Economic Vitality in a Data Driven World

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DATA – “the new natural resource”.

Data is the new natural resource powering the Fourth Industrial Revolution.

First
Industrial Revolution

Steam-powered
mechanical production

Second
Industrial Revolution

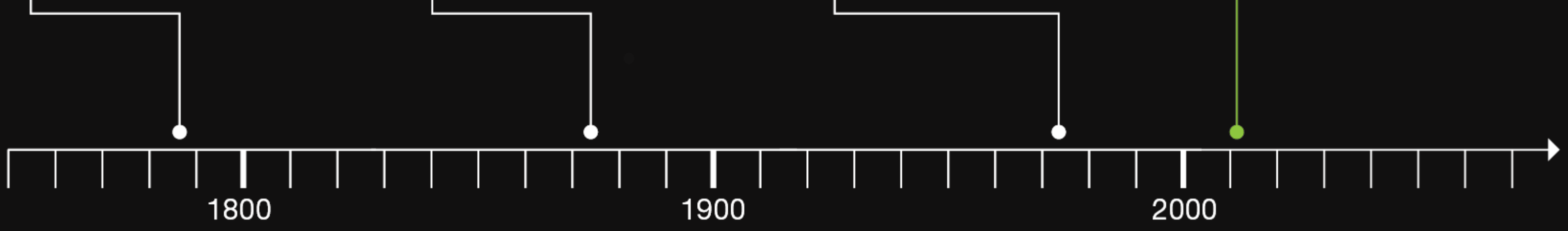
Electric-powered
mass production

Third
Industrial Revolution

Technology-driven
automated production

Fourth
Industrial Revolution

Data-powered
digital solutions



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Data as A Natural Resource …

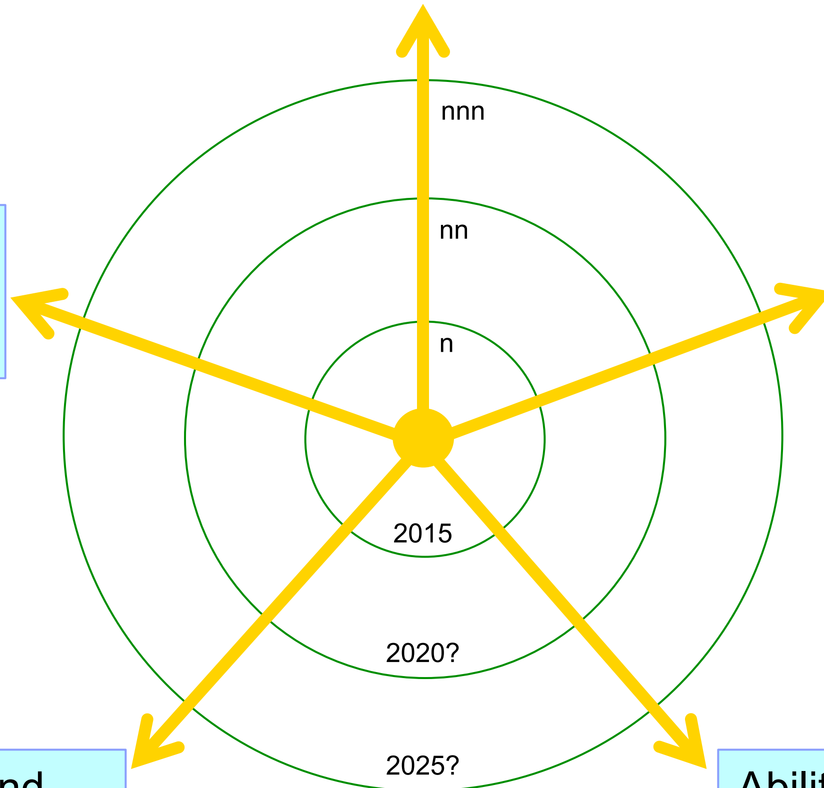
Sensors and meters per spatial unit, readings per time period - the *"internet of things"*

Range of other sources – the *"internet of stuff"*

Ability to integrate

Ability to analyze and optimize

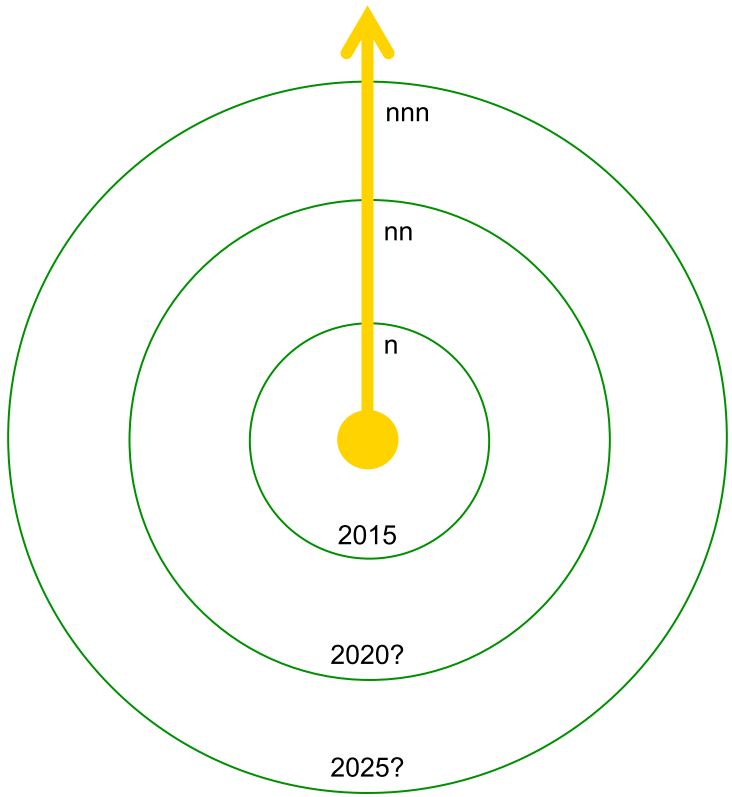
Use of leading indicators - "Perceive, Predict, Perform"



