

Urban Data Platforms (UDP)

Graham Colclough
Q4 2021

A few steering Questions...

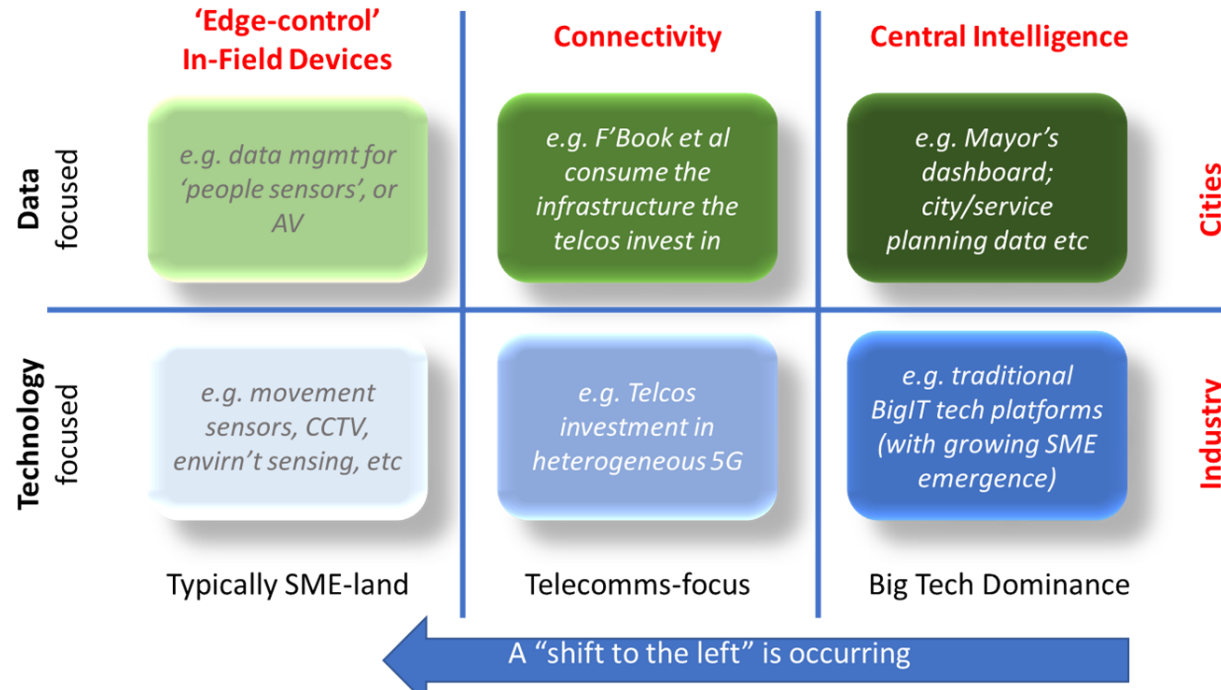
- What is an Urban Data Platform?
- What do cities use them for?
- What is the UDP initiative up to?
- Why is it so hard to justify the investment?

What is an Urban Data Platform (UDP)?

