



Towards the Smart World

Smart Platform: Infrastructure and Analytics

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our future through science



Towards the Smart World

Context

- Cities are the engine for future economic growth: 65% of the GDP in 600 global cities in 2025 [McKinsey]
- Cities take up a mere 2% of the world's land mass, but account for 80% of the world's energy consumption, 70% of the world's greenhouse gas emissions, 60% of our water consumption [UN]
- Urbanization will significantly increase [UN], growing world population: 9.3 billion in 2050, growing % of people live in urban areas (> 50% in 2035 Africa).
In Africa: from 412 million now => 870 million in 2035

Smarter and greener cities are needed to address challenges (resources, infrastructure, sustainable, liveable, economical, social, environmental).

ICT allows cities/people to make better decisions (smarter) and become greener (better usage of available resources)

Real and Digital world



Real world



Real and Digital world become more connected



Real world



sense



act



understand



Digital world



implement
systemic change

Real and Digital world become the Smart World



Real world



sense



understand



forecast



Future world



simulate



act



Digital world

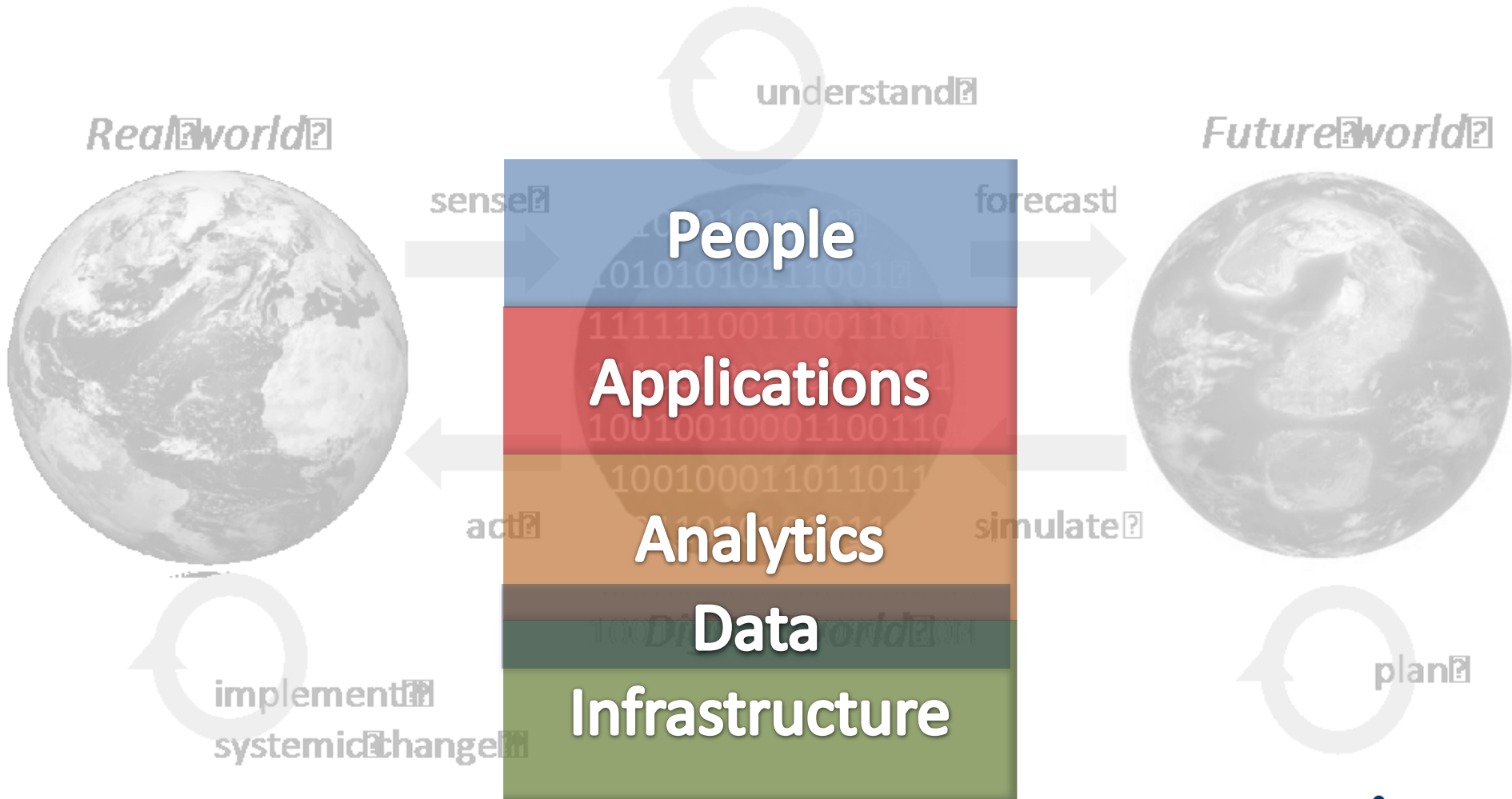
implement
systemic change



plan