Let's take a tour around the wheel and see what this means for cities and communities…*

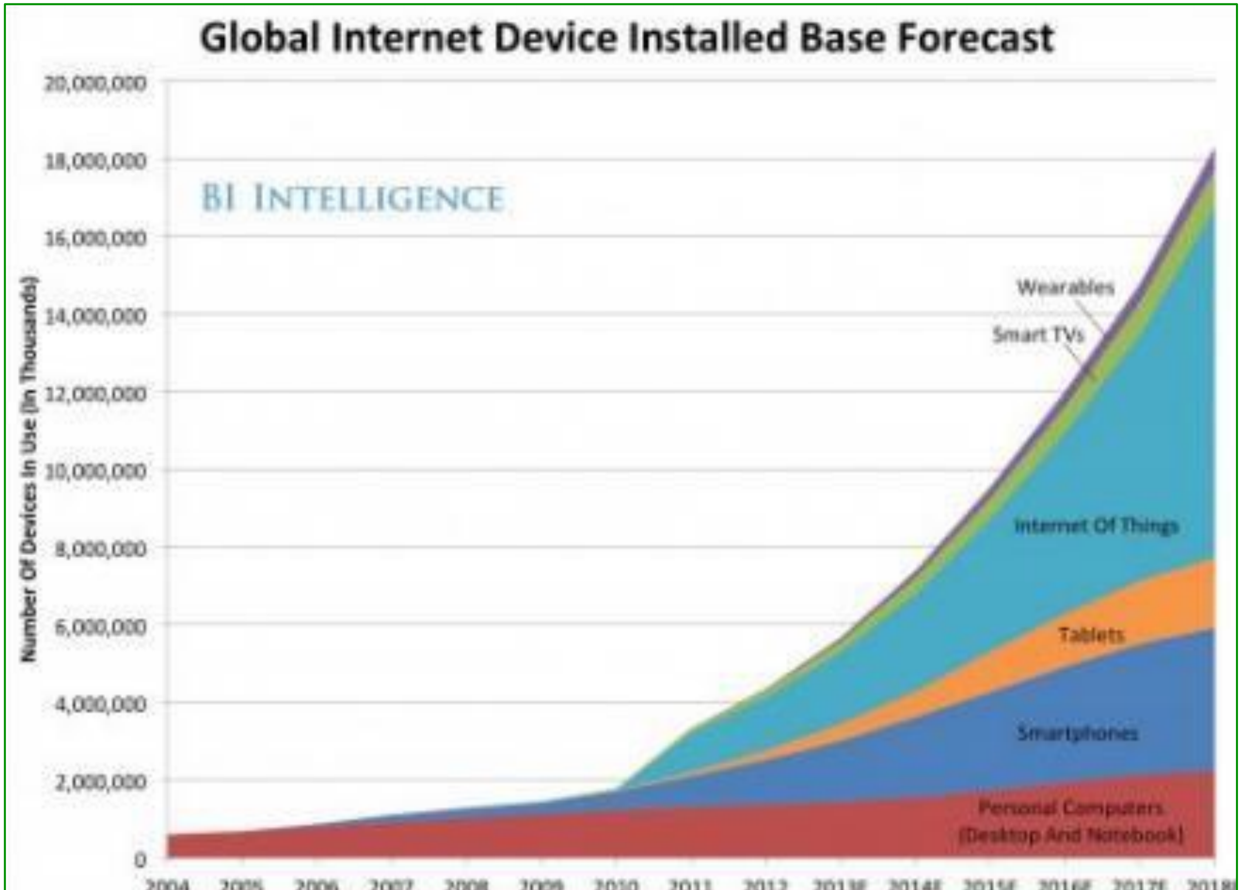
Sensors and meters – the “internet of things”

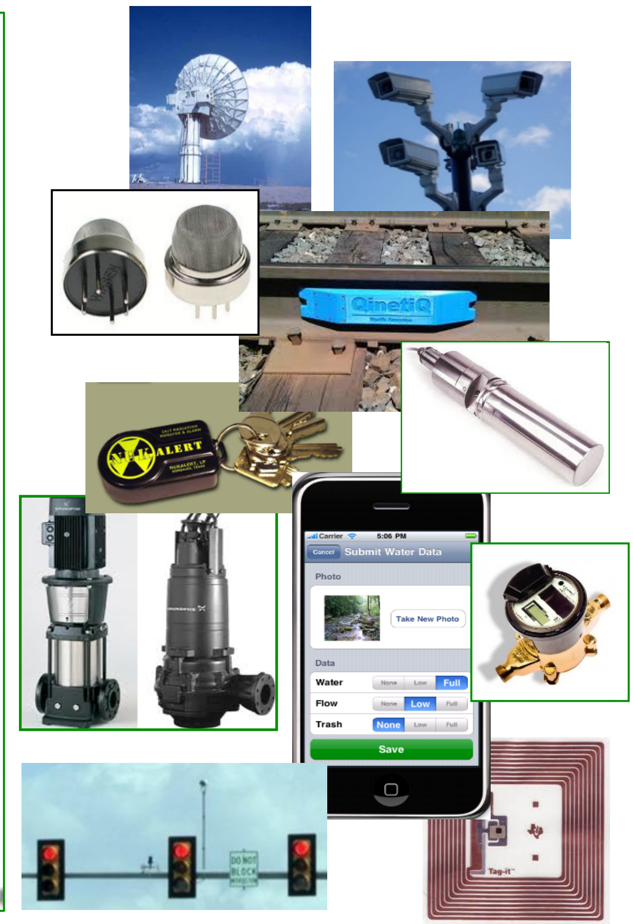
Sensors and meters per spatial unit, readings per time period - the *“internet of things”*



