Dynamic Mapping of Secondary Cities: - A Global and Innovation Context

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1. Problems are global distributed
2. Big spatiotemporal data
3. Global dynamics of sharing and accessing to data
4. Complex and interdisciplinary

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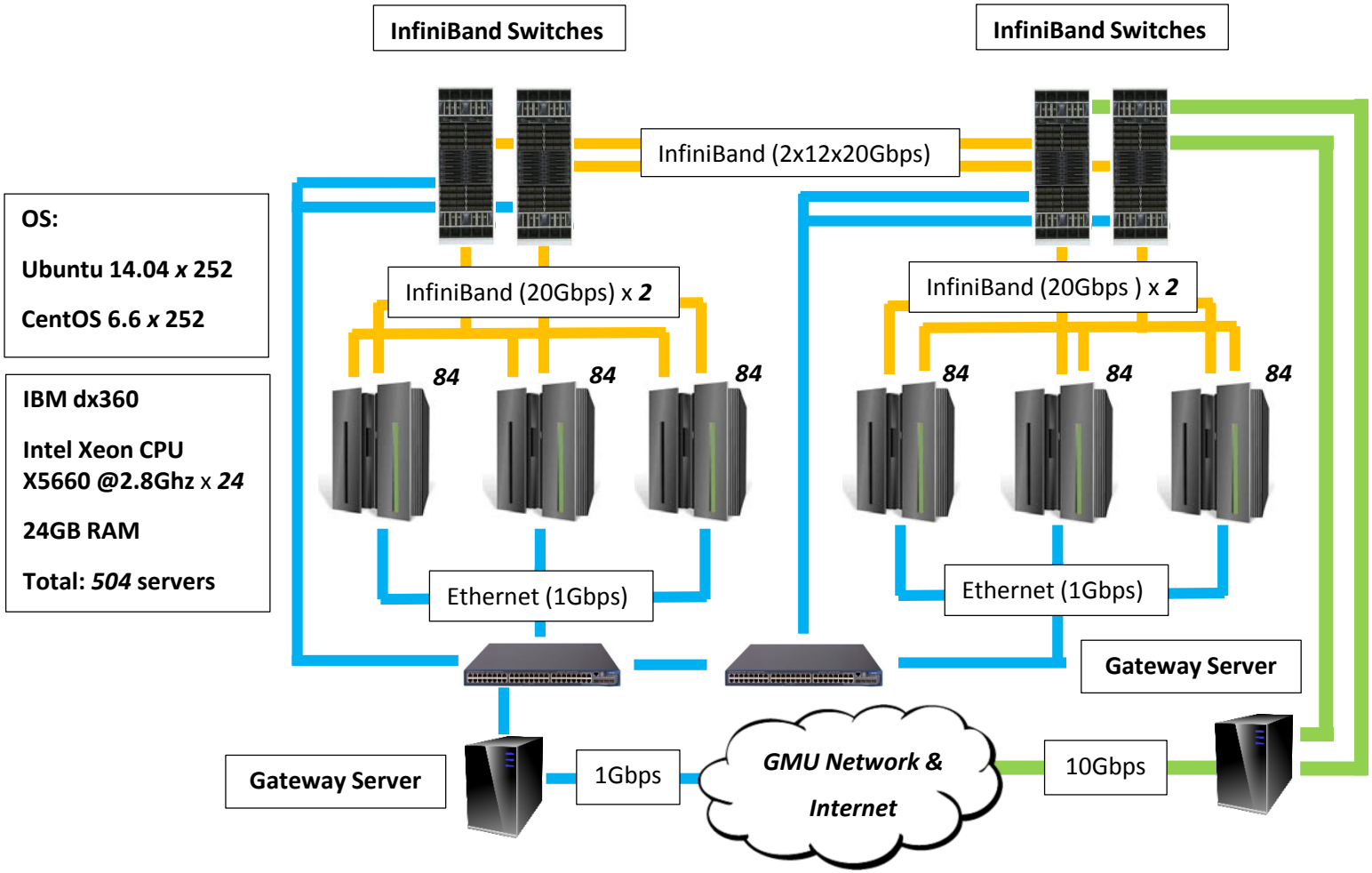
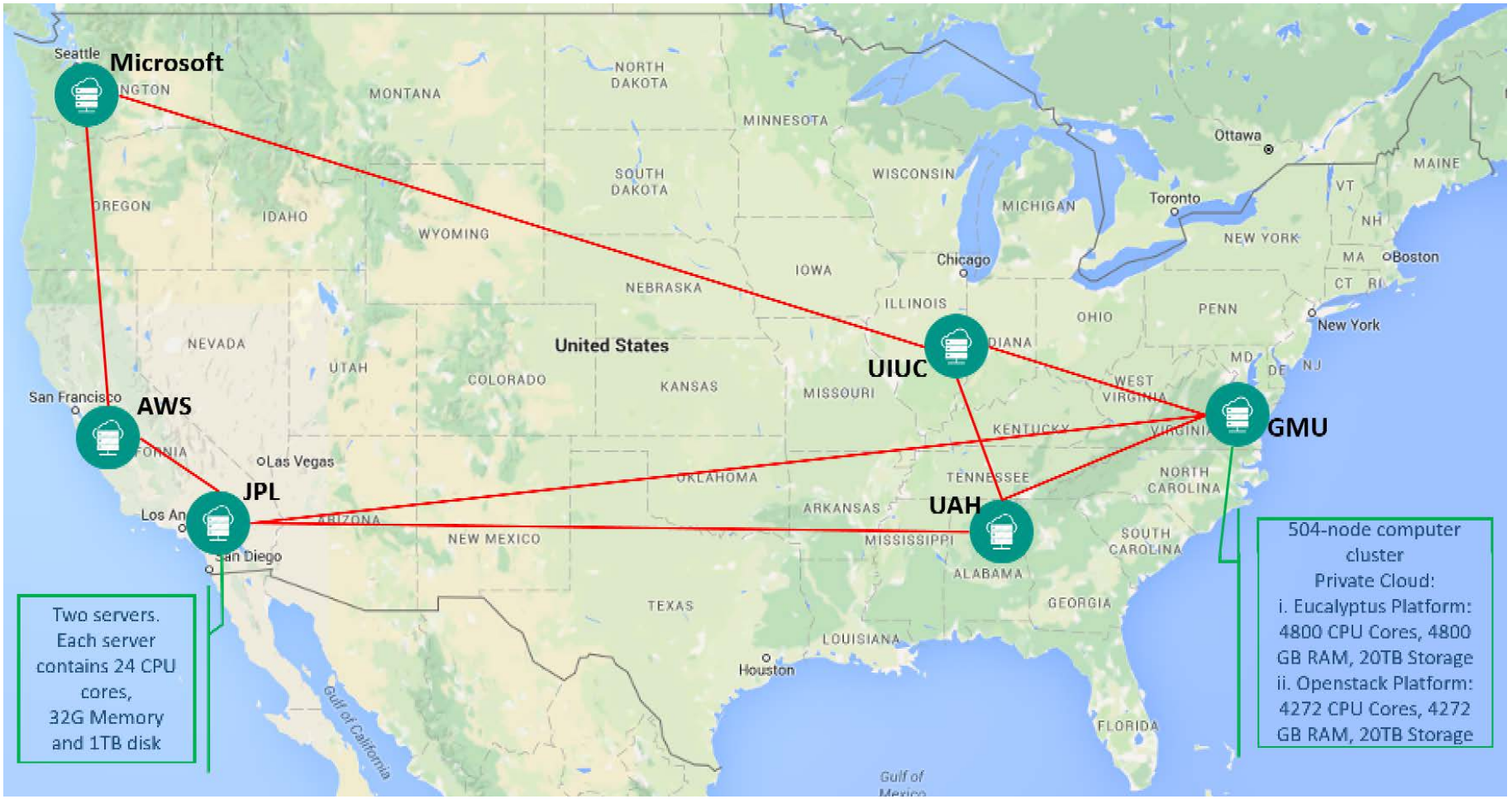
Physical Infrastructure and Network Configuration

