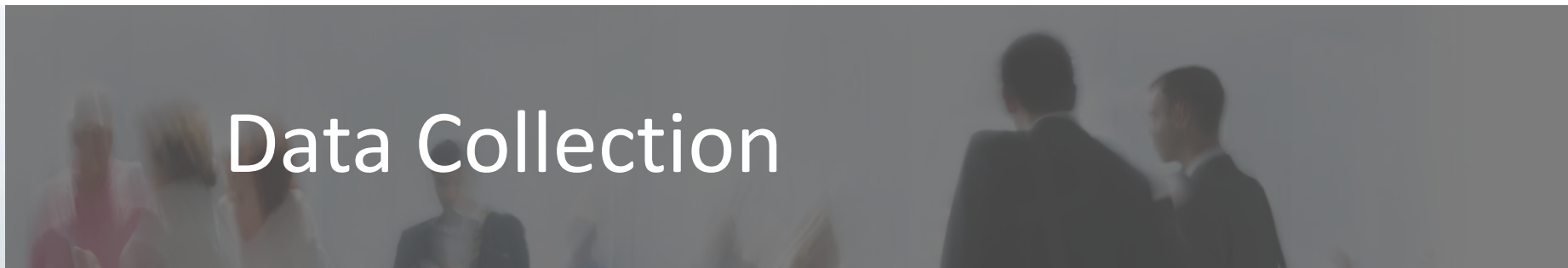
## Macro BIM adoption: Comparative Market Analysis



2017



# Data Collection



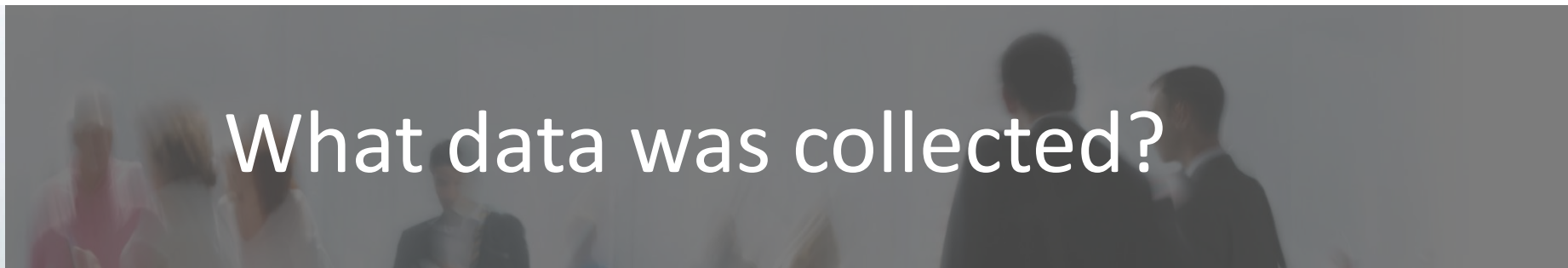


*Initial Benchmarking Data – collected in 2015 from*  
20 countries and 95 experts

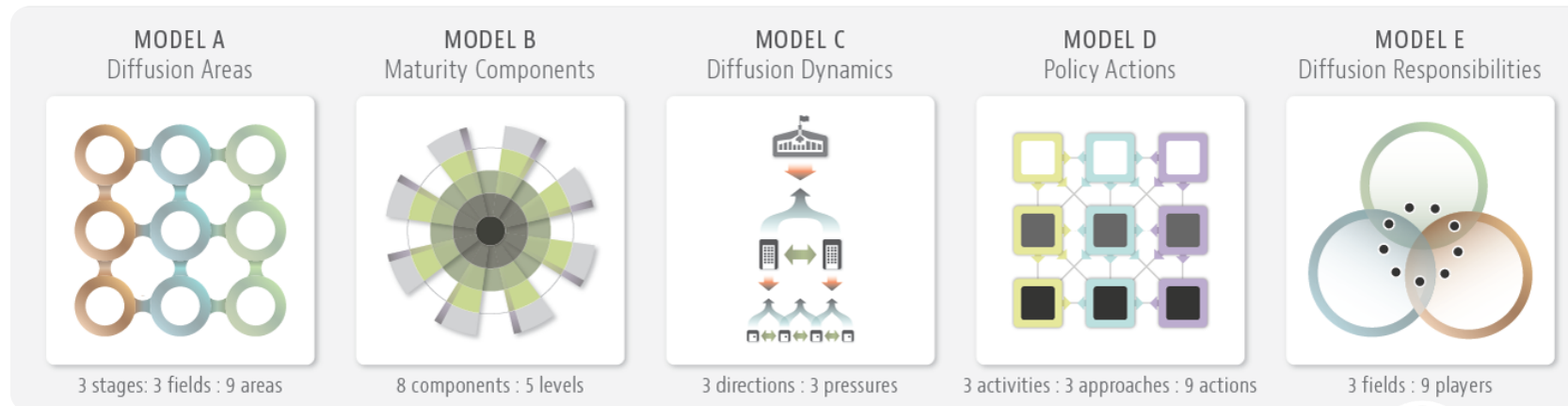
<b>Country</b>	<b>No.</b>	<b>Country</b>	<b>No.</b>	<b>Country</b>	<b>No.</b>	<b>Country</b>	<b>No.</b>
Australia	4	New Zealand	3	Netherlands	4	Switzerland	2
China	3	Brazil	4	Portugal	9	UAE	3
Finland	5	Ireland	3	Qatar	6	United Kingdom	16
Hong Kong	3	Italy	5	Russia	2	USA	5
Malaysia	4	Mexico	3	Spain	7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



What data was collected?







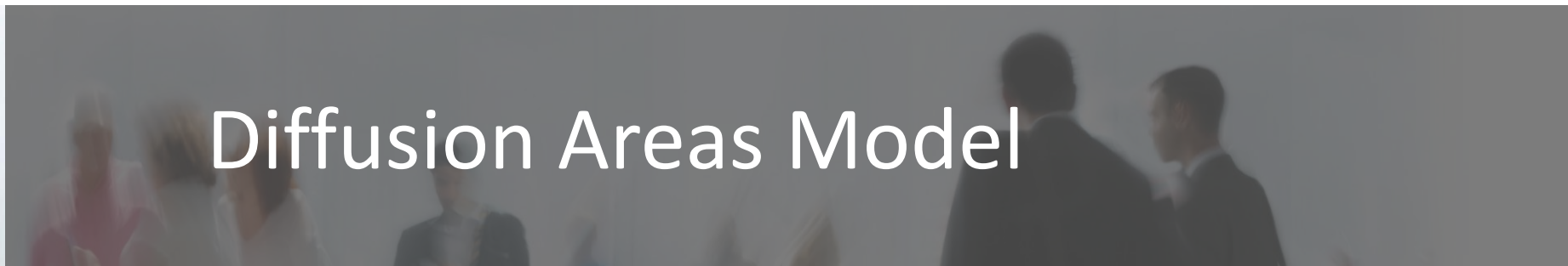
## Macro Adoption Models

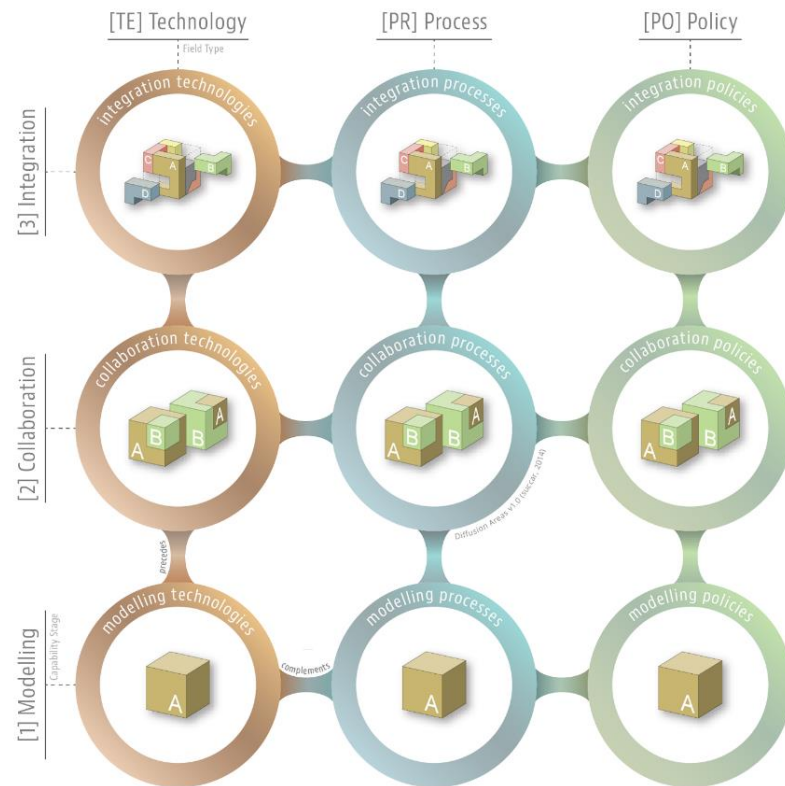


*video available*



# Diffusion Areas Model

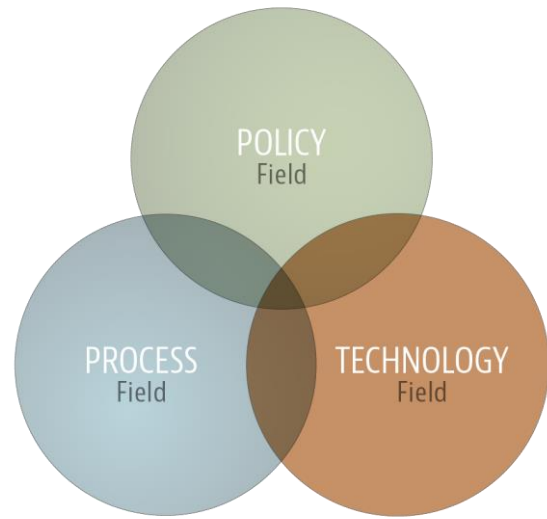




The **Diffusion Areas Model** clarifies *how to measure the Extent of BIM Diffusion* across markets

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

*[Applicable at OScales 1-10]*

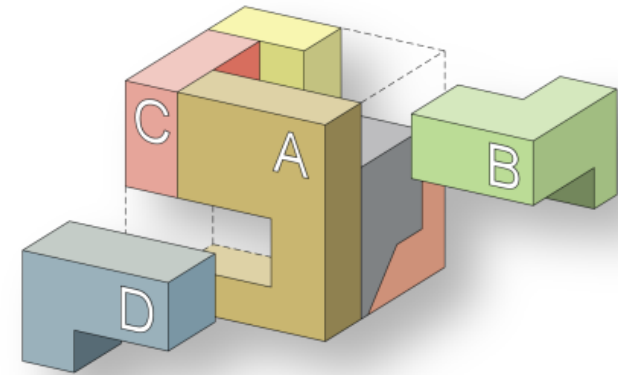
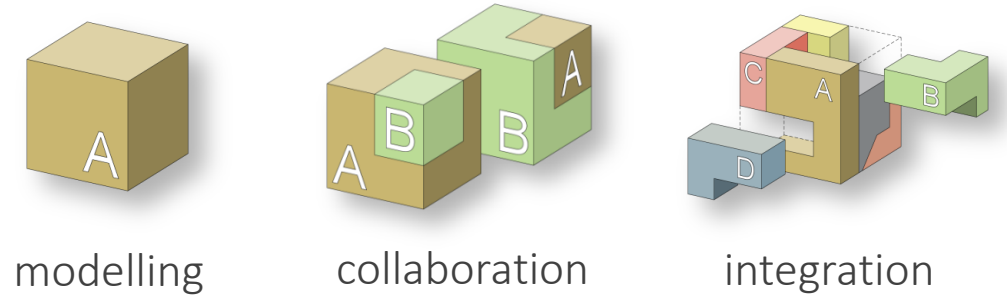


### FIELDS

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



*Fields*



### STAGES

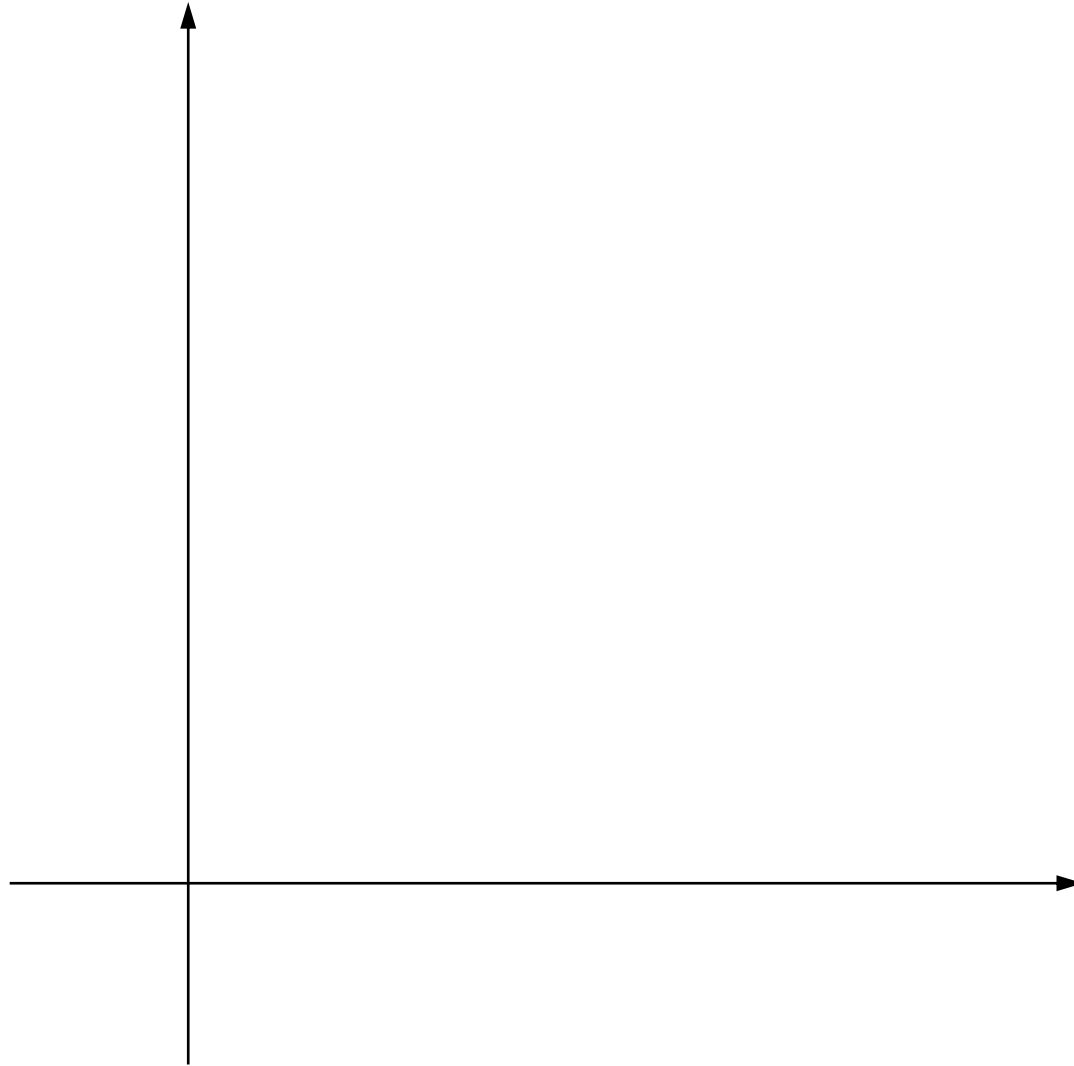
BIM Stages refer to the performance milestones to be crossed across the BIM domain



