Benefits from integrating BIM + GIS data
&
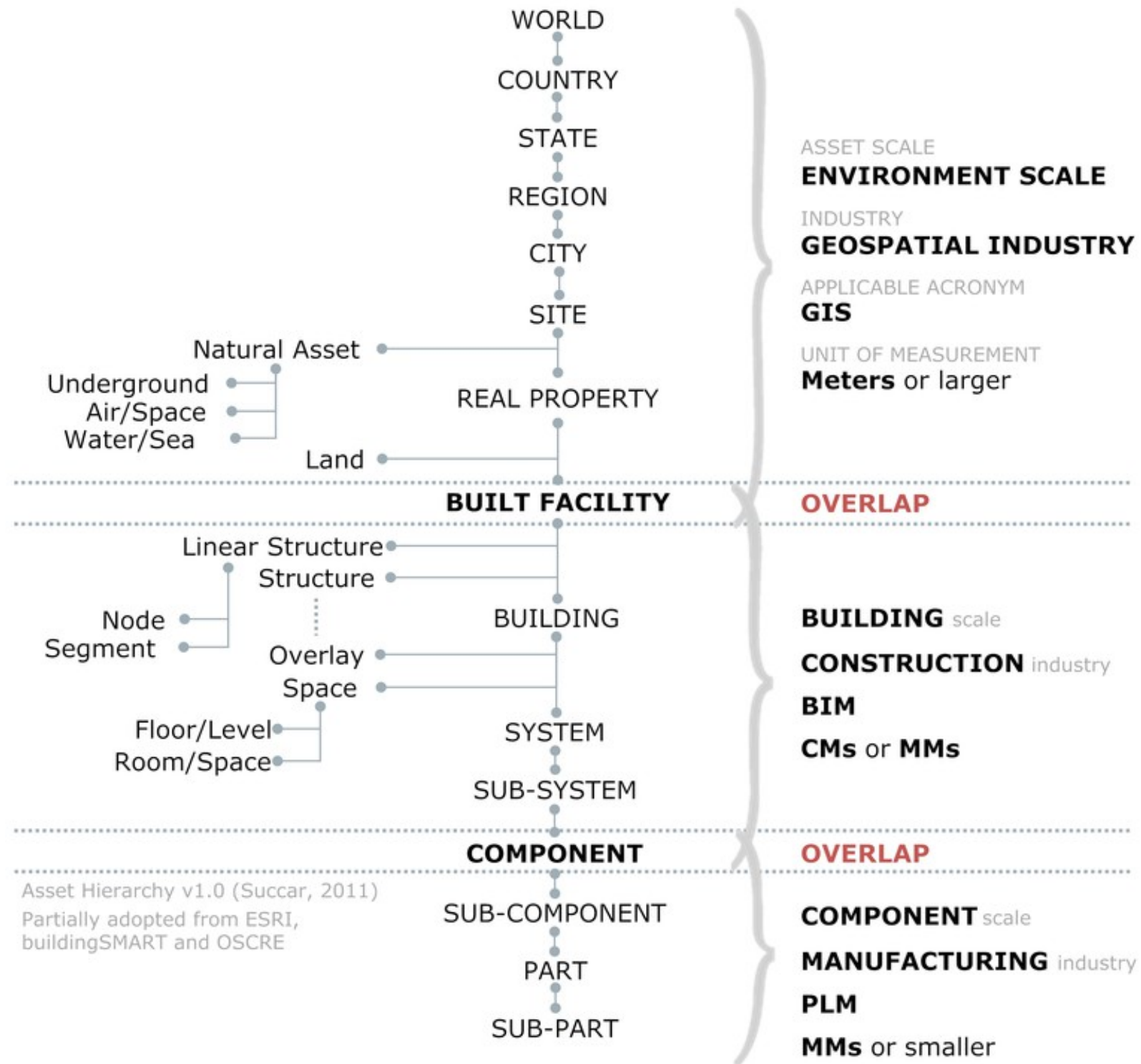# models for assessing their adoption at country level

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Lisbon Congress Centre, Portugal
28 May 2015

Integrating BIM + GIS

Integrating BIM + GIS

Use Case

Assessing Energy Efficiency Interventions at district level

Benefits from integrating BIM + GIS data & models for assessing their adoption at country level

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Standard Assessment Procedure (SAP)

- 80 different items of data
- Visit by an expert assessor (30 min/visit
- Aggregate data for locality, town, city, region, etc.

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Dwelling *geometry* sub-model

- Number of storeys
- Floor area and perimeter
- Height of each storey
- Area of the roof
- Etc.

Dwelling *physics* sub-model

- Degree day region
- Height above sea level (m)
- Mean wind speed
- Level of over-shading
- Dwelling detachment (mid or end terraced, semidetached, detached, flat
- Etc .