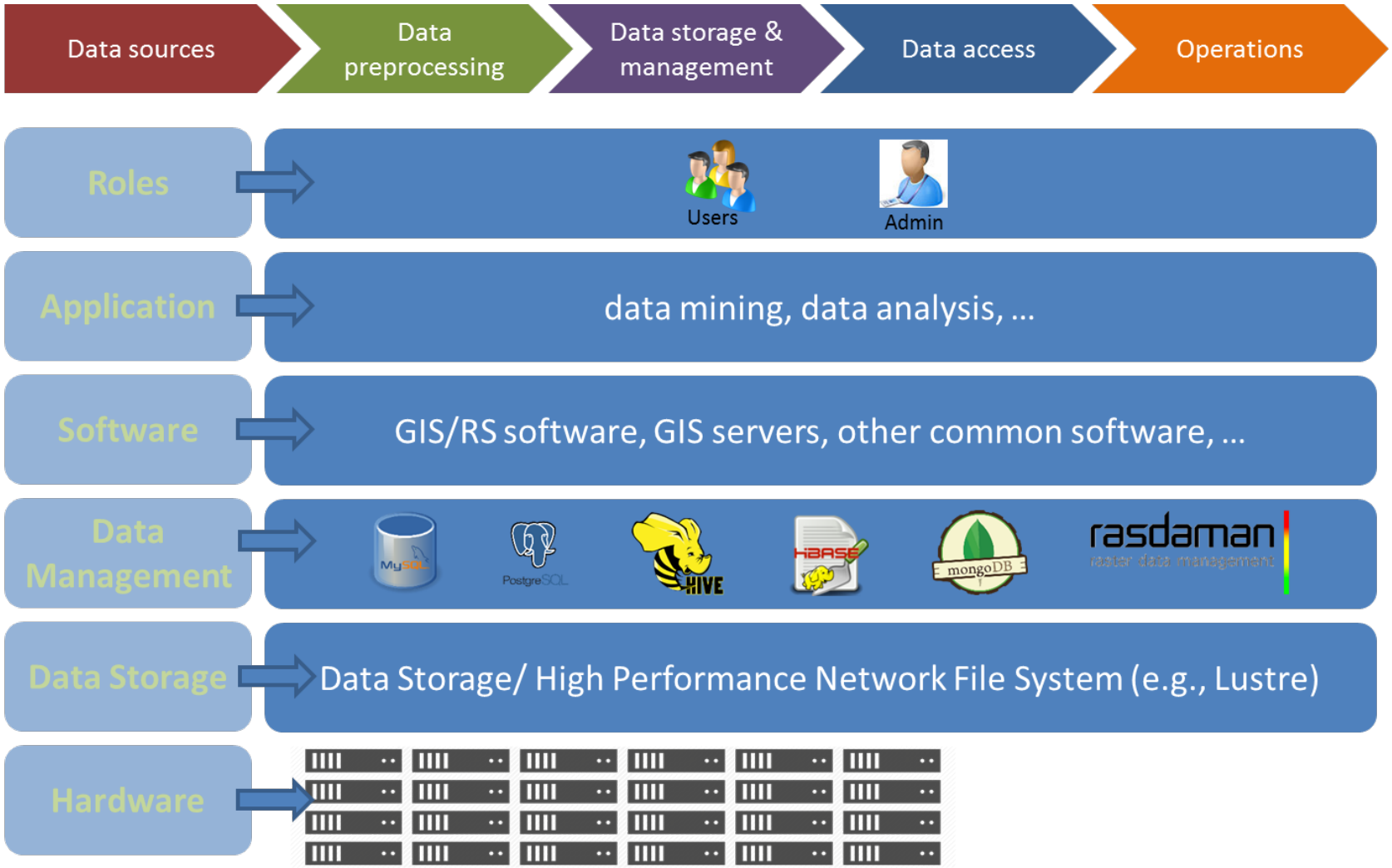


GeoCloud: A national big data cloud



A Global Geocomputing Environment

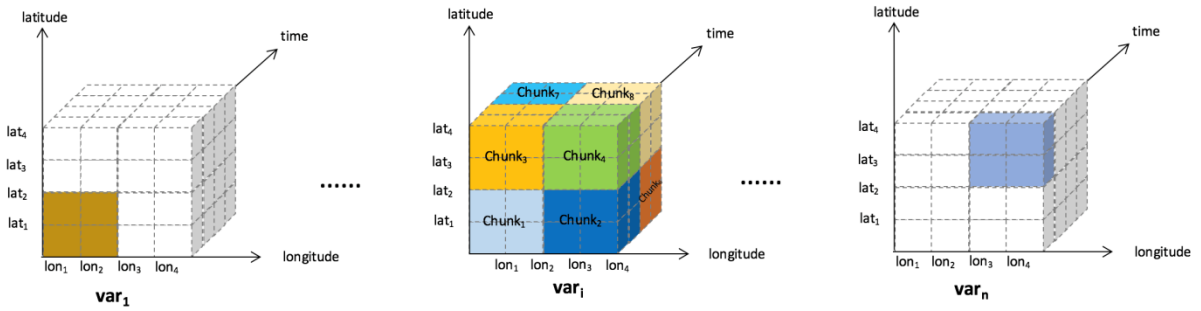
Planned Software/data infrastructure