The Smart World has four layers



These four layers are driven by DATA

Top down, centralised, holistic



Huge and increasing volumes of structured and unstructured, real time

DATA

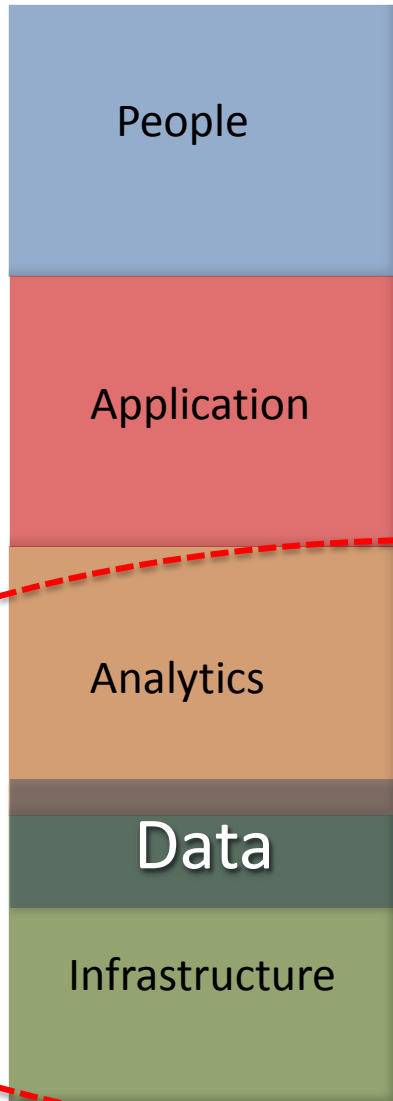
Challenges:

getting the data
digesting the data for decision making



Bottom up, distributed, focussed

Smart World: Decision centric



Enhancing quality of Life!

Acting

Controlling

Adding value by adding intelligence

Sense making

Processing

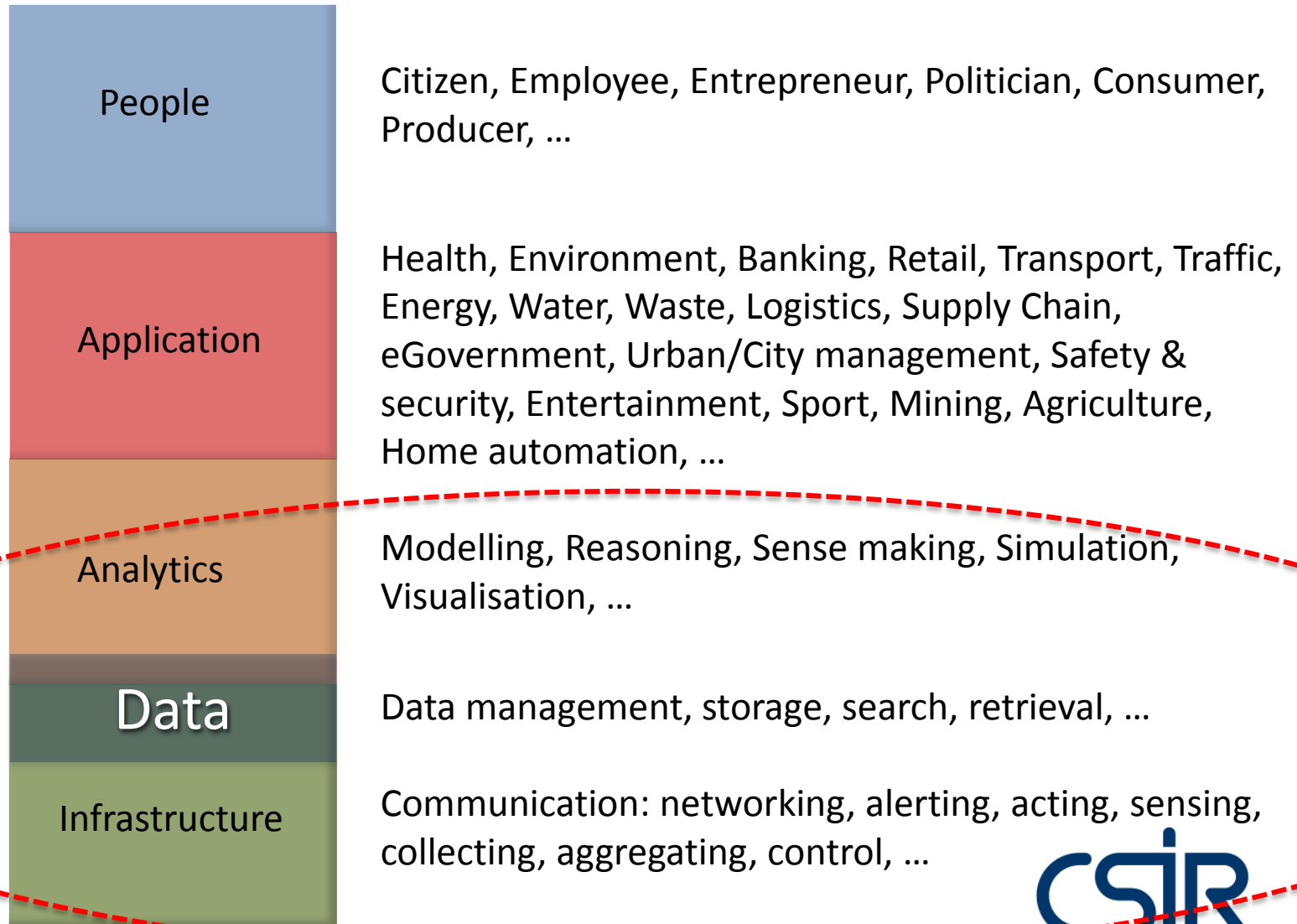
Managing

Connecting

Sensing

**Smart
Platform**

Smart World: Decision centric



**Smart
Platform**



Scope and intent

- ▶ Context -and content -aware sensing, informing and acting by sensing the environment
- ▶ (using all possible sensors, satellite, mobile phones, ..., and people (as ultimate sensors),
- ▶ transporting data via secure adaptive heterogeneous communication network (with minimum maintenance, autonomous and robust wireless self-configuring and self-healing networks also capable of operating in remote areas)
- ▶ initiate appropriate actions
- ▶ Distributed storage, indexing and archiving, searching and retrieval of large amount of unstructured / structured data

Data

Infrastructure

Technologies

- ▶ Sensor networks, mesh networks, IPv6, Internet of Things (IoT), Cloud, IaaS, SaaS, P2P, E-authentication, E-Identity, Trust, Security, ...