Dwelling *usage* sub-model

- Heating system type
- Type of heating controls (programmers, thermostats)
- Number of occupants
- Etc.

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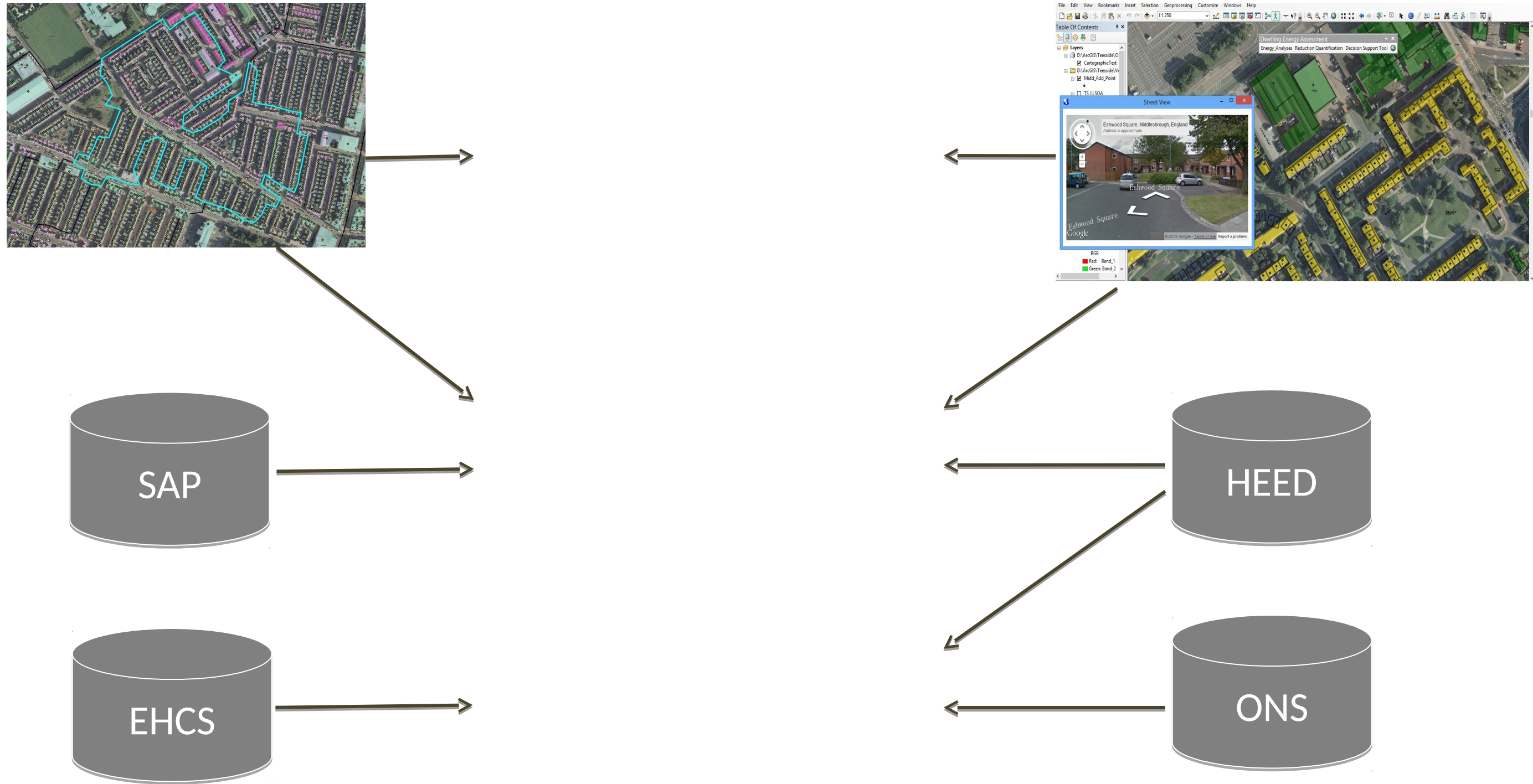
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Source: Amit et al., 2013

Integrating BIM + GIS

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Legend

Newcastle
☐ LLSOA Boundaries

Average Space Heating (kWh)

☐ 12155.204082	☐ 13882.743503	☐ 16674.037396
☐ 11779.014851	☐ 13075.095296	☐ 14646.573209	☐ 19891.670543

