

*Presented at the FIG Working Week 2019,
April 21-26 2019 in Hanoi, Vietnam*

ORDNANCE SURVEY

Cities of the Future – Where Is the Actionable Geospatial Information?

John Kedar FInstRE, FRGS, CGeog(GIS)
Director International Engagement
john.kedar@os.uk

Kimberley Worthy BSc, MMgt, MBA, FRGS, CGeog (GIS)
Head Professional Services Team
Ordnance Survey



What we do

- Create, maintain and distribute detailed geospatial information for Britain
- 500 million geospatial features in the master map
- 10,000+ changes a day
- International business



What is Smart? - Helping Dubai become the world's happiest city

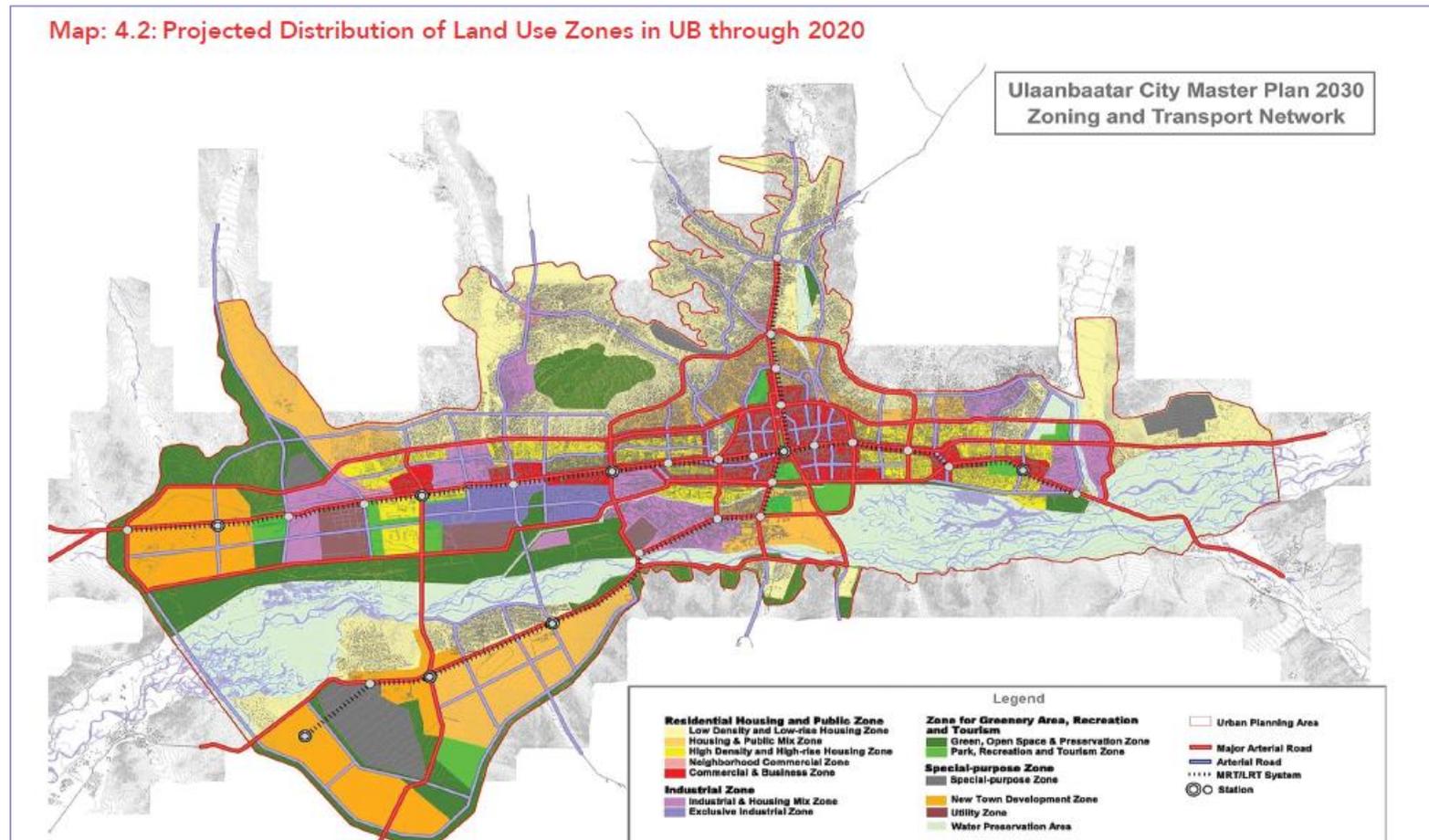


What is Smart? – land administration?



What is Smart? - City planning?

Map: 4.2: Projected Distribution of Land Use Zones in UB through 2020



Some city challenges.....