The “internet of things”

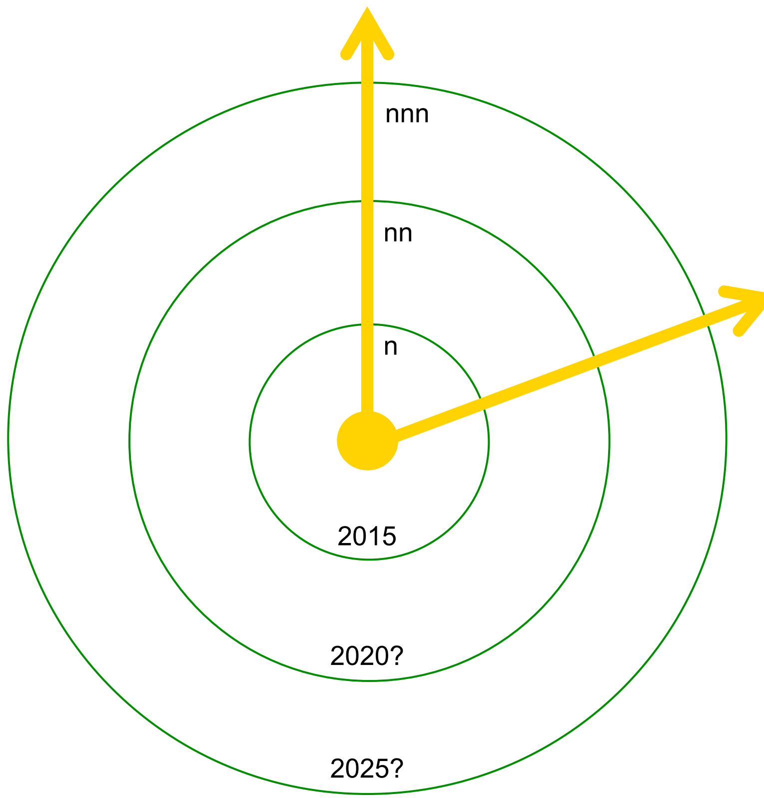
- One estimate for the number of internet-connected devices is 18 billion in 2018*
- McKinsey predicts that the IoT could generate $11 trn in additional economic value by 2025*





Other sources - the "internet of stuff"

Sensors and meters per spatial unit, readings per time period - the *"internet of things"*

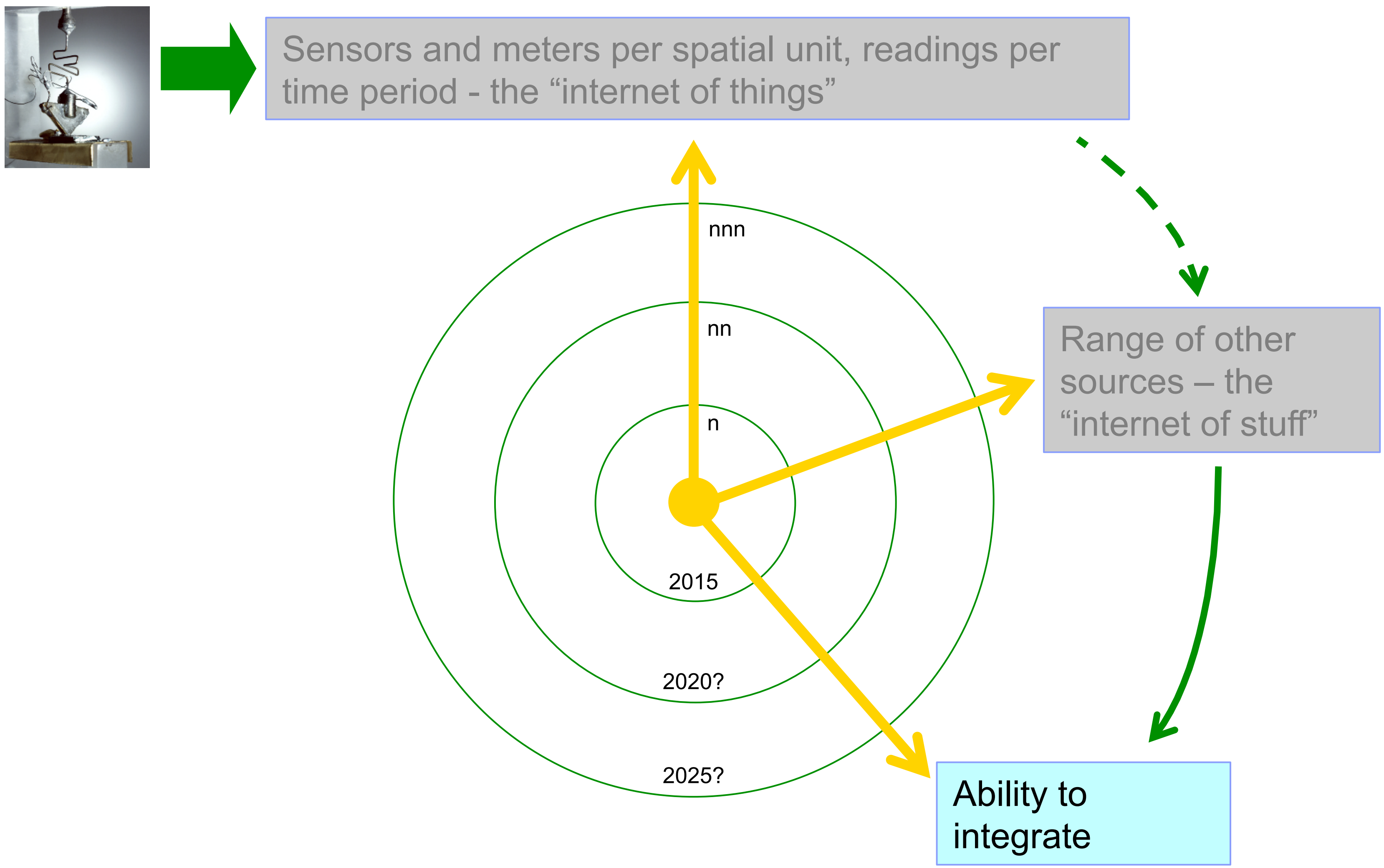


Range of other sources – the *"internet of stuff"*

Accumulated data of multiple kinds in the “internet of stuff”