Source: Amit et al., 2013
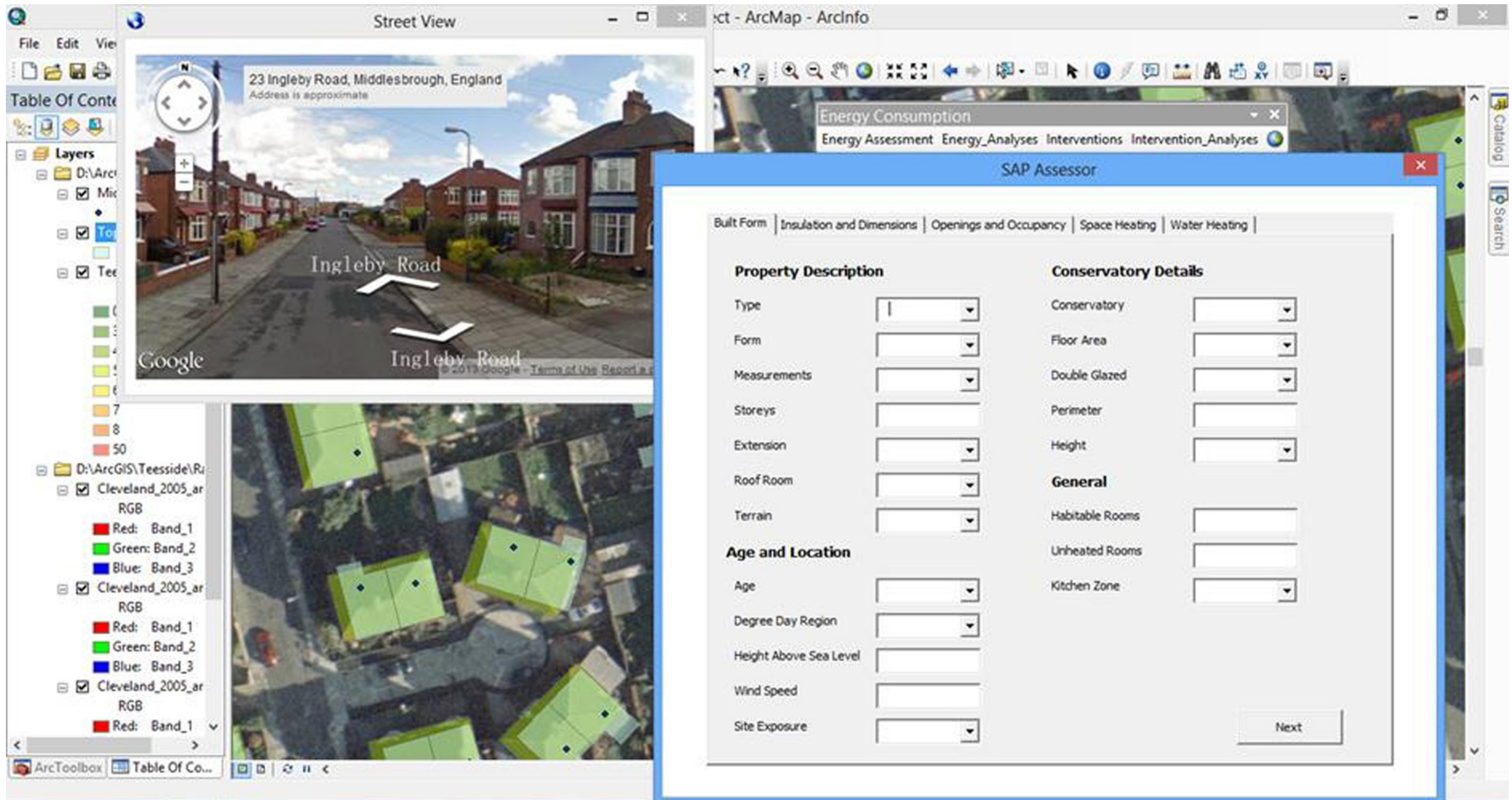
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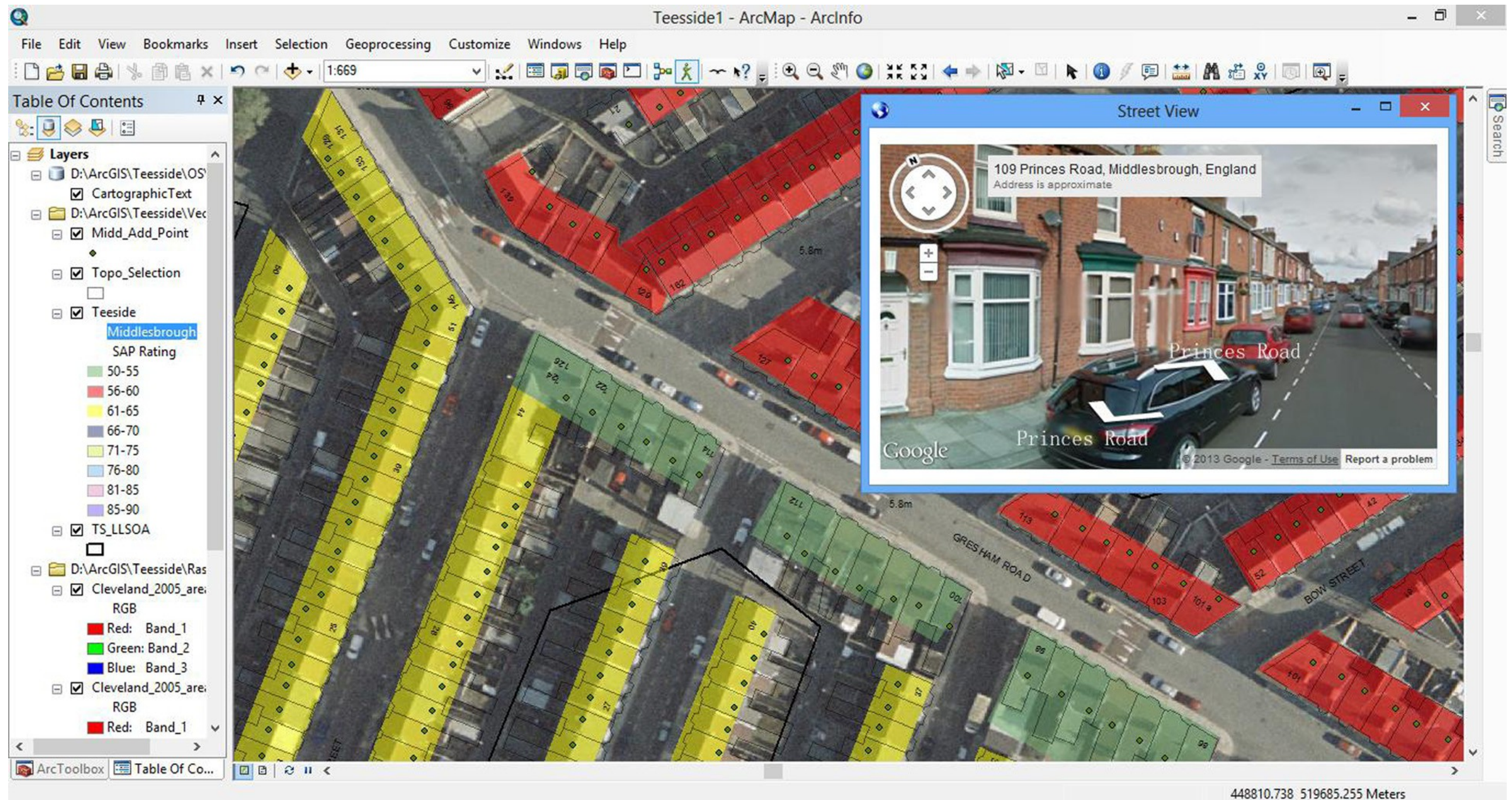| Dwelling type	Number	Energy consumption (kWh/Annum)
Terraced	719	15,948,608
Semi-detached	23	357,700
Detached	14	265,387
Total	756	16,571,695

