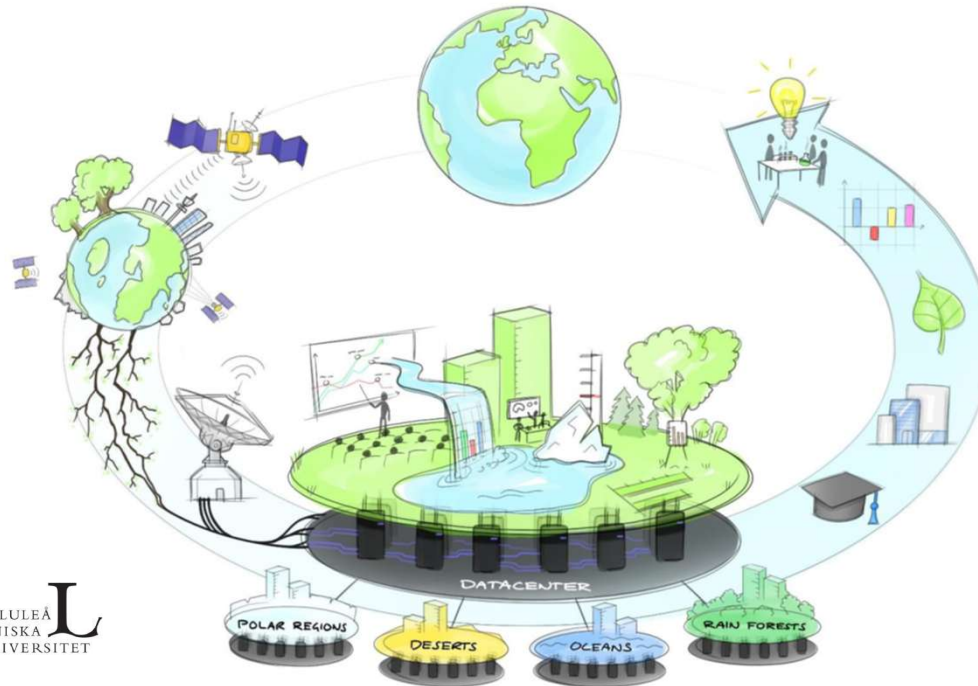


# GLOBAL WATCH CENTER

MONITORING EARTH'S HEALTH FOR THE BENEFIT OF ALL



A joint effort by



LULEÅ  
TEKNISKA  
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TOBIAS ROOS  
SSC

AEROSPACE TECHNOLOGY CONGRESS 2019

# AGENDA



- 1 A changing world - challenges & opportunities
- 2 GWC – the proposed solution
- 3 Conclusions & the way forward

# A CHANGING WORLD - CHALLENGES & OPPORTUNITIES

## THE CLIMATE AND HUMAN CIVILIZATION



- The world faces a large number of pressing issues – in the process of being measured and quantified to assess the global status
- A global, data-based overview is needed to understand global problems and provide optimal solutions
- The amount of data available is vast, and fast growing - but how do we ensure that we can maximize its usefulness?
- The world is more closely connected than ever - looking at isolated issues is not enough

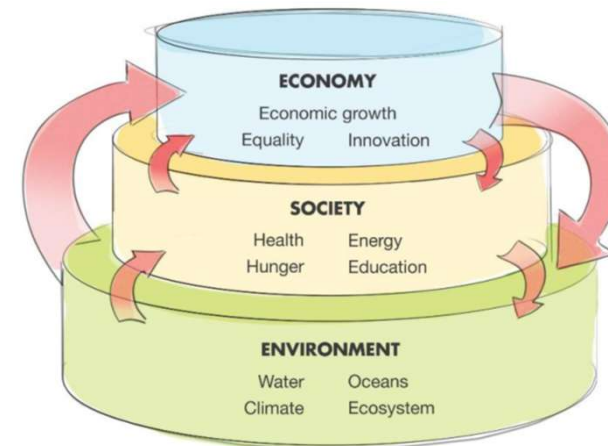


# A CHANGING WORLD - CHALLENGES & OPPORTUNITIES

## MEASURING IMPACT



- Planetary boundaries<sup>1</sup>
  - Quantifying what we know and do not know about the planet's health, in terms of civilizational impact and its limits
- The UN have defined a set of Sustainable Development Goals (SDGs), relating to all aspects of our planet's health. The different goals are linked – changes to the biosphere affect society and the economy, and vice versa