- Governments, multilaterals
  - Open data
- Web estate (Facebook, Google)
- Twitter, blogging etc
- Broadcast media
- Content aggregators
- Digitization of existing sources
- Telcos, utilities
- GIS layers
- Satellites
- …

Ability to integrate – as noted, data combinations may be the key to value



Integrating data and using it *in combinations* to unlock insights. For example:

- Simulations that link flooding to traffic and evacuation issues – example demonstrated for Rio De Janeiro.
- Coupled models – weather, run/off and flooding, traffic.
- Required data:
  - Historical weather patterns and forthcoming weather.
  - Topography and topology.
  - Streets and intersection layouts, road capacity.
  - Critical assets - traffic signals, power supplies.
  - Commute and drivership patterns by time of day.
  - Car location (from cellphone location signals)
  - .. Etc

*

1.

2.

3.

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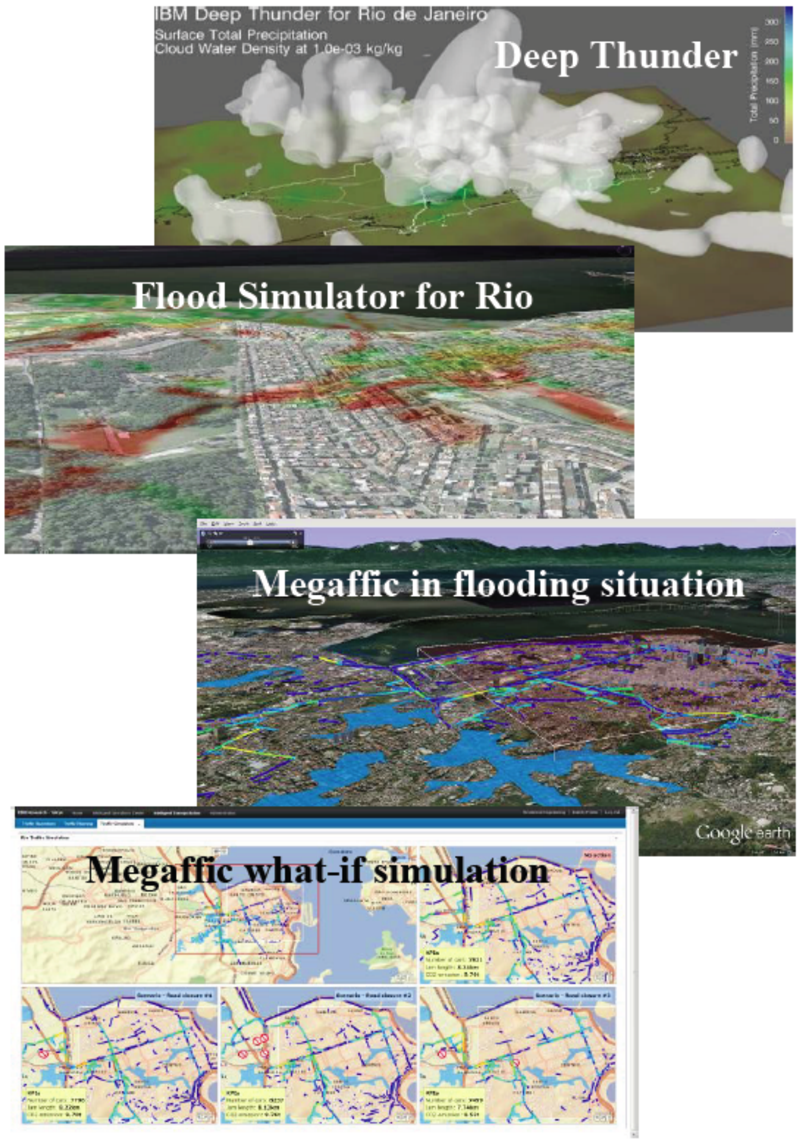
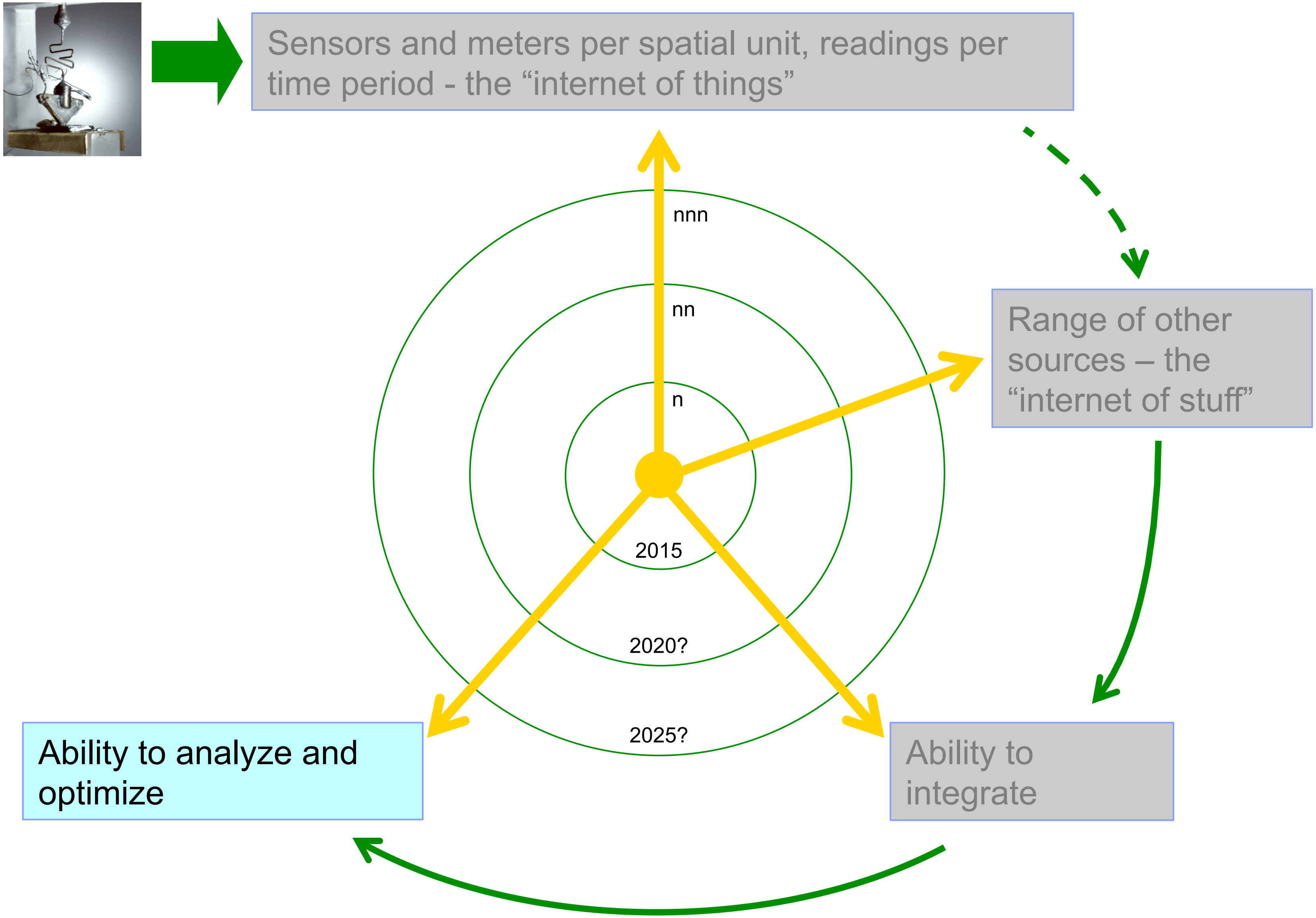