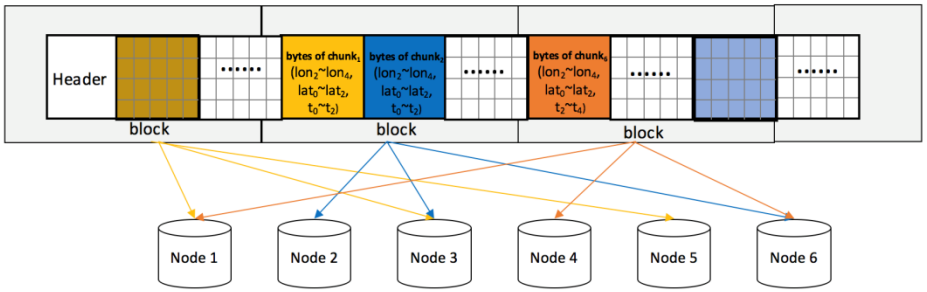
Spatiotemporal B-Tree Index

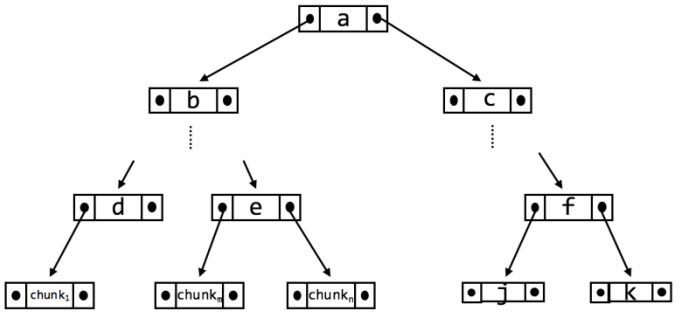
The ClimateRDD refers to the spark in-memory object that refers to a chunk.

One file is for one day, within the file:



