

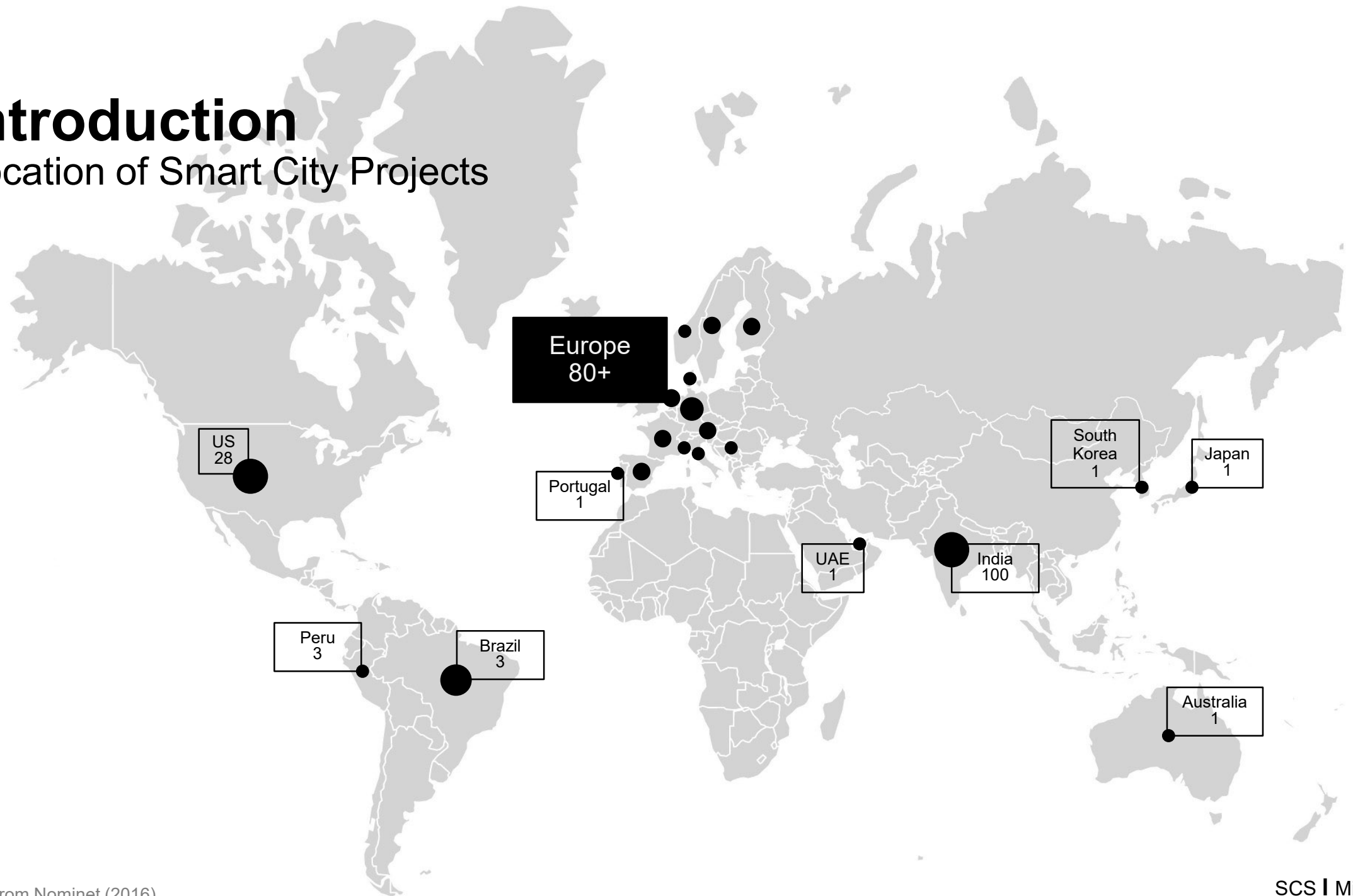


Digital visual tools as support instruments for
COLLABORATIVE DECISION-MAKING in
Smart City Projects