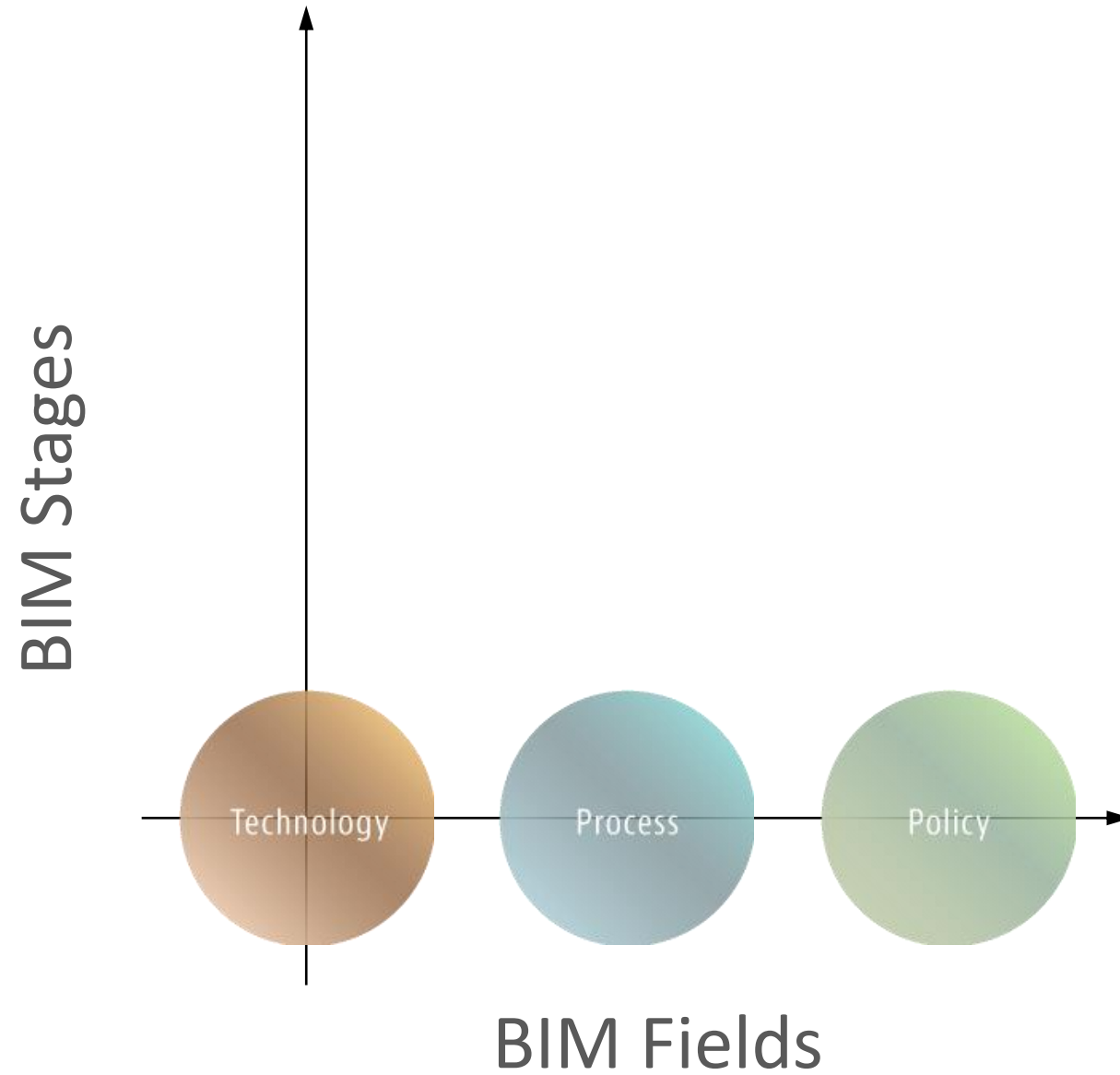
*Stages*

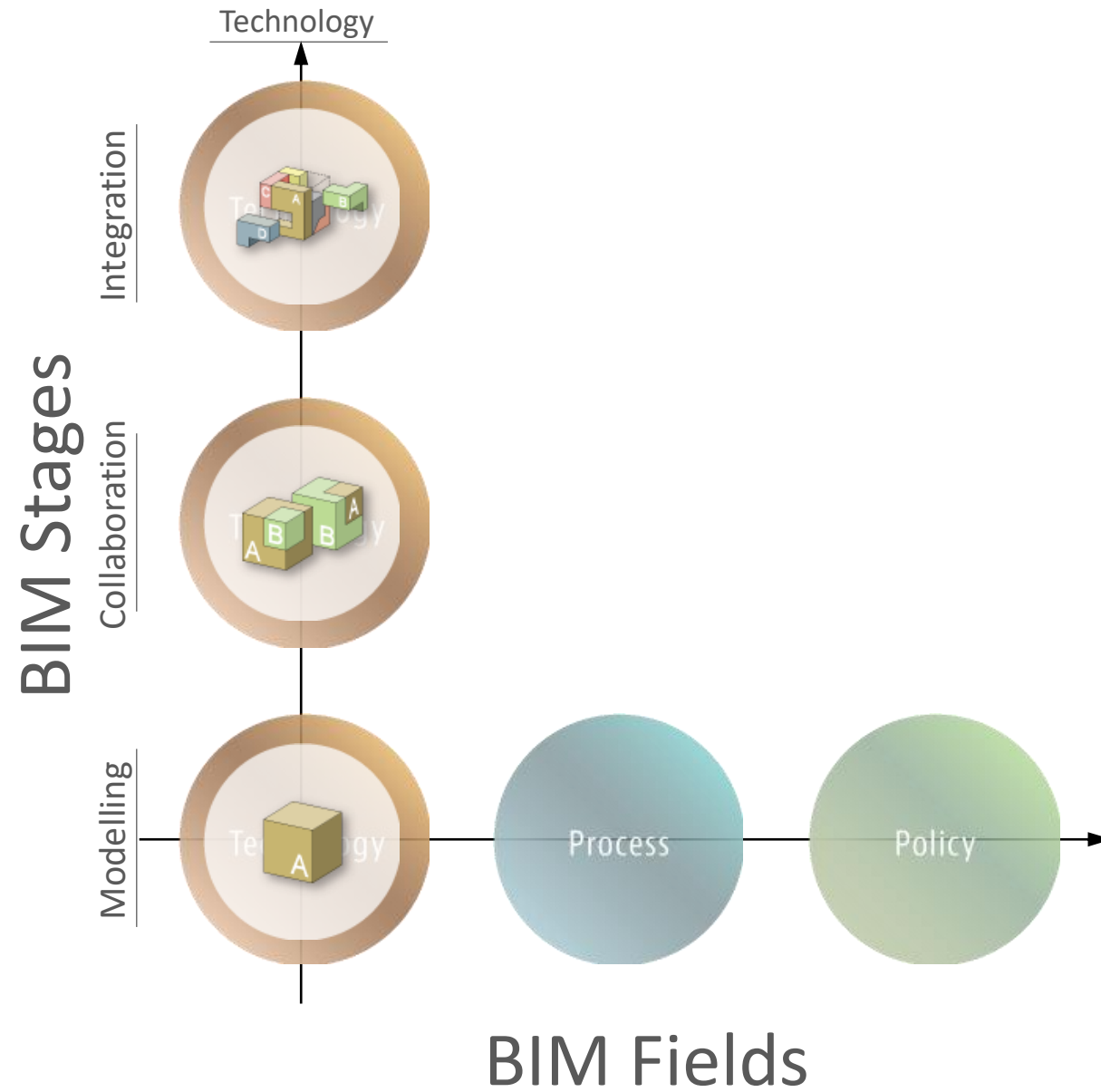


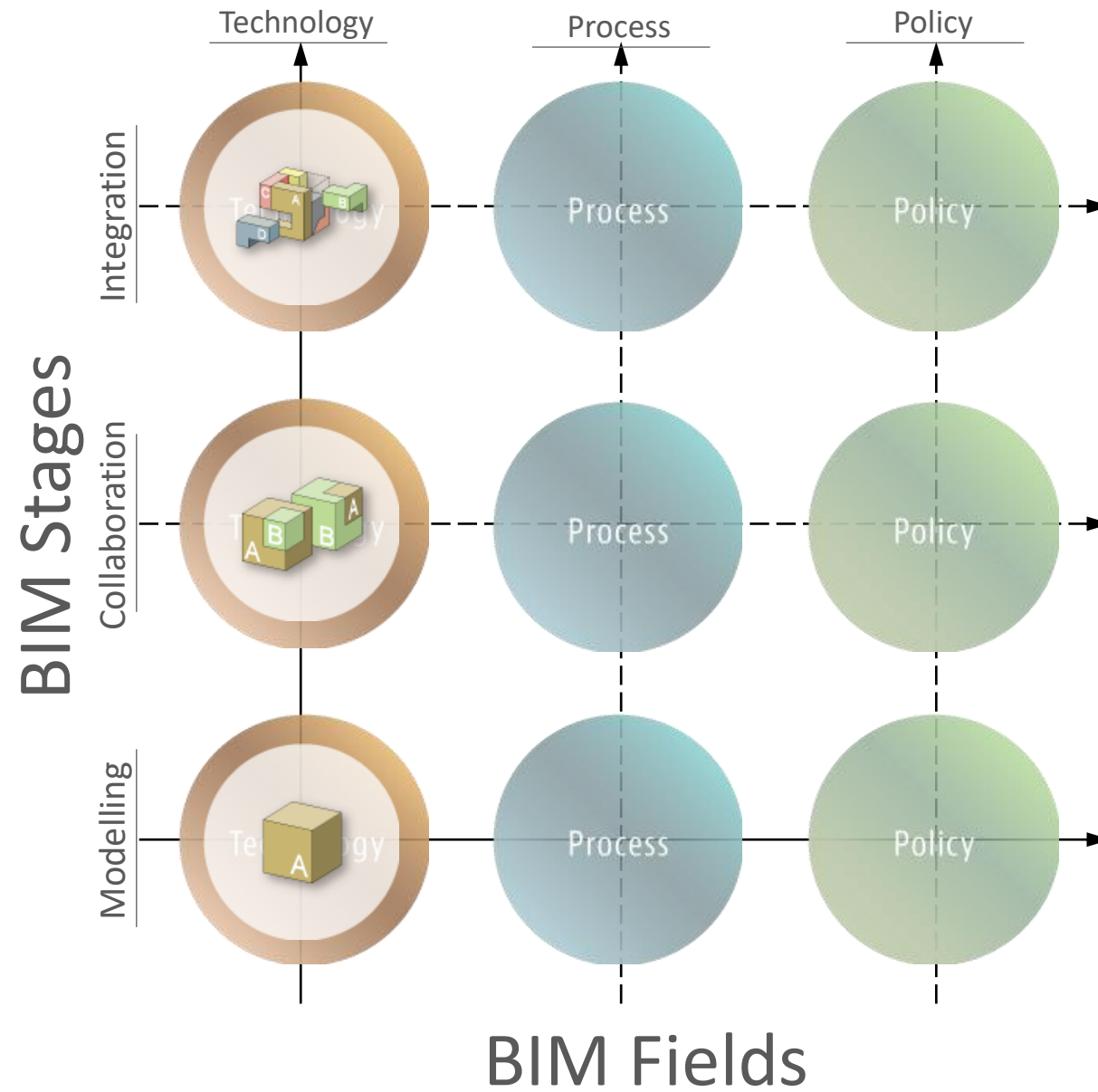
BIM Stages



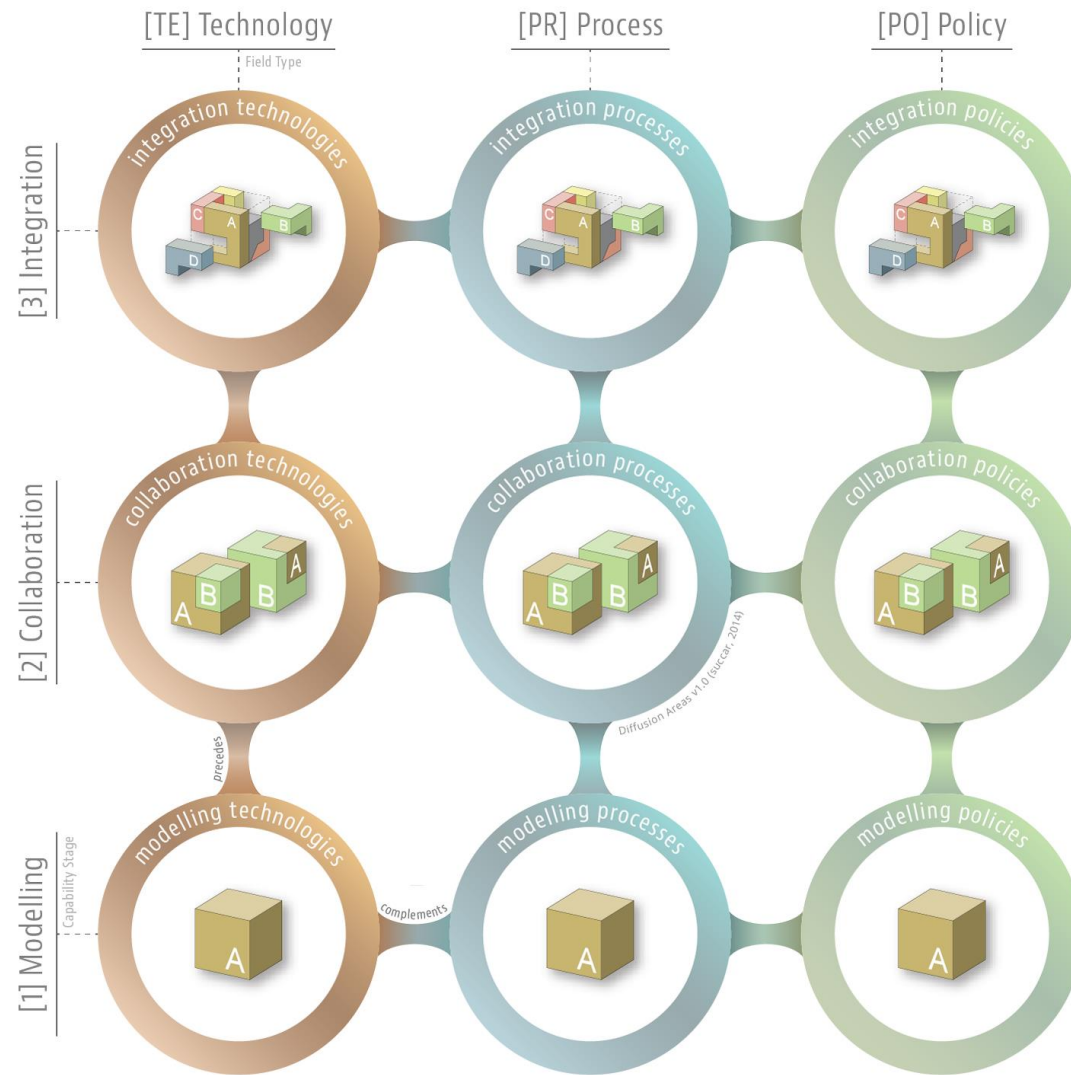
BIM Fields







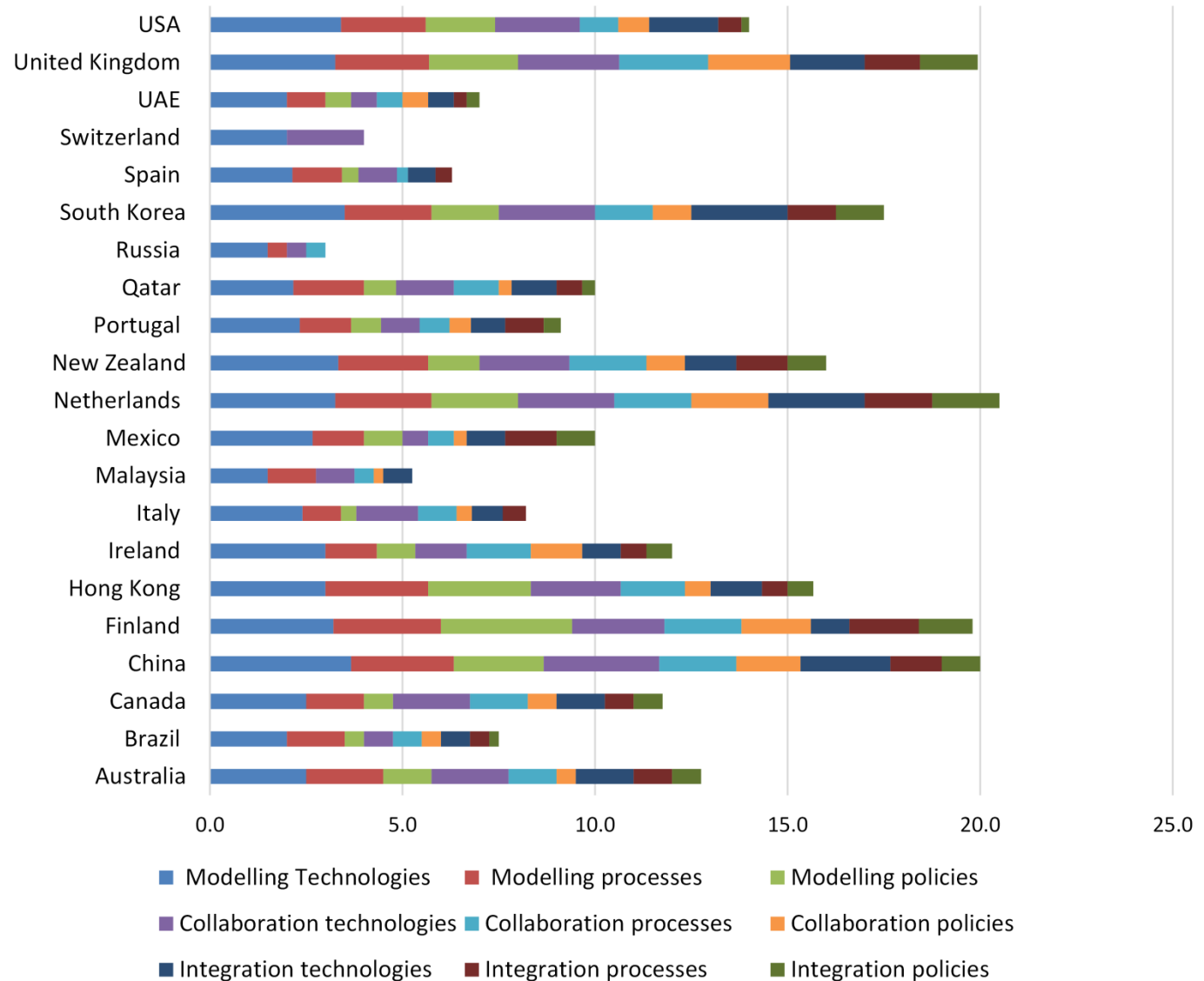
# BIM Stages



# BIM Fields

# Diffusion Areas

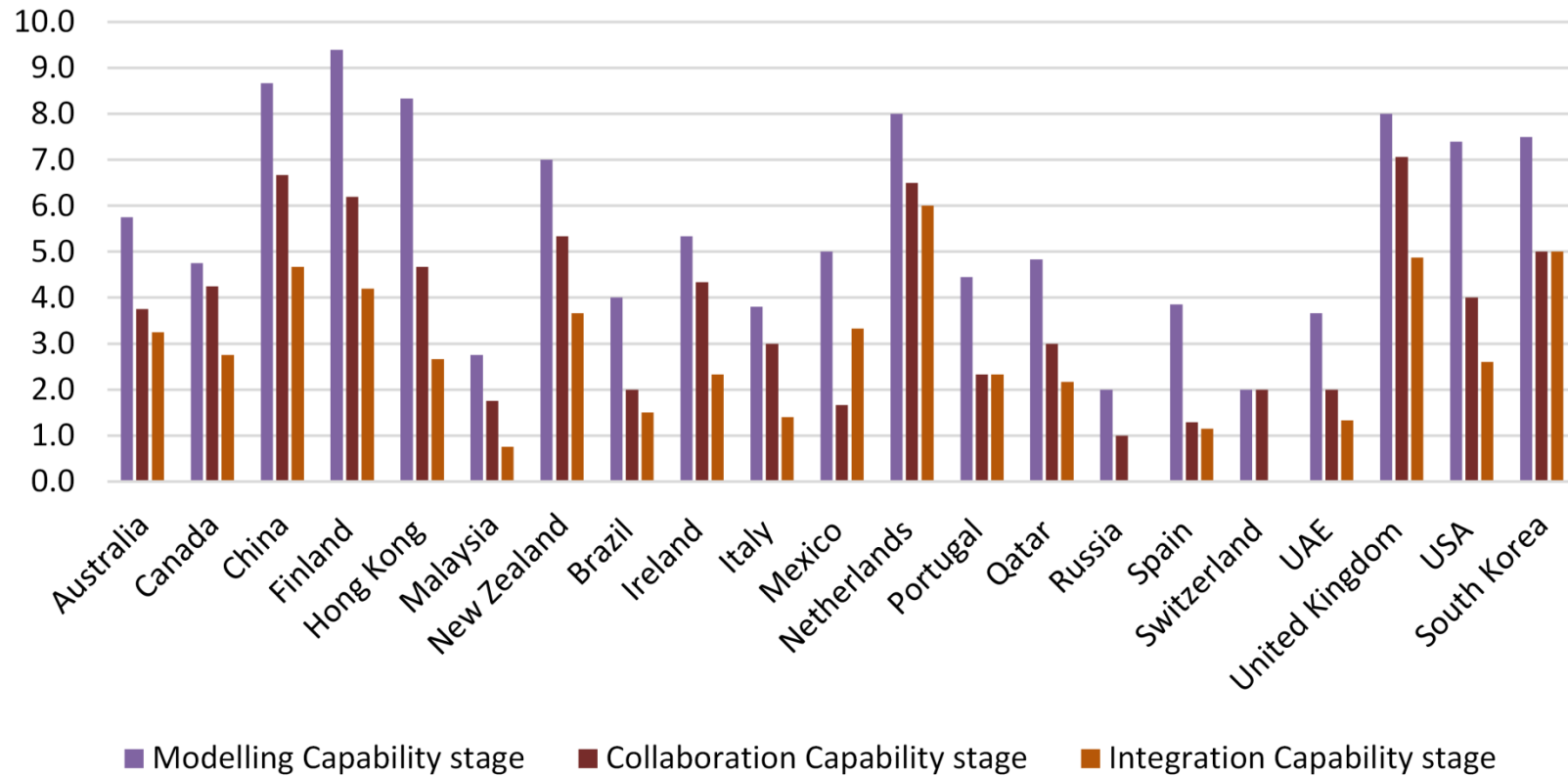