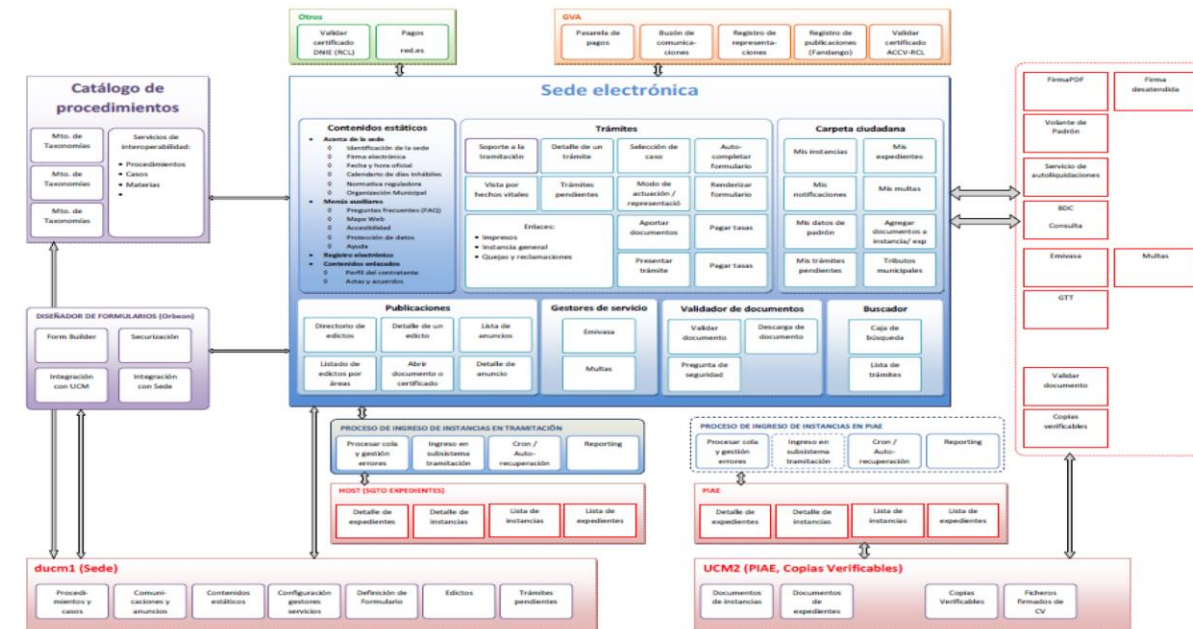
An 'Urban Data Platform' is...

... the implemented realisation of a logical architecture (design) that brings together (integrates) data flows within and across city systems
... and exploits modern technologies (IoT/sensors, cloud, mobile, analytics, social media etc)
... providing the **building blocks** that enable cities to rapidly shift from fragmented operations to include more: efficient and effective operations, predictive capabilities, and novel ways of engaging and serving city stakeholders
... in order to **transform outcomes**, in a way that is **tangible and measurable**, at local level {e.g. increase energy efficiency, reduce traffic congestion and emissions, create (digital) innovation ecosystems, efficient city operations for administrations and services}.

The Pragmatists (business) view...



...& the more traditional (tech) Ref Architecture view



A pragmatic UDP Typology

Not mutually exclusive. Different priorities for different elements. Business Models vary. Ever-changing development journey. Data quality issues!

Scorecard

Mayors Dashboard to provide an overall view of the current situation

Examples:

- NYC
- London

A puzzle piece with a digital background showing a circular gauge and data points. The word 'SCORECARD' is faintly visible in the background.

Federated Operations \$\$\$\$

Multi-stakeholder open standards-based cross-sectoral operational platform. Significant cost; considerable value

Examples:

- Few and far between!


A puzzle piece with a digital background showing a globe and data points. The word 'INFORMATION' is faintly visible in the background.

Digital Twin \$\$

From AI & real-time analysis to long-term scenario building and 3D visualisation

Examples:

- Singapore

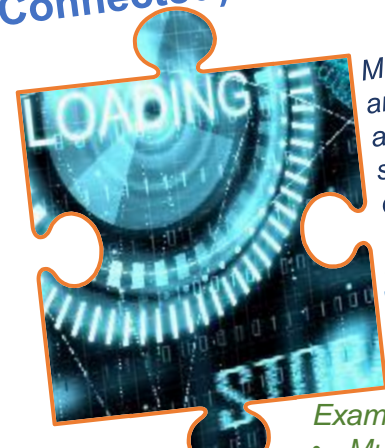
A puzzle piece with a digital background showing a 3D model of a building and data points. The words 'AI' and 'BACKUP' are faintly visible in the background.

(Connected) Silos

Most common, and limiting in ability to deliver step-change in decisions and city operations

Examples:

- Multiple

A puzzle piece with a digital background showing a circular gauge and data points. The words 'LOADING' and 'STOP' are faintly visible in the background.

Data Store \$\$

Open data portals supporting research, planning, as well as transparency and access to information

Examples:

- London Data Store


A puzzle piece with a digital background showing a globe and data points. The word 'WORKLOAD' is faintly visible in the background.