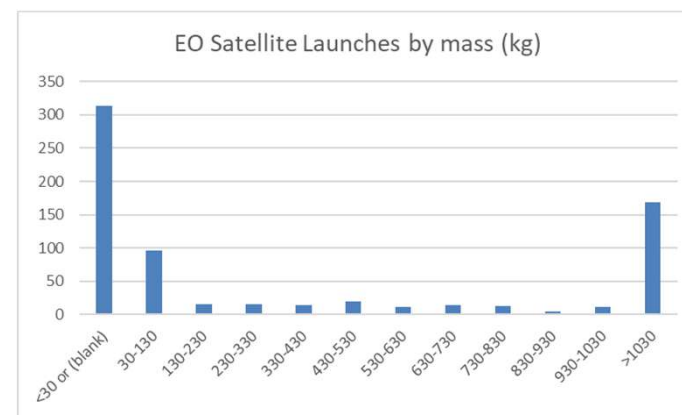
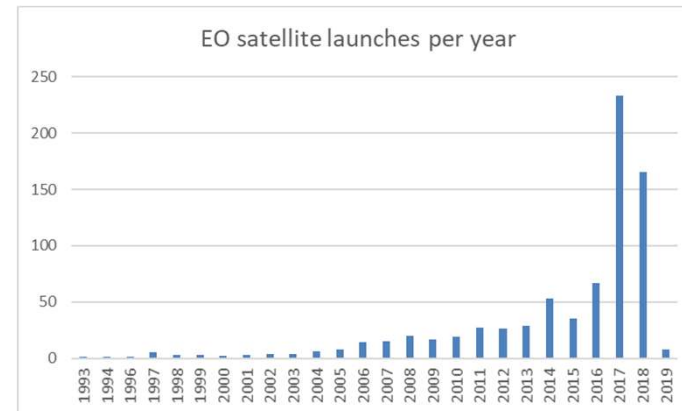


# A CHANGING WORLD - CHALLENGES & OPPORTUNITIES

## TECHNOLOGY TRENDS



- The amount of active Earth Observation satellites has seen large growth over the past decade
- Two clear populations can be seen – small and light, and large and heavy, with little in between. Most recent launches are small satellites
- Different requirements for the different classes, and different types and amounts of data produced

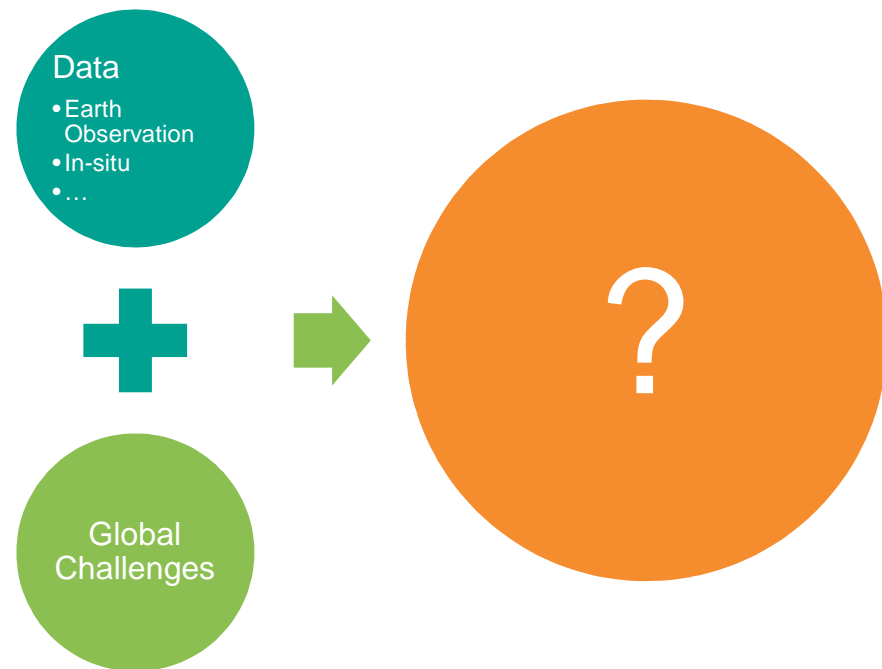


Source: Union of Concerned Scientists (UCS) Satellite Database 4-1-2019, [www.ucsusa.org/satellite\\_database](http://www.ucsusa.org/satellite_database)

# A CHANGING WORLD - CHALLENGES & OPPORTUNITIES

## MULTIPLE TRENDS

- Increasing amounts of satellites - massive data amounts provide opportunities, and also difficulties
  - Transparency
  - Heterogeneity
- Internet of Things
  - Sensors and data
- Measurable, quantifiable goals and limits
  - Planetary Boundaries and SDGs