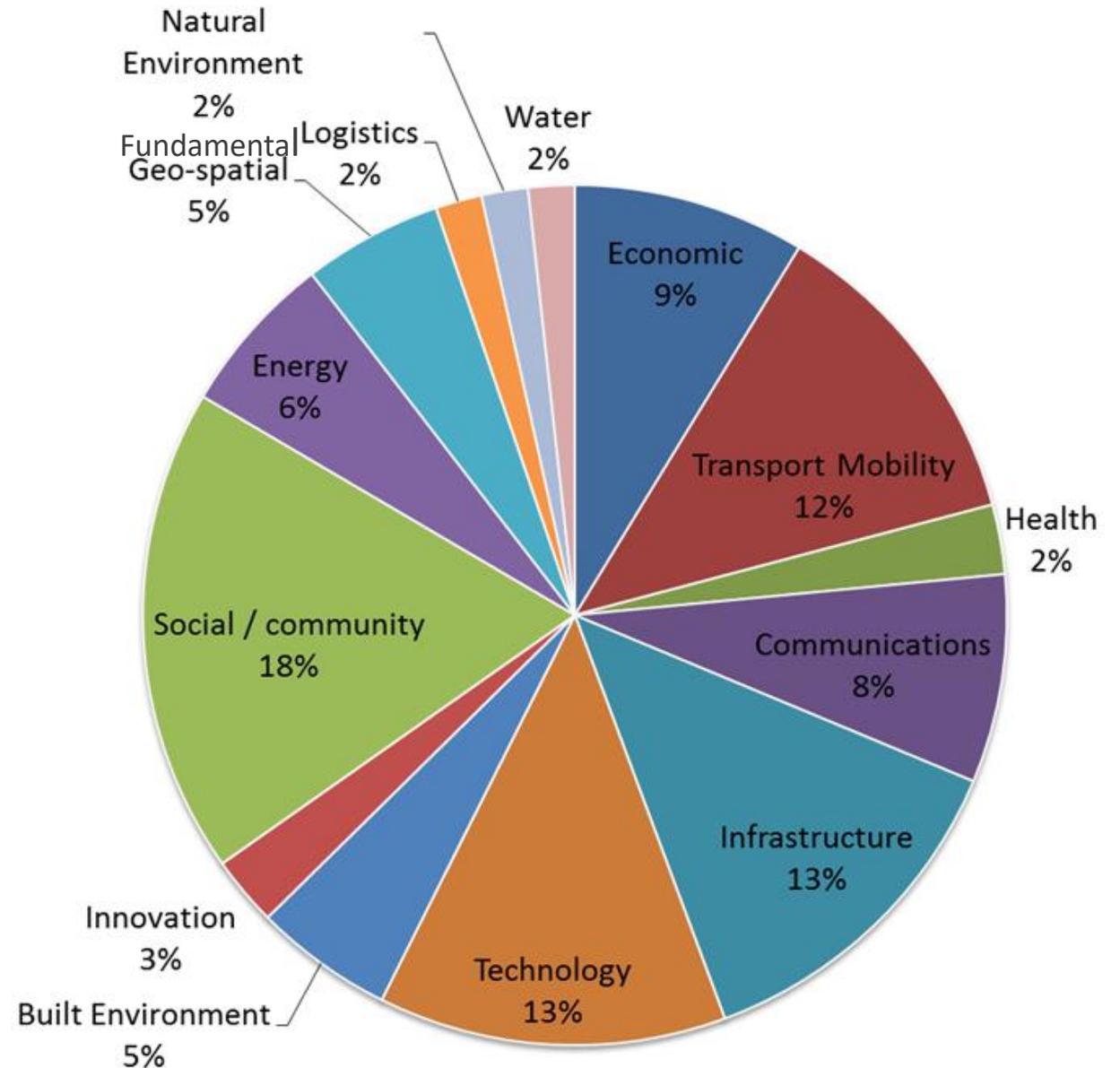
..... as urbanization progresses toward 70% of the World's population by 2050

- Cities are rapidly developing and peri-urban areas being subsumed. Resilience, safety and security are critical to all.
- Ensuring the resilient delivery of services, whether utilities, healthcare, waste or education.
- Reducing congestion and pollution.
- Making lives better for citizens.
- City Economy and Employment.
- City v State governance

The Data Ecosystem

80%

of data has an associated location





INTEGRATED GEOSPATIAL INFORMATION FRAMEWORK

A STRATEGIC GUIDE TO DEVELOP AND STRENGTHEN
NATIONAL GEOSPATIAL INFORMATION MANAGEMENT



UN-GGIM

United Nations Secretariat
Global Geospatial Information Management

Positioning geospatial information to address global challenges

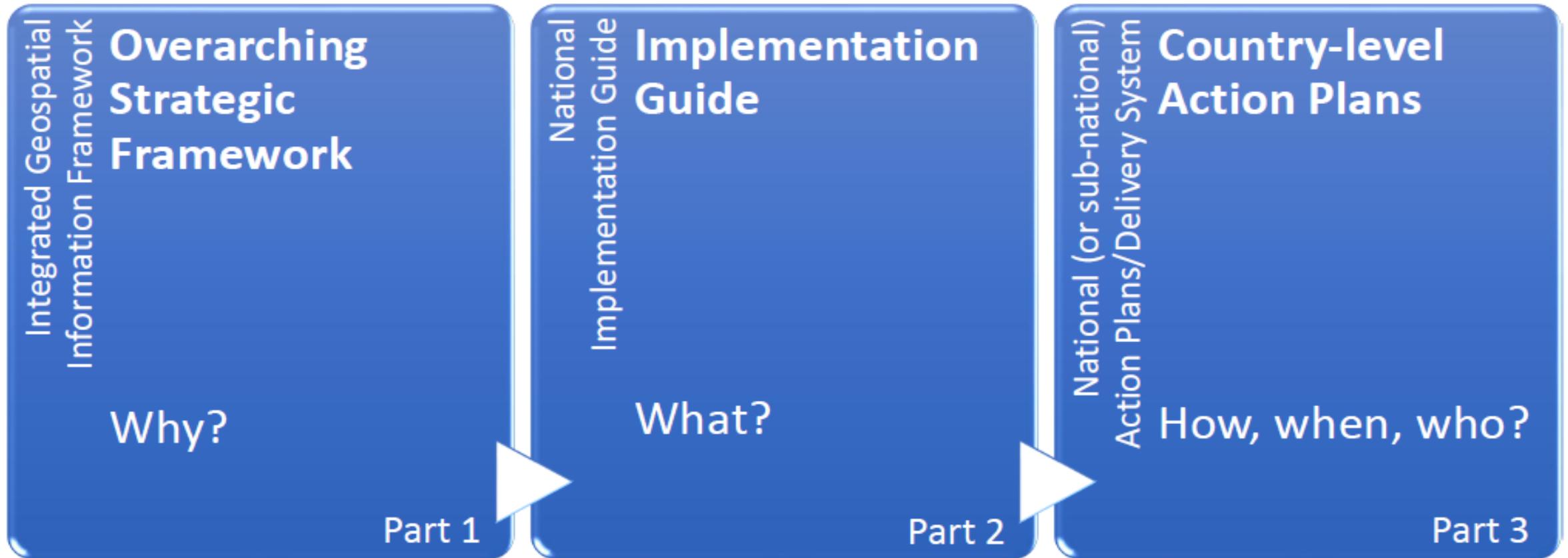
ggim.un.org

The Integrated Geospatial Information Framework (IGIF) Vision

The efficient use of geospatial information by all countries to effectively measure, monitor and achieve sustainable social, economic and environmental development – leaving no one behind