Source: Amit et al., 2013

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Intervention	Fixed cost	Energy saved (MWh/Year)	CO_2 saved (Tons/Year)	Annual savings	Lifetime savings
Fabric Change	£5,973,156	9,084	1,795	£281,090	£8,432,708
Solar PV	£4,309,200	631	127	£217,123	£5,428,080
μ-CHP	£1,814,400	1,311	678	£259,308	£5,186,160
Condensing Boiler	£1,209,600	585	115	£24,158	£483,179
ASHP (Under-floor)	£6,804,000	4,005	793	£123,984	£3,719,520
ASHP (Radiator)	£4,536,000	−1,037	−205	-£32,130	−£963,900
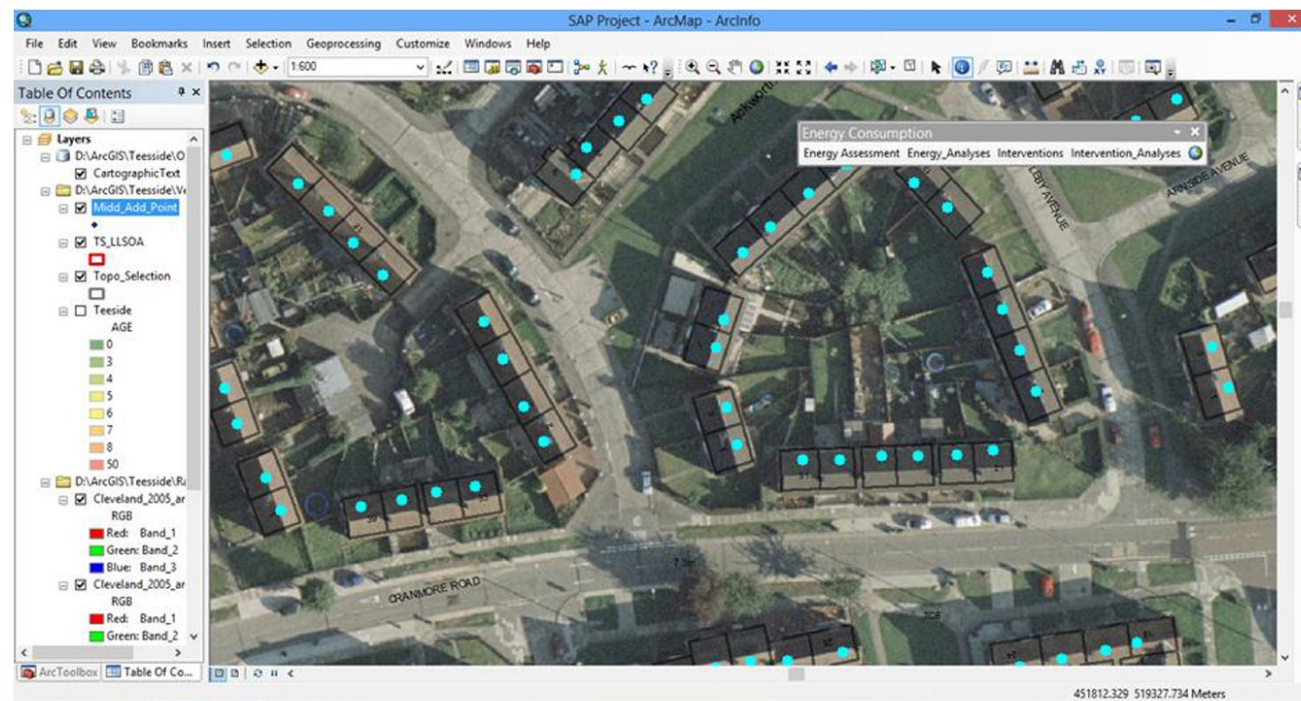
Dwellings with potential for heat pumps.
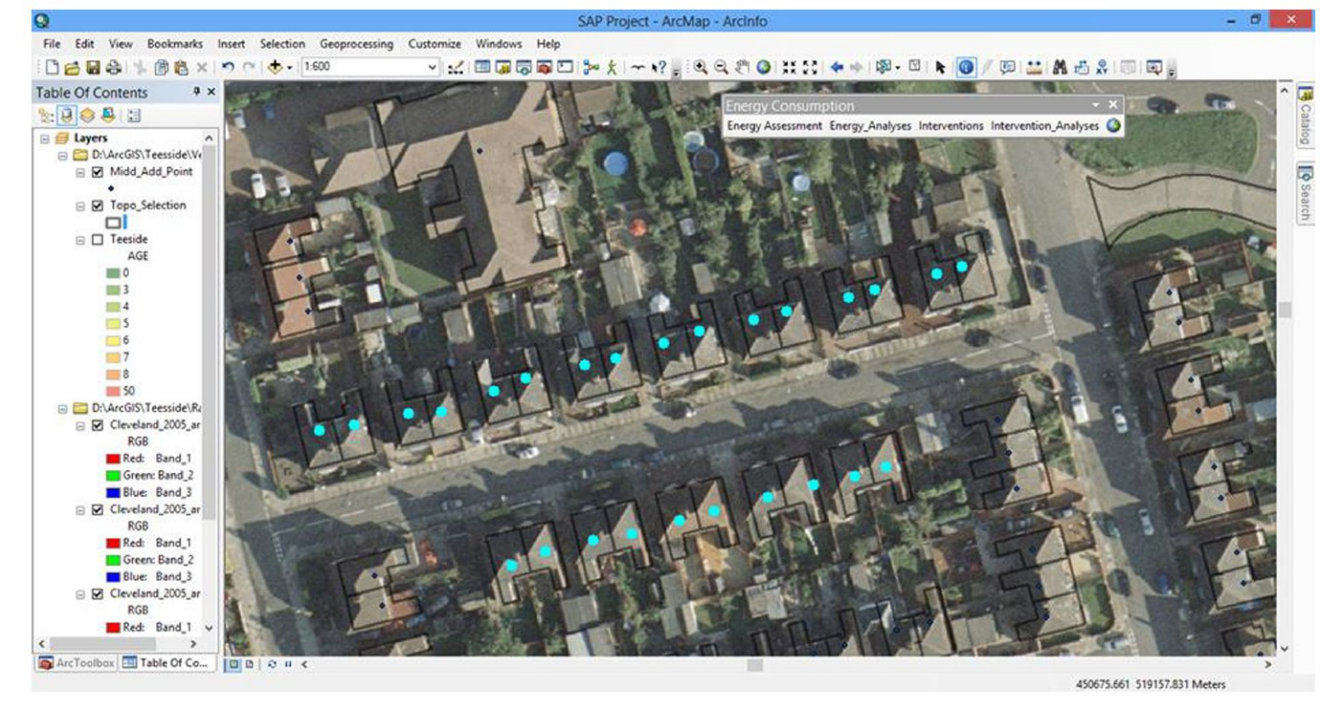
Houses with south facing roofs for solar panels.