# GWC – THE PROPOSED SOLUTION

## GOALS

- The Global Watch Center initiative aims to provide a global, transparent, comprehensive, up-to-date view of all aspects of our planet, such as:
  - Weather and climate
  - Vegetation and wildlife
  - Natural resources and land use
  - Disasters, natural and man-made
  - ...and much more
- This global view will be used to provide actionable information to decision makers, predict future events and ultimately recommend actions and policies
- The end user applications that will be the result of a successful implementation of GWC are directly linked to the monitoring and eventual accomplishment of the Sustainable Development Goals

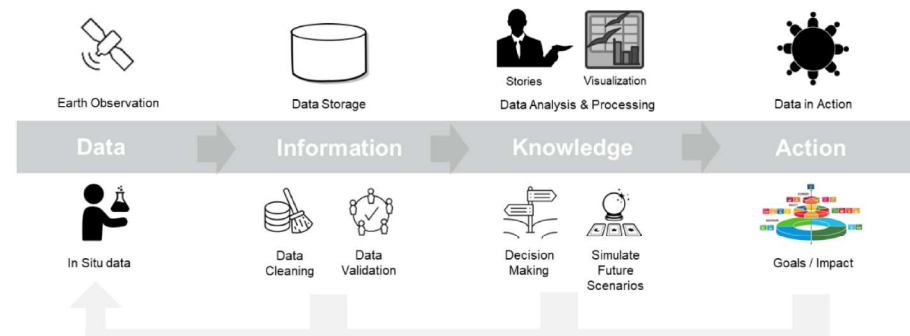


# SOLUTION

DATA – INFORMATION – KNOWLEDGE – ACTION



- GWC aims to address the entire data chain, from collection, through processing using state of the art tools, to presentation and distribution of actionable information
- To facilitate this, a global infrastructure is devised comprising both input in the form of remote and in-situ sensing nodes, and output in the form of distribution and presentation nodes