Rating in 21 countries





# Diffusion Areas

## Trends



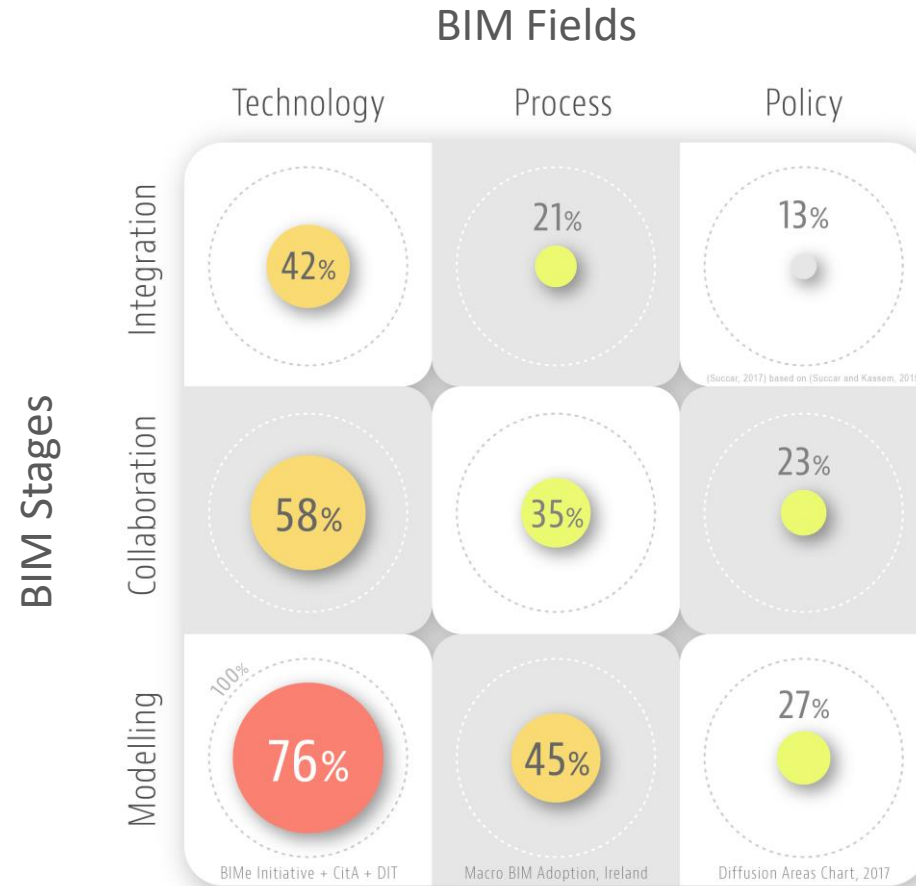


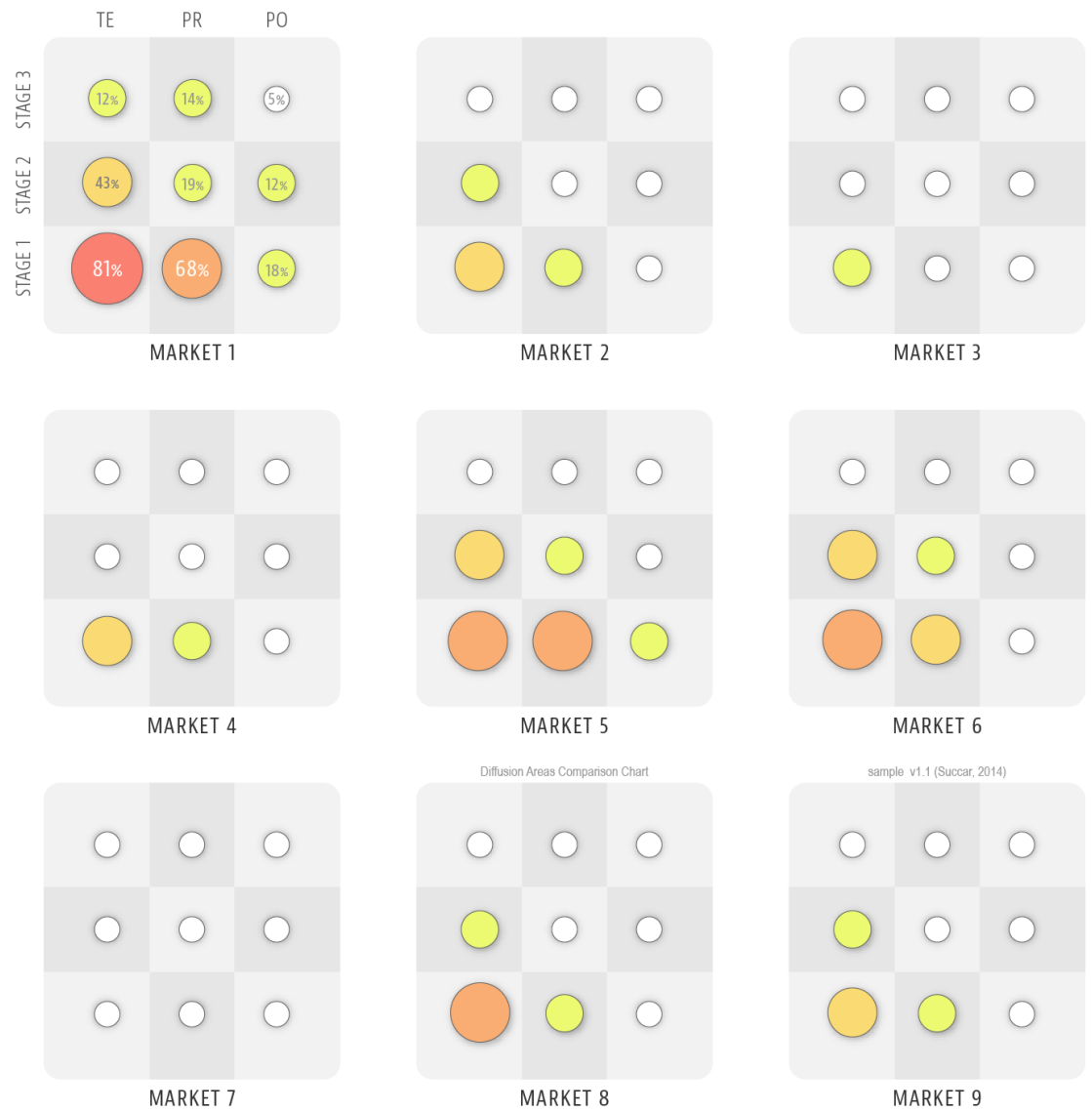
## Diffusion Areas Chart

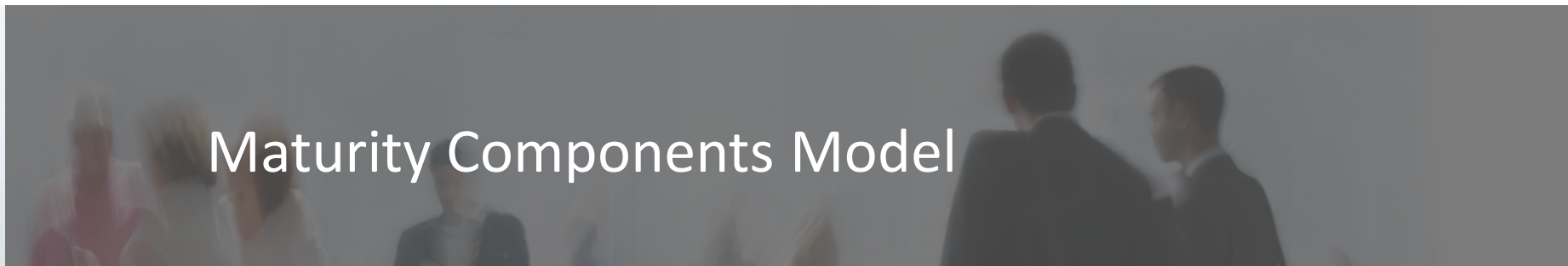
clarifying BIM diffusion within a market