Data Marketplace \$\$\$

Commercial store for data that stimulates the creation and utilization of data

Examples:

- Copenhagen

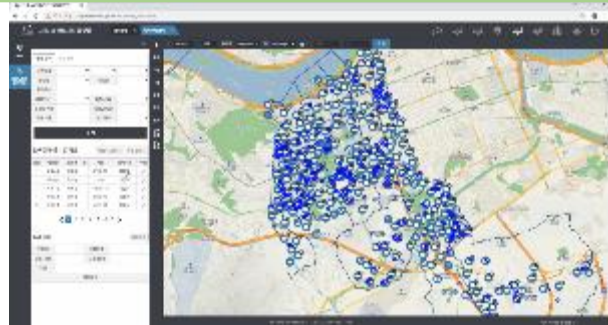
A puzzle piece with a digital background showing a globe and data points. The words 'RESOURCE' and 'PUBLIC' are faintly visible in the background.

Cities are applying UDPs across a breadth of diverse uses

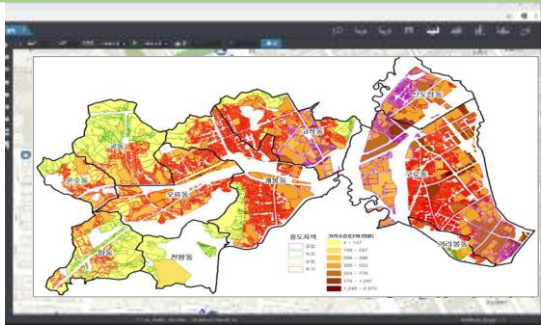
Urban Planning Support System



Citizen Engage't (Complaints)