Case Study with Stadtwerke München, Smartes M-District

Introduction

Location of Smart City Projects



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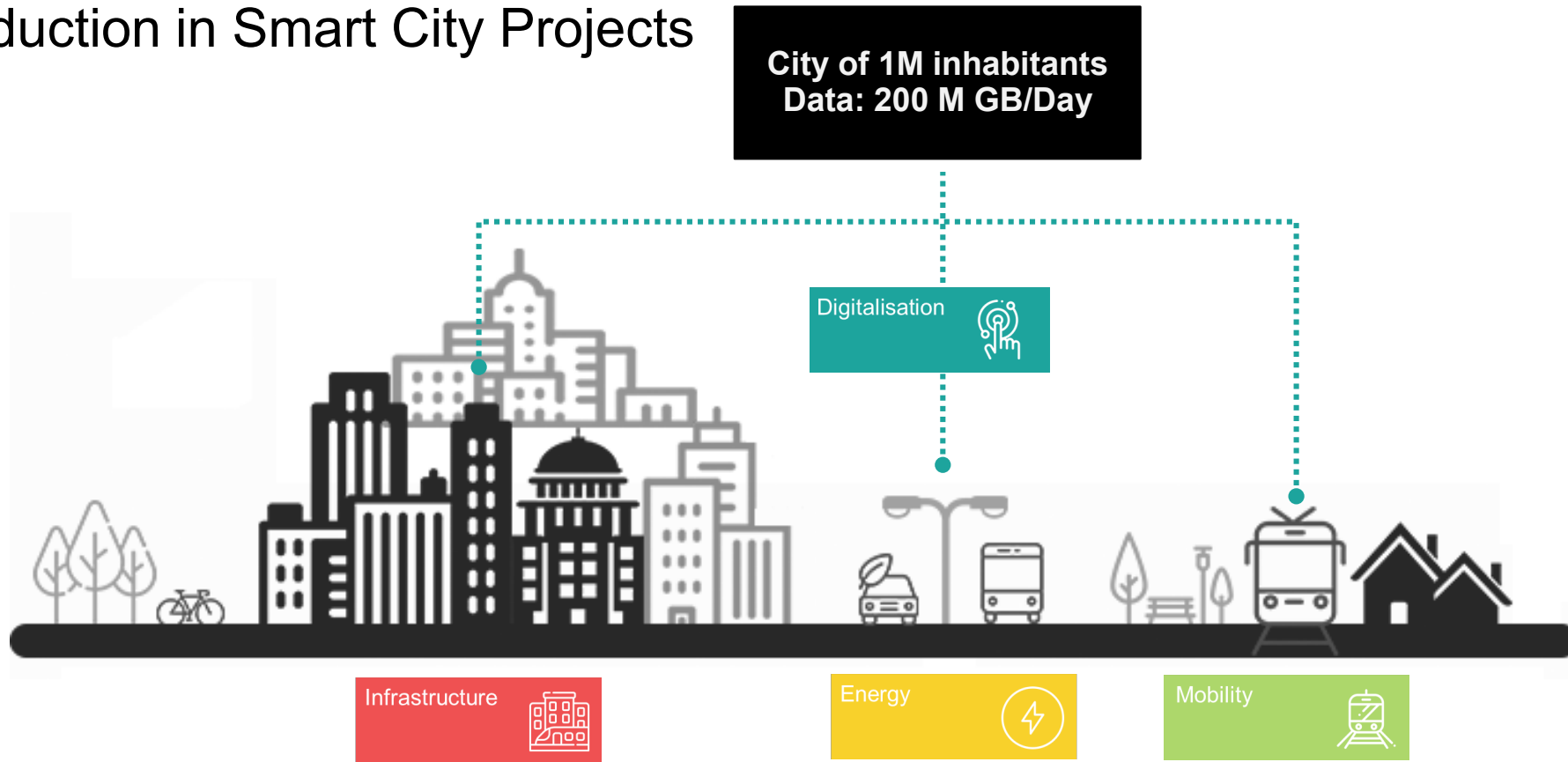
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Introduction

Data production in Smart City Projects



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Introduction

Case Study

SMARTES M-QUARTIER

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Energy



Infrastructure



Digitalisation



Mobility

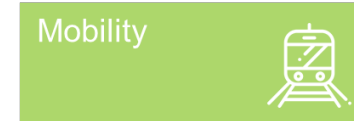
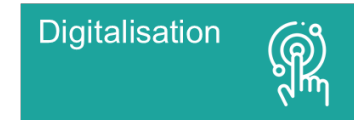