### Ireland 2017

Macro BIM Adoption Snapshot  
conducted in collaboration with CitA and DIT







# Maturity Components Model



## Macro Maturity Components Model

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

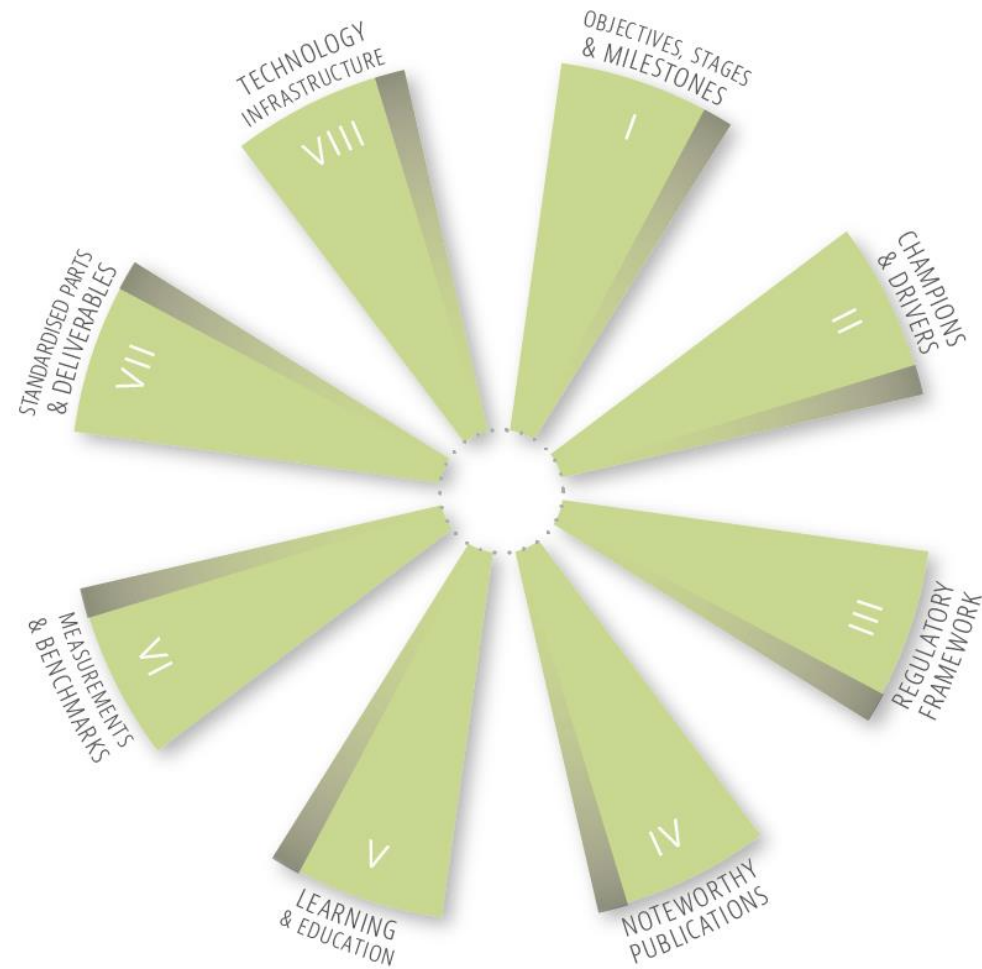




## Macro Maturity Components Model

*the eight*

**Maturity Components**



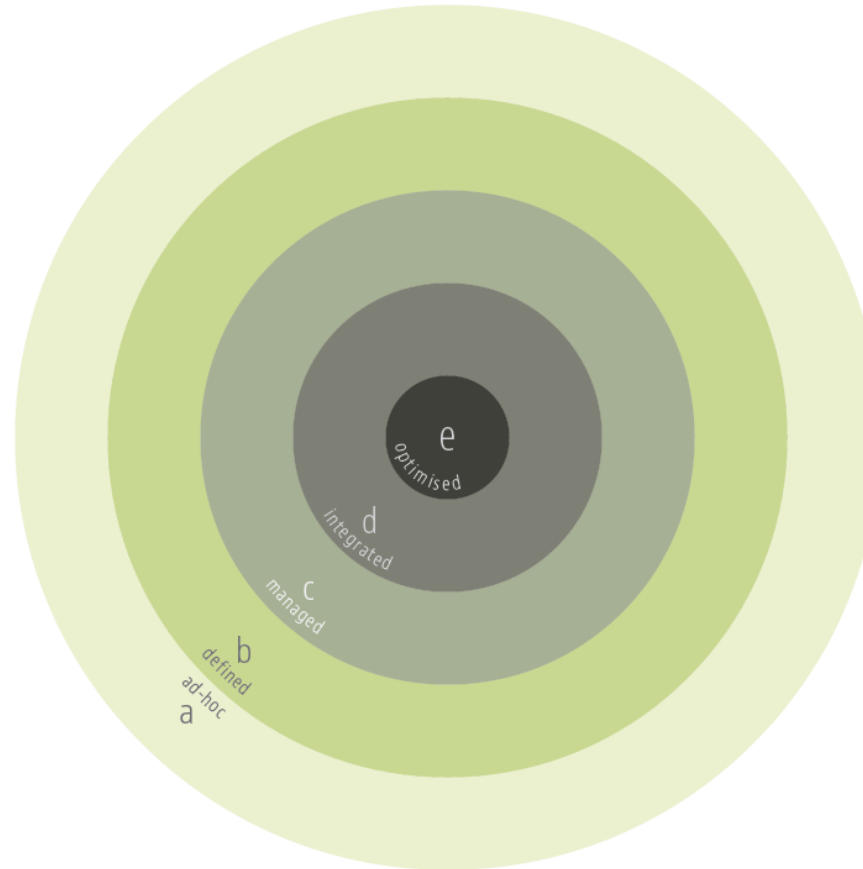




## Macro Maturity Components Model

*the five*

**Maturity Levels**





## Macro Maturity Components Model

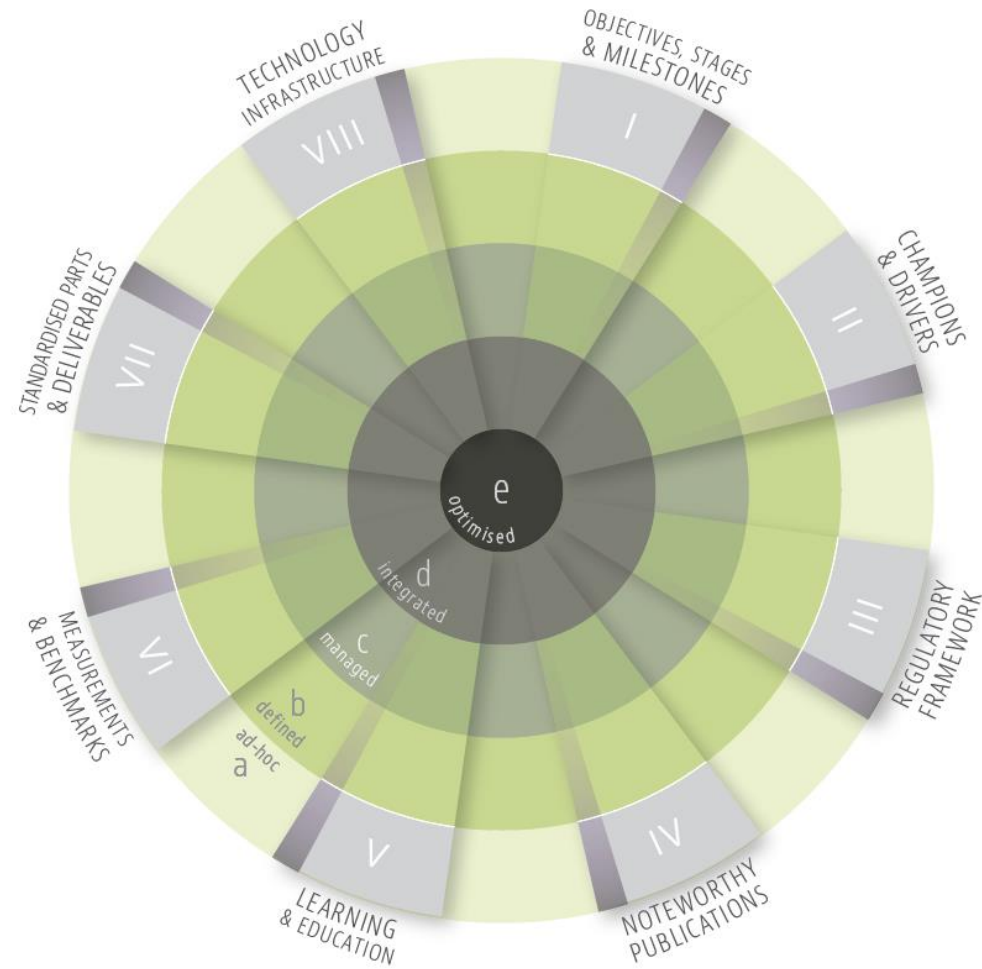
*the eight*

**Maturity Components**

+

*the five*

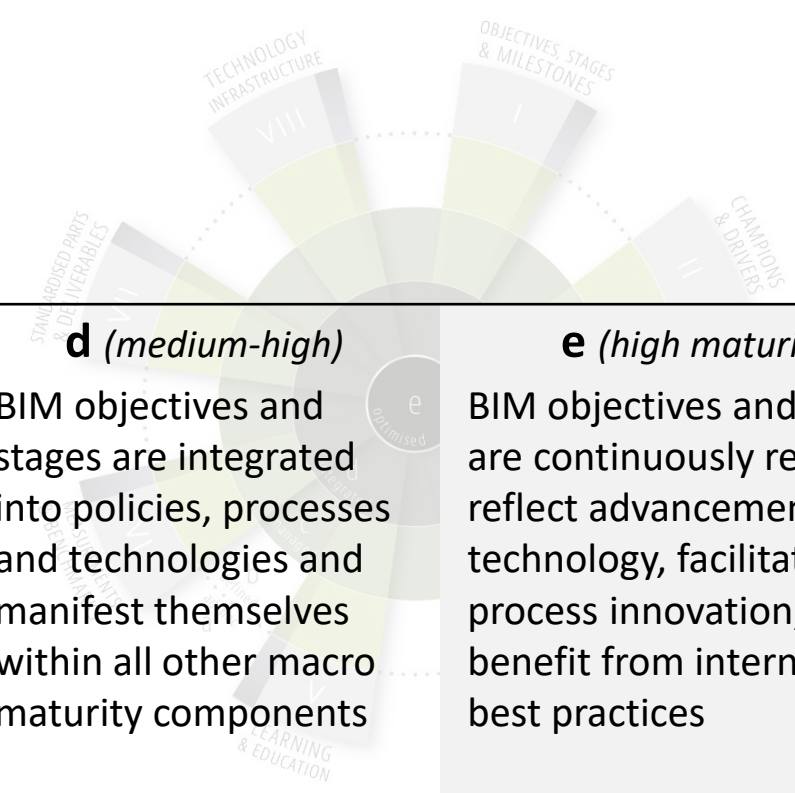
**Maturity Levels**





Component I

Objectives, stages and milestones



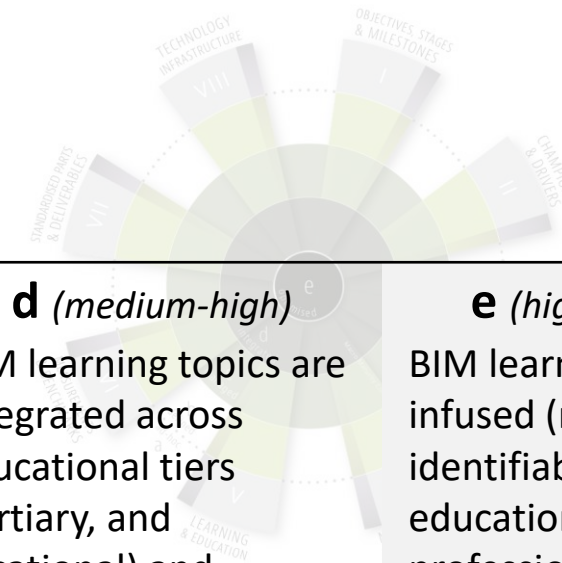
<p><b>a</b> (<i>low maturity</i>)</p> <p>There are no market-scale BIM objectives or well-defined BIM implementation stages or milestones</p>	<p><b>b</b> (<i>medium-low</i>)</p> <p>There are well-defined macro BIM objectives, implementation milestones and capability stages</p>	<p><b>c</b> (<i>medium maturity</i>)</p> <p>BIM objectives, stages and milestones are centrally managed and formally monitored</p>	<p><b>d</b> (<i>medium-high</i>)</p> <p>BIM objectives and stages are integrated into policies, processes and technologies and manifest themselves within all other macro maturity components</p>	<p><b>e</b> (<i>high maturity</i>)</p> <p>BIM objectives and stages are continuously refined to reflect advancements in technology, facilitate process innovation, and benefit from international best practices</p>
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**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



<b>a</b> ( <i>low maturity</i> )	<b>b</b> ( <i>medium-low</i> )	<b>c</b> ( <i>medium maturity</i> )	<b>d</b> ( <i>medium-high</i> )	<b>e</b> ( <i>high maturity</i> )
<p>BIM learning topics are neither identified nor included within legacy education/training programs; learning providers lack the ability to deliver BIM-infused education</p>	<p>BIM learning topics are identified and introduced into education/training programs; BIM learning providers are available across a number of disciplines and specialties</p>	<p>BIM learning topics are mapped to current and emergent roles; BIM learning providers deliver accredited programs across disciplines and specialties</p>	<p>BIM learning topics are integrated across educational tiers (tertiary, and vocational) and address the learning requirements of all industry stakeholders</p>	<p>BIM learning topics are infused (not separately identifiable) into education, training and professional development programs</p>

**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; ...*



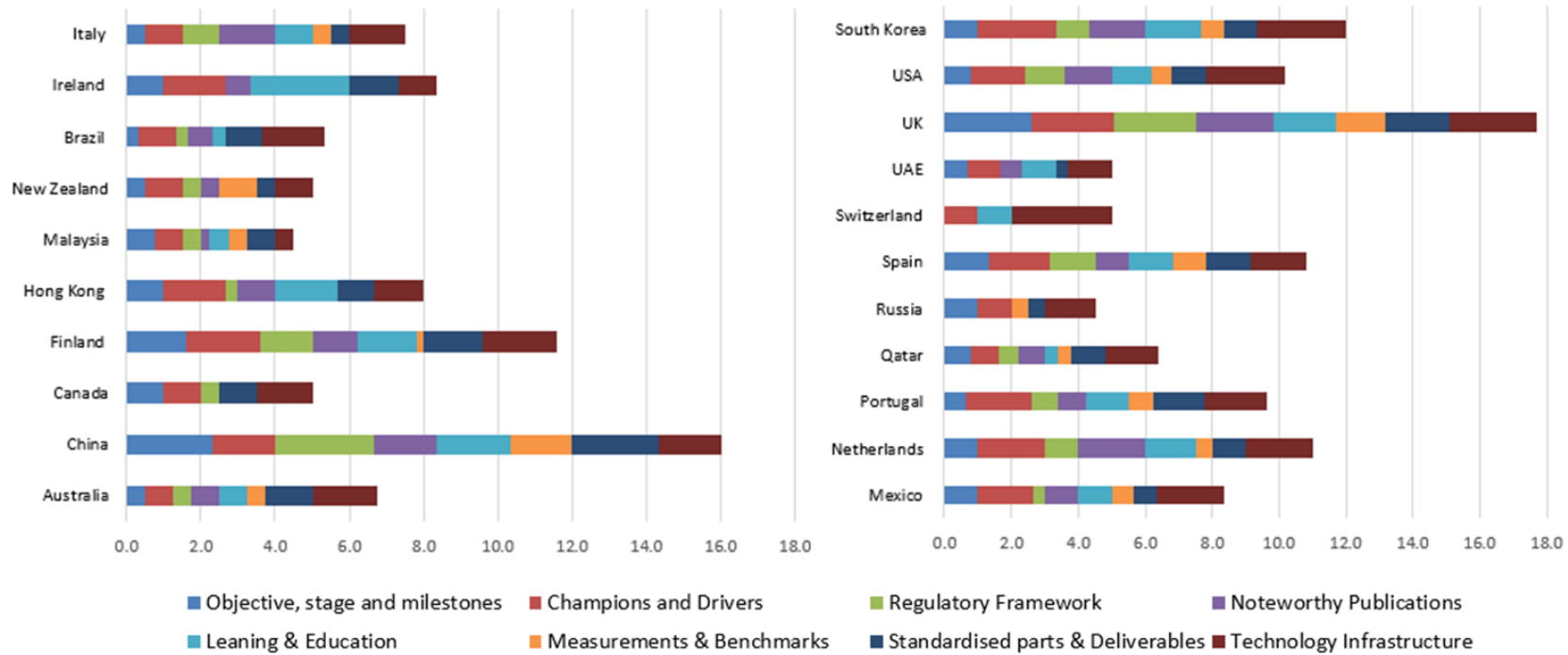
## Component VII

# Standardised parts and deliverables

[latest version or additional information](#)

<b>a</b> ( <i>low maturity</i> )	<b>b</b> ( <i>medium-low</i> )	<b>c</b> ( <i>medium maturity</i> )	<b>d</b> ( <i>medium-high</i> )	<b>e</b> ( <i>high maturity</i> )
<p>There no market-specific <i>object libraries</i> (e.g. doors and windows); service delivery <i>model uses</i> (e.g. clash detection) and <i>operational data</i> requirements (e.g. COBie)</p>	<p><i>Object libraries</i> are available yet follow varied modelling and classification norms; service delivery <i>model uses</i> and <i>operational data</i> requirements are informally defined and partially used</p>	<p>Standardised <i>object libraries</i> are available and used; service delivery <i>model uses</i> and <i>operational data</i> requirements are formally defined and used across all project lifecycle phases</p>	<p>Standardised <i>object libraries</i>, service delivery <i>model uses</i>, and <i>operational data</i> requirements are integrated into, procurement mechanisms, project workflows and lifecycle facility operations</p>	<p>Standardised <i>object libraries</i>, service delivery <i>model uses</i> and <i>operational data</i> requirements are continuously optimised and realigned to improve usage, accessibility, interoperability and connectivity</p>

**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*



MARKET 1



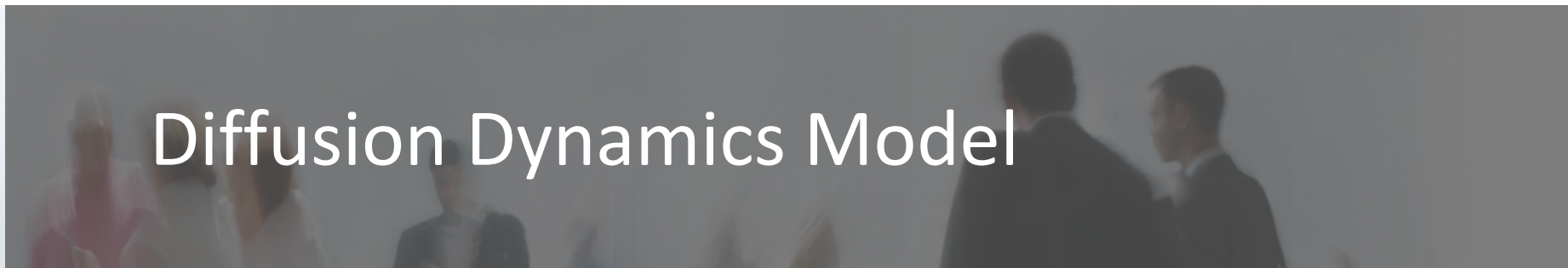
MARKET 2



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:

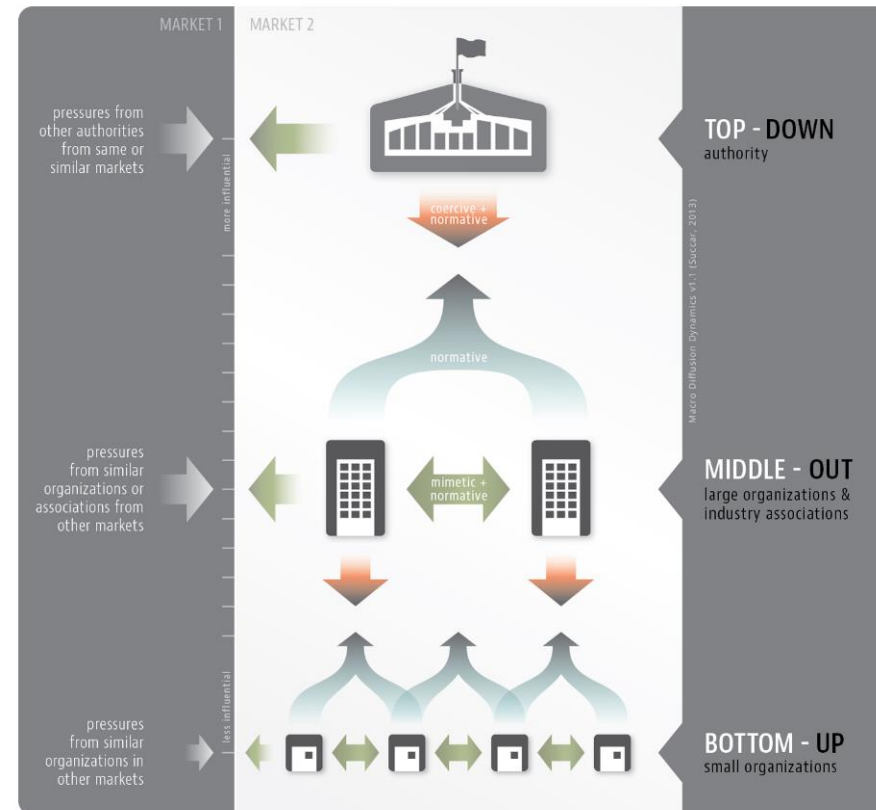
Top-Down, Middle-Out & Bottom-Up.

### 3 Pressure Mechanisms:

Downwards, Upwards & Horizontal; and

### 3 Pressure Types:

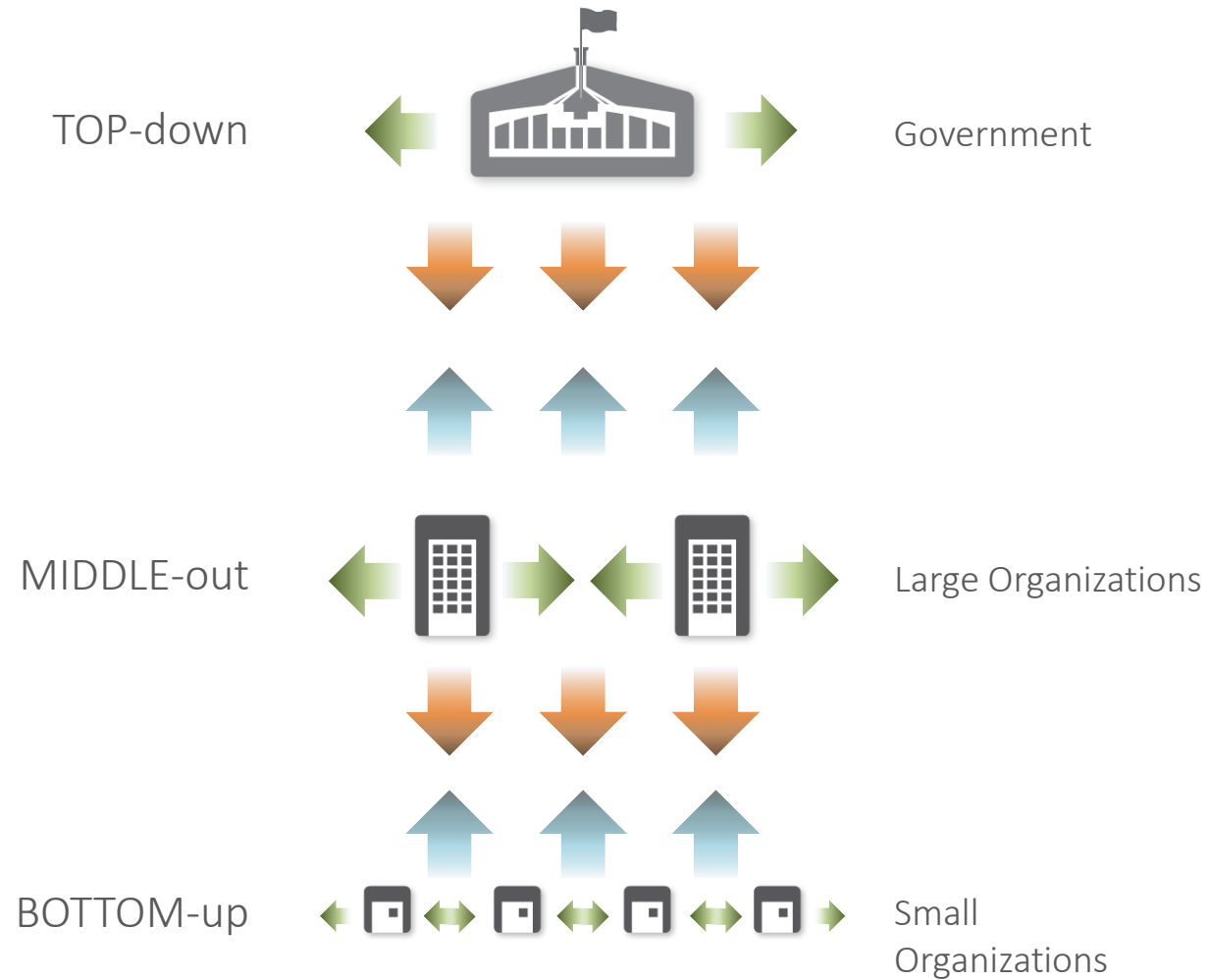
Coercive, Normative, & Mimetic





## Diffusion Dynamics Model

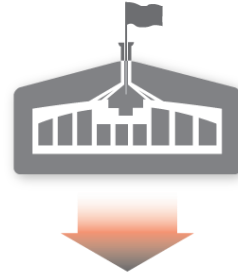
clarifies the *how*  
BIM diffuses  
within and across  
markets