Land Valuation & Forecasting



Underground (Surface) Water Mgmt



Traffic Mgmt



Integrated Vehicle Mgmt



Integrated Emergency Services



(Criminal) Vehicle Detection



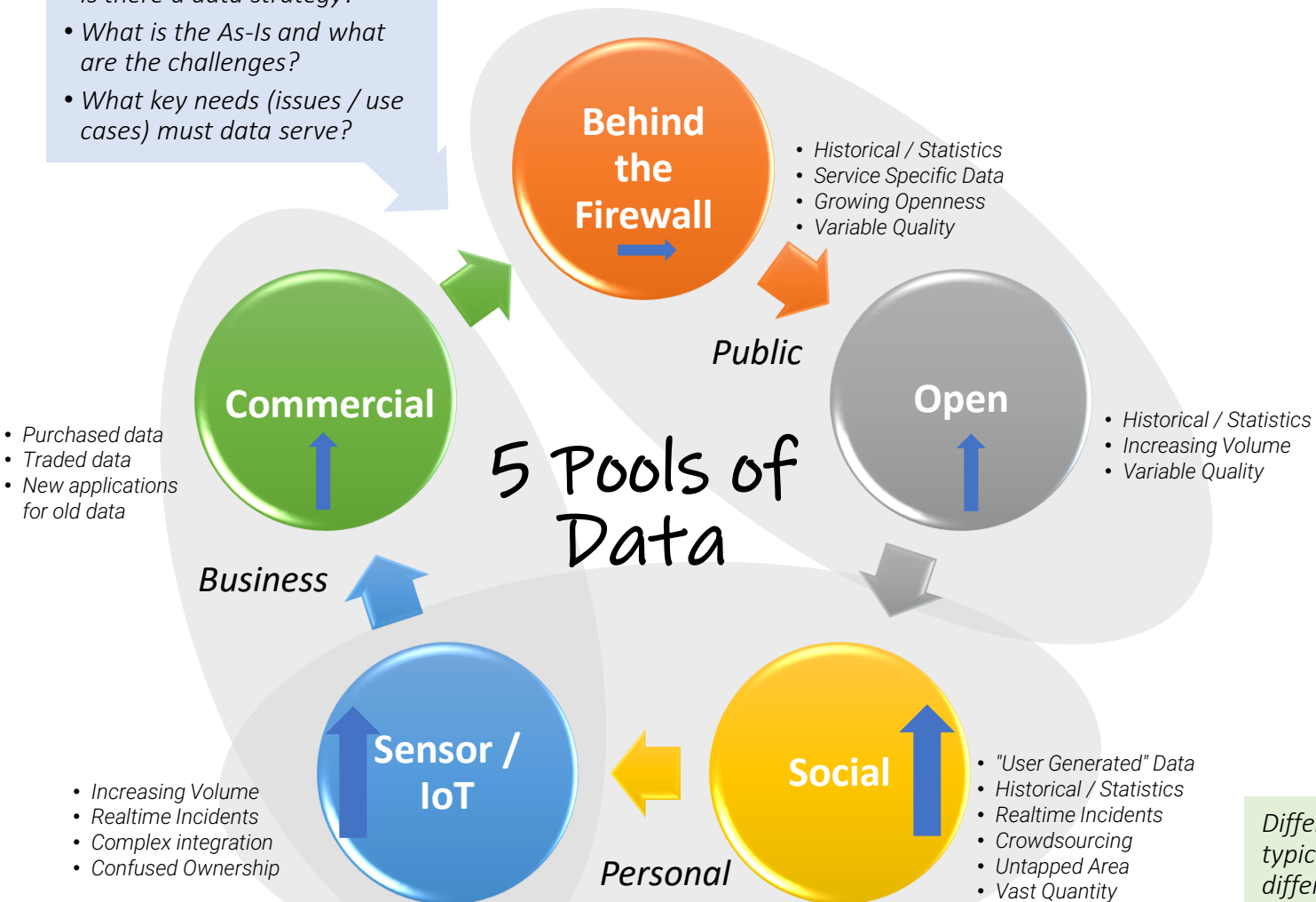
Underground Asset Mgmt



Challenges in creating a functional Data Ecosystem

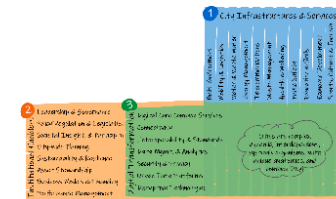
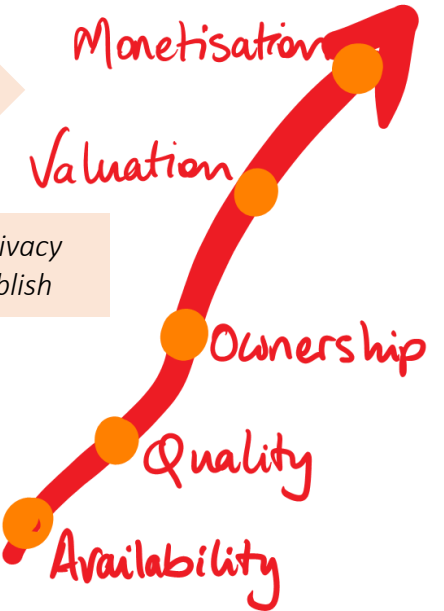
Pragmatic Data Model

- Is there a data strategy?
- What is the As-Is and what are the challenges?
- What key needs (issues / use cases) must data serve?



For each source (& overall) we must consider...

Data governance, security & privacy considerations are vital to establish



Type	Data	Source	Availability	Quality	Notes
Behind-the-Firewall (BtF)	Streetscene	Dept X			
	Environment	City Service Provider			
Open	Socio-Demo				
	Weather				
	City Comm				
Social Media	Sentiment				
Commercial	Waste		As-Is	To-Be	Bin sensors, routing analytics & predictive analytics
Sensor/IoT	Public Safety		As-Is	To-Be	Societal participation; modern public field force equipment; collaboration!
	Transport		As-Is	To-Be	Deep cross-sector integration; doubling of mobile/fixed sensors
	Sport & Leisure		As-Is	To-Be	Asset capture; e-schedule generation; collaboration cross-public/private
	Public Housing & Place-making		As-Is	To-Be	E-curriculum;
	Education & Skills		As-Is	To-Be	Transformation of SME enablement processes; foreign web comms
	Economic Development		As-Is	To-Be	Cross-provider integration; EHR; societal consensus
	Health & Wellbeing		As-Is	To-Be	Data sharing agreements with utility providers
	Energy Mgmt		As-Is	To-Be	Field sensors for leak detection; predictive maintenance analytics
	Water		As-Is	To-Be	Smart Planning processes; BIM
	Development		As-Is	To-Be	

Different sectors typically are at very different levels of data maturity, with very different ambitions. Is this status known?

Much on digital / UDPs is going on across Europe to learn from...