Scope and intent

- ▶ Large-scale data processing
- ▶ Mining and analysis for alerts, reports and forward decisions
- ▶ Three decision layers:
 - Descriptive (reporting)
 - Predictive (modelling, simulation)
 - Prescriptive (optimisation)

Technologies

- ▶ Automated algorithms and machine-enabled analysis, visualisation
- ▶ Modelling, simulation and visualisation
- ▶ Knowledge abstraction and representation
- ▶ Inference modelling
- ▶ Computational intelligence
- ▶ Decision support: forecasting, scenario generation, risk analysis

Analytics

Data



Smart World needs a **common Smart Platform**

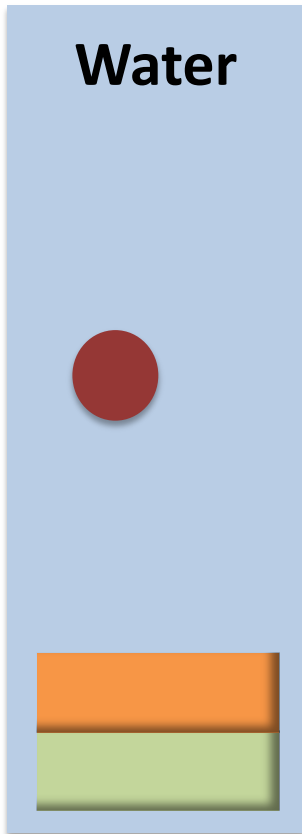
Smart world needs a common Smart Platform

Optimises investment, coordinates capability development

- Leverage: relevant capability and capacity, adjacent initiatives, complementary investments
- Align resource deployment
- Open for new services to broaden stakeholder base

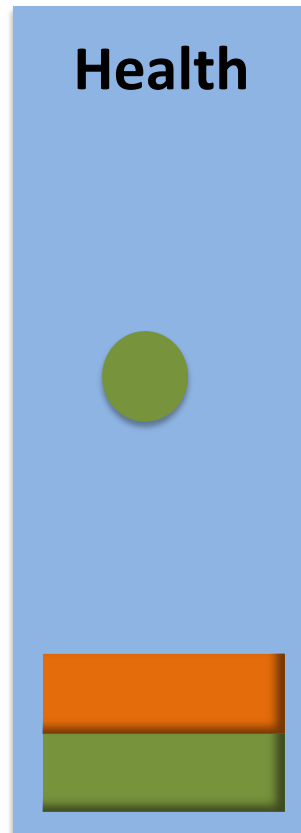
Ensures reuse & synergies

- Higher value decisions **across** domains
- Generic, open standards with focus on interoperability (avoids proprietary solutions)
- Modular, flexible, extendible and scalable solution



Determine changes in quality of (drinking) water in specific regions

Analytics
Infrastructure



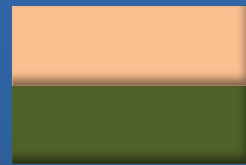
Determine incidents for specific diseases at different geographical locations (at household level)

Analytics
Infrastructure



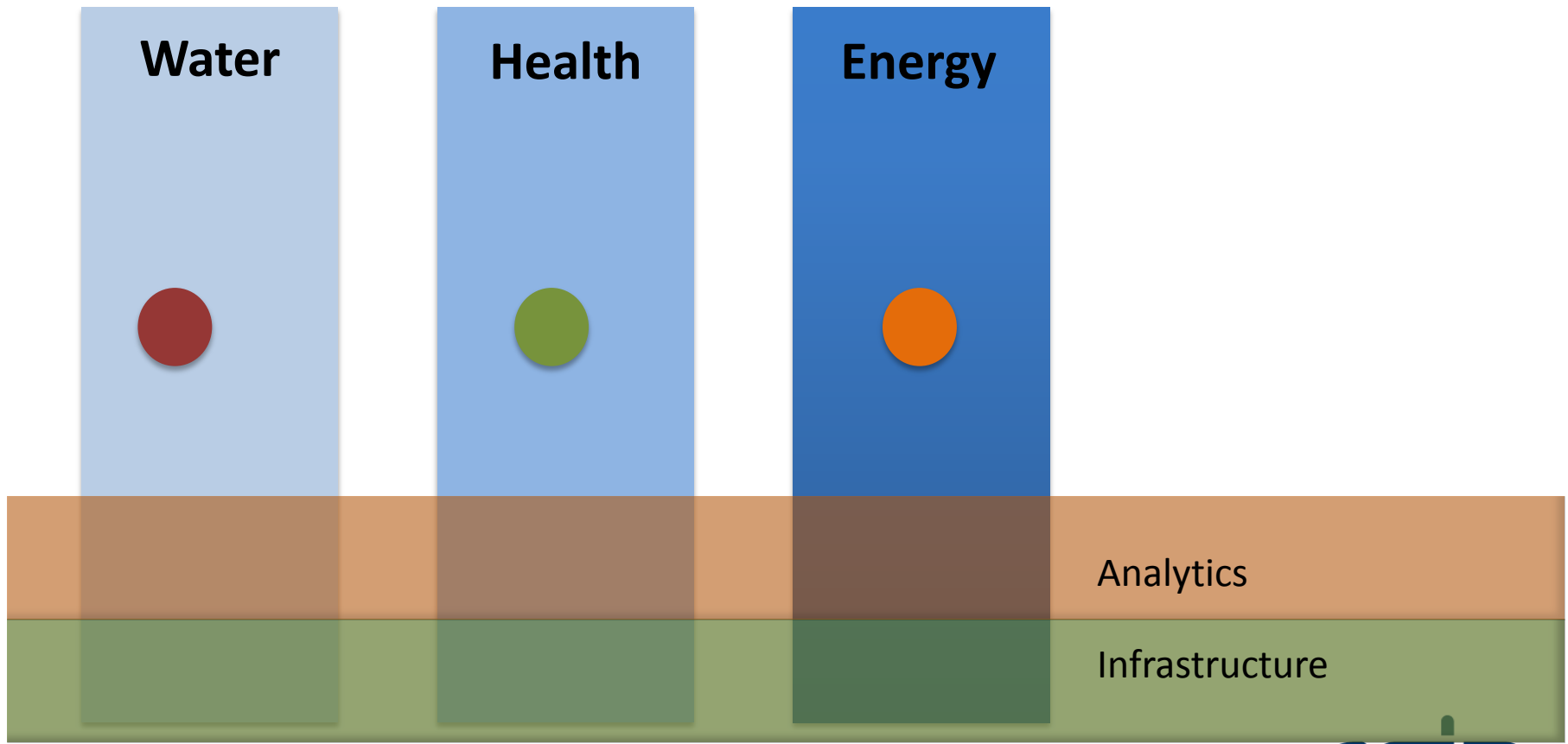
Determine changes in settlements and population density in different regions