Integrated Geospatial Information Framework

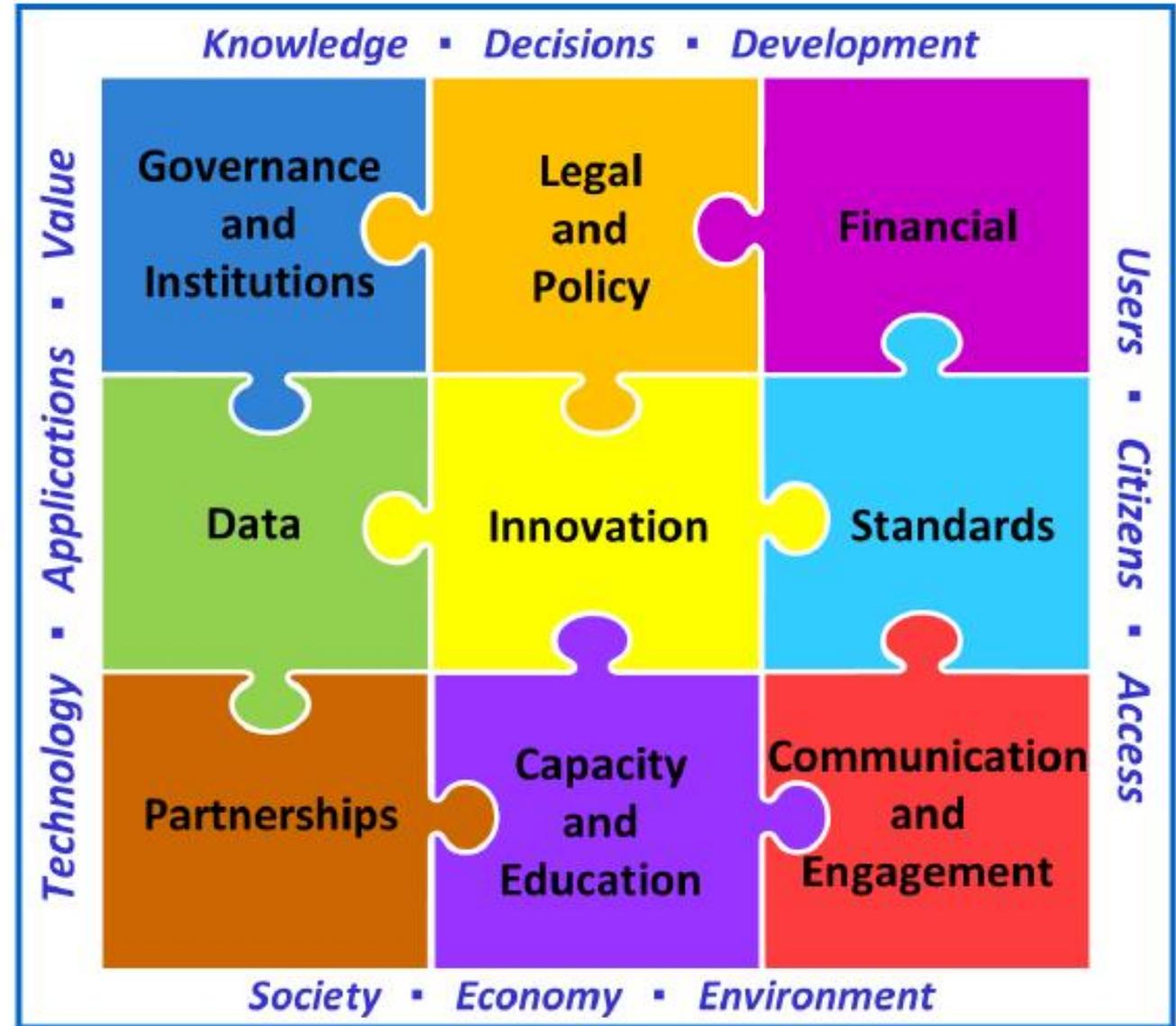


9 Strategic Pathways

Governance →

Technology →

People →



Part 3: National Action Plan – theory into practice

Operationalize the Integrated Geospatial Information Framework will be done through **country level Action Plans**, *linking to **government national priorities, analysing socio-economic benefits and identifying financing** for implementation.*



City visions.....

Manchester UK:

competitive, dynamic and sustainable economy skilled people
connected internationally limiting impacts of climate change safe

Dar es Salaam City Tanzania:

sustainable development residents do not live in poverty and have decent
standards of living attract investors.

Dubai:

Happy, empowered people Inclusive Preferred Place to Live & Work
..... Smart & Sustainable Global Hub Pioneering Government