SW/M

SCS | Michelle Rosales

Introduction

Case Study: Smartes M Quartier



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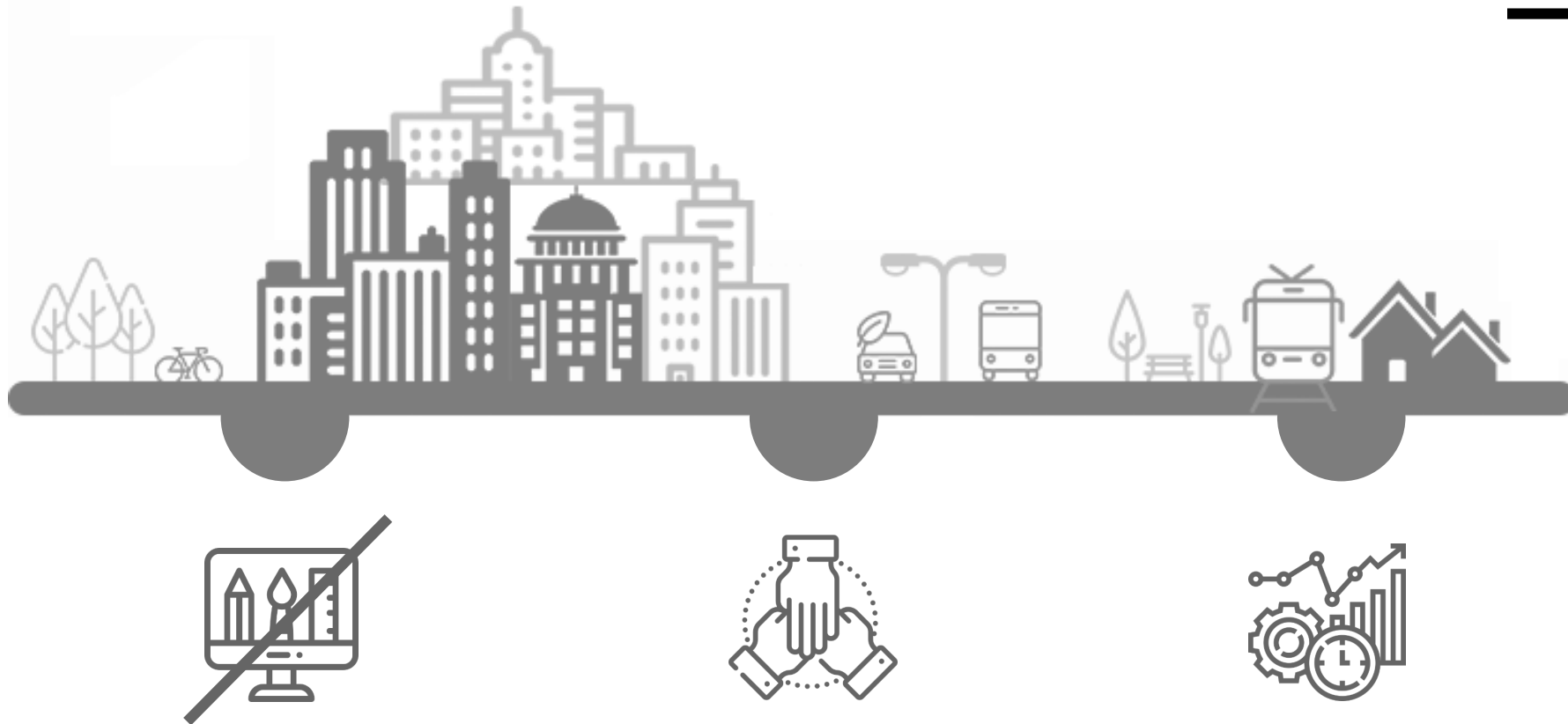
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Introduction

Problems

How to develop a toolkit to support collaborative decision-making with digital visual tools as support instruments for smart city projects?