Source: Amit et al., 2013

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Macro BIM adoption:
models for assessing their adoption at country level

Model 1

Macro Maturity Components
The 8 ingredients of BIM diffusion policy

Macro Adoption Model 1

Maturity
Components

8 components, 5 levels

latest version or additional information

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Maturity Components

MARKET 1   MARKET 2   MARKET 3

MARKET 4   MARKET 5   MARKET 6

MARKET 7   MARKET 8   MARKET 9

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Model 2

Diffusion Dynamics
How does BIM diffuse in a market?

Diffusion Dynamics

Macro Adoption Model 2

3 directions, 3 pressures

MARKET 1   MARKET 2

more influential

pressures from other authorities from same or similar markets

TOP - DOWN
authority

coercive + normative

normative

Macro Diffusion Dynamics v1.1 (Succar, 2013)

pressures from similar organizations or associations from other markets

mimetic + normative

MIDDLE - OUT
large organizations & industry associations

less influential

pressures from similar organizations in other markets

BOTTOM - UP
small organizations

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Model 3

Policy Actions

*What policy makers (can) do to facilitate
BIM adoption across a market*

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Macro Adoption Model 3
Policy Actions
3 activities, 3 approaches

[1] Passive — Approaches
[2] Active
[3] Assertive

Activities

[A] Communicate

[A1] MAKE AWARE
[A2] EDUCATE
[A3] PRESCRIBE

is followed by

Policy Actions v1.4 (Succar, 2014)

[B] Engage

[B1] ENCOURAGE
[B2] INCENTIVISE
[B3] ENFORCE

[C] Monitor

[C1] OBSERVE
[C2] TRACK
[C3] CONTROL

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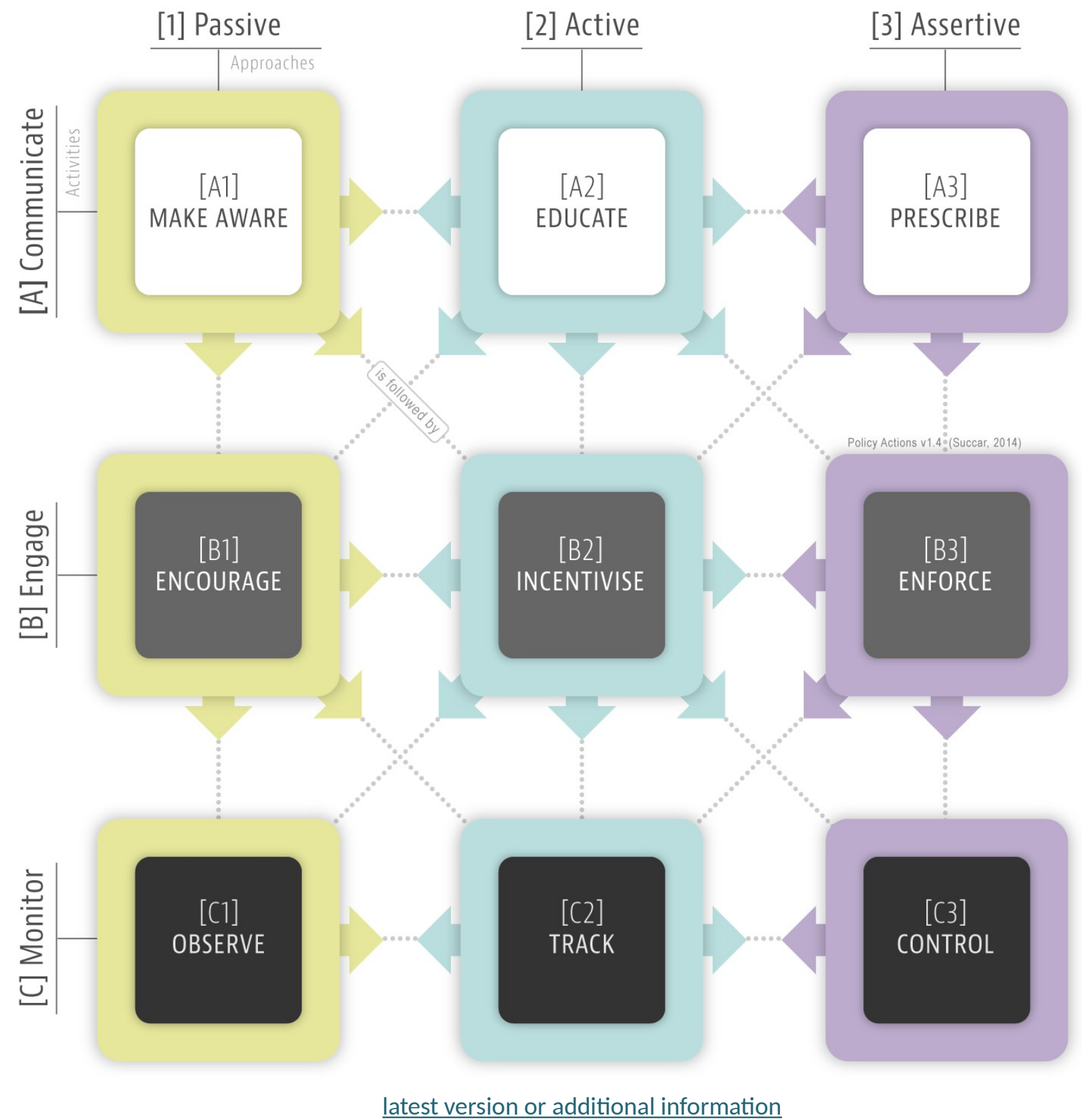
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Macro Adoption Model 3
Policy Actions
Sample Chart