Bridge the gap between the logical and the physical data model





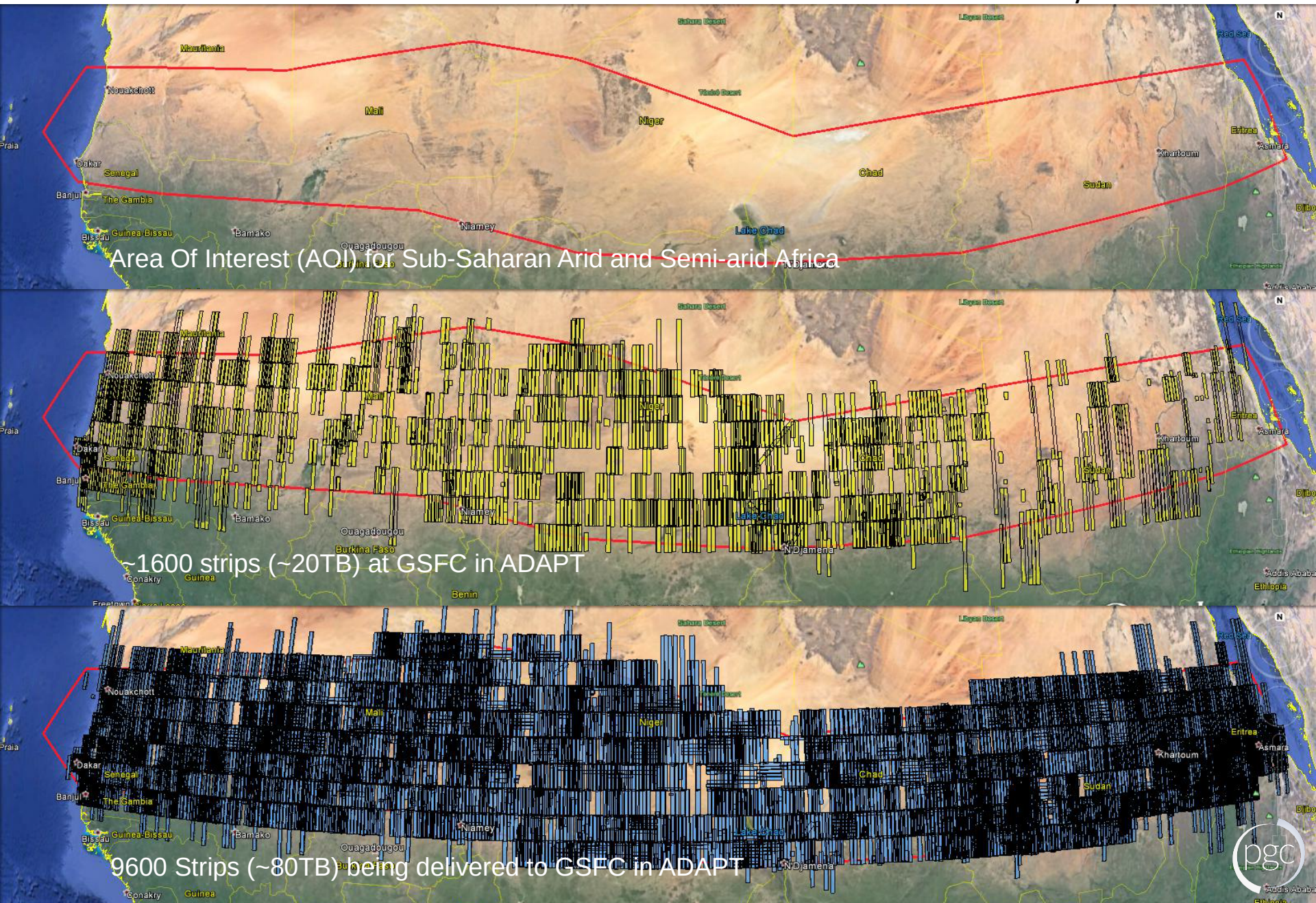
Every variable has a B-tree

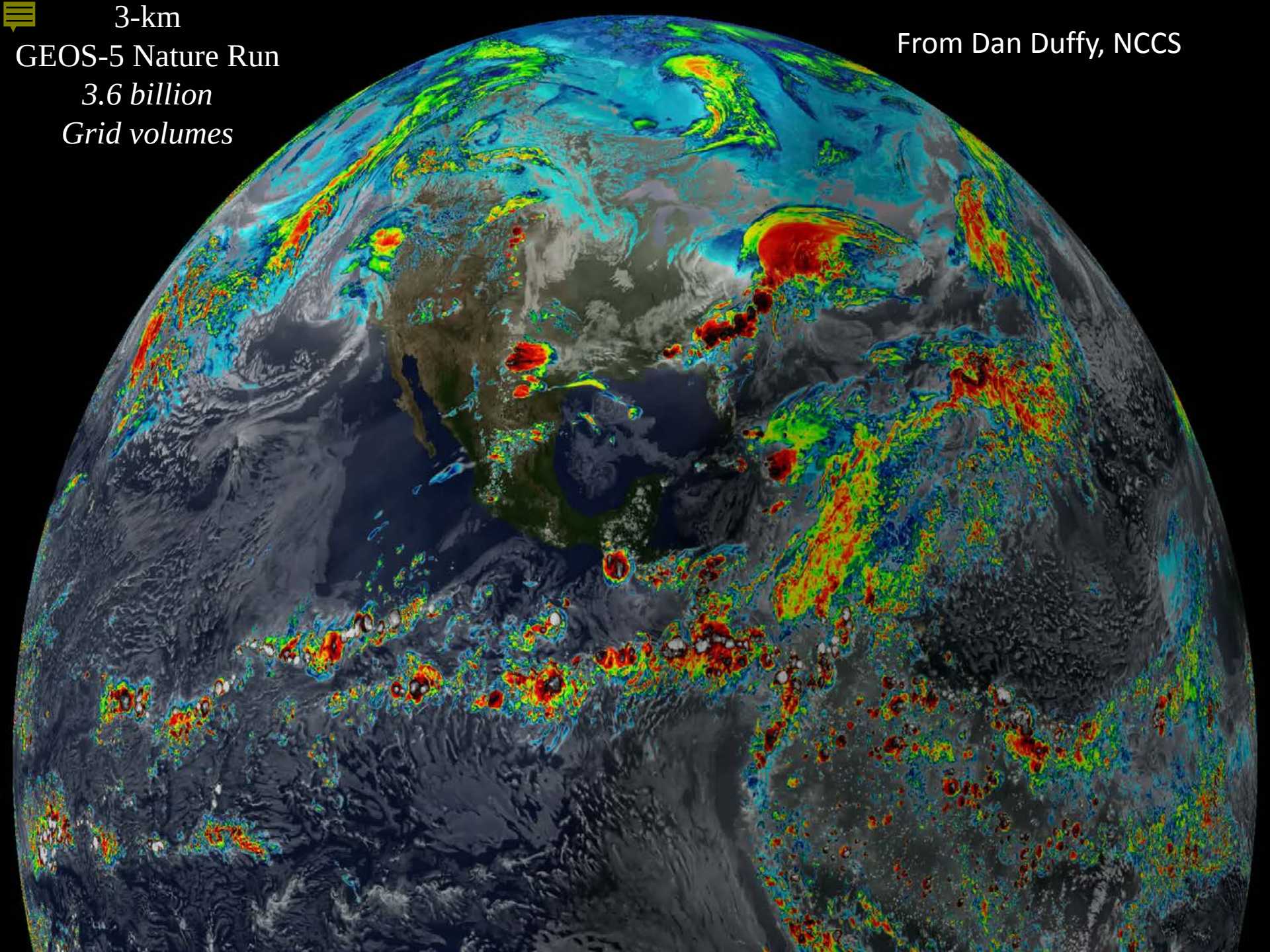
Each leaf node:

- Logical data info
  - variable name
  - geospatial range
  - temporal range
  - chunk corner
  - chunk shape
- Physical data pointer
  - node list
  - fileId(byte offset, byte length, file name)

Existing Sub-Saharan Arid and Semi-arid Sub-meter Commercial Imagery

From Dan Duffy




3-km
GEOS-5 Nature Run
3.6 billion
Grid volumes
From Dan Duffy, NCCS

Dust Storm Hazards

- Illness & Diseases
- Traffic & Car accidences
- Air Pollution
- Ecological System
- Desertification
- Global/regional Climate

Phoenix Dust Storm a "100-Year Event“, 2011, July 5th

Dust Storm eScience Infrastructure

GEORGE MASON Center of Intelligent Spatial Computing for Water/Energy Science

I/UCRC for Spatiotemporal Thinking, Computing, and Application is Formed by

- **UCSB** Center for Spatial Studies (as a continuation of NCGIA) leads GIScience innovation