Living-In.EU: a 5-pt framework & substantial ongoing content work

Overview commitments

Financial

1.1 Joint Investment Plan

1.2 Multi-level synergies

1.3 Local digital transformation with EU funds

1.4 Use common procurement practices

Technical

2.1 Common list of Standards & Technical Specifications

2.2 Key Enablers - Available for All

2.3 Common Marketplace

Legal

3 Assess and develop legal measures for a common EU framework

Education & Capacity Building

4.1 Develop administrative capacities

4.2 Citizen-centric design approaches

4.3 Digital education and skills for public authorities and businesses

4.4 Provide digital education and skills to the public

4.5 Culture of co-creation, participative and cross-sector approach

4.6 Facilitate and coordinate activities for scaling-up

4.7 Opportunities that can accelerate deployment DfHs

Monitoring & Measuring

5 Framework based on existing methodologies

LIVING-IN.EU

124 cities involved in Lighthouse Demonstrator programmes – all involving data management

And an 8,000 stakeholder strong Smart Cities Marketplace with an 8-year Urban Data Platform initiative

bsi. creating excellence in data

European Innovation Partnership for Smart Cities & Communities (EIP-SCC)

Rethinking the city: using the power of data to address urban challenges and societal change

A guide for city leaders

bsi. creating excellence in data

EIP-SCC Urban Platform Management Framework

Enabling cities to maximize value from city data

Market Survey on UDP status of ~80 cities

Erasmus Centre for Data Analytics

EIP-SCC

Smart Cities and Communities

RUGGEDISED

Survey & Delphi Study on Urban Data Platforms & Data Management Results

April 15, 2020 | Dr Marcel van Oosterhout, Dr Haydee Sheombar, Julia Holst, Erasmus University Rotterdam

Gov'ce Research for PPP UDPs

Governance Mechanisms of Public-Private Partnerships in the Context of Urban Data Platforms

A Case Study on Urban Data Platforms that strive for Triple Bottom Line Value

Ruggedised Research Project

Master Thesis – Final Version

Quint van Stuivenberg 455109

MSc Business Information Management Rotterdam School of Management Erasmus University

Supervisor Dr. Samaneh Bagheri

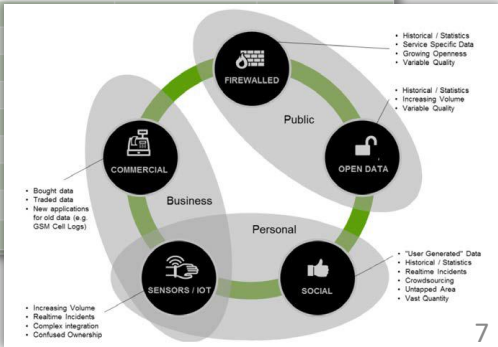
Co-Reader Dr. Marcel van Oosterhout

Date 25/07/2021

EU UDP “Packaging” activities

Service	Paper Based	Batch Process	Silo Integrated	X-agency Integrated	Cross-Sector Integrated	Near Real-time	Real-time	Key Technology & Data Transformation Requirements
Waste		As-Is		To-Be				Bin sensors, routing analytics & predictive analytics
Public Safety				As-Is		To-Be		Societal participation; modern public field force equipment; collaboration!
Transport				As-Is		To-Be		Deep cross-sector integration; doubling of mobile/fixed sensors
Sport & Leisure	As-Is							
Public Housing & Place-making	As-Is							
Education & Skills			As-Is					
Economic Development	As-Is							
Health & Wellbeing				As-Is				
Energy Mgmt				As-Is				
Water				As-Is				
Development				As-Is				
		Type	Data	Source	Availability	Quality	Notes	
		Behind-the-Firewall (BtF)	Streetscene	Dept X				
		Open	Environment	City Service Provider				
			Socio-Demographic					
			Weather	National weather				
			City Comms Platform					
		Social Media	Sentiment/Issues/etc	Twitter				
				Facebook				
		Commercial						
		Sensor/IoT						

...excerpts from the “Mgmt Framework”