## Diffusion Dynamics Model

clarifies the *how*  
BIM diffuses  
within and across  
markets



Government

Downwards Pressures  
*coercive pressures*



Large Organizations

Downwards Pressures  
*coercive pressures*

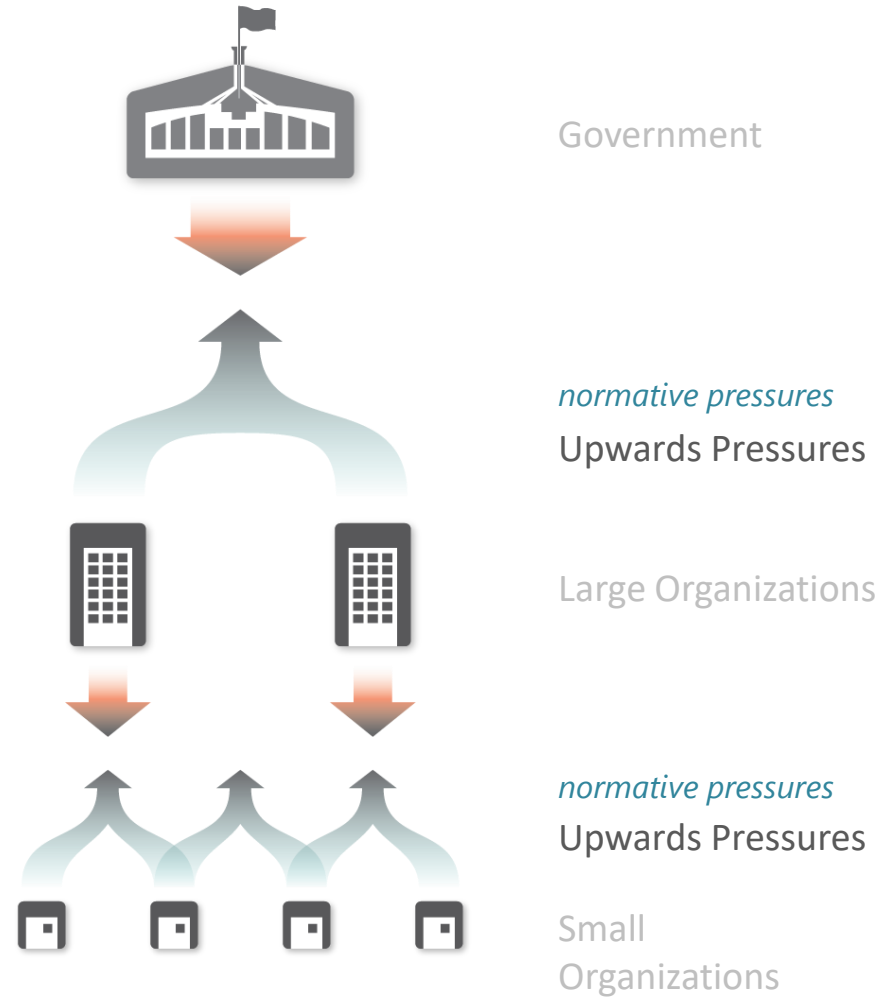


Small  
Organizations



## Diffusion Dynamics Model

clarifies the *how*  
BIM diffuses  
within and across  
markets

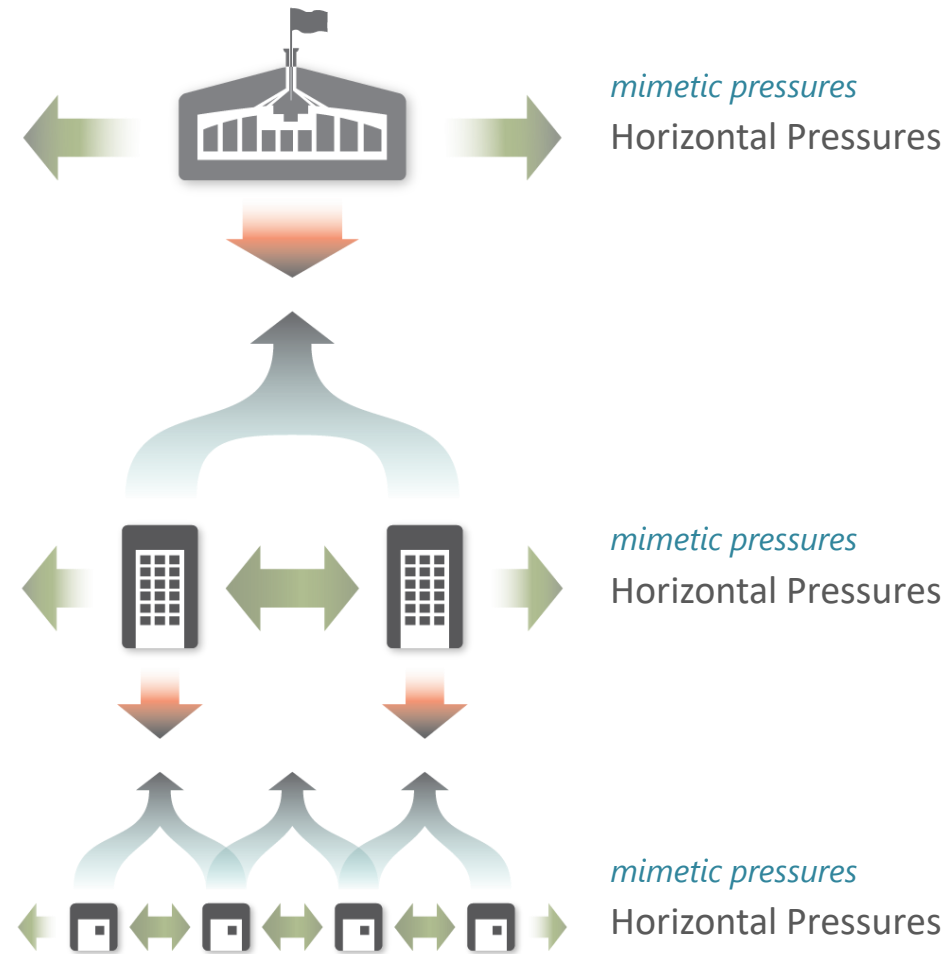






## Diffusion Dynamics Model

clarifies the *how* BIM  
diffuses within and  
across markets

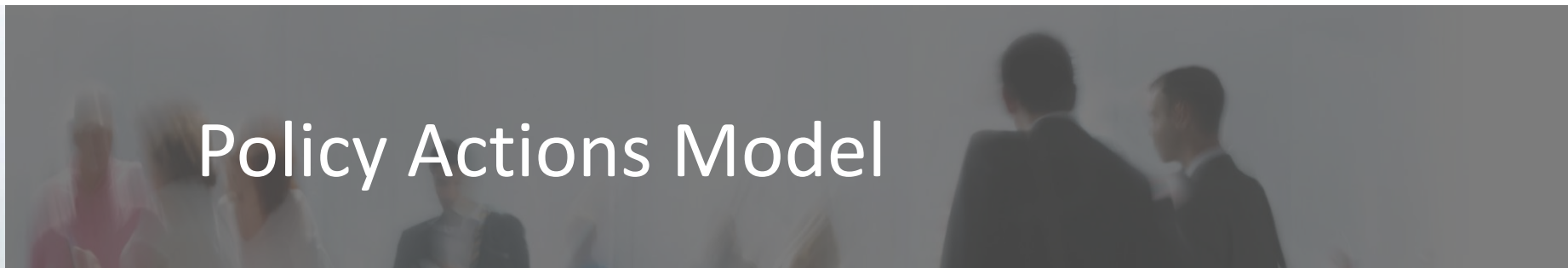




	Top Down	Middle-out	Bottom-up
Australia		•	
Brazil		•	
Canada		•	
China		•	
Finland		•	
Hong Kong	•		
Ireland		•	
Italy		•	
Malaysia		•	
Mexico		•	
Netherlands		•	

	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

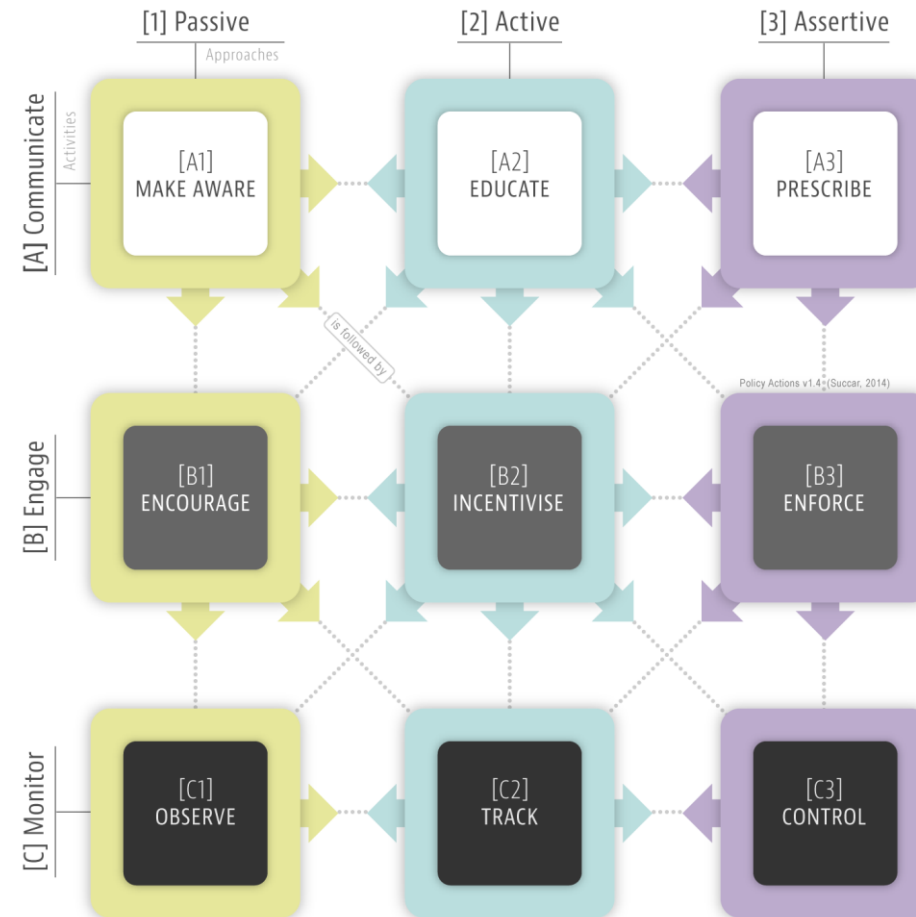
clarifies how different Policy Makers have *different Policy Approaches* to influencing BIM Adoption

The model includes  
**3 Policy Approaches:**

Passive, Active, &  
Assertive; *and*

**3 Policy Activities:**

Make Aware, Encourage  
& Observe





## Policy Approaches

### Make Aware

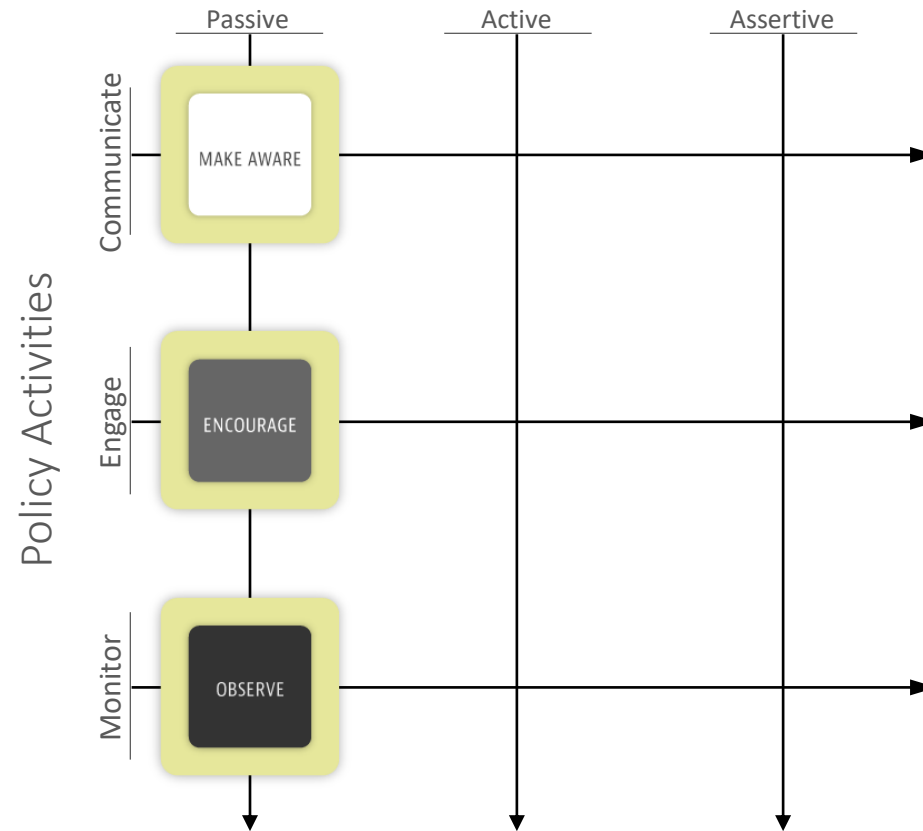
policy player informs stakeholders of the importance of a new system/process

### 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

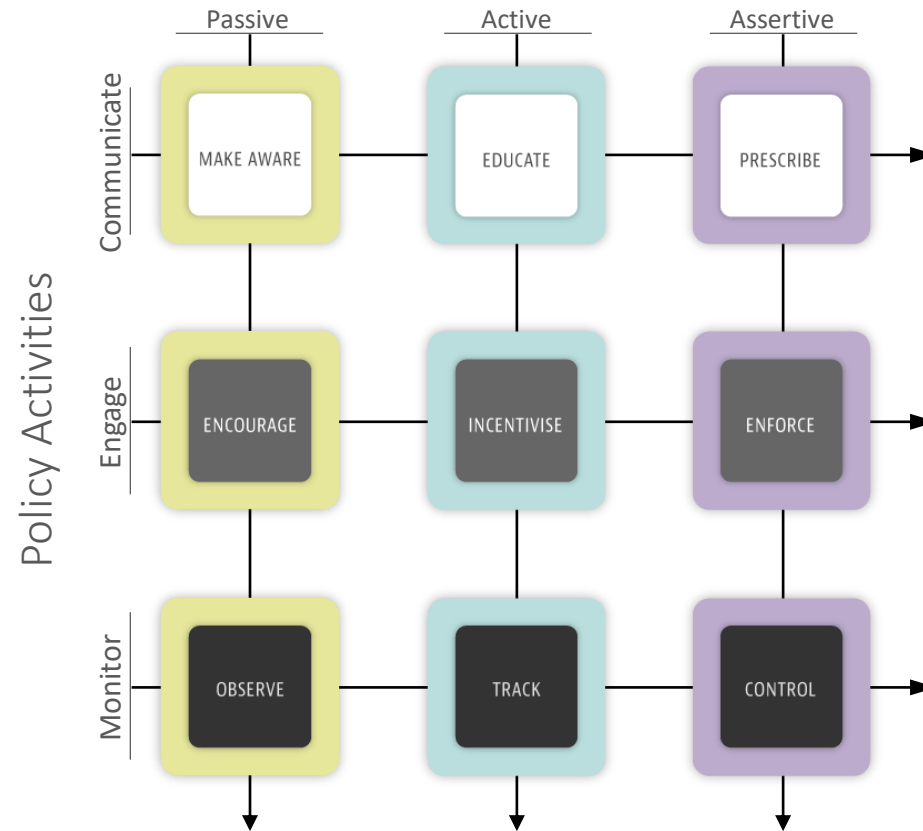
policy player generates informative guides to educate stakeholders of the system/process