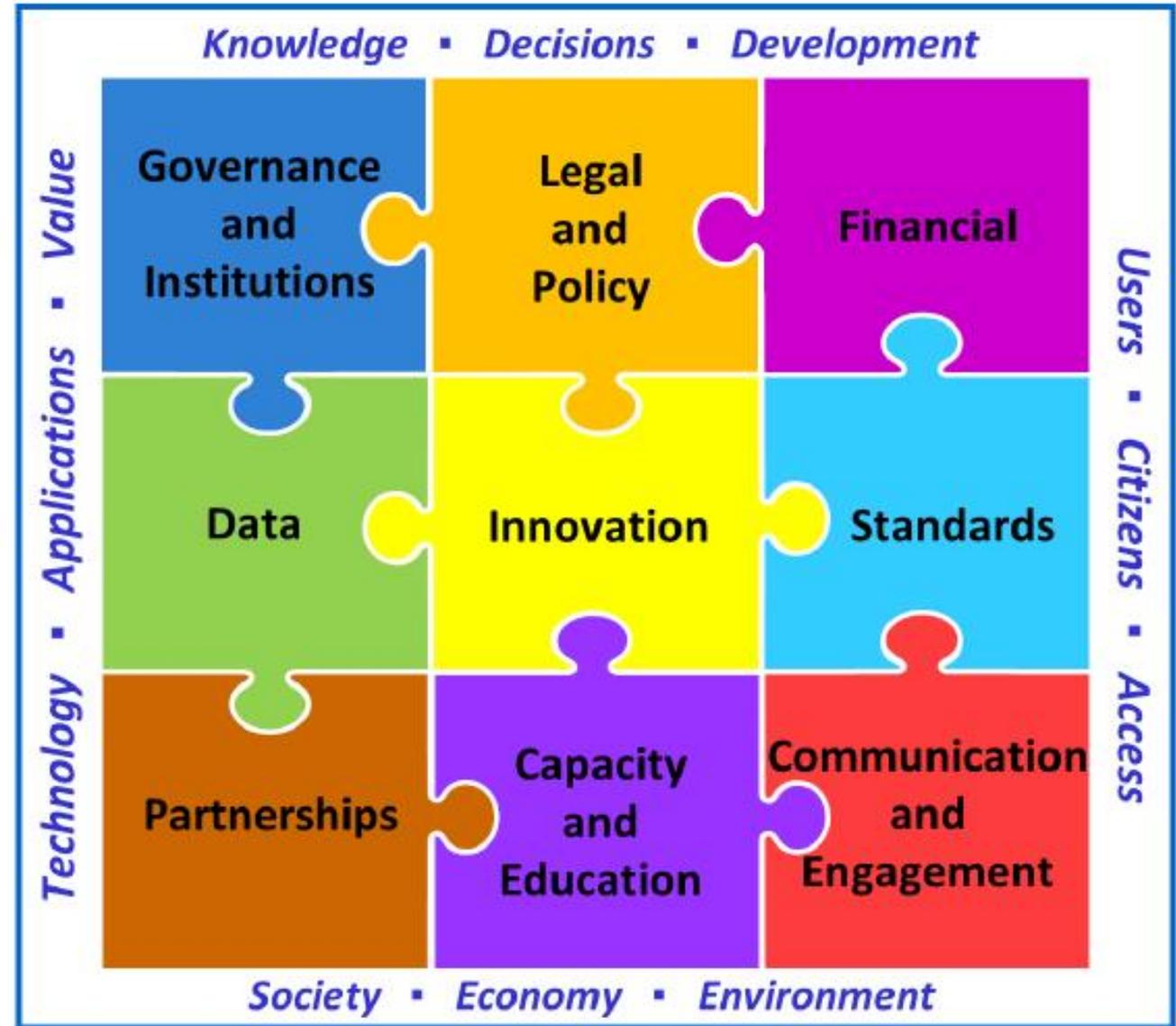
.....So what is 'smart'?