Energy

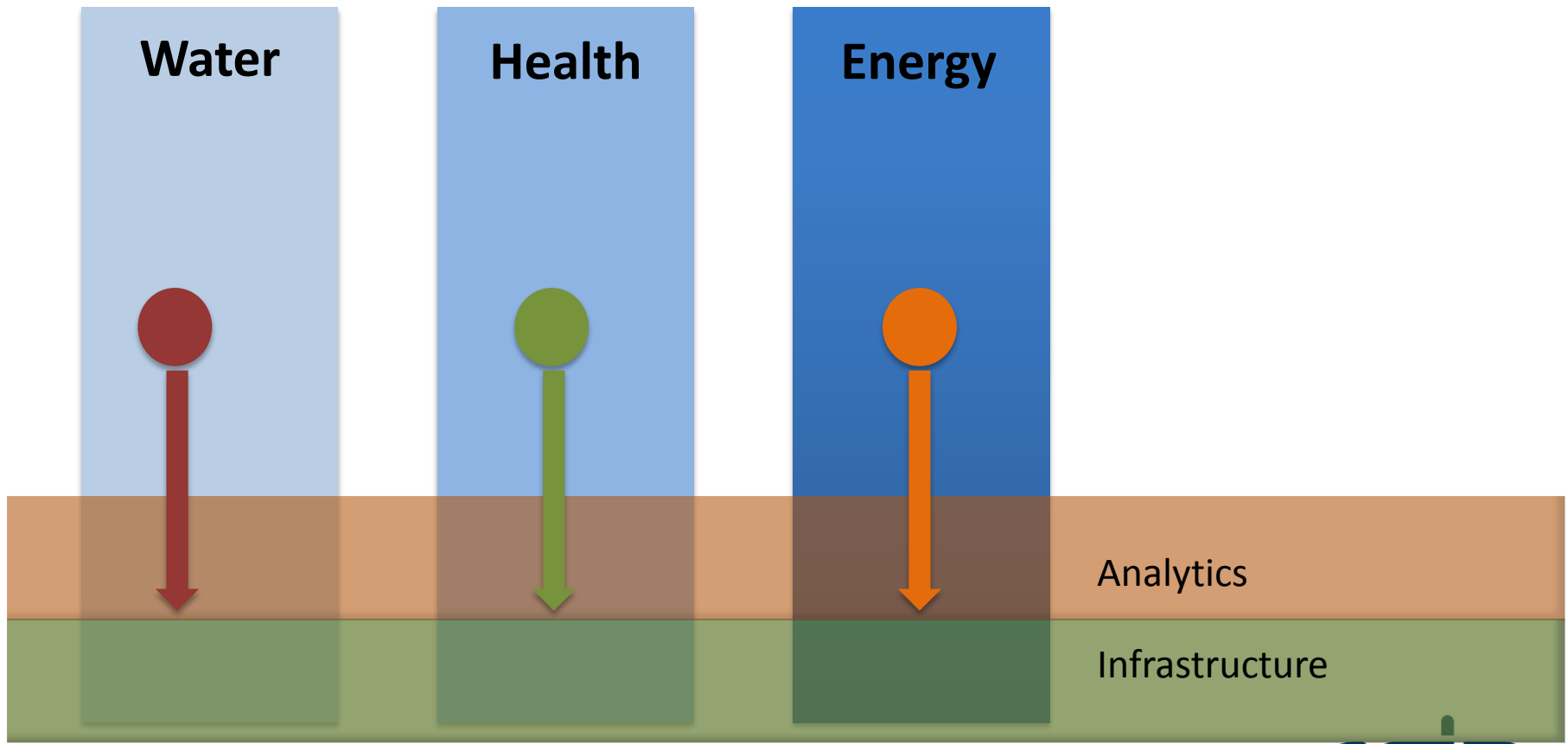


Analytics
Infrastructure

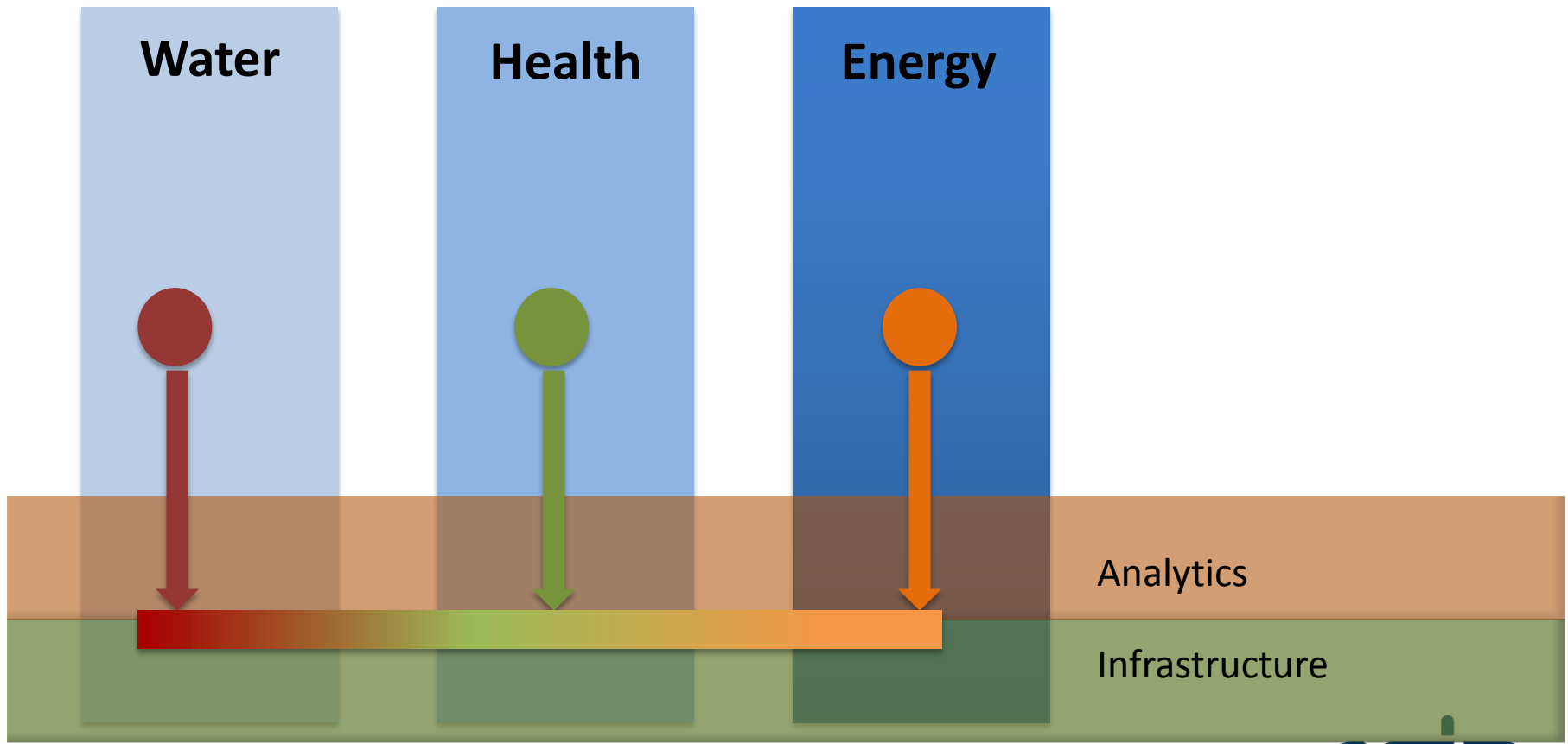
Sharing and combining delivers basis for better decisions