### 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

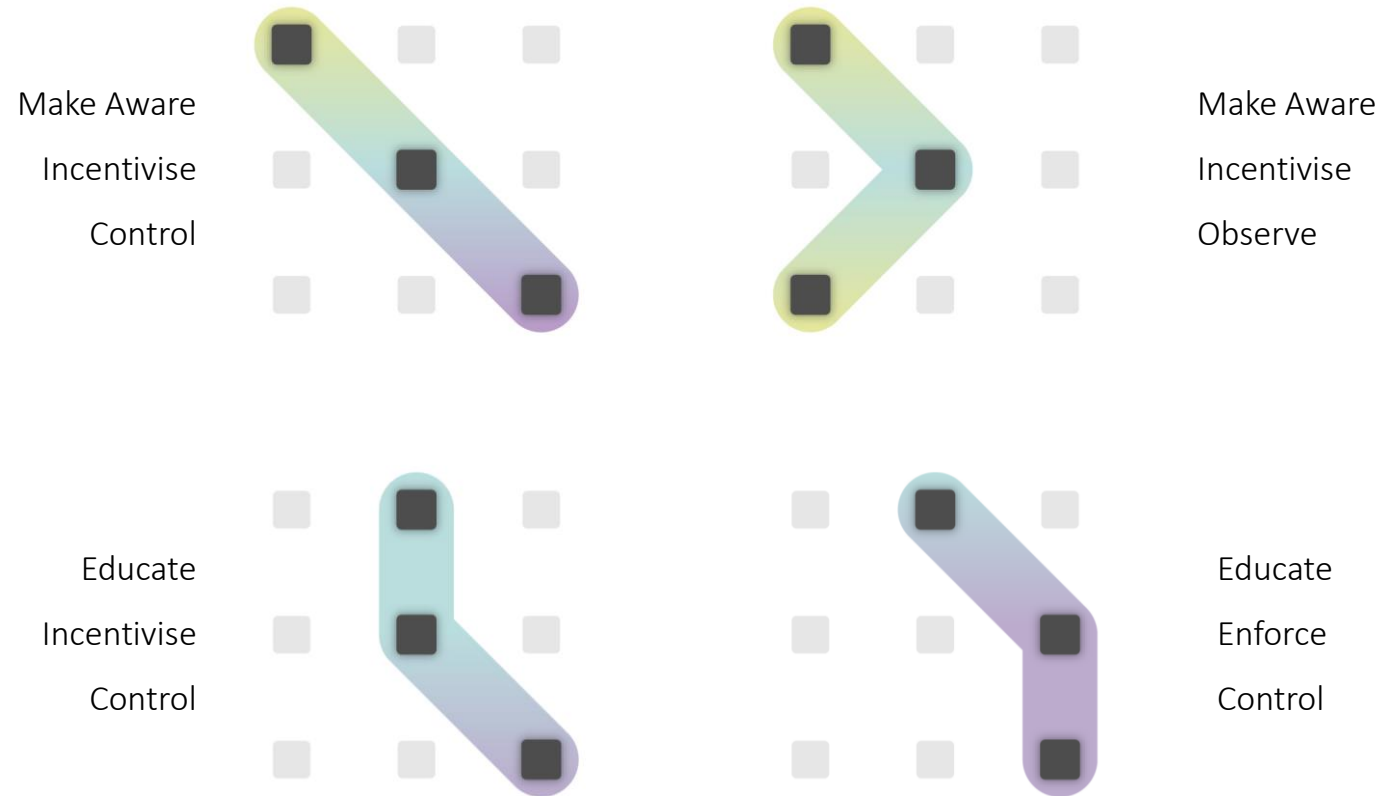
### Control

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



## Policy Actions Charts

comparative  
sample charts

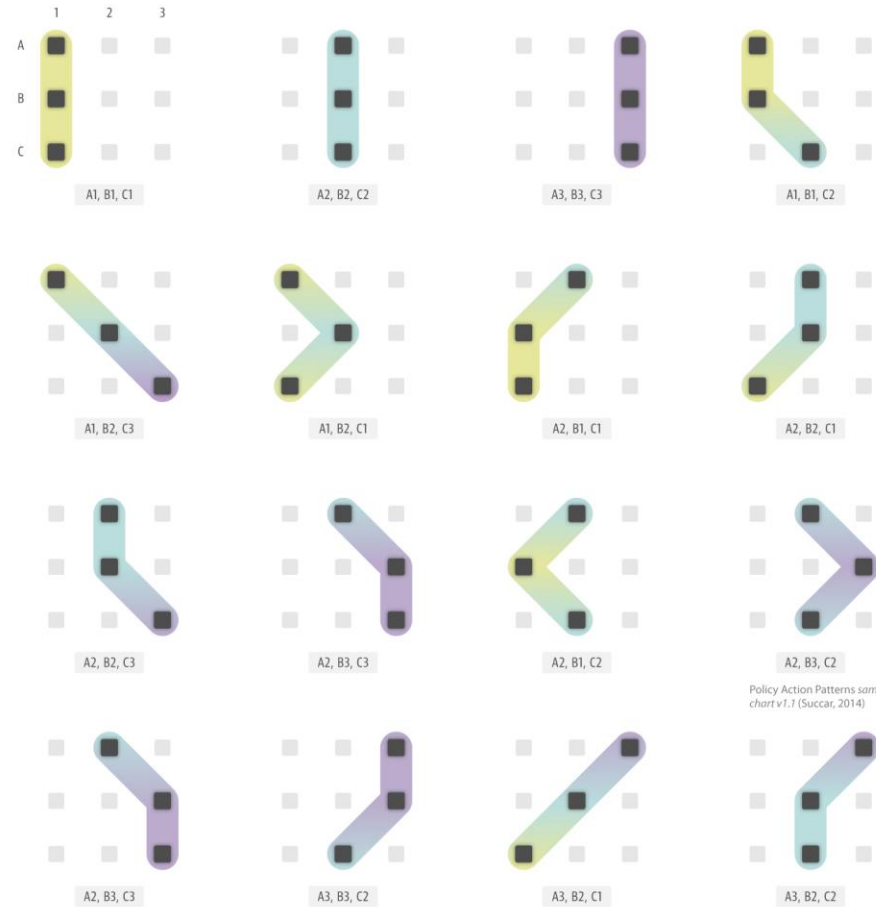


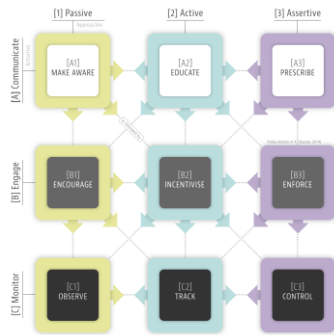




## Policy Actions Charts

comparative  
sample charts





Policy Action types  
across the 2015 sample

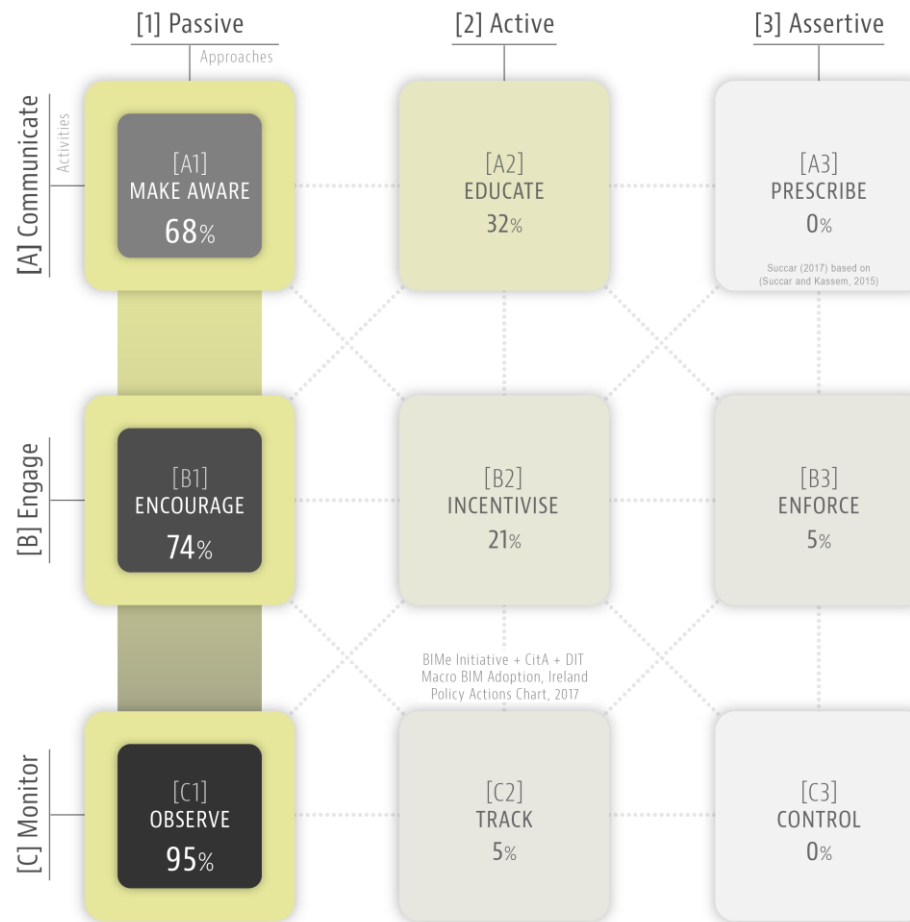
	Communicate - Passive <b>Make Aware</b>	Communicate - Active <b>Educate</b>	Communicate - Prescriptive <b>Prescribe</b>	Engage - Passive <b>Encourage</b>	Engage - Active <b>Incentivise</b>	Engage - Prescriptive <b>Enforce</b>	Monitor - Passive <b>Observe</b>	Monitor - Active <b>Track</b>	Monitor - Prescriptive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



## Policy Actions Chart

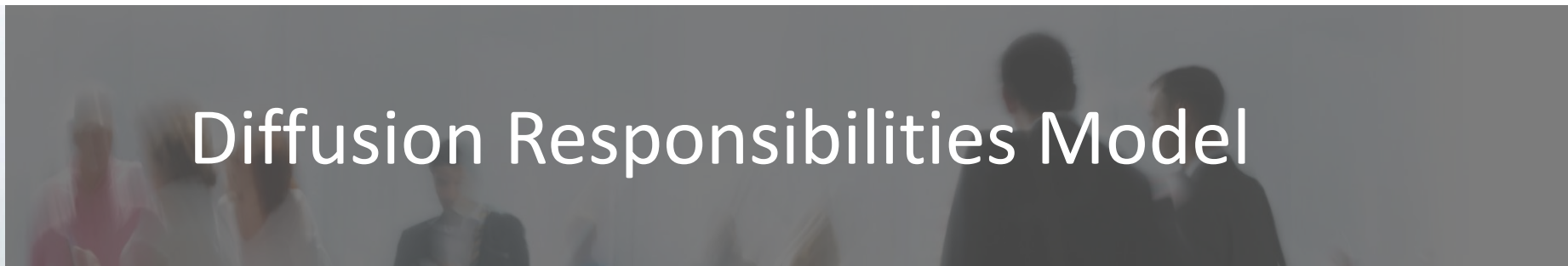
### Ireland 2017

Macro BIM Adoption Snapshot  
conducted in collaboration with CitA and DIT





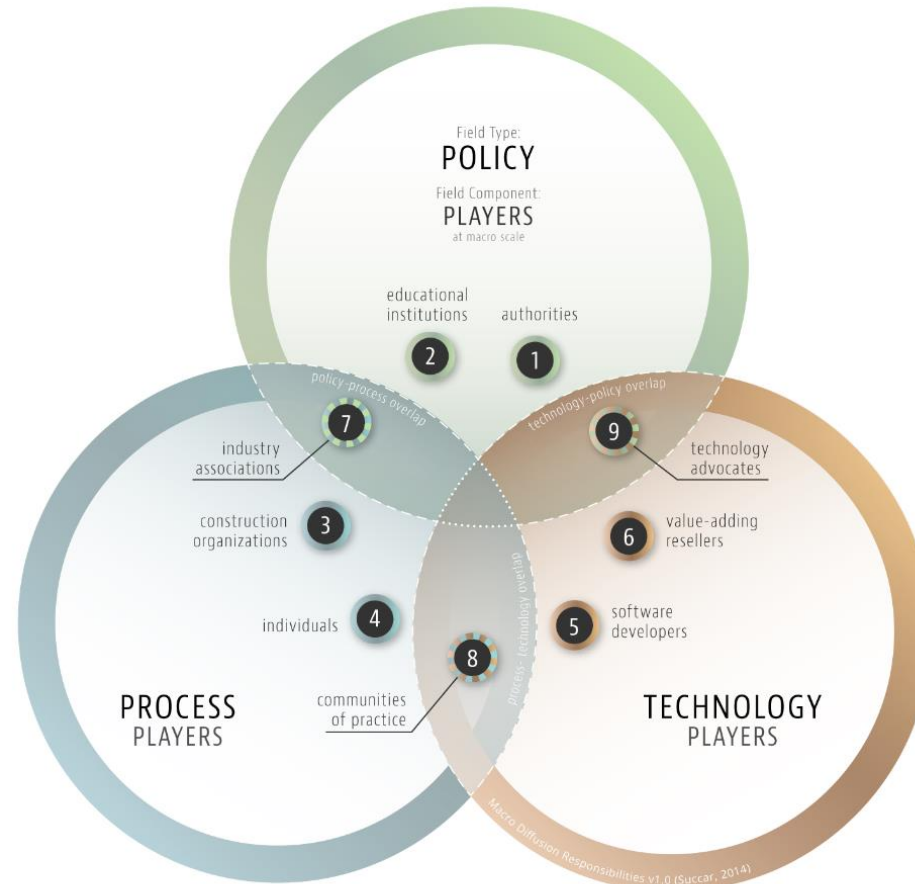
# Diffusion Responsibilities Model





## Diffusion Responsibilities Model

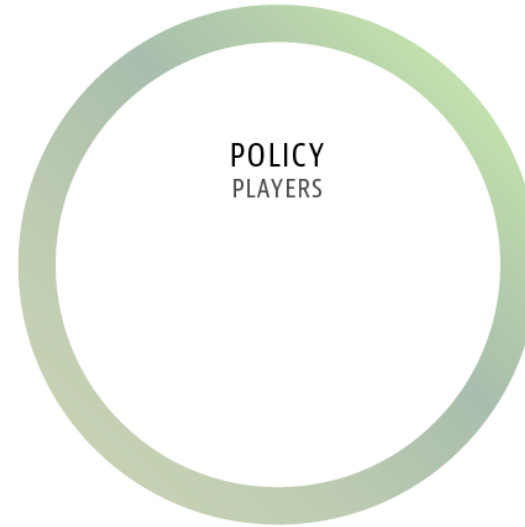
clarifies the *different BIM Diffusion Roles* played by industry stakeholders – clustered into 9 Groups





## Diffusion Responsibilities Model

clarifies the *different*  
*BIM Diffusion Roles*  
played by industry  
stakeholders – clustered  
into 9 Groups

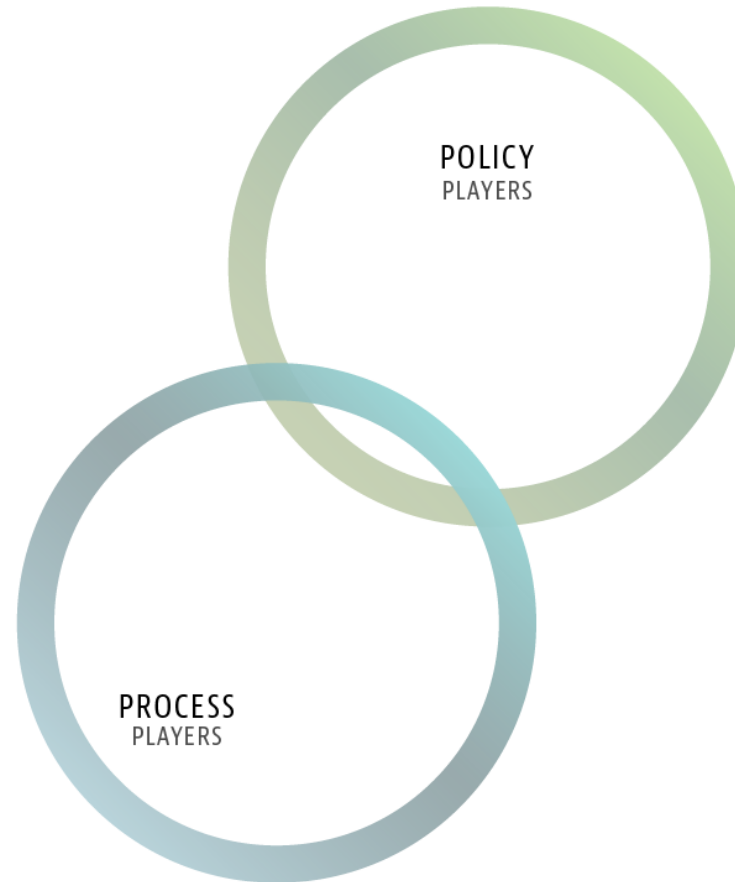


*BIM Fields*



## Diffusion Responsibilities Model

clarifies the *different*  
*BIM Diffusion Roles*  
played by industry  
stakeholders – clustered  
into 9 *Groups*



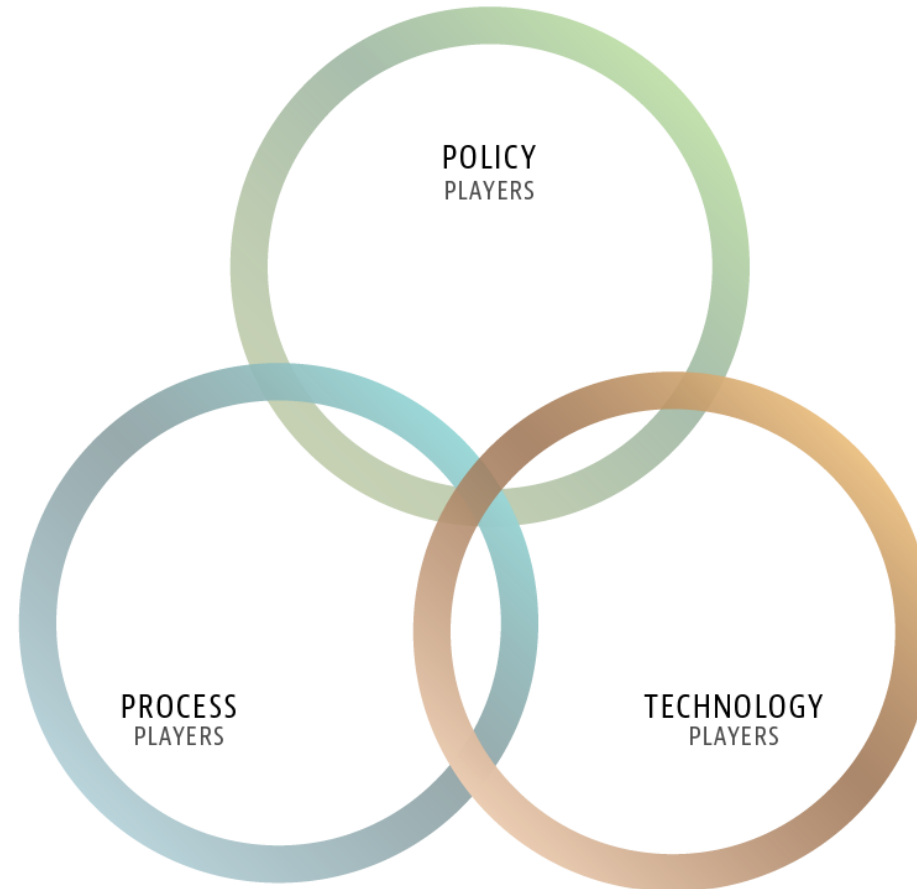
*BIM Fields*





## Diffusion Responsibilities Model

clarifies the *different*  
*BIM Diffusion Roles*  
played by industry  
stakeholders – clustered  
into 9 Groups