  -> **Spatiotemporal Thinking**

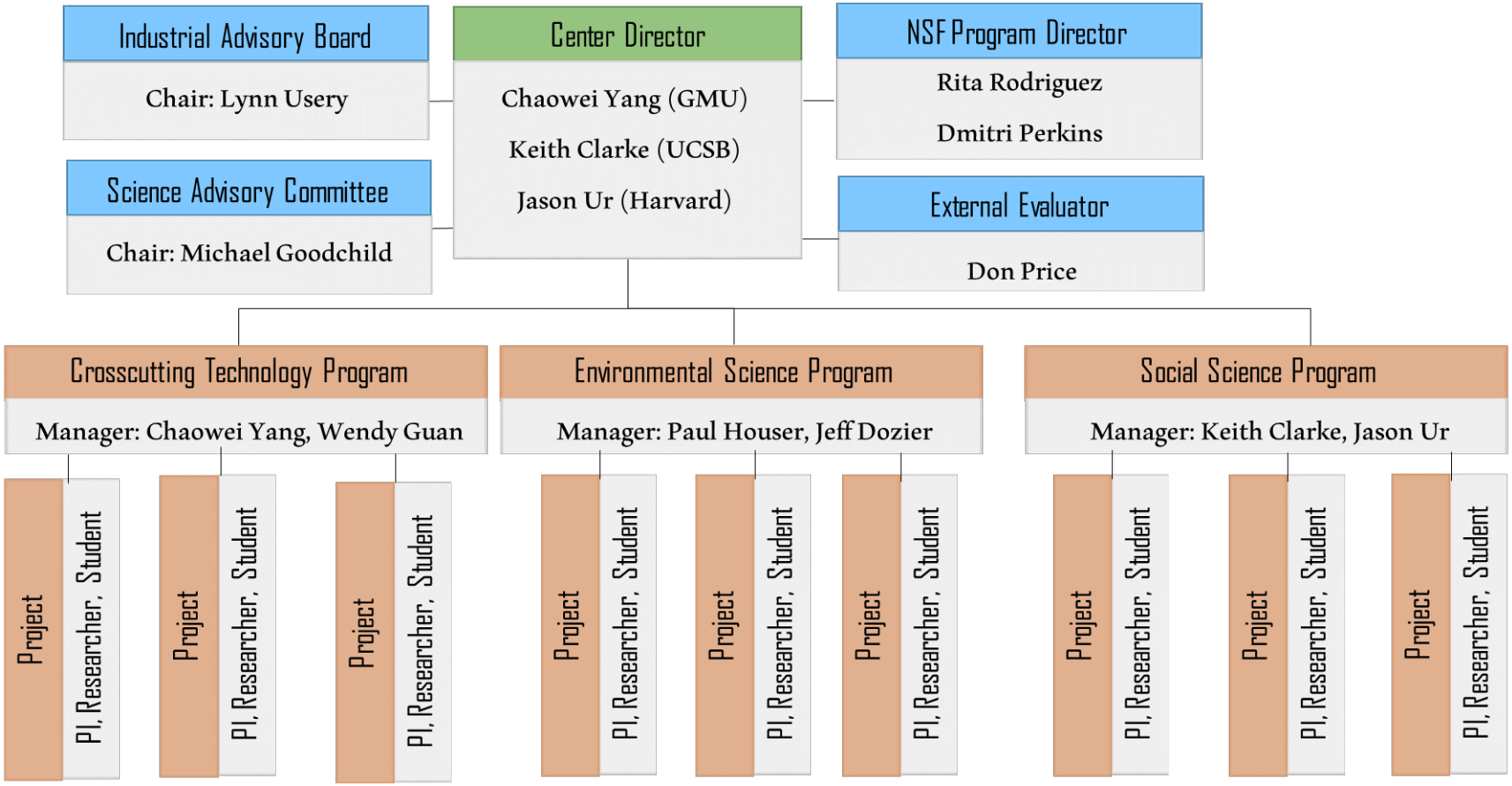
- **GMU** Center for Intelligent Spatial Computing leads computational research for geospatial issues

  -> **Spatiotemporal Computing**

- **Harvard** Center for Geographic Analyses supports applications of world significance

  -> **Spatiotemporal Applications**

Collaborating on Projects



Research Topics

Goal & Objectives

Advance

- Spatiotemporal thinking -> Human intelligence
- Spatiotemporal computing -> Computer software and tools
- Spatiotemporal applications -> Human capability of responding to deep scientific questions and grand engineering challenges

Collaboratively, make a difference by building the spatiotemporal infrastructure.

- Innovative Research–Academia
- Products and Services–Industry
- Operations–Agencies