9 Strategic Pathways

Governance →

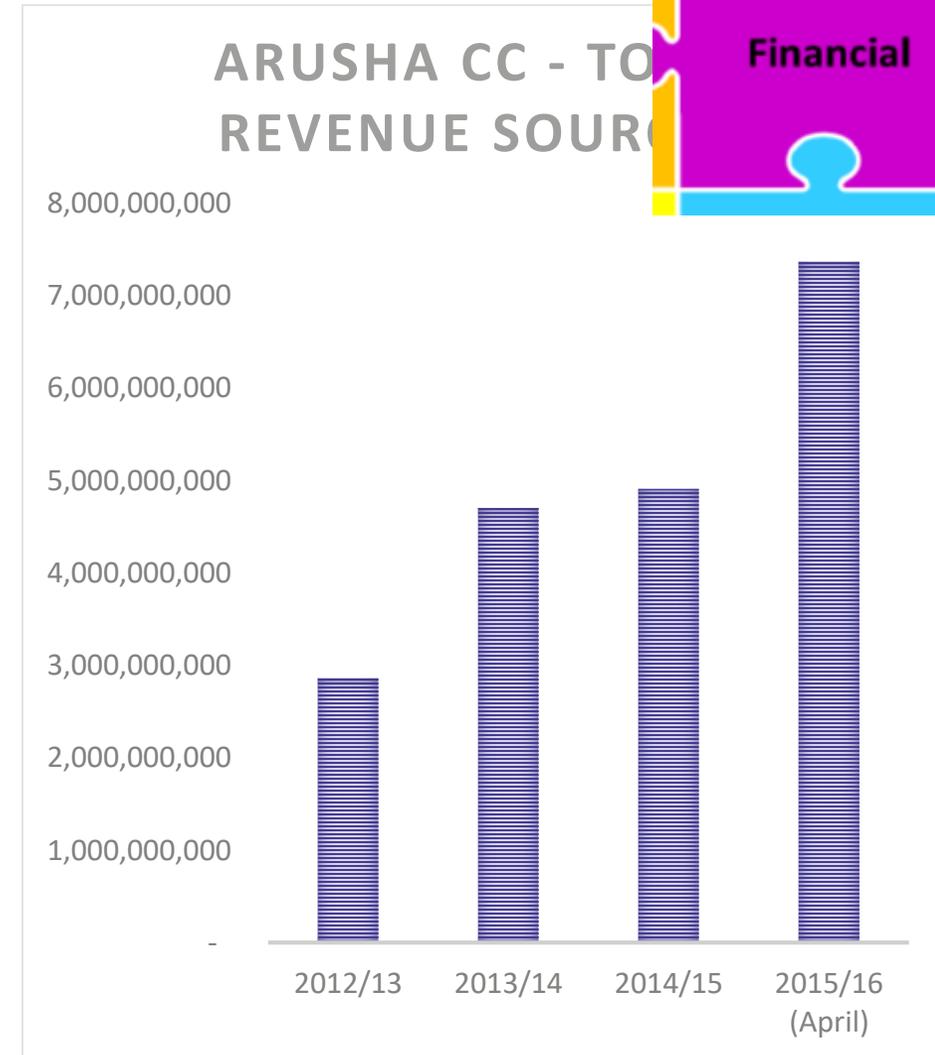
Technology →

People →



Revenue Example: Arusha Local Government Revenues

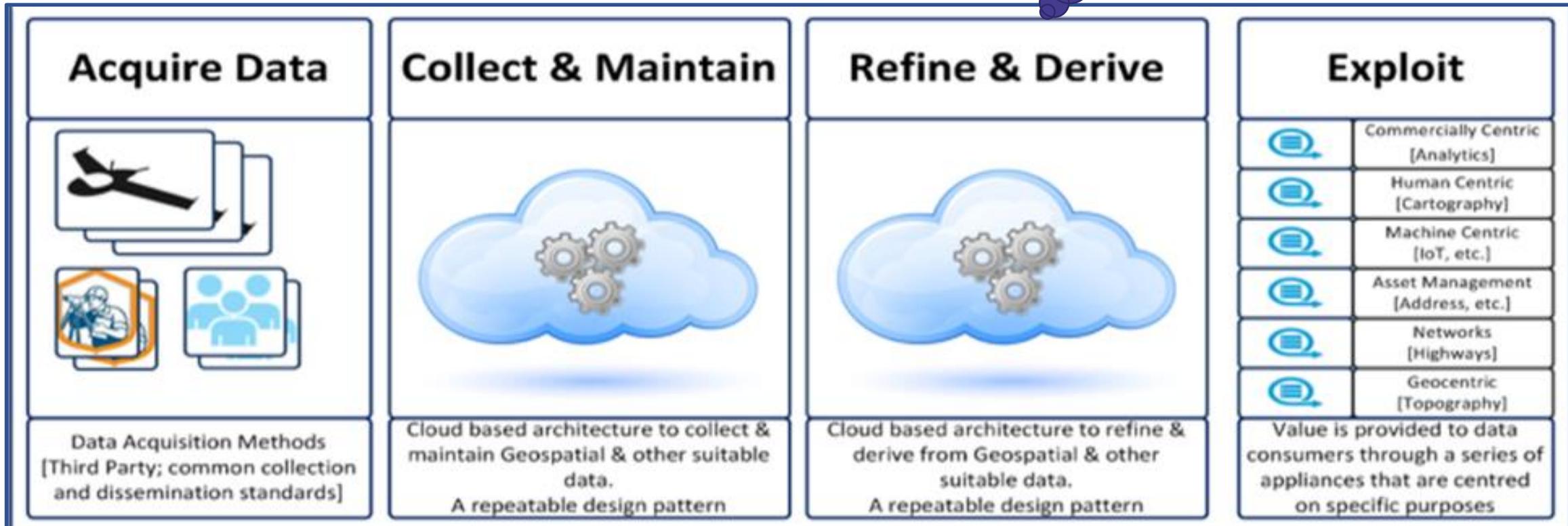
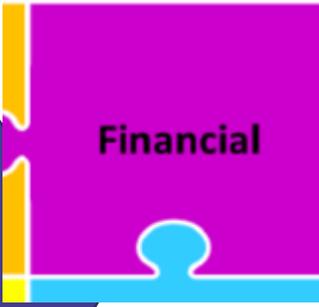
- Service levy, property tax, billboards, parking fees, income from sale or rent, market fees and charges, secondary school fee etc.
- Local Government Revenue Collection Information System: Geographically locate all taxpayers and properties
- Comprehensive spatial database: satellite imagery, roads and individual buildings digitised, unique property reference number, attributes (e.g. use, condition, age)



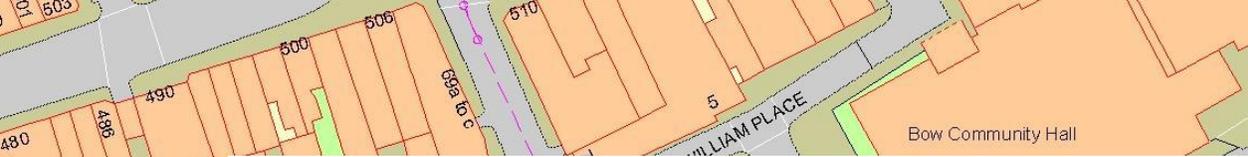
World Bank Land and Property Conference 2017. The role of ICT in delivering efficient revenue collection in developing countries: The Tanzanian experience. Prof William McCluskey, African Tax Institute, University of Pretoria, Chyi-Yun Huang, World Bank, Patrick Doherty, Consultant, Prof Riel Franzsen, African Tax Institute, University of Pretoria

Transforming operations with help of **cloud services**

Capacity, capital, skills, technical risk, data currency, connectivity



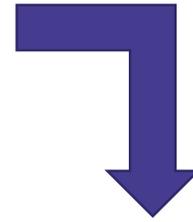
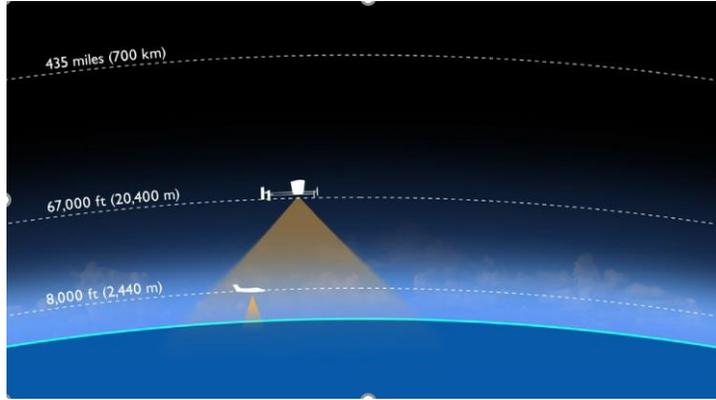
Time and Place – the 4th dimension is critical