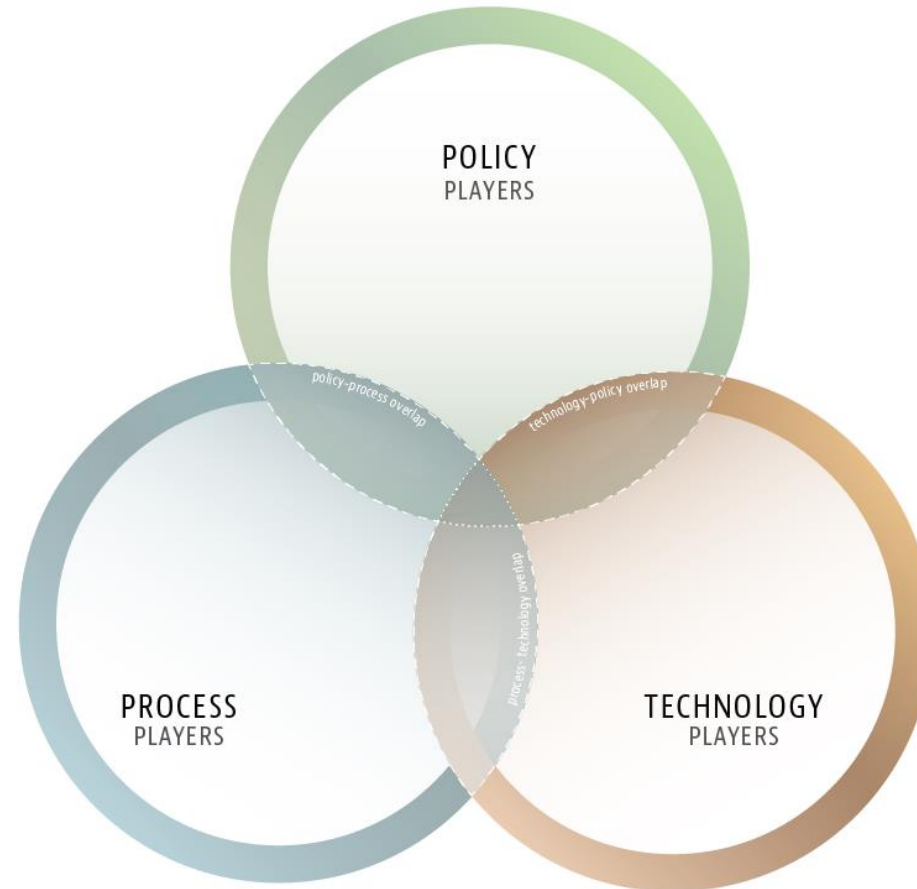


*BIM Fields*

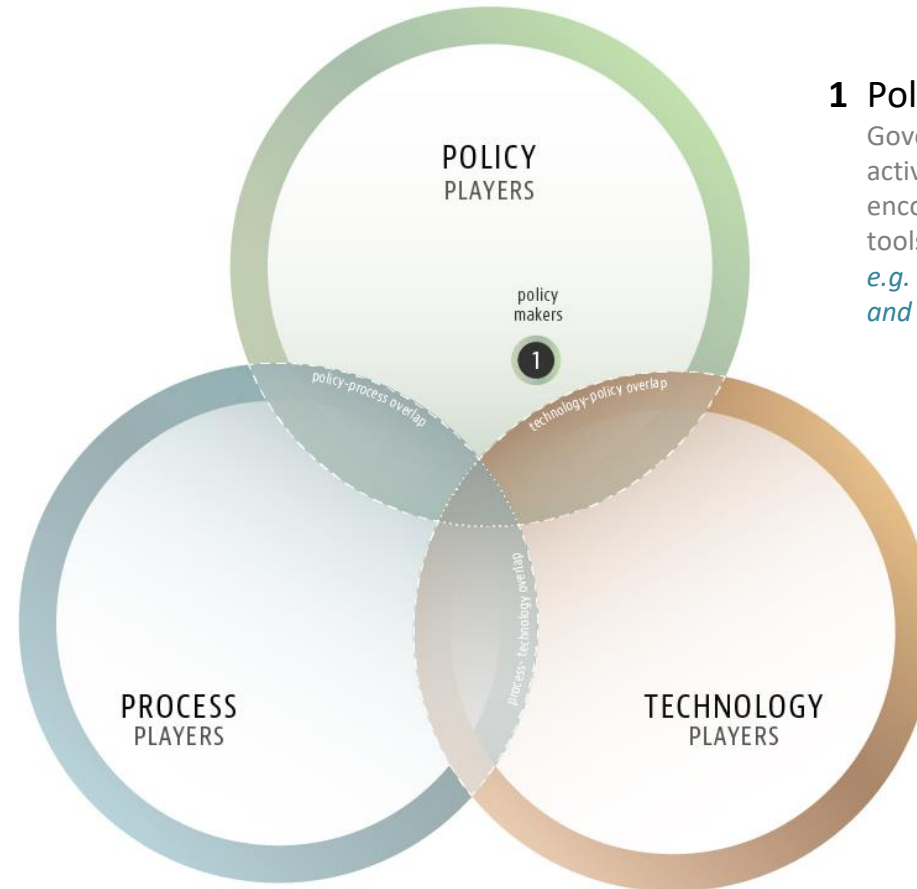


## Diffusion Responsibilities Model

clarifies the *different*  
*BIM Diffusion Roles*  
played by industry  
stakeholders – clustered  
into 9 Groups



BIM Fields



## 1 Policy Makers

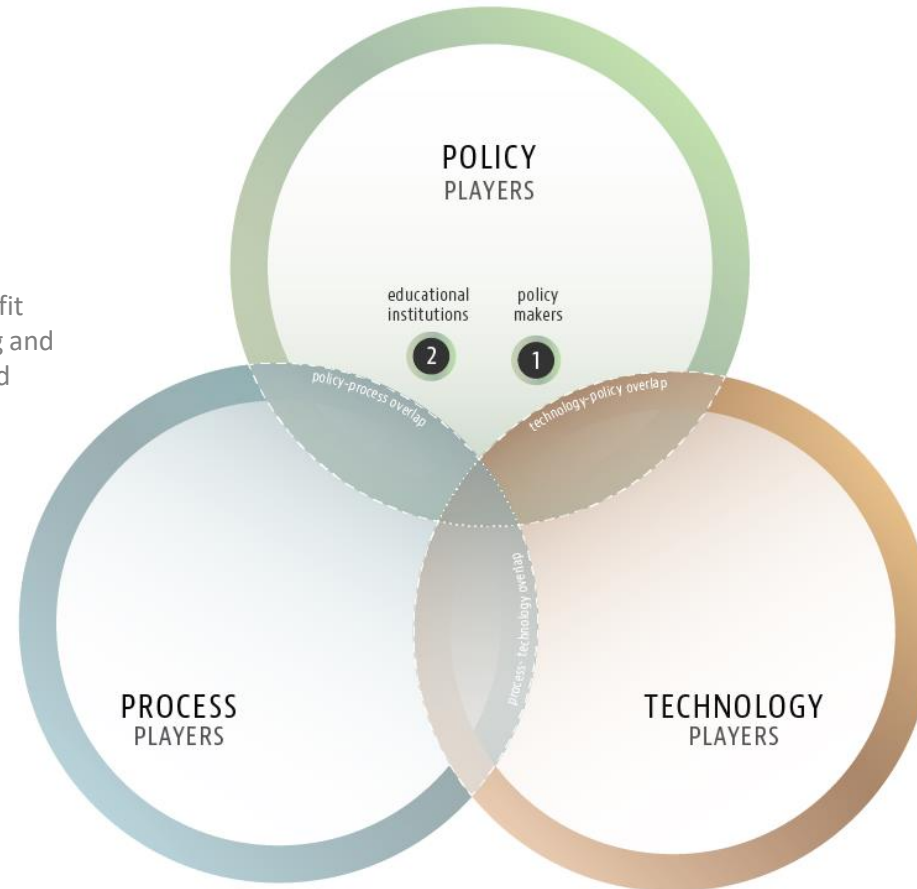
Governmental players playing an active role in mandating or encouraging the adoption of BIM tools and workflows

*e.g. the Task Group in the UK and BCA in Singapore*



## 2 Educational Institutions

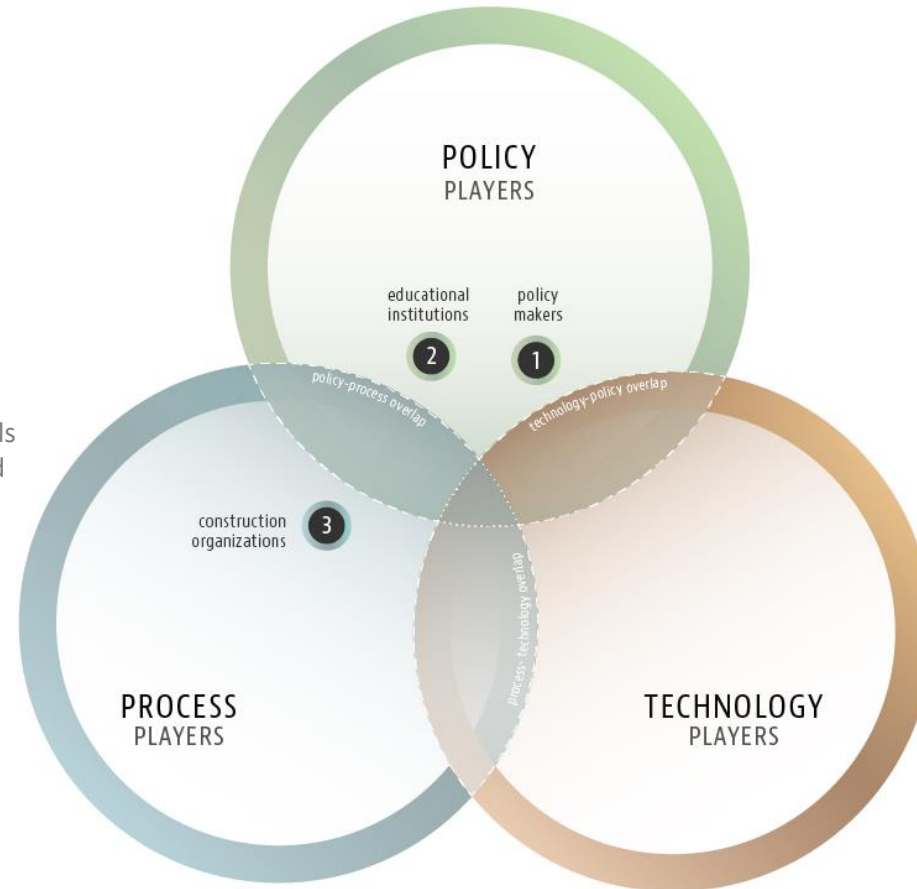
The universities and not-for-profit technical institutions developing and delivering learning programs and materials





### 3 Construction Organizations

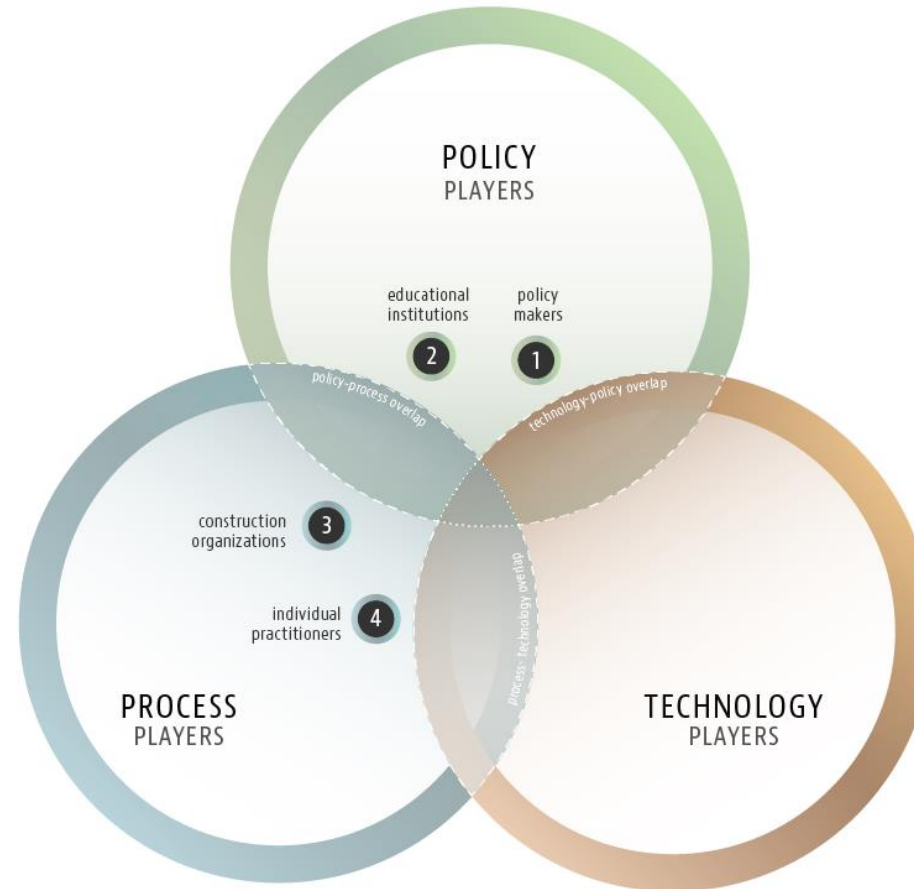
Designers, contractors, owners, operators and other organizational players involved in deploying BIM tools and workflows, training their staff and delivering BIM-enabled outcomes

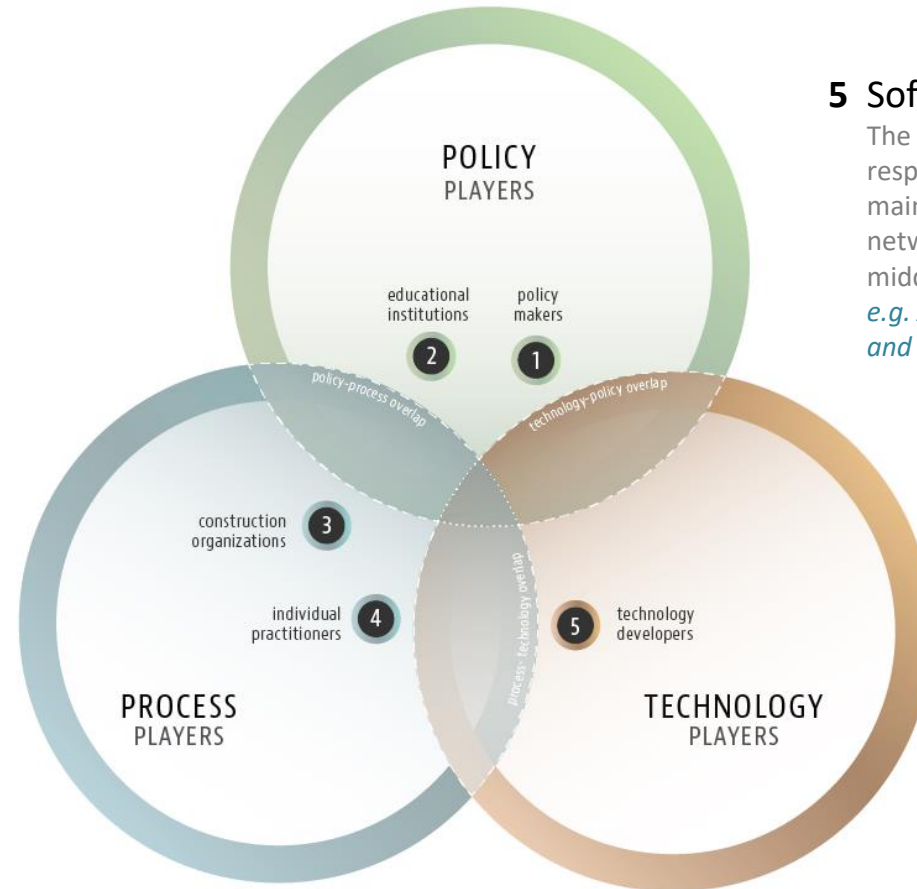




## 4 Individuals

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

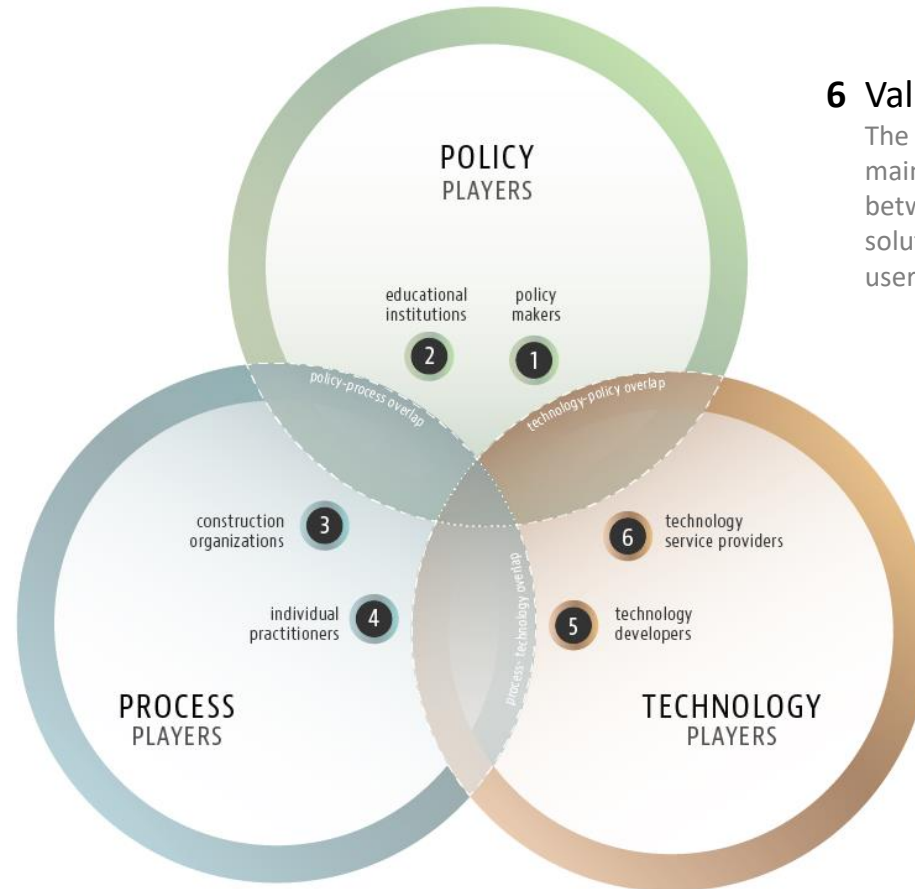




## 5 Software Developers

The large software houses responsible for developing and maintaining BIM software tools, network solutions and middleware  
*e.g. Autodesk, Nemetschek and Trimble*





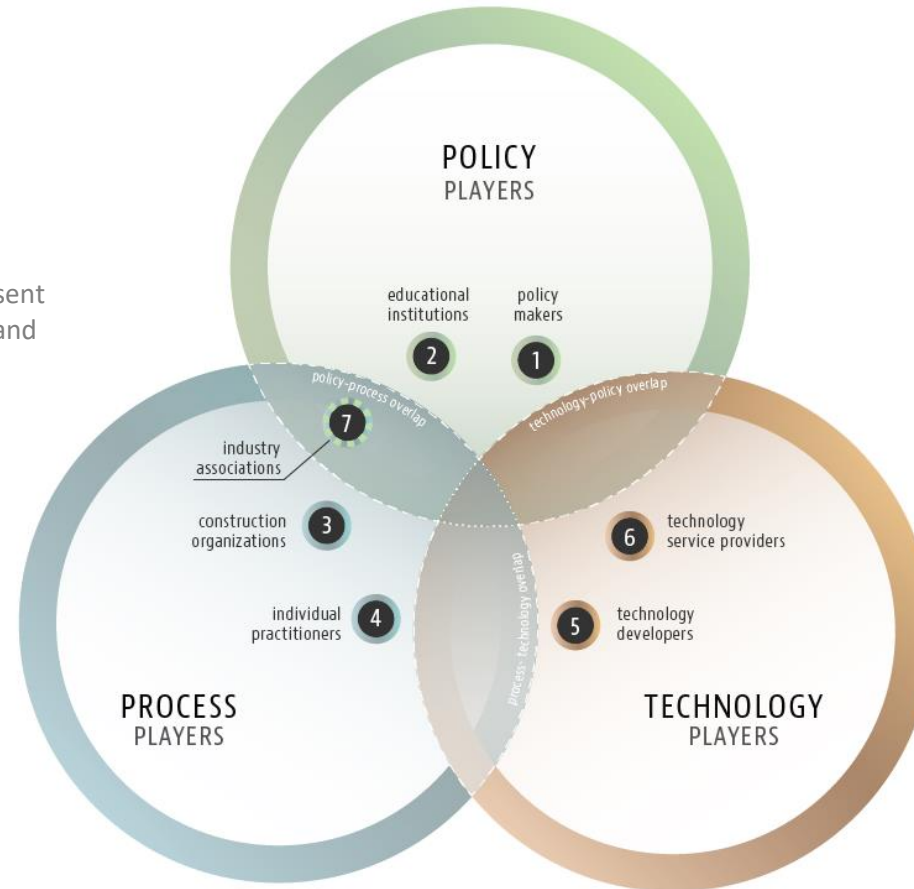
## 6 Value-adding Resellers

The companies bridging and maintaining the relationship between software/network solution developers and end users



