



GEO Land Cover Activities

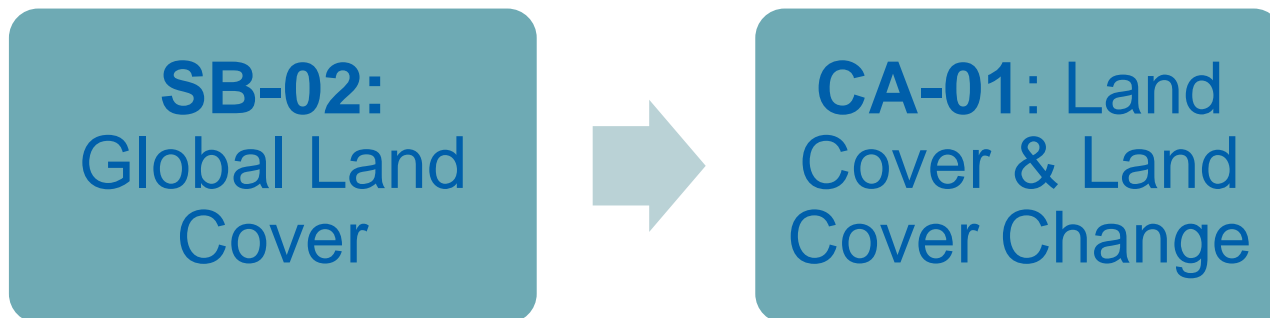
**GOFC-GOLD Science Meeting
31 October - 3 November 2016
Den Haag, The Netherlands**

**Gary Geller & André Obregón
GEO Secretariat**



GEO LC Activity Overview

LC in the New GEO Work Programme



- **Added Land Cover Change**
- **Beyond global: Regional and national products**
 - **Global map limitations at regional/national level**
 - **Most decisions at national level**

Land Cover and Land Cover Change

CA: LC & LCC

- **GOFC-GOLD (Martin Herold, Brice Mora)**
- **NGCC (Chen Jun)**
- **JRC (Andreas Brink, Zoltan Szantoi)**
- **IIASA (Steffen Fritz)**

2017-2019 GEO Work Programme Activities

- Continue exploring “new approach” discussed at Rotterdam workshop
- Conduct survey on national requirements
- GEO/UNGGIM/ISPRS training course on GLC mapping for developing countries (Beijing; NGCC)
- Develop concept for “Collaborative GLC Information Service” (“CoGland”;NGCC)

- Africa: AfriGEOSS WG on LC for Africa

Rotterdam Meeting and Post-Activities

Current Situation

- **Needs vary from user to user:**
 - International and national users not always aligned
 - UNSD, OECD, SDGs, CBD, Ramsar, UNCCD, national governments...

- **Most methods are labor-intensive:**
 - Fixed classes
 - Infrequent (eg, every 5 years)
 - Long time lag

- **Result:**
 - Evolving needs of many users not met. How to fix?

- **Discussed at GEO Plenary 2015 LC Side Event in Mexico**

Rotterdam Meeting

- 23-24 May 2016 (Geospatial World Forum)
- Follow-on to GEO Plenary side event
- Basic premise:
 - Despite many LC products, many needs still unmet
 - Advances in S&T can support a new approach
 - More data, improved algorithms, increased compute
- Explore ways to meet this vision:

“A sustainable operational system that generates land cover datasets according to specific user requirements for geographic scope and the number and types of classes; datasets can be generated on a regular basis using consistent methods and with needed accuracy”

Rotterdam Meeting

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- Follow-on to GEO Plenary side event
- Basic premise:
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- Explore ways to meet this vision:

**A sustainable operational system
that can meet varied user requirements**

- **What would such a system look like?**
- **What are the challenges to building it?**

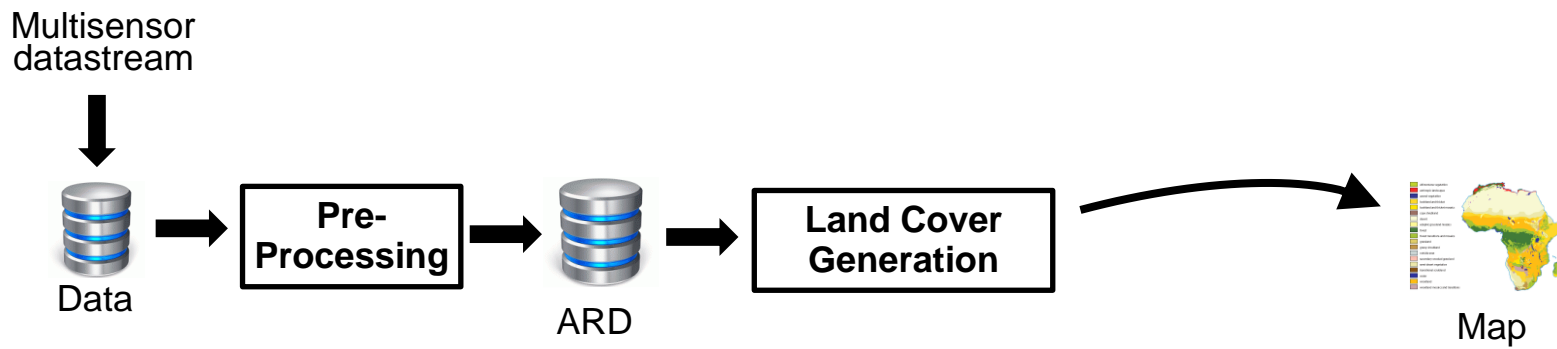
Meeting Outcome

- **To meet varied user needs:**
 - **On-demand system**
 - **Automated**
 - **Lots of data**
- **Reference data - integral part of any system**
- **Many challenges!**