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Introduction

Research aim and objectives

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Literature Review

Reference Projects

Users

Recommendations



Toolkit

1

Relevant topics
Secondary data

2

Categorisation
KPIs
Scenario Analysis

3

Requirements
Cross-sectoral
Team use

4

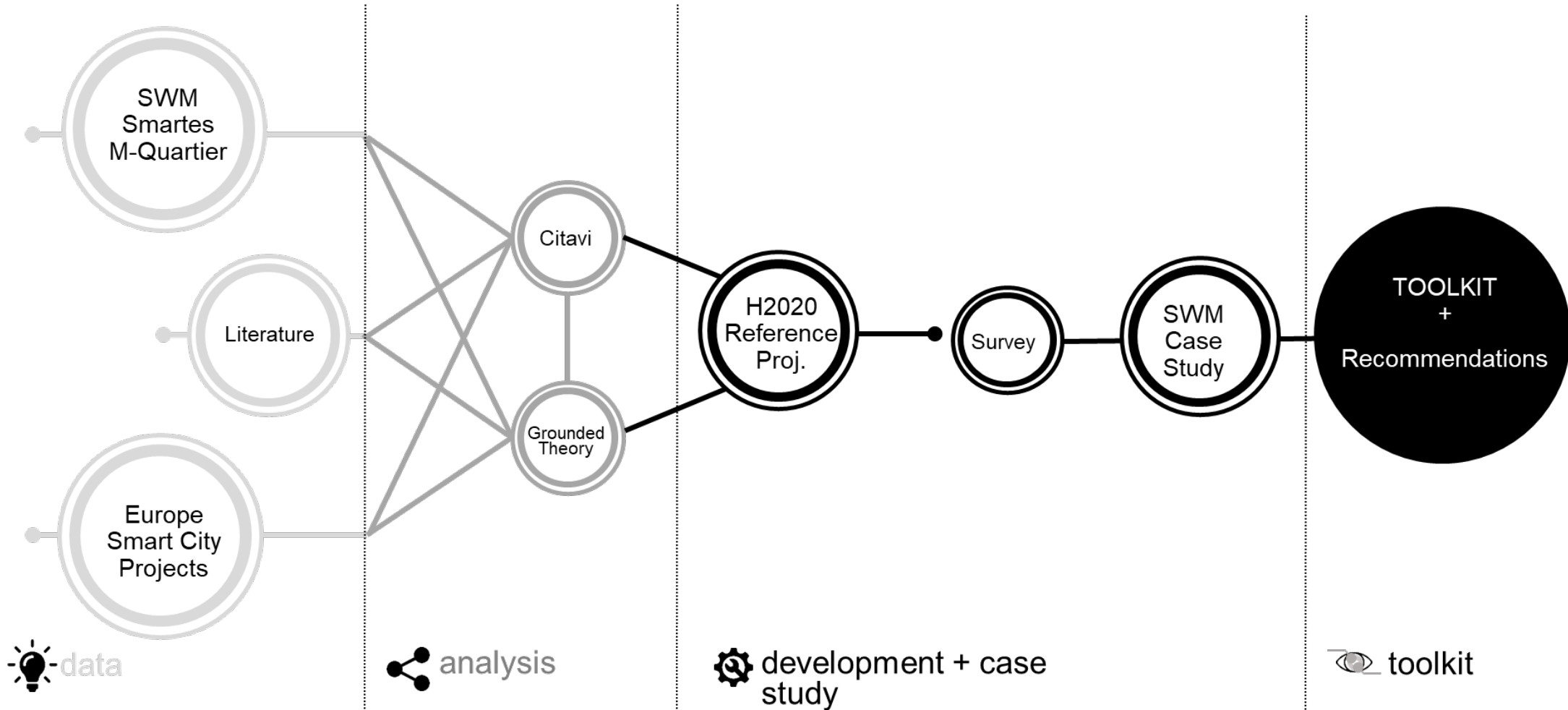
Smartes
M-Quartier

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Collaborative
Decision-Making
Using digital
visual tools as
support
instruments

Methodology

Research Strategy



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Findings and discussion

1. Data Infrastructure: Intelligence Layer

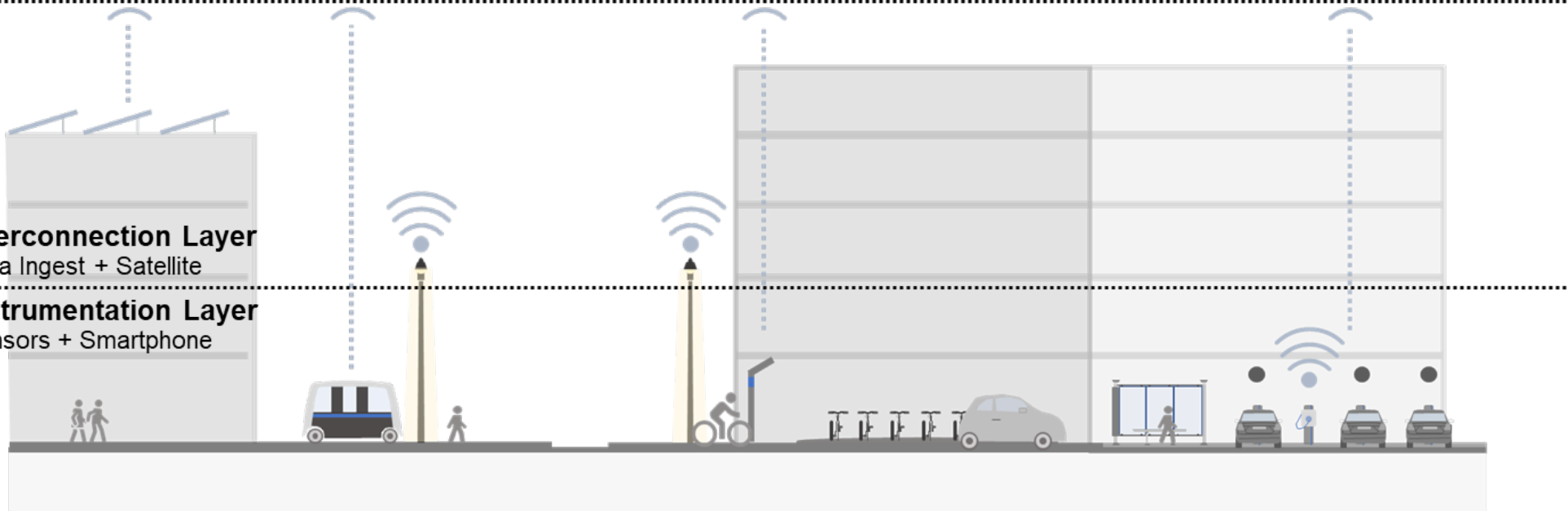
Intelligence Layer

Interconnection Layer

Data Ingest + Satellite

Instrumentation Layer

Sensors + Smartphone



Based on Berntzen et al. (2018)(own illustration).