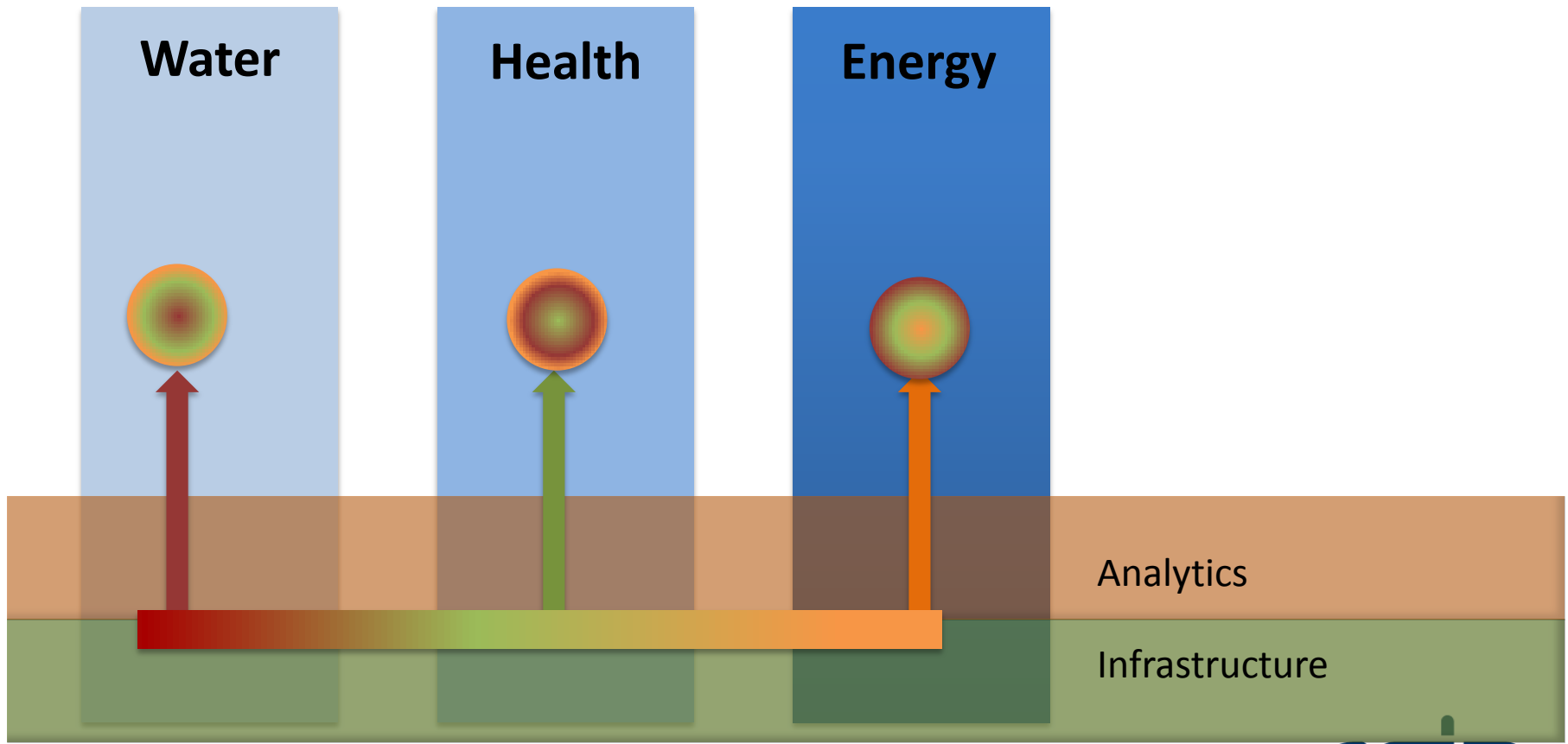
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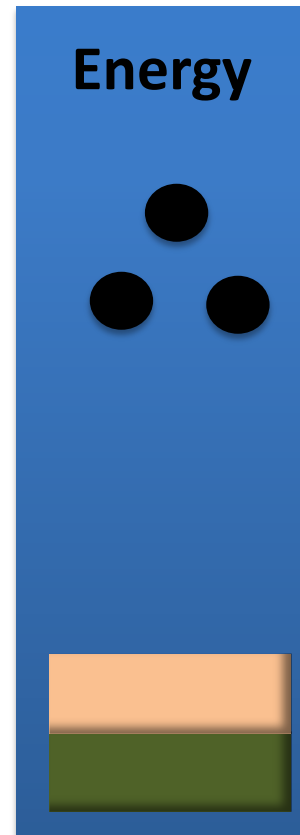
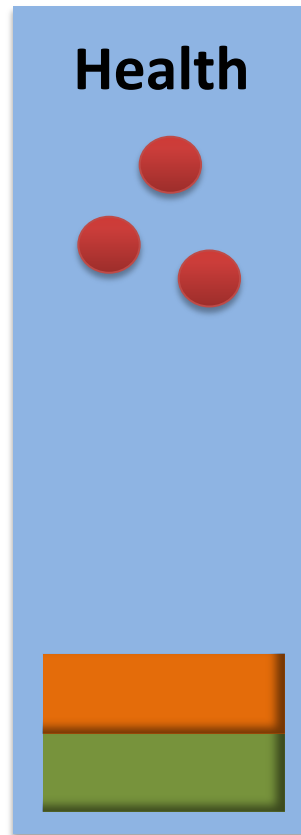
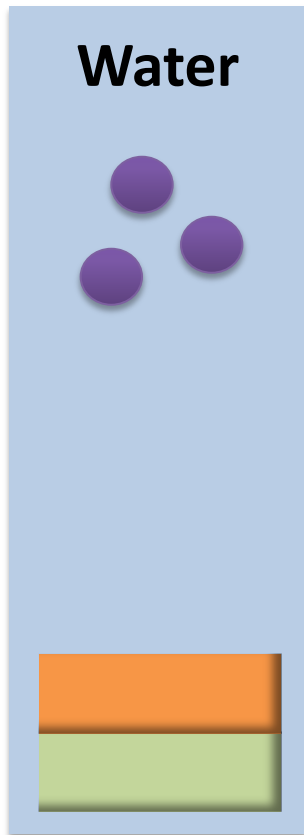
Sharing delivers information for higher-value decisions

- ▶ Determine disease incidents caused or influenced by **water** pollution (also due to possible sabotage treats)
- ▶ Determine the impact of access to clean drinking water on **health** care
- ▶ Determine the **effect of settlements and population** densities on health care and the spread of diseases caused by polluted water