Analysis and optimization



The role of models is changing…

- Modeling used to have a back-office, “off-line” scenario generation role. Now it’s becoming a front-office, “on-line” part of the decision making stream.
- Example - traffic management:

Operational/ Transactional

- Toll collection only - disconnected operational data.
- Transaction data from the management of payments.
- Little automated use is made of real-time traffic data.

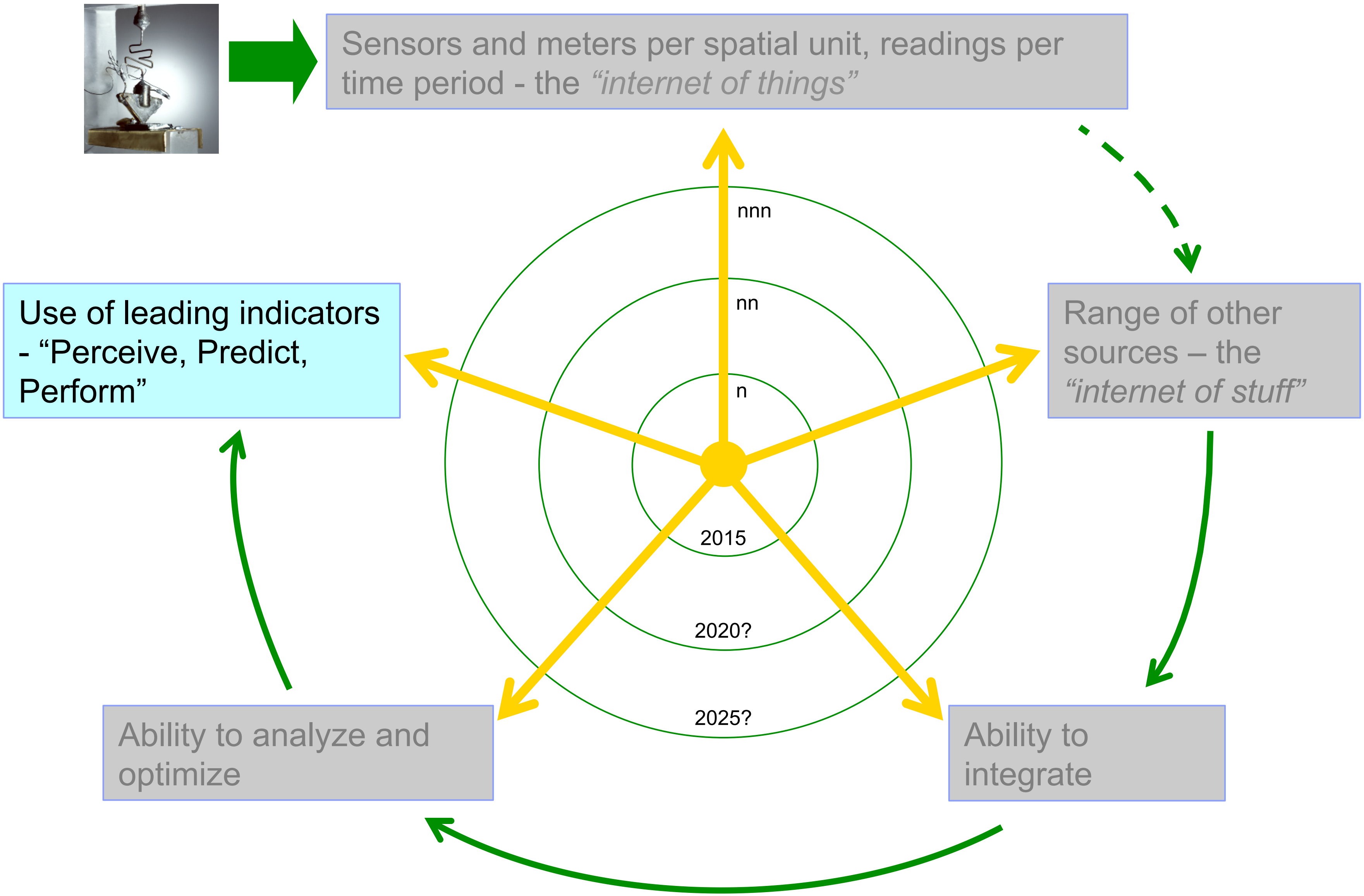
Insights

- More granular charging, by location.
- Analysis of traffic patterns to manage city congestion.
- Ad hoc modeling traffic to predict and manage entire system.

System wide control

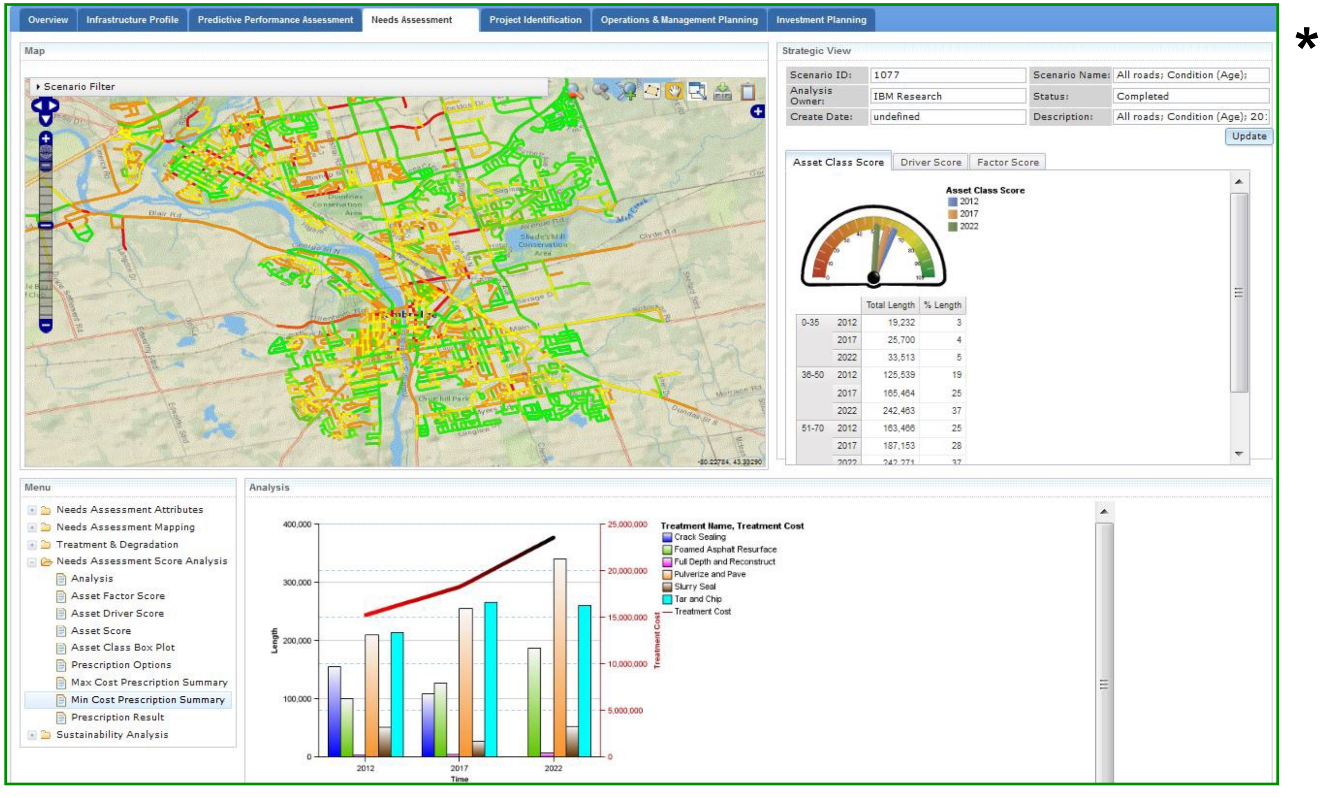
- Dynamic and congestion based pricing.
- Route planning and advice, shippers, concrete haulers, limo companies, theatres, taxis etc.
- City-wide, dynamic traffic optimization.

"Perceive, predict, perform"



Example: capital budgeting for cities based on what will fail *next* year

- Budgeting for water, sewer and road renewal expense based on predicted remaining in-service life.
- Uses service histories and sophisticated clustering and forecasting, to find patterns of physical asset characteristics and operational circumstances.