PLAN



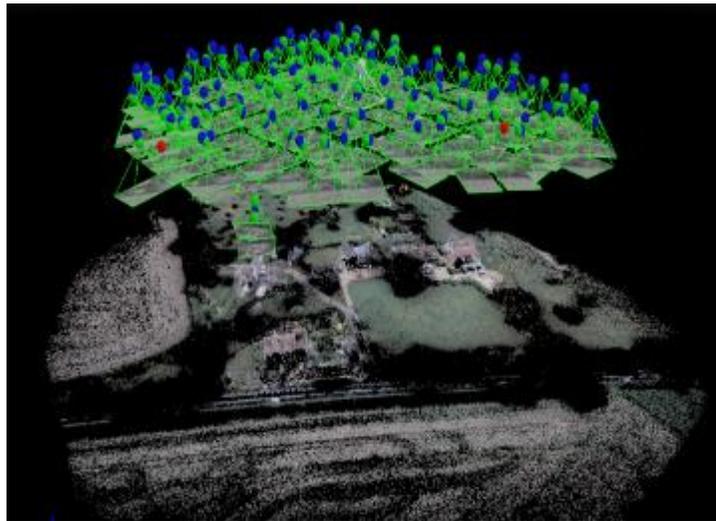
FLY



COLLECT



INTO DATABASE

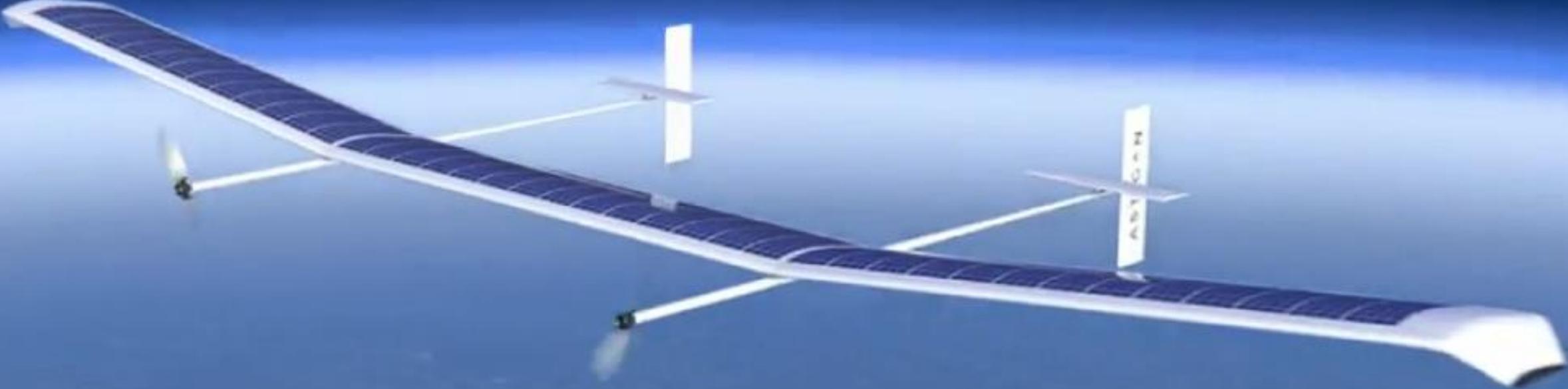


AUTO EXTRACT



<https://www.youtube.com/watch?v=z7ij4QBfPG4>

Astigan – data collection to new heights

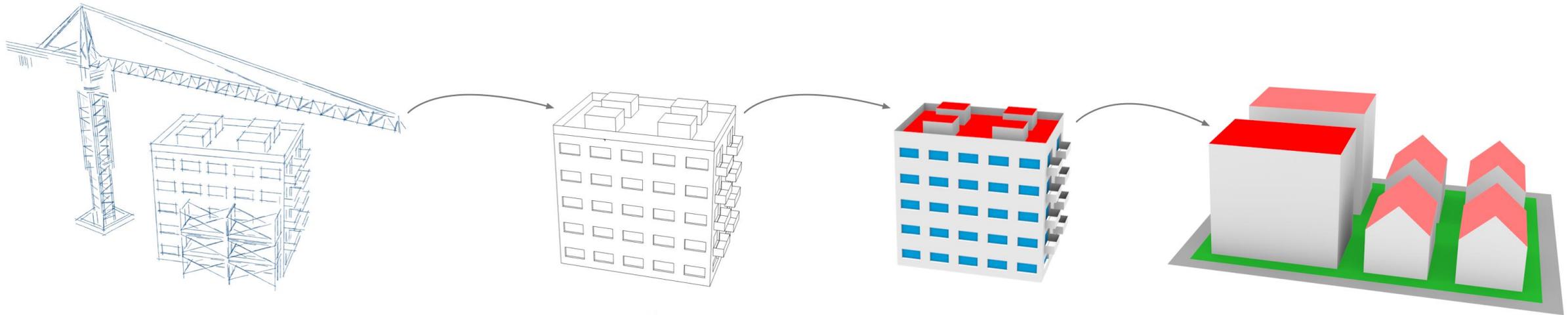


Developing a 3D data model in Singapore

GovTech asked Ordnance Survey International for expert advice about creating data specifications, and a product flowline and process to generate CityGML-compliant data.