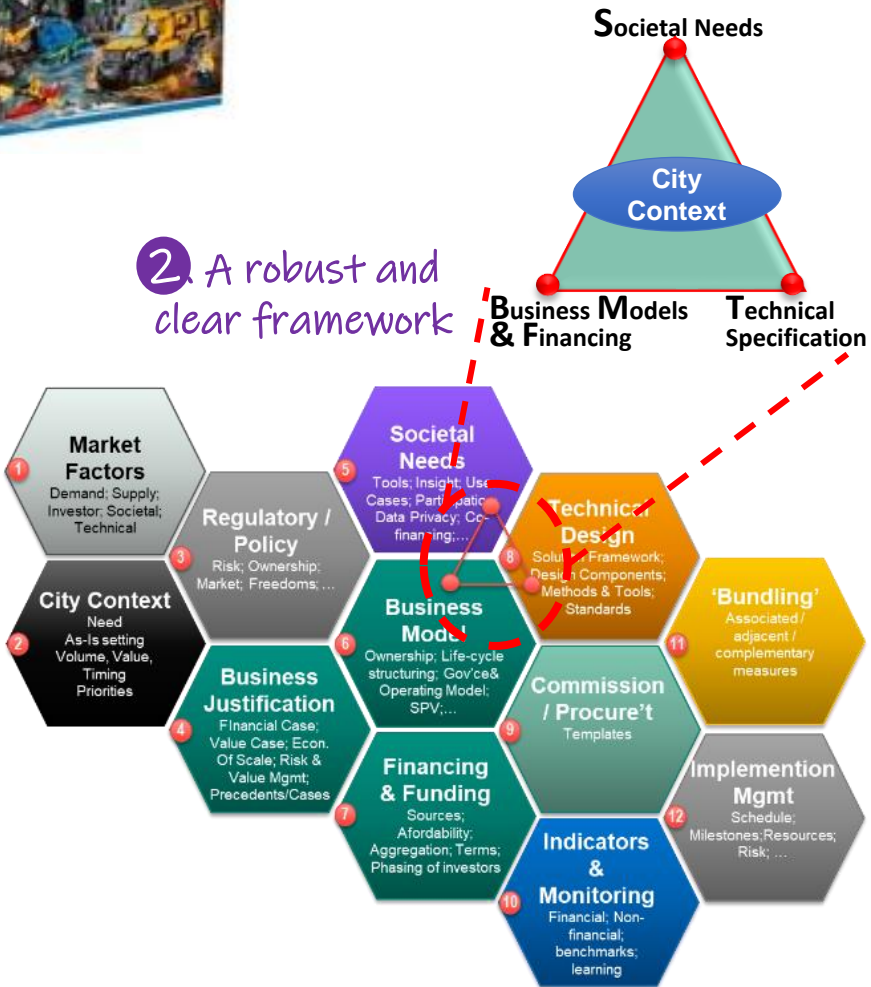
'Packaging up' UDPs for scale deployment












1 Lego as the metaphor

3. An emerging UDP Portfolio

2 A robust and clear framework



Stage 1: Engaging Stakeholders	 Leadership Guide A 10-page document clarifying for politicians and city leaders the opportunity from Urban Data Platforms. <i>Status: 80% draft.</i>	 Management Framework / Playbook 50p Mgmt Framework: a core document supporting city project officer to help align across various infra / service heads; to time-compress decision making. Plus 1-page process guide (update). Plus planned ShCities 'Playbook' <i>Status: 80% draft</i>
	 (Political) Leadership Storyboard A 1-page storyline to outline the key messages that 'sell' the concept to (political) leadership in a city – output from the cross-SCC01 (Lyon) Maker event (Oct 2019). <i>Status: 50% draft</i>	 Smart /Solution Booklet A 15page document targeted at the multiple city service owners that could benefit to provide a basic understanding of the key opportunities. <i>Status: 80% (to align as ShC/SCIS)</i>
Stage 2: Making the Case	 Market Analyses City Surveys capturing the state-of-play of UDPs across EU (2020 survey captured >100 participants) <i>Status: 2020/2019/2015 EU Market Surveys undertaken; planned bi-annually.</i>	 CDO Role Description A 6-page role description for a City Chief Data Officer. <i>Status: 80% co-created / validated by international market experts and EU cities.</i>
	Business Case Justification Short Document capturing the different business models and financing options <i>Status: Intention to capture Indirect BCase (BCN+), and Collaborative BCase (Rotterdam – tbc)</i>	Decision Support Tool User Guide A digital online platform evaluating bankable smart lampposts projects directed for variety of cities decisions markers. <i>Status: intended as copy-paste logical model to HL' post DST</i>
Stage 3: Implementation	 EIP-SCC & DIN Reference Architectures ~50-100 page documents on detailed specifications <i>Status: 100% (distinction/alignment not fully clarified)</i>	 Requirements Specification (EIP-SCC) 40p doc providing a model to help city data officers understand how to analyse data opportunities <i>Status: 80% published (2016), not fully tested</i>
	Buyer's Guide A market catalogue to inform cities on the different smart lamppost providers <i>Status: 0% draft</i>	 ESPRESSO Standard Listing Identify the various applicable standards for design and procurement <i>Status: 80% current (2016 vintage)</i>
Stage 4: Sustaining Value	Value Monitoring Indicators Listing indicators (financial and non-financial) relevant for the UDP; also addressing <i>Status: 0%</i>	Value of Urban Data (VoUD) Use case based packaged replicable approach to support analysis of different forms of urban data valuation, to justify actions <i>Status: proposed EU project call in process</i>
	Regional Structure <i>Status: N</i>	Market Case Studies Structured document capturing different case studies to ensure awareness of market needs and innovation. <i>Status: 0%</i>