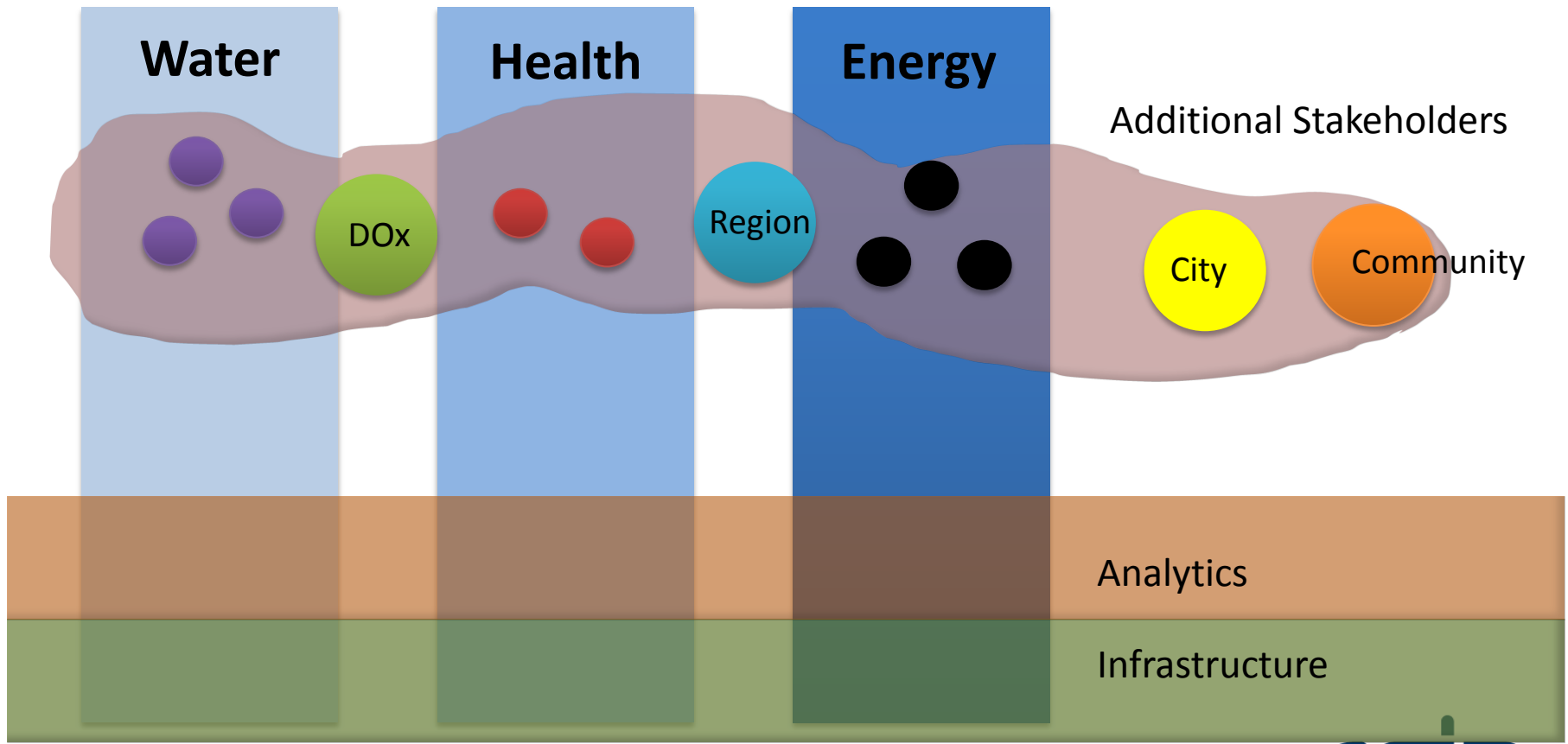


Warn people, via community health care takers (video training), about possible coming diseases (based upon actual kind of polluted water) and what