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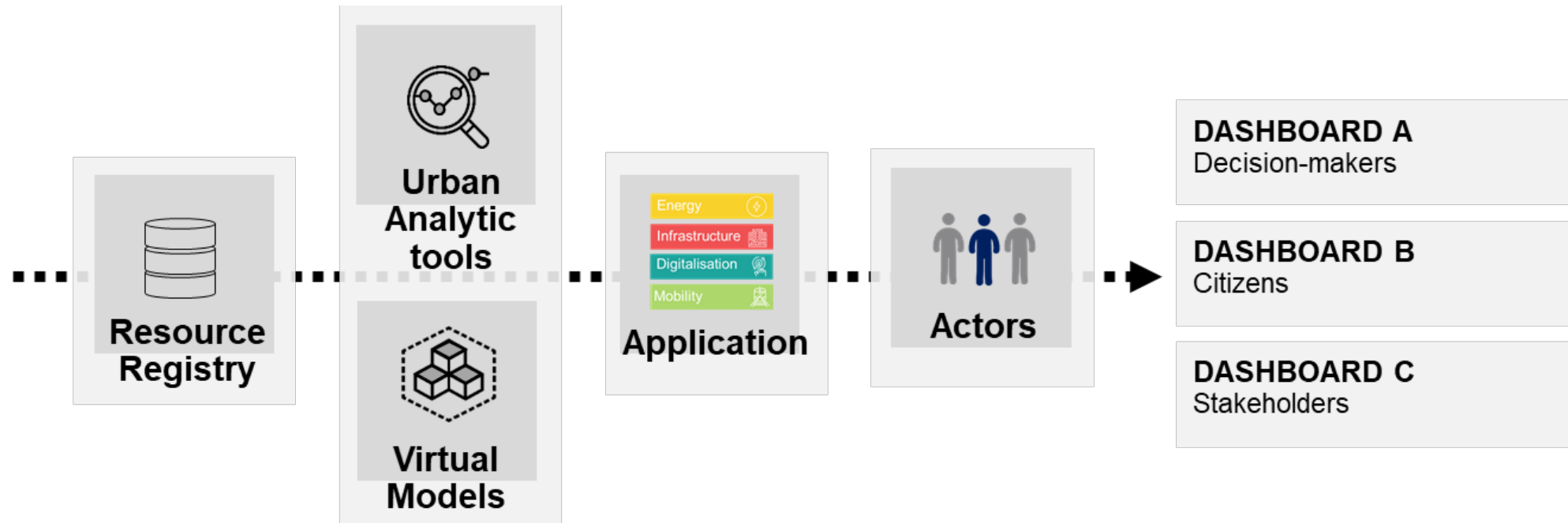
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Findings and discussion

1. Data Infrastructure: Intelligence Layer



E10, OGC (2014), Matheus et al. (2016) and Kolbe and Moshrefzadh, 2017 (own illustration).

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Findings and discussion

1. Data Infrastructure: Virtual Models

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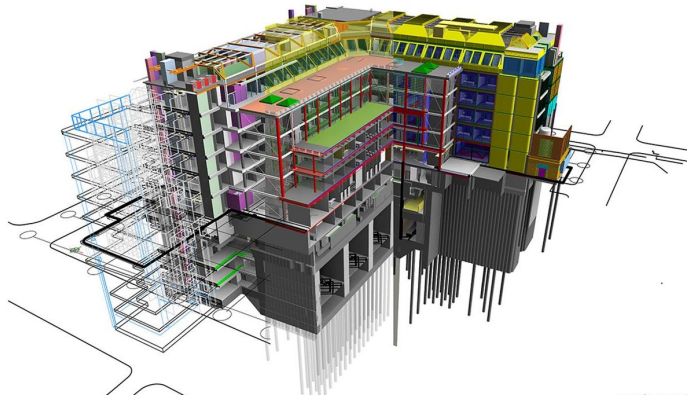
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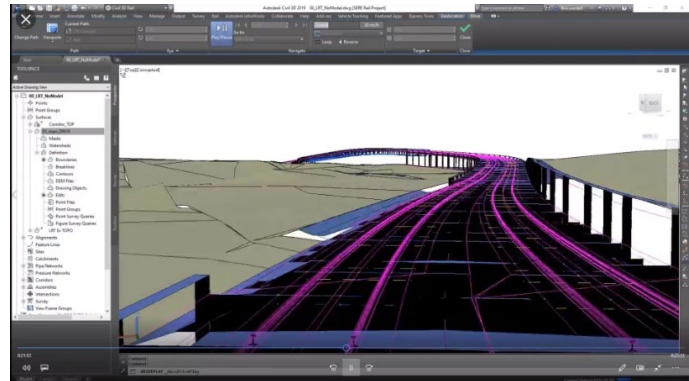
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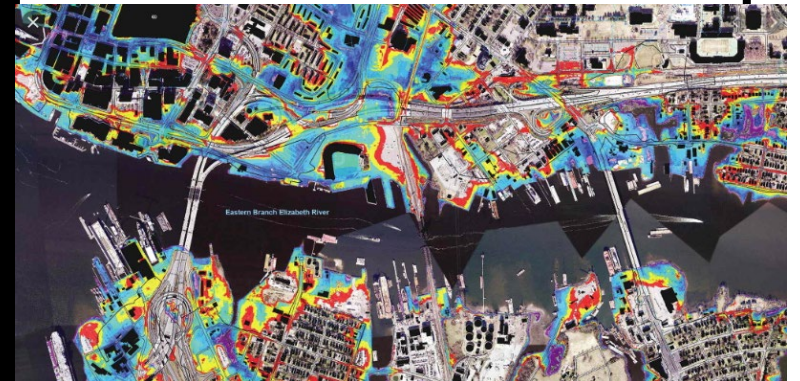
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STW Architects, Bauygues UK, (2009)



Wardell, (2019)



Fugro, (2019)

Findings and discussion

2. Stakeholder Roles

Dashboard A

Strategy definition,
Effect analysis,
Strategical partnerships

Dashboard B

Strategy definition,
Technology development

Dashboard C

Strategical partnerships,
Project development

Dashboard D

Solutions and service selection

Research Institutes



Businesses



Public entities



Civil Society



E02, E06, E07, Finquelievich (2016, p. 64)