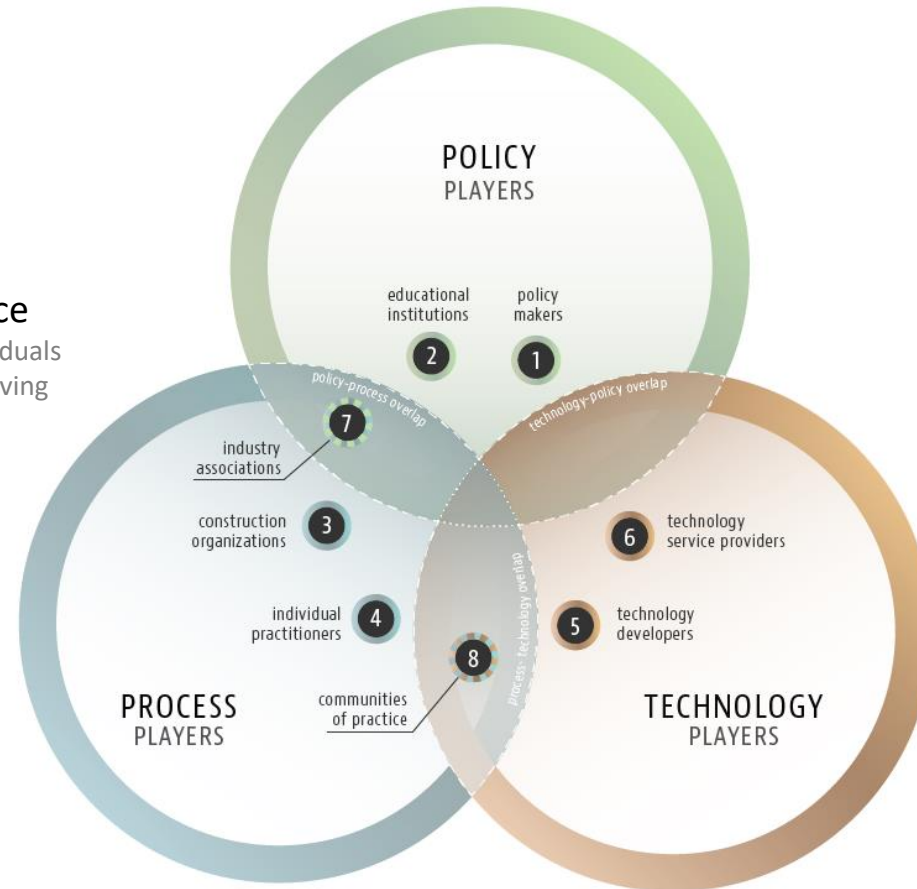
## 7 Industry Associations

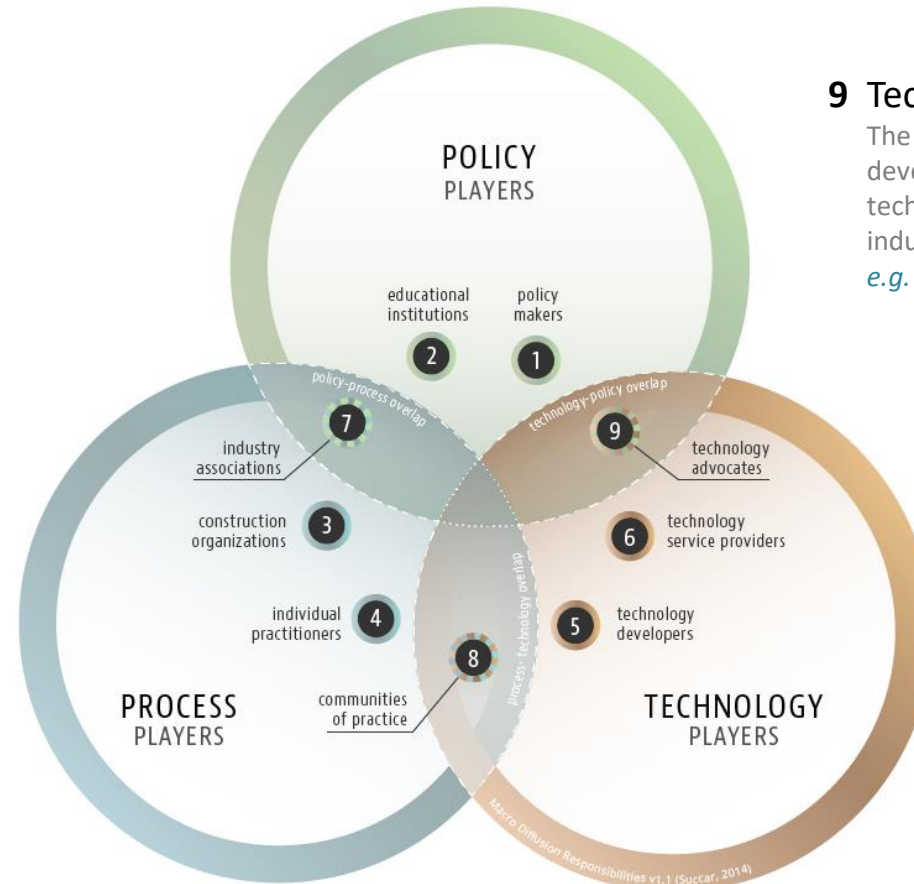
Associations dedicated to represent the interests of their individual and organizational members  
*e.g. AMCA in Australia*





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





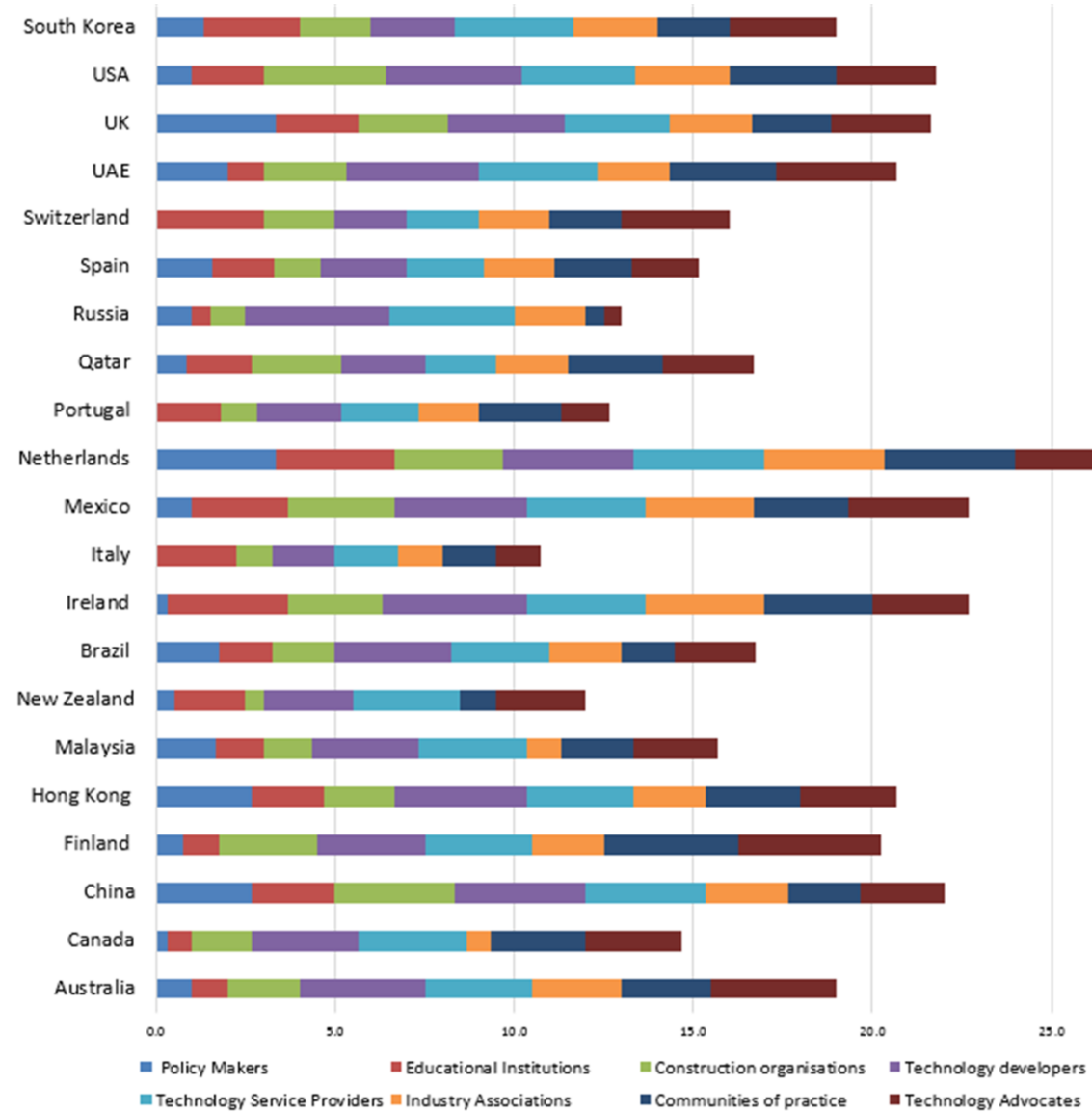
## 9 Technology Advocates

The associations involved in developing and promoting technology-centric solutions for industry problems

*e.g. buildingSMART*

# Diffusion Responsibilities

Comparing contribution of player groups within the same country



# Diffusion Responsibilities

Comparing contribution of player groups across countries

## 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 Maturity Components

Diffusion-Role Matrix v1.0 *sample shown at GLevel 1 (Succar, 2015)*

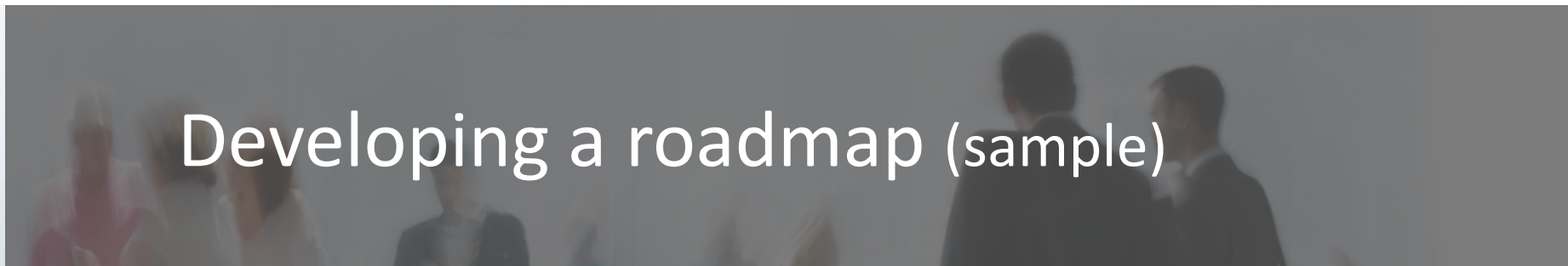
	Objectives , Stages and...	Champions & Drivers	Regulatory Framework	Noteworthy Publications	Learning & Education	Measurements & Benchmarks	Standardised Parts and...	Technology Infrastructure
Policy Makers	A	A	A	B	B	A	B	C
Educational Institutions	B	B	A	A	A	B	C	C
Construction Organizations	B	A	B	B	B	A	A	B
Individual Practitioners	C	C	C	C	A	C	C	C
Technology Developers	C	C	C	C	B	C	B	A
Technology Service Providers	C	C	C	B	A	C	B	A
Industry Associations	B	B	A	A	B	A	C	C
Communities of Practice	C	B	C	B	B	C	A	C
Technology Advocates	A	A	B	A	B	B	A	B

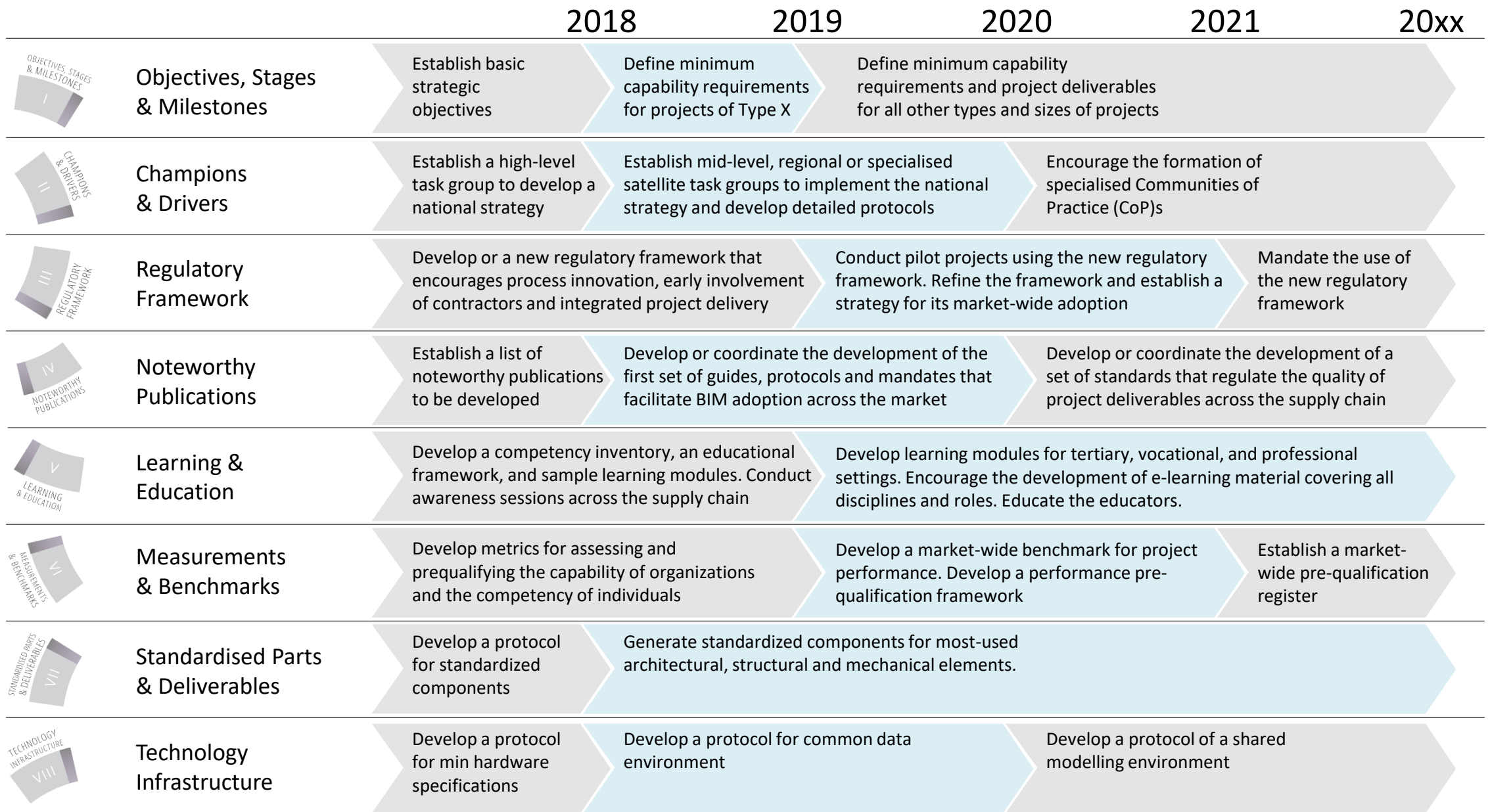
[A] Leading, [B] Supporting, & [C] Participating roles





## Developing a roadmap (sample)







# In Summary





## Some of the questions that are typically asked:

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

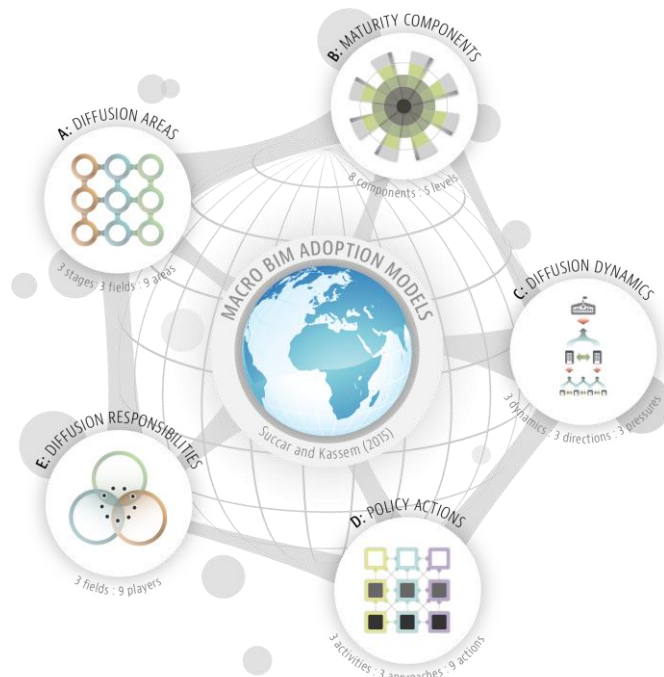
How long does it take for BIM policies to take effect?

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?



**CitA**  
BIM GATHERING



# Thank you

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