Policy Action Patterns *sample chart v1.1* (Succar, 2014)

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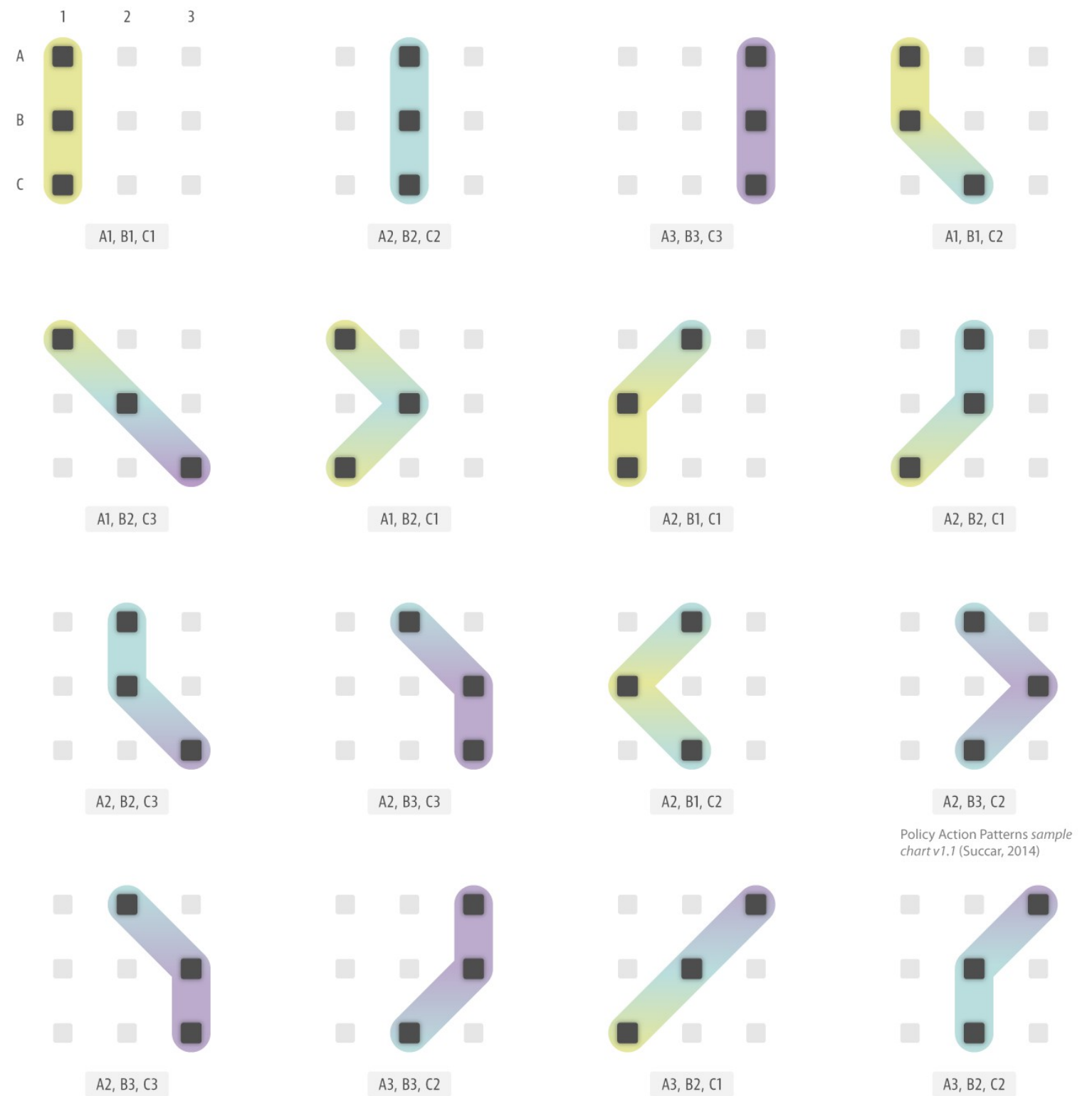
Model 4

Diffusion Responsibilities
who's role is it to enable BIM diffusion?