Development of tools to enable further enhancement of the Virtual Singapore representation... combining BIM, Geospatial, and urban use cases



Native BIM



Virtual Singapore



Above and below ground data integration

Standards



Integration of third party data for city and region planning and development

Secure | <https://labs.os.uk/prototyping/osel-framework-ite/nwg-innovation-festival/>

Search location

NWG Innovation Festival 2018



Data catalogue

Clear all layers

- Durham County Council
- Newcastle City Council
- Sunderland City Council
- Northumbrian Water Group
- Northern Powergrid
- Northern Gas Networks



Properties

OBJECTID
2049

GISURN
s167100007745

CONTAM_N
6

DATE_
1990

DESCRIPT
Factory or works - use not specified

UNIQUE_ID
2049

SHAPE_AREA
189090.535617

SHAPE_LEN
2894.22106463

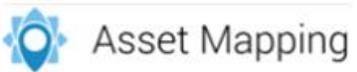
Partnerships



Central Manchester University Hospitals
NHS Foundation Trust



SIEMENS



Telensa



An aerial photograph of a city street grid with various data overlays. A semi-transparent dark blue rectangle is positioned in the center-left, containing white text. The map features a grid of streets, with some areas highlighted in green. Overlaid on the map are numerous small blue and green dots, and several lines in yellow, orange, and red. The text is centered within the blue rectangle.

A unique view

Combining this new information with OS MasterMap
creates a unique view

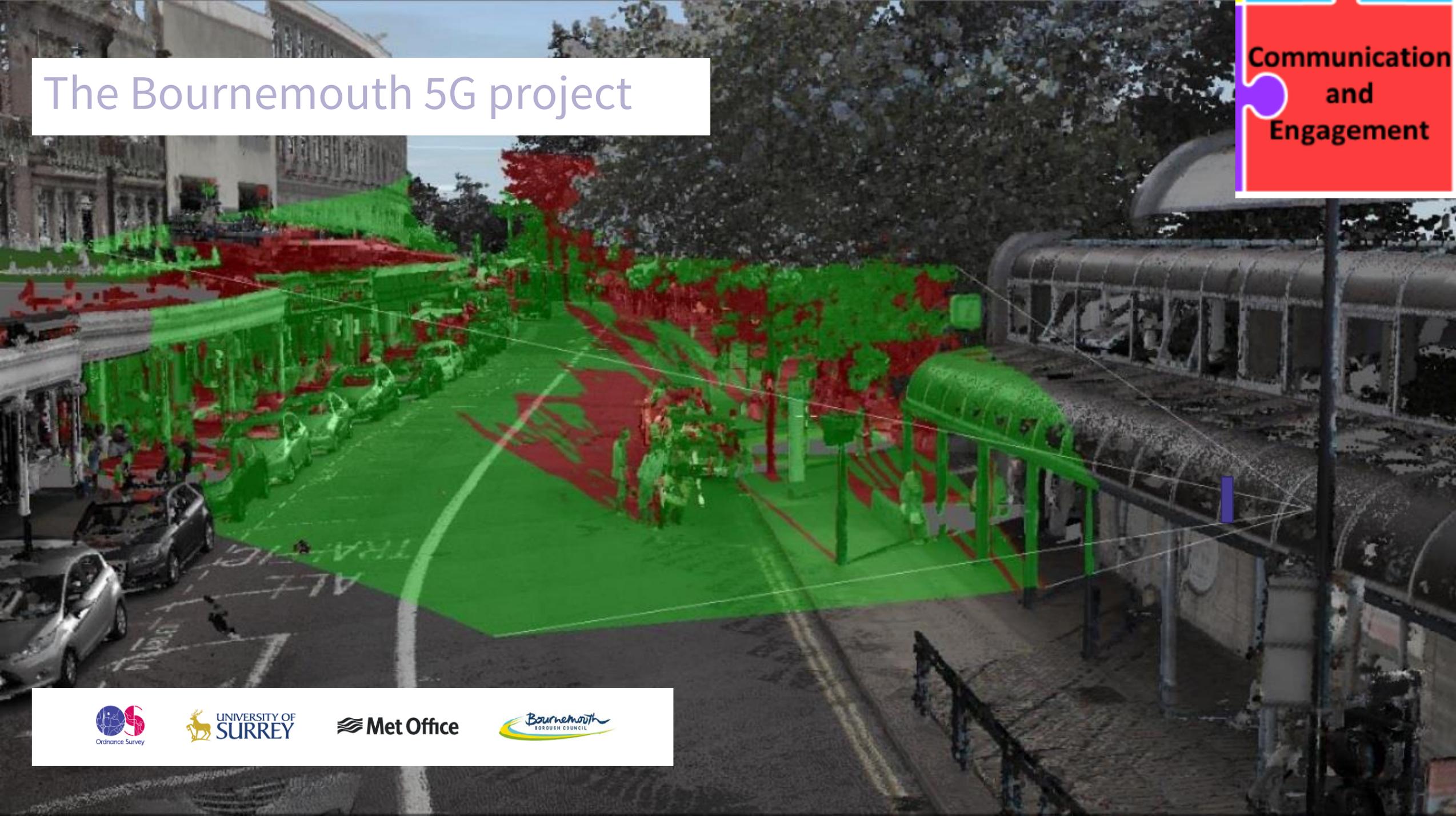
This enables innovation and creates compelling opportunities
for Smart Cities and IoT

Urban Navigation



The Bournemouth 5G project

Communication
and
Engagement



Communication and Engagement

The screenshot displays a ROS simulation environment. At the top, a toolbar includes icons for 'Interact', 'Move Camera', 'Select', 'Focus Camera', 'Hit Measure', '2D Pose Estimate', '2D Nav Goal', and 'Publish Point'. Below this is a 'Displays' panel with a list of visualization options such as 'Global Options', 'Fixed Frame', 'Background Color', 'Frame Rate', 'Default Light', 'Global Status: Ok', 'Grid', 'TF', 'Points Map', 'Vector Map', 'Camera', 'Points Raw', 'Vscan Points', 'Control Pose', 'Current Pose', 'Detection Range', 'Next Waypoint Mark', and 'PP Trajectory Mark'. The main 3D view shows a black car on a road with multiple lanes, labeled 'Lane: 1' through 'Lane: 50'. Traffic lights are visible, labeled 'Light: 36', 'Light: 58', and 'Light: 94'. A red text overlay '(0) Follow' is positioned near the car. At the bottom, a 'Runtime Manager' window shows a tree view of system components: 'Localization' (including 'gssss_localizer', 'ndt_localizer', 'icp_localizer', 'autoware_connector'), 'Detection' (including 'cv_detector'), 'freespace_planner', 'way_planner', 'OpenPlanner - Global planning', 'Motion Planning' (including 'dp_planner', 'ff_waypoint_resolver'), and 'OpenPlanner - Local planning'. A terminal window at the bottom shows the command 'rosrun create_clicked_point create_clicked_point.py -65 54 1.5 0 0' and a list of process IDs and priorities.