Seeking to make it feasible for ALL cities to adopt fast & with confidence

2020 (major) Survey – Key Insights

104 Respondents from 82 cities (80% SCC01 Lighthouse Cities) – relevant market signals

1. UDP development still in **early days**
 - 44% in explore/plan; 25% in build; 31% operational
2. **Data scope**: ~20% work with 'silo' data, 19% developing an internal platform, 45% with data from municipality and other business stakeholders
3. **Drivers mainly internal** city objectives (decision making, cost-efficient, effective operations, privacy & security)
4. 42% of cities have a dedicated Chief Data Officer (**CDO**)
5. Dominant **domains**: Mobility, Energy, Built environment, Sport/leisure/culture, Water & Waste management
6. 2/3rd City-owned; 10% Private. **City-Hall-Led philosophy**. 55% developed/procured by external advisor
7. **Citizens** as yet not significantly involved / users
8. 68% use open data **standards**; 57% use interface-related standards (e.g. Espresso); 26% use integrated modular system by a private party (e.g. Fi-Ware)
9. UDPs mainly support open data sharing, connecting parties (suppliers/users), and proving APIs for services. **Visions** for: visualization / 3D / 'digital twin', application catalogues, & software development toolkits
10. Little focus on facilitating 3rd party business models or new social/civic models (**few new business models**)
11. **Accelerators**: Trust, Triple helix collaboration, Open standards, Subsidies & grants. **Barriers**: Contractual complexity, Legislation (e.g. privacy, procurement), Cyber security, Data Ethics & Societal concerns
12. **Capability gaps** in cities: cross-silo collaboration, cross-silo data quality mgmt., data governance; change management & leadership
13. **Justification**: 47% treat UDP as critical infrastructure, 41% require business case (of which 32% combine business case with services)
14. **Adoption** (actual use) seen as still relatively low

UDP - getting costs down; & value up

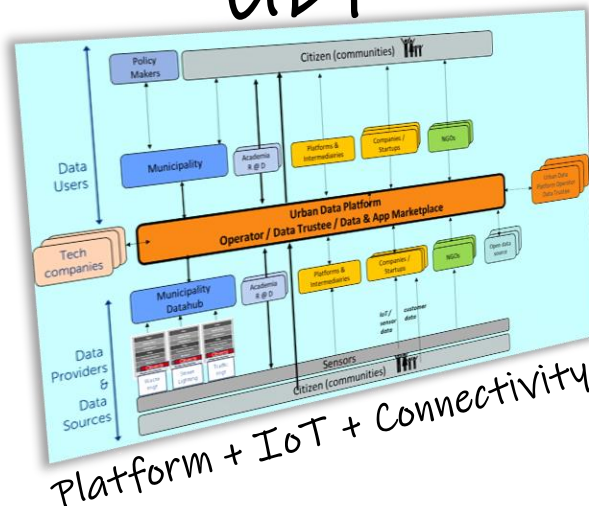
Costs down



- as-a-Service
- Open Source

Open Standards
are VITAL

UDP



A blend of financial & non-financial value.
With v. different perspectives of gains