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Macro Adoption Model 5
BIM diffusion
stakeholder responsibility

1. Authorities
2. Educational institutions
3. Construction organizations
4. Individuals
5. Software developers
6. Value-adding resellers
7. Industry associations
8. Communities of practice
9. Technology advocates
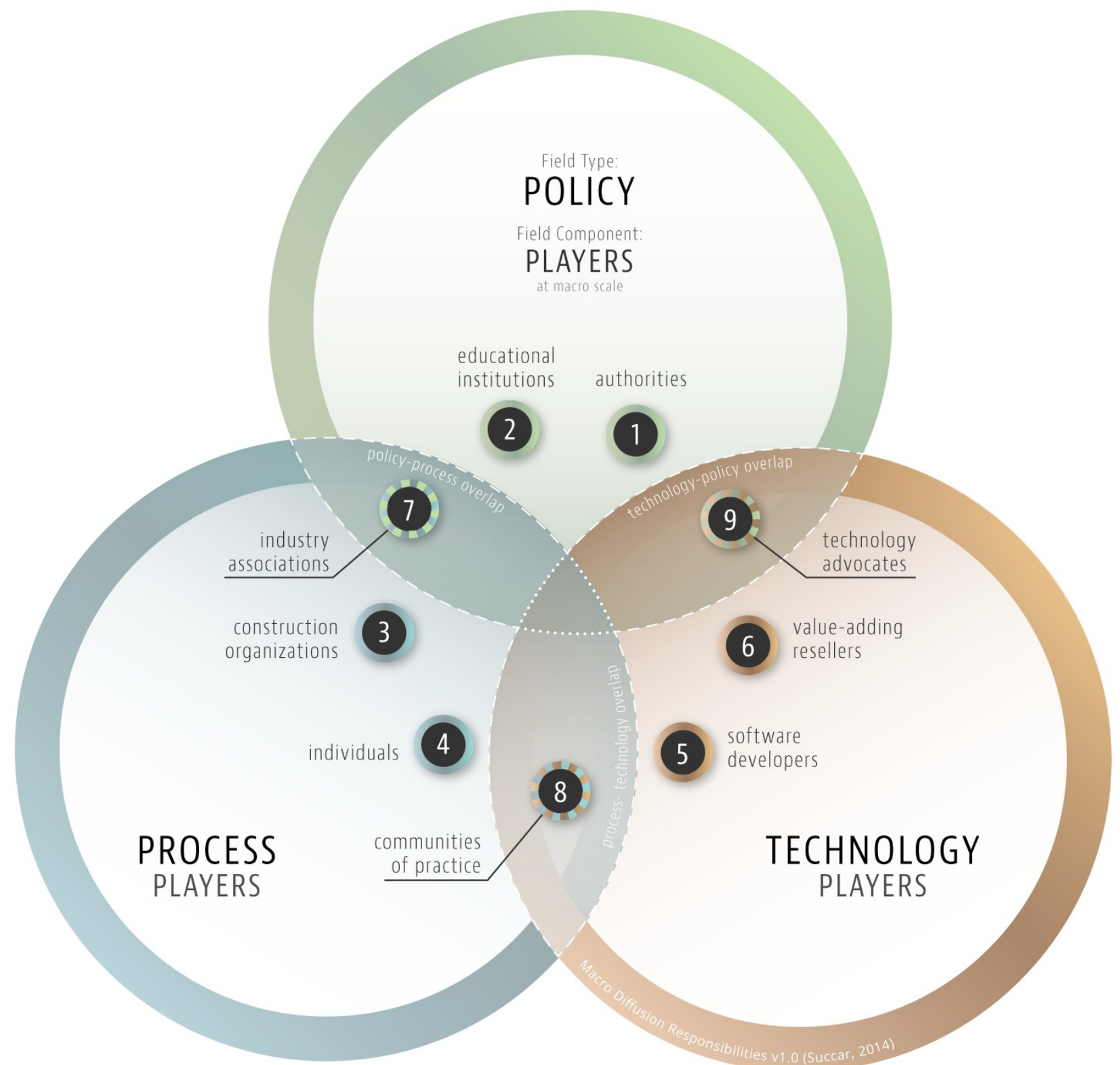
Current Full-Size Version

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Macro Adoption Model 5
BIM diffusion
stakeholder responsibility

Macro Maturity Components

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

Macro Player Groups	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

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THANK YOU