preventive actions to be taken

Whilst each domain has dedicated stakeholders ...



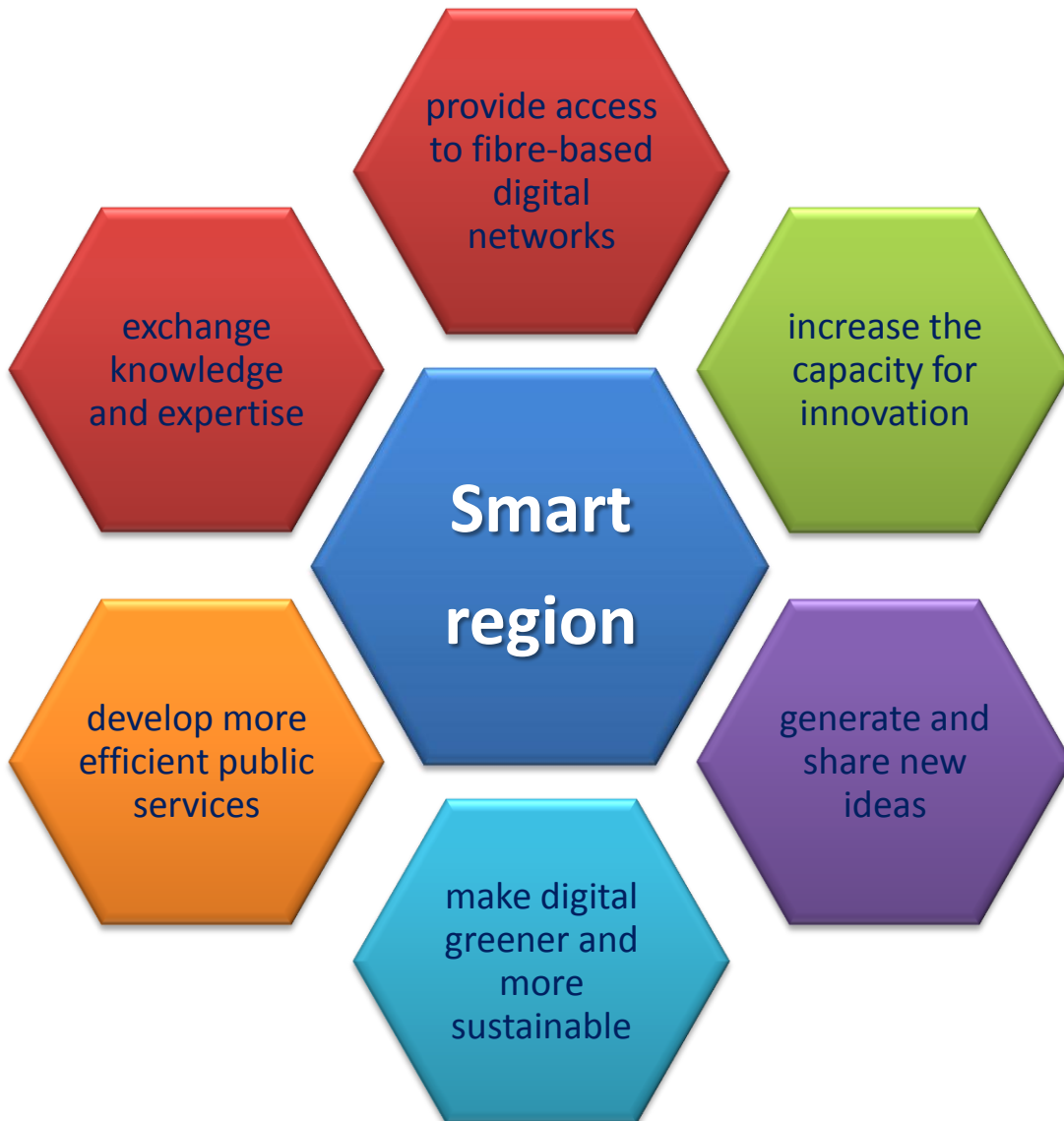
... combination broadens the stakeholder base exponentially