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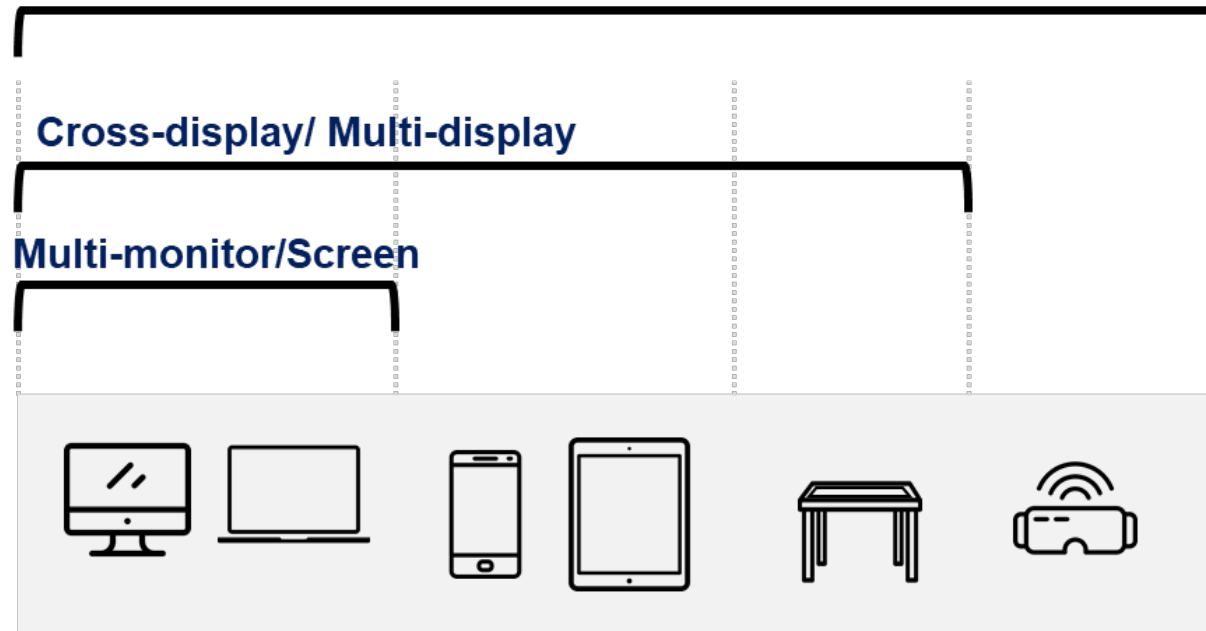
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Findings and discussion

4. Collective Intelligence: Interoperability

Cross-device/ Multi-device



Cross- device space dimension: relationship and scale amended from Brudy et al. (2019, p. 4).

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Findings and discussion

4. Collective Intelligence: Data Standardisation

Semantic

Object = Terminology



Syntactic

digital format agreement

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Findings and discussion

4. Collective Intelligence: Data Analysis

04 **Return of Investment** Sustainability pillars:
Impact vs. investment

03 **Graphics** time period comparison:
variable in defined time periods, different variables

02 **Baseline** Behavior, trend analysis, prediction

01 **Indicators** variables, measurements

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Index Sustainability

smartness, project:

- Progress tracking
- Simulation/Scenario
- Decision-making process

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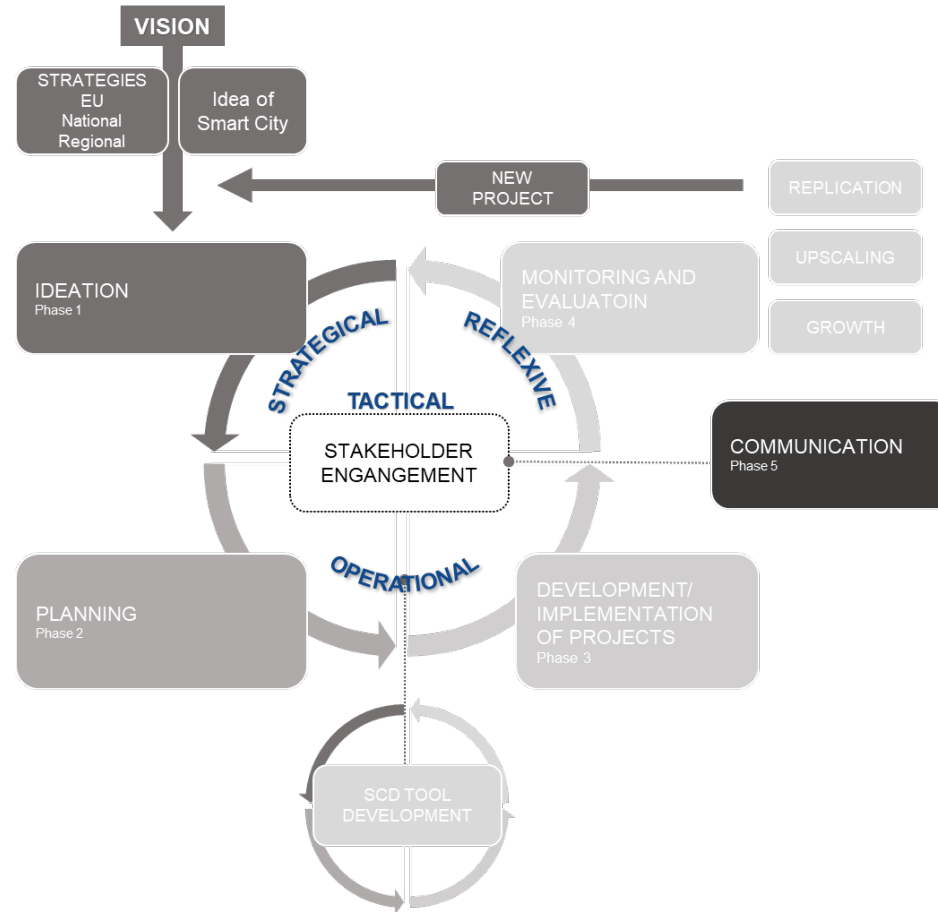
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Findings and discussion