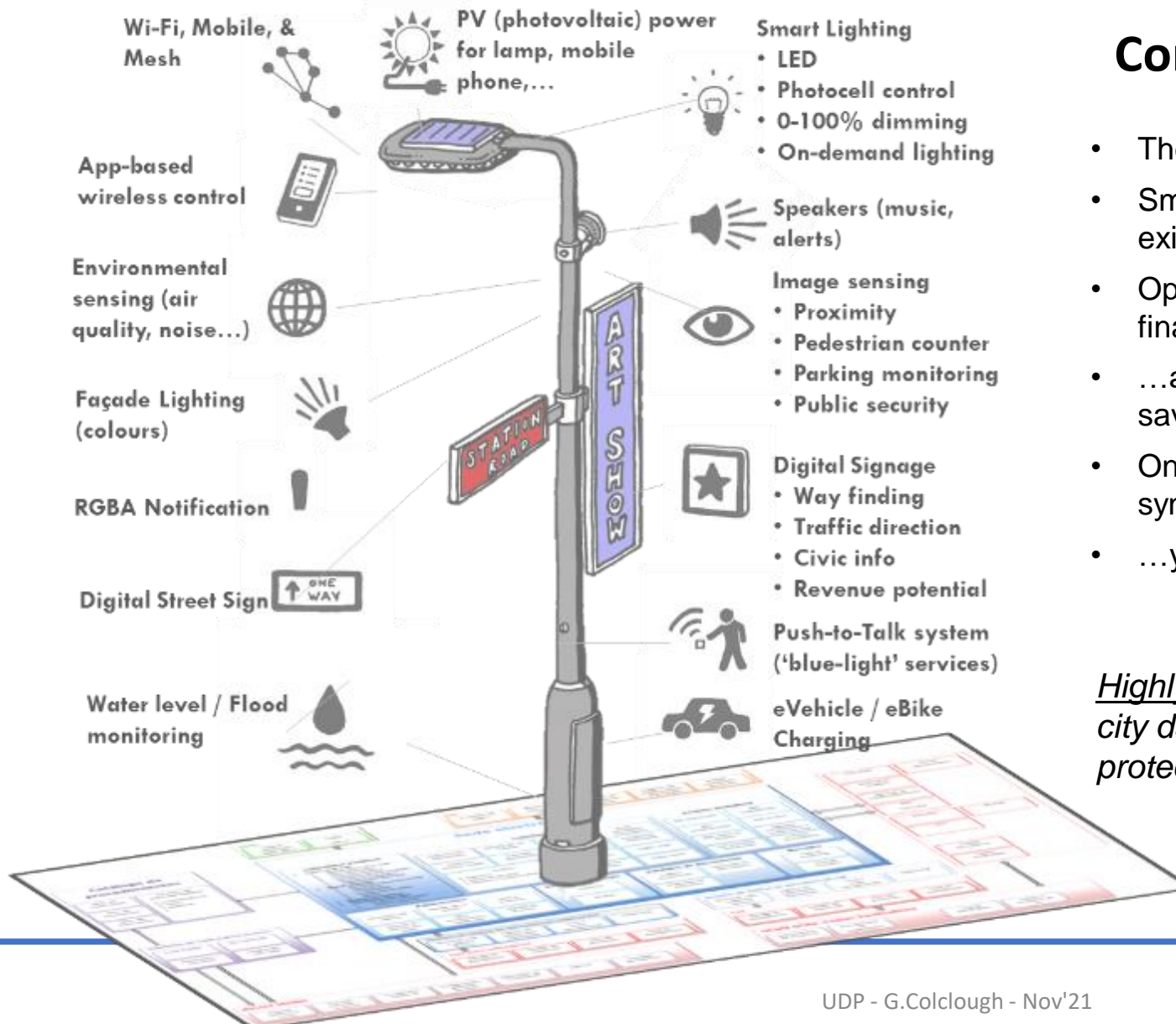
- Parking fees
- Tax & Rates
- Planning
- Energy Mngt
- Smart Lampposts
- Mobility
- Community Engage't

Societal Support

Value up

Financial justification – it could be so easy!

A Dozen Things to do with a Lamppost that have little to do with light



Conjoined Business / Value Case

- The marriage of Data Platform & Smart Lamppost
- Smart Lampposts offer potential to multi-purpose the existing (& new) pan-city web of lighting poles
- Opens up other forms of services and benefits (non-financial, and indeed hard-to-justify)
- ...and delivers a significant ROI (50-80% energy savings)
- One without the other struggles to work – true synergy
- ...yet also hard to align cross-sector!

Highly bankable; helps justify a pan-city data platform implementation; protects and de-risks investment