Integrated Decisions drive Smart Regions

Smart region: key components and drivers



- ▶ Stimulate economic development and regeneration, fulfil socio-economic ambitions
- ▶ Respond to need for connectedness
- ▶ Next-generation access deployment
- ▶ Create Applications pull
- ▶ Technology push: create experimentation environments that stimulate innovation
- ▶ Enable citizen engagement, empowerment, participation

Cities are the engines of growth for smart regions



The new cities are:

- **Smart** - innovation, invention & entrepreneurship
- **Inclusive** - multiple deprivation & scale of social exclusion in urban areas
- **Sustainable** - cities generate 75% + of emissions = problem & solution
- **Transparent** - Access + Open Data + Co-production
- **People-driven** - “From Human Factors to Human Actors”

Smart Cities Cases - Lessons learned (EU)



- Smart city is more an **urban strategy** than an urban reality
- Top-down planning and bottom-up initiatives should **complement** each other. City hall is sometimes dominant, dilemma's of **citizens engagement**.
- Widespread use of **pilots** is preparing cities for initiative, experiment and learning
- Districts, neighborhoods, and clusters are fundamental elements of smart city strategy, because the city is a **system of systems**.
- A smart city strategy involves **all actors**, organizations, communities, R&D, NGOs, clusters and authorities. The partnership should achieve a **common vision**, flagship projects, collaboration and synergy.
- Major **challenges** for successful smart city strategies deal with skills, creativities, user-driven innovation, entrepreneurship, VC funding, and management of intra-government rivalries.



CSIR Meraka:

Building a **Smart Platform
to help make Smart Cities
into Smart Regions**

CSIR Meraka: Making Smart Cities into Smart Regions

How: Holistic, Integrative, Modular

Scope: touches & **combines:**

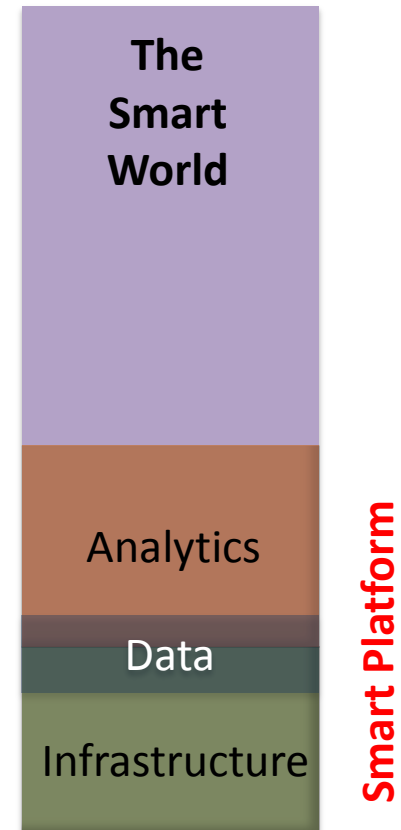
Urban environment management, **Health, Environment**, Transport, Traffic, **Energy, Water**, Waste, Logistics, Supply Chain, eGovernment, **Safety and security**, Entertainment, Sport, Agriculture

Approach: Private People Public Partnership

- ▶ Synthesize corporate (top down) and people (bottom up)
- ▶ Private driven and funded
- ▶ Public (city/region) driven and funded
- ▶ People/citizen oriented

No single solution available: we need to **build** the **Smart Platform**

- ▶ Need to understand and customise for the local context
- ▶ Leverage local infrastructure, connectivity, resources, ...
- ▶ Integrate the bottom up with the top down:
- ▶ Stimulate Human Capital Development & knowledge transfer



Impact of the Smart Platform

- Developing local technology leads to **new skilled and unskilled jobs**
 - in local manufacturing, installation & management of the infrastructure as well as in data collection, data management data, mobile and web based application, customer & business services design. It contributes to skills development of City staff and decision makers interacting with simulation and forecasting tools
- Through the improved insights, cities are **able to deal better** with social and economic consequences of migration to the city, more **efficient and effective use of existing (physical) infrastructure and resources**, easier to maintain infrastructure, enhances service delivery, reduced risk to life and property through disaster mitigation and management as well as citizen engagement building a better and greener city
- **Better South Africa**, when Smart Platform:
 - is applied to other domains
 - scalable up and replicated in other environments

We believe

CSIR Meraka is an attractive partner for realising City's & region's ambitions in the near future to become a true smart region for all its citizens and visitors.





Thank you

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