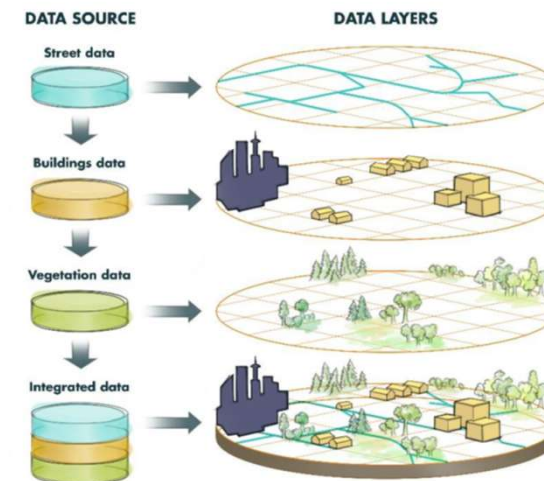


# GWC – THE PROPOSED SOLUTION

## DISTRIBUTED & ADAPTABLE

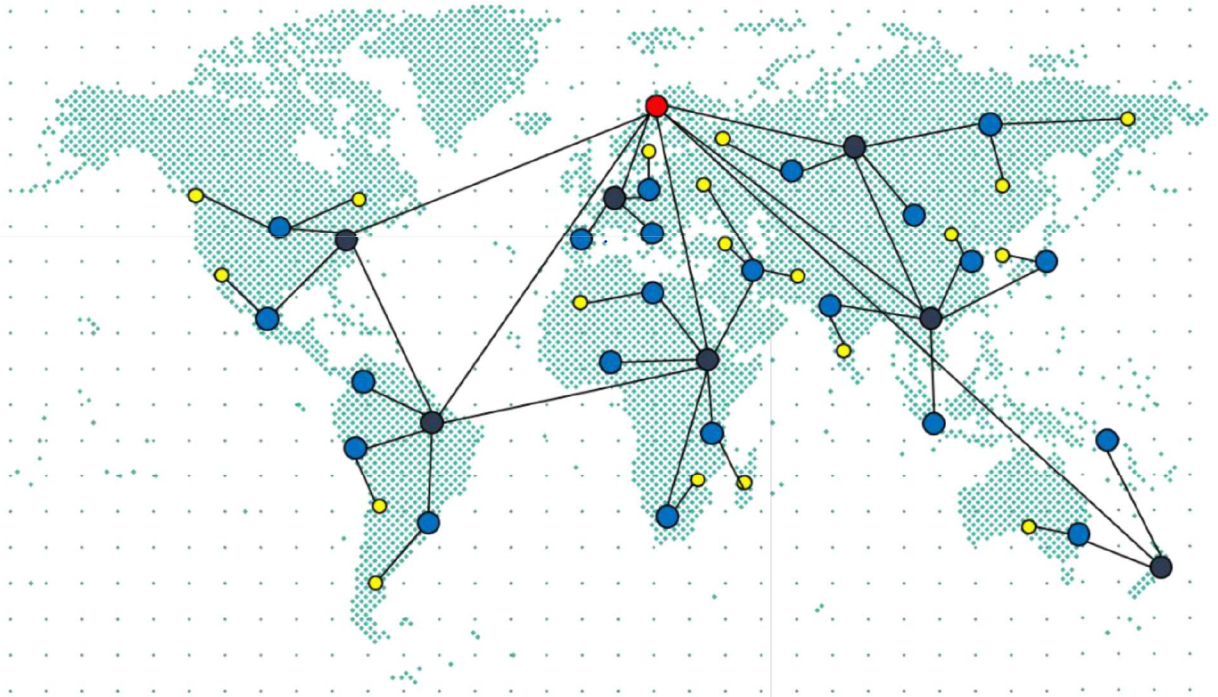


- Use cases determine the requirements on the different function blocks in the data chain
  - Timeliness of data, data volume, veracity, cost, etc...
- Four main function blocks
  - Data Gathering
  - Data Processing
  - Data Analysis
  - Presentation
- GWC does not store all data on its own, but relies on a distributed storage solution, drawing upon a multitude of different sources
- The GWC Map of Data contains information about where data can be found, as well as the data type, provider, age, etc.
- Metadata is the key



# SOLUTION

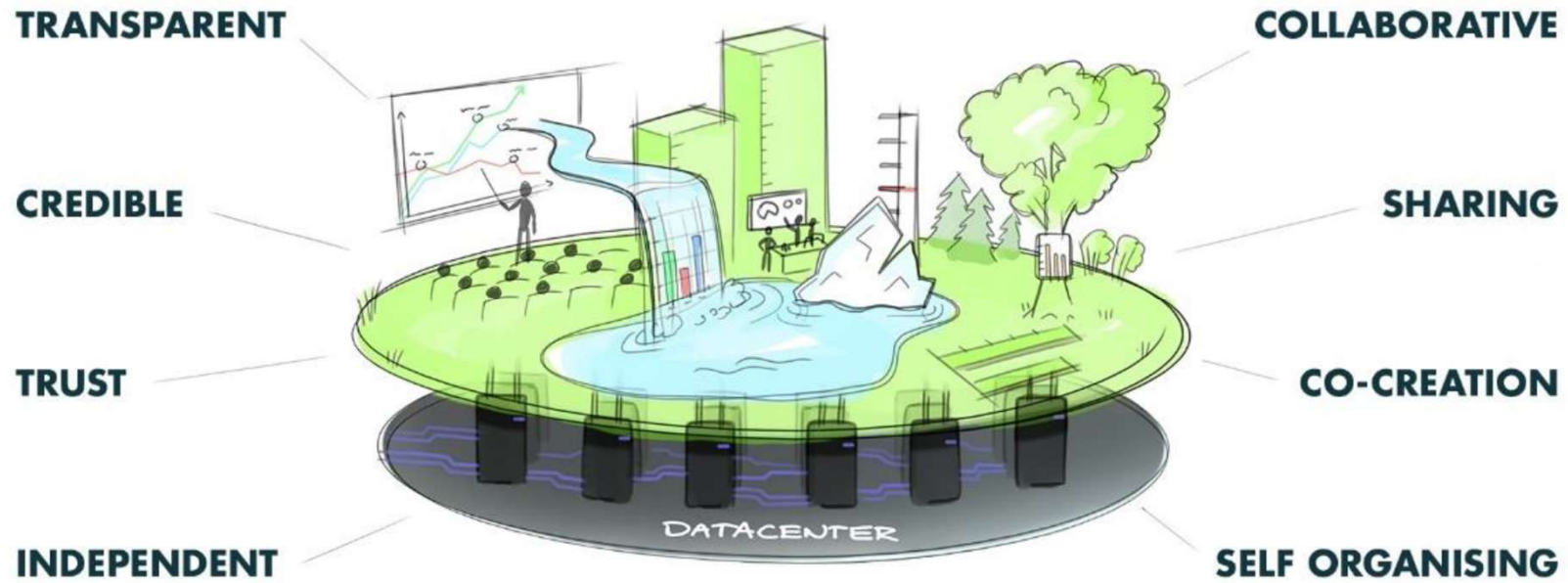
## GLOBAL INFORMATION INFRASTRUCTURE (GII) 5-LAYER DISTRIBUTION MODEL



*The exact location of the nodes is to be decided and is only intended for illustration purposes.*

# GWC – THE PROPOSED SOLUTION

## CORE VALUES



# CONCLUSIONS & THE WAY FORWARD



- First phase of a feasibility study concluded in 2019
  - Positive results
  - Conceptual overview
  - Needs & demand
- Second phase to begin shortly
  - Implementation focused
  - Detailed study
  - Technical work
  - Specific use cases

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