5. Project Development



Summary of decision-making levels and process development of SC Projects, adapted form (Mora and Bolici, 2016).

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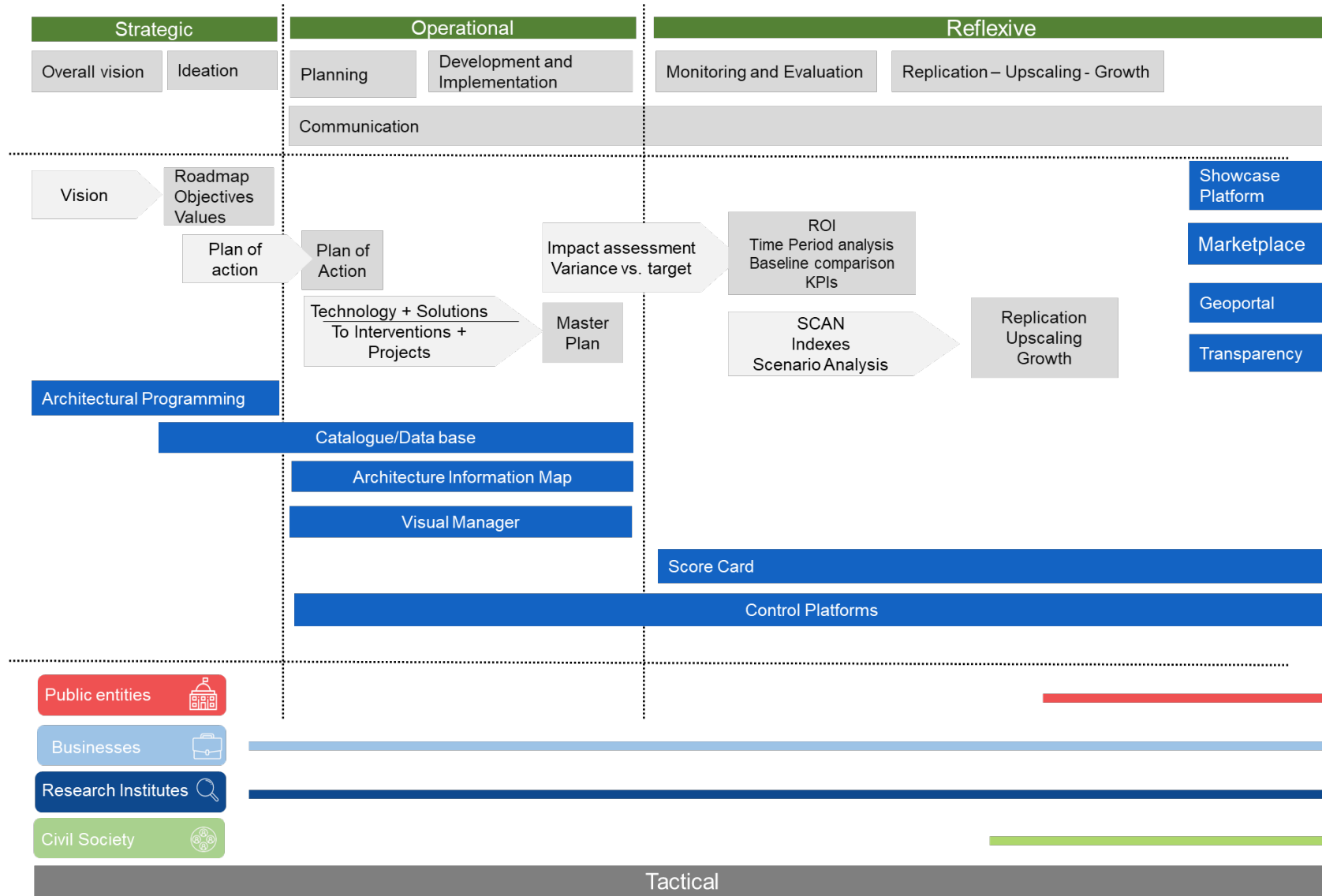
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Findings and discussion