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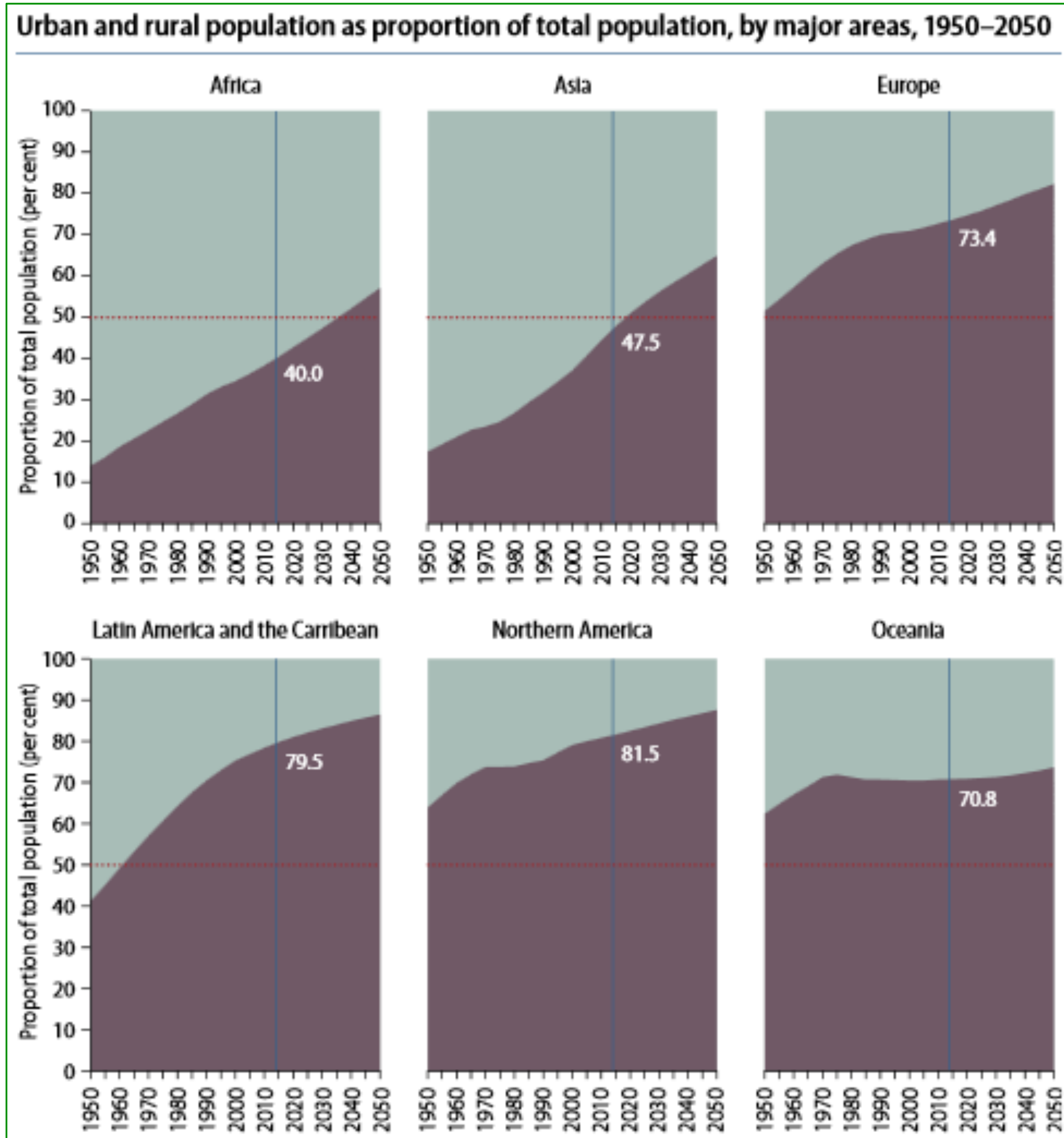
- Linked to a scoring methodology to identify replacement priorities and also prescribed maintenance or replacement needs.
- Spatial distribution of expenditure also monitored.