This panel shows the 'Views' and 'Current' information in the ROS GUI. The 'Views' section includes 'Type: Third' and a list of view parameters: 'Near', 'Invert', 'Target', 'Distance', 'Focal', 'Focal', 'Yaw', 'Pitch', and 'Focal Point'. The 'Current' section shows the following values: 'Near: 0.410398' and 'Focal Point: 0, 0, 0'. At the bottom, there are 'Remove' and 'Rename' buttons, and an 'Experimental' checkbox.

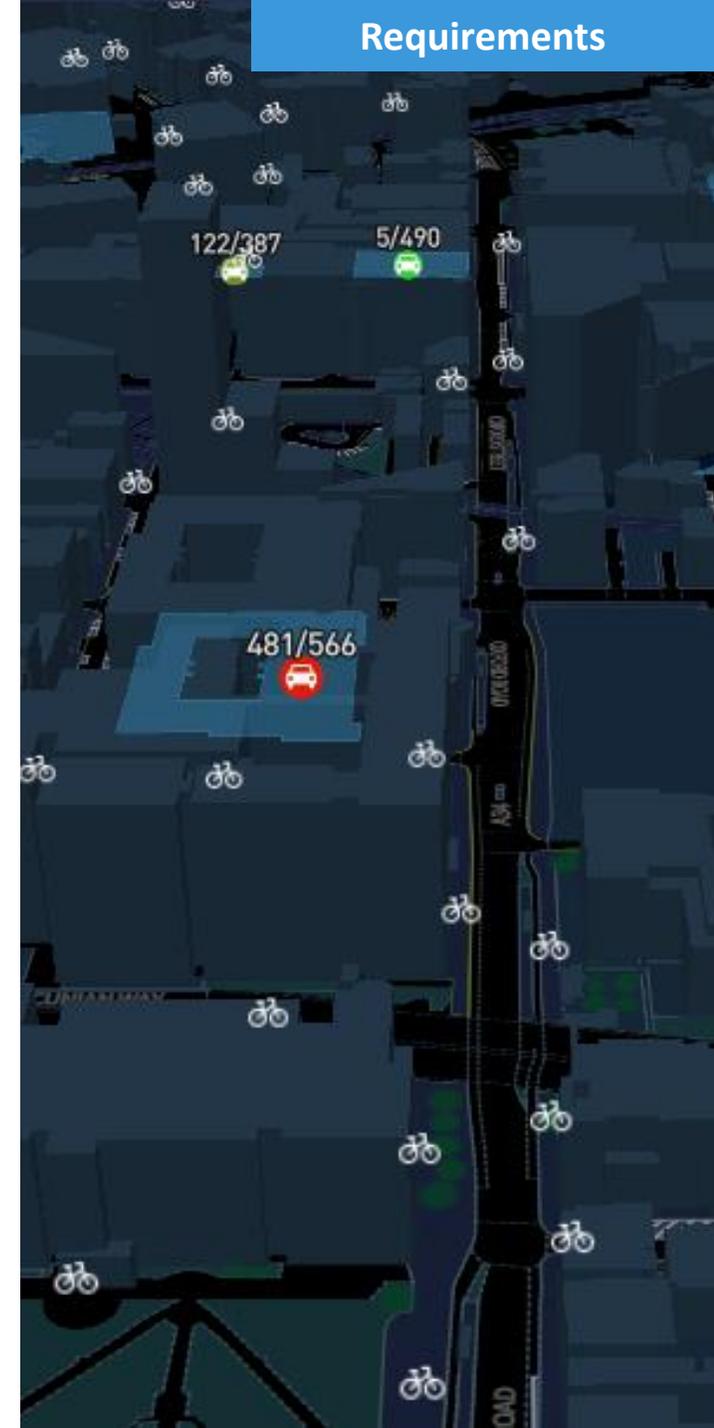
The terminal window shows the following output:

```
jclarke@jclarke-Athena: ~/GIT/ecave/ROS/catkin_ws/src  
[sched_setscheduler] pid=15730, priority=SCHED_OTHER  
[sched_setscheduler] pid=18434, priority=SCHED_OTHER  
[sched_setscheduler] pid=21998, priority=SCHED_OTHER  
[sched_setscheduler] pid=22147, priority=SCHED_OTHER  
[sched_setscheduler] pid=22318, priority=SCHED_OTHER  
[sched_setscheduler] pid=22348, priority=SCHED_OTHER  
[sched_setscheduler] pid=26340, priority=SCHED_OTHER  
[sched_setscheduler] pid=26506, priority=SCHED_OTHER  
rosrun create_clicked_point create_clicked_point.py -65 54 1.5 0 0
```



We are seeing a growing need from cities for:

- **Granularity.** We are seeing emerging requirements for high-resolution, 3D data frameworks.
- **Connectivity.** Networks need to support the transfer of dynamic data, rich, attributed content and underpin the connection of fixed and mobile assets
- **Standards.** Ever-more important to enable true interoperability and machine-readability.
- **Data models.** Need to be authoritative, federated, fully integrated, extensible and secure, supporting alternative interpretations of the real world.
- **Sustainability.** Frictionless data exchange and the right business models.
- **Visualisation.** (AKA cartography) remains fundamentally important because humans are still in charge.



Thank You



John Kedar

John.kedar@os.uk