Toolkit



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Legend

Decision-Making Layers

Project development phases

Decision Moment Output

Activity

Case Study

Platform development

01

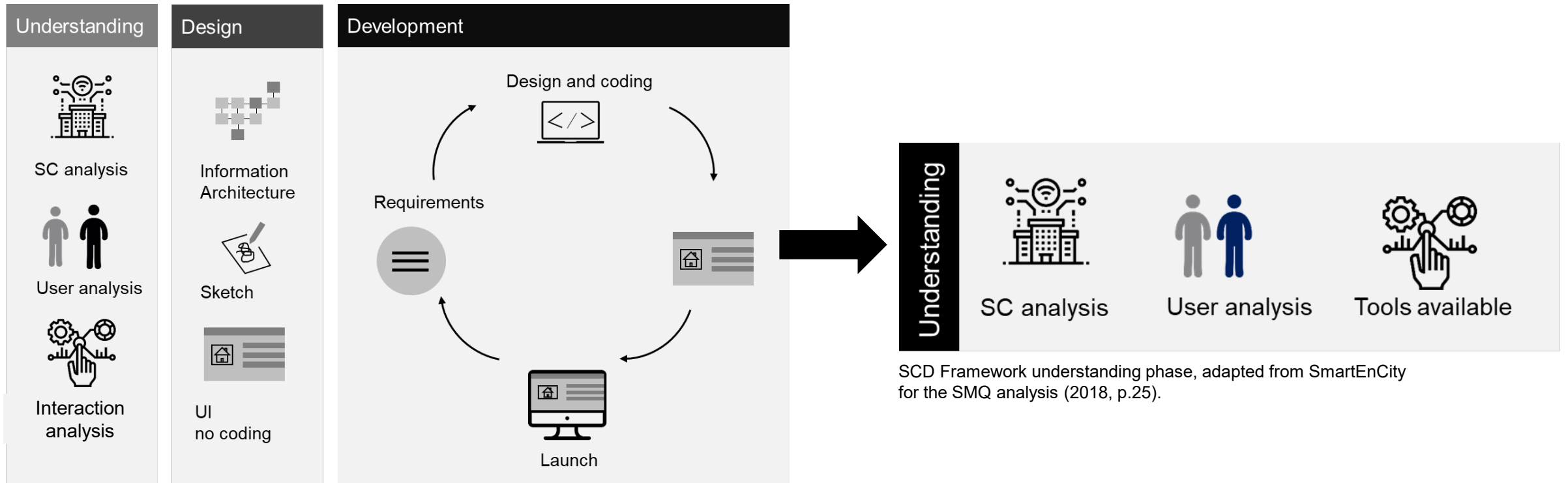
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Smart Citizen Centred Digital Design Framework amended from SmartEnCity (2018, p. 25).

Case Study

Recommendations

Data collection common Databank

Baseline, KPIs, Time comparison, Evaluation (benefits) of opensource Information – Internal/External

Common Vision/Roadmap

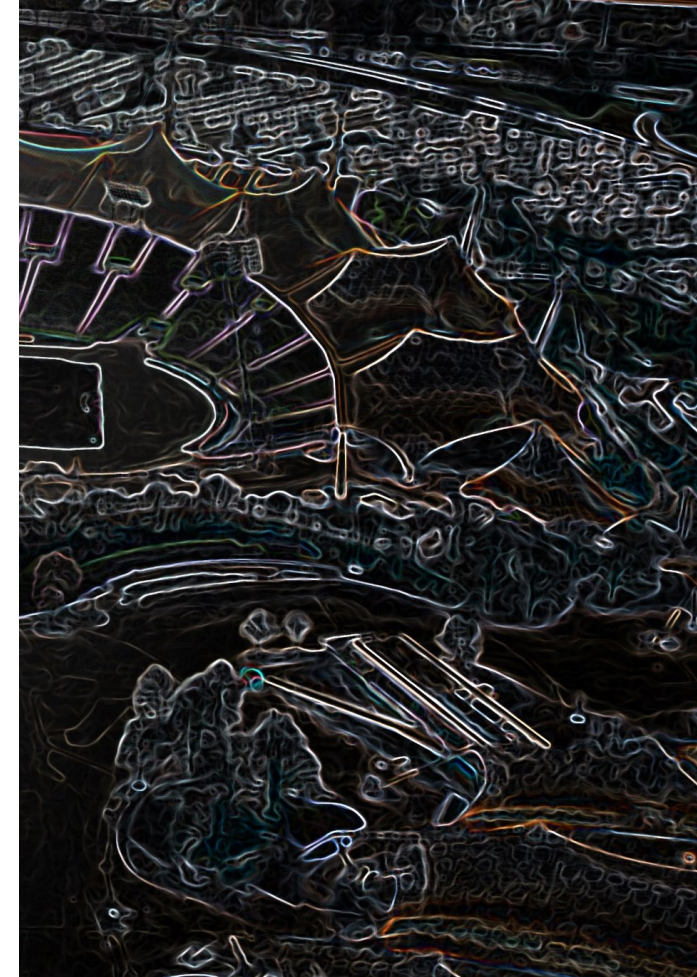
Values>KPIs, action plan

Standardisation: Semantic + Syntactic

Formats + Terminology
Analytic tools

SCD Framework: Software development

ASD + UCD – Product Owner
Cross sectoral team
Netze 360 Plattform



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