Data and Cities

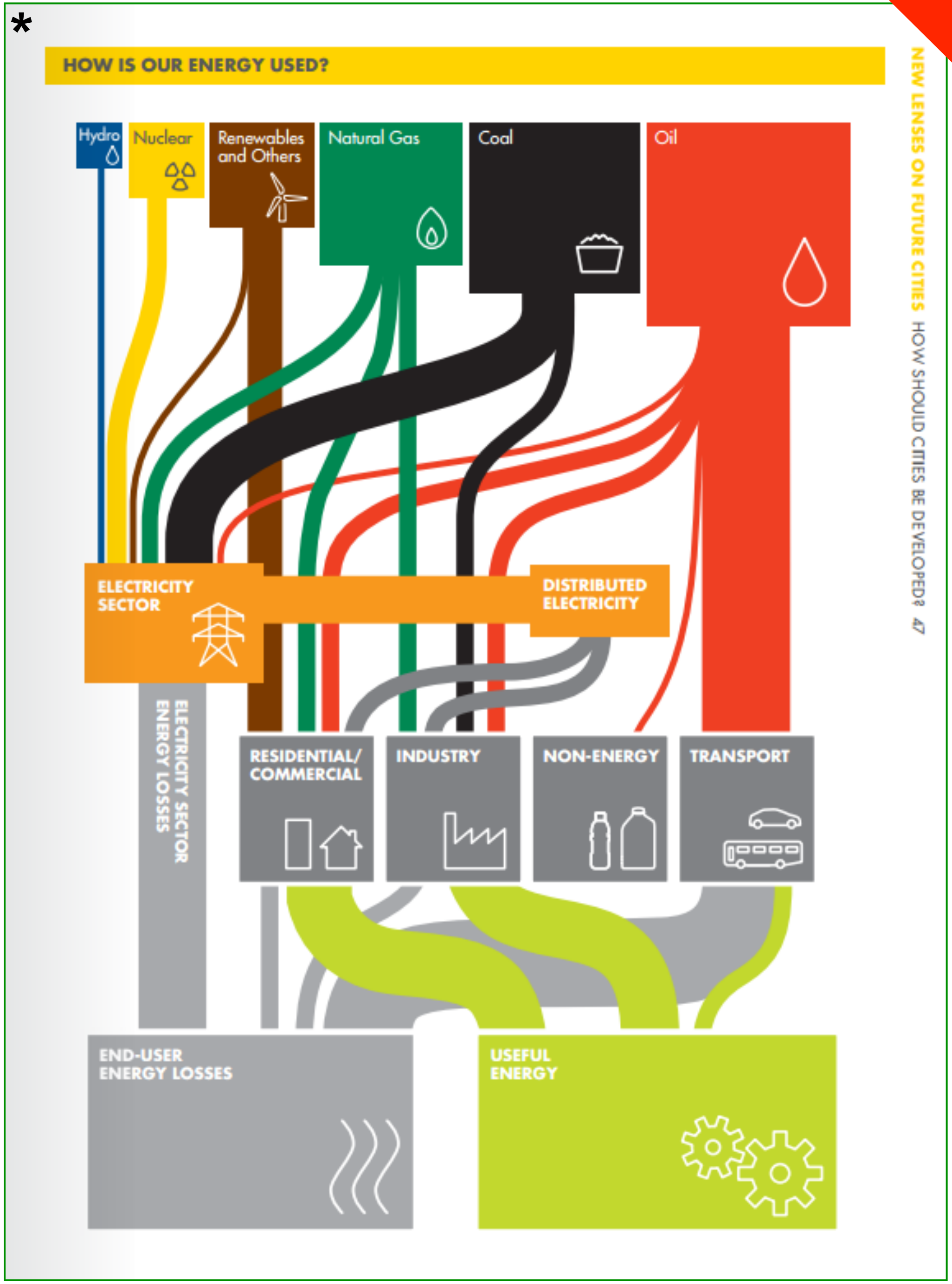
Urbanization rates…

- By 2010, for the first time in history, more than 50% of people lived in cities:
  - By 2050 it will be 70-75%.
  - In the US it is already 80%.
  - 350m people in China will have moved to cities by 2025 (more than the entire population of the US).
  - Cities will add 1 million people a week until 2050.
  - World-wide, 3 billion people will live in slums by 2030.*



Cities are a primary source of waste…

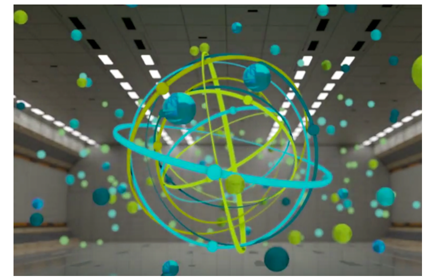
- The top 20 mega cities will account for 75% of the world's energy use.*
- Yet taking the US as an example, more than half of primary energy use is unproductive. Most ends up as low grade waste heat, due mainly to losses in generation (20%) and from transportation (75%).*