Smart Cities Architecture

Smart City

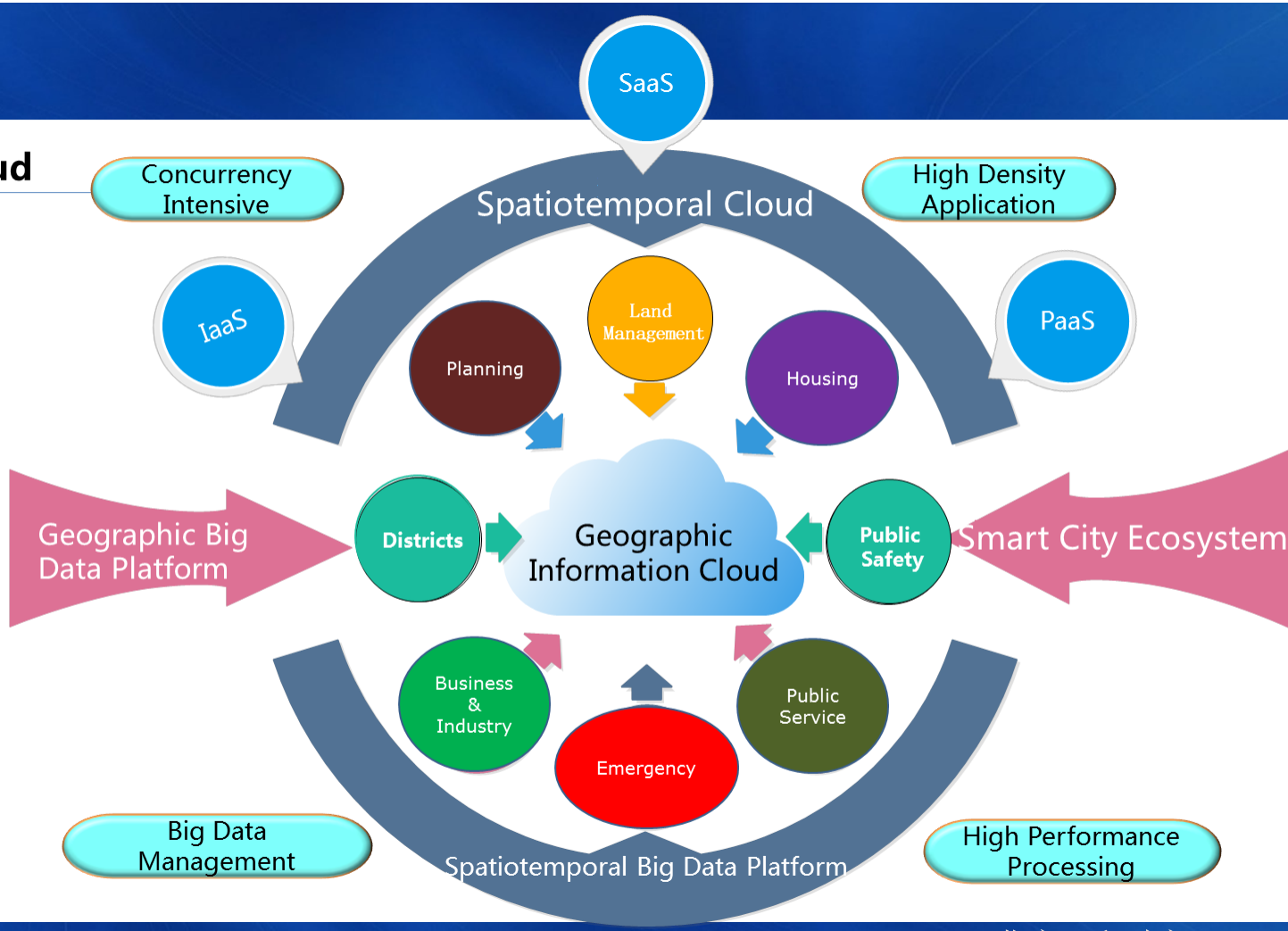
Spatiotemporal Cloud

One Center

Two Platforms

Three Layers of Services

Four Capabilities



Smart City

•Automatic charge
•Ticketing management
•Transportation management
•Etc.

Smart Transportation

•High-speed Network
•Smart power
•Energy smart
•Smart Water
•Etc.

Smart public utilities

•medical records
•Health services
•Personalized Treatment
•Etc.

Smart Health

•Open learning
•Advanced classroom
•Wisdom park
•Etc.

Smart education and science

Comprehensive sensing

full integration

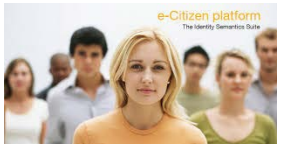
Smart City

Sustainable operation

Innovation

•Crime information
•Emergency response
•Real-time monitoring
•Etc.

Smart Public Safety



•Insurance management
•Employee service
•Family services
•Housing information management

Smart citizen service

Internet of Things for Smart Service

Supporting Secondary City Dynamic Mapping with Spatiotemporal Innovations

	Data	Infrastructure	Sustainable	Smart
Thinking				
Computing				
Applications				
Innovation				