- **General agreement on an overall approach**
- **Now finalizing “synthesis paper”**

Generalized Architectural Concept

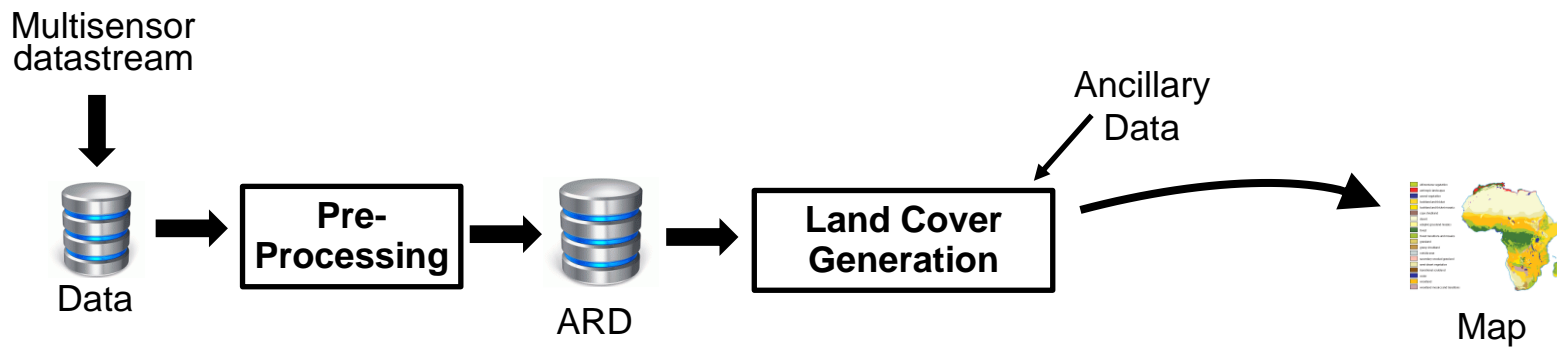
V2016-10-28



ARD is Analysis-Ready Data, e.g., which has been atmospherically corrected

Generalized Architectural Concept

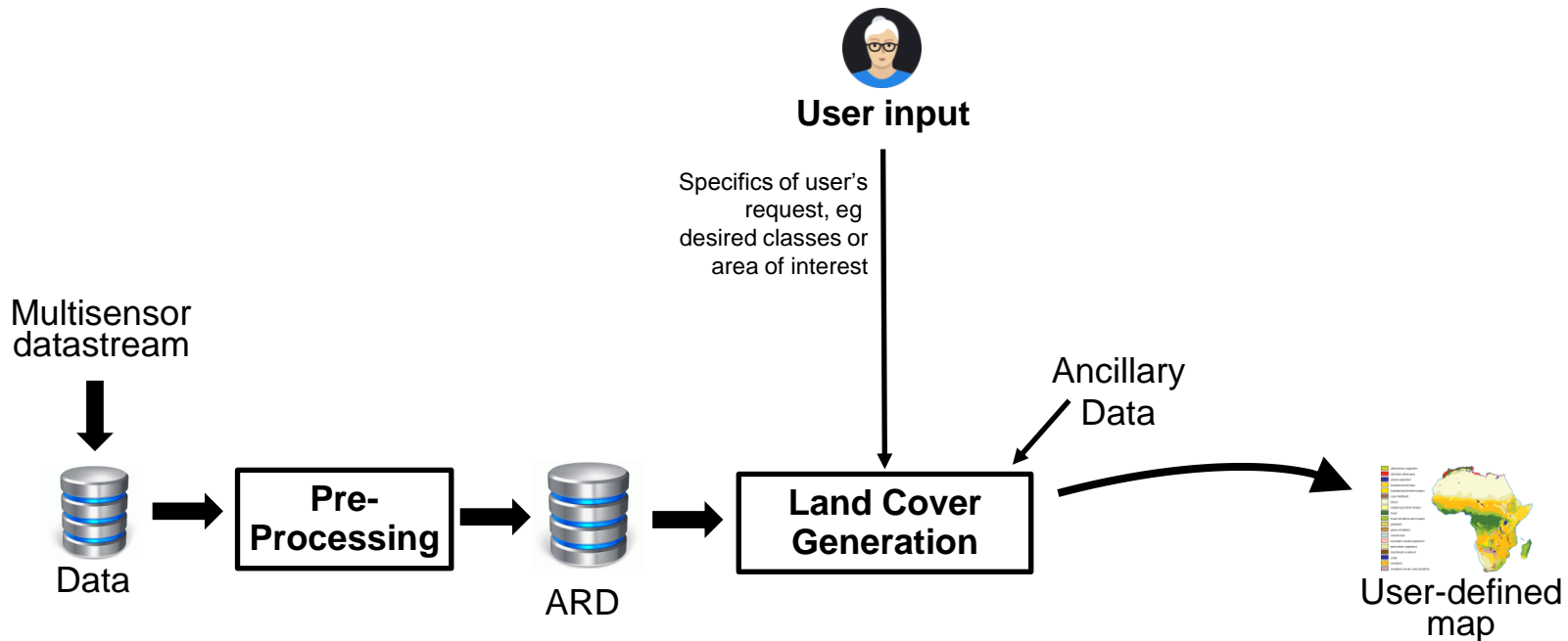