- The Sankey diagram, right, shows the global situation.



Big Data Ever Evolving….What has changed?

The explosion of data

New ways of operating

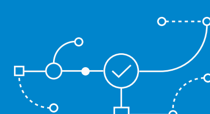


Cognitive computing

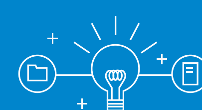
Governments and Private Organizations in the Cognitive Era need systems and capabilities that can enhance digital intelligence exponentially – shortening the lifecycle from collection, to analysis and situational understanding

UNDERSTAND

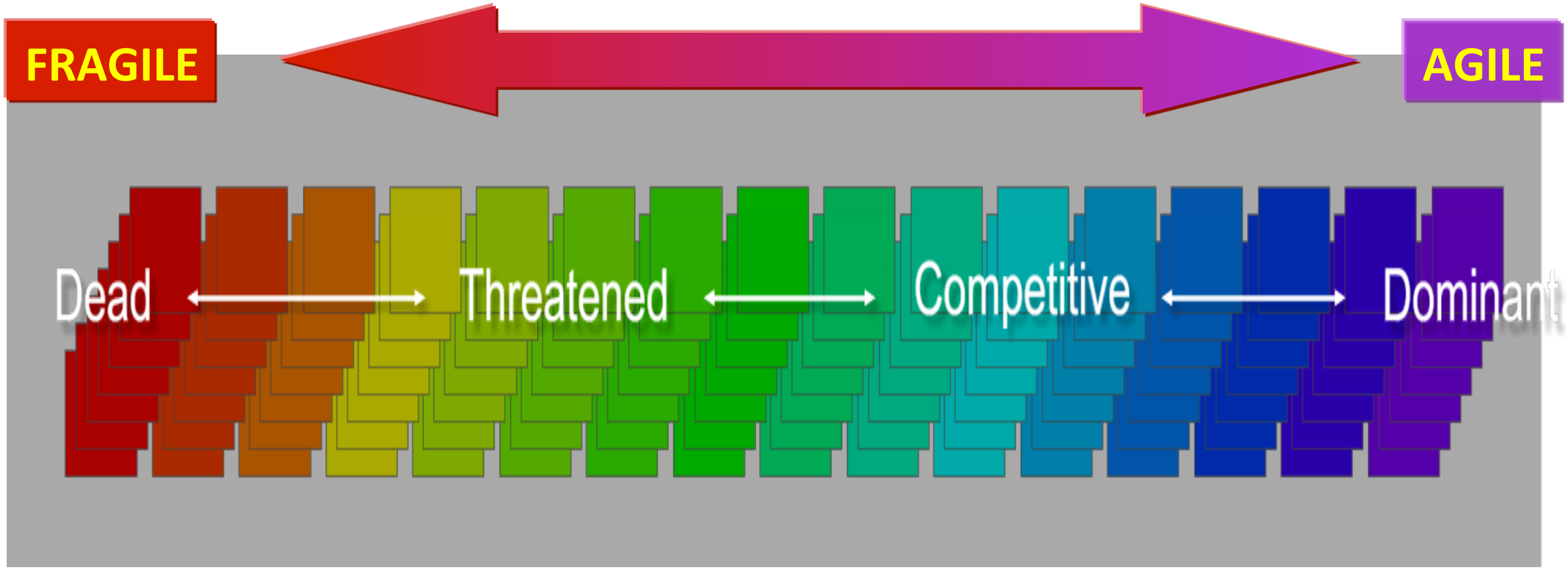
REASON
with Confidence



LEARN /
Discover



INTERACT
in Natural Language



What kind of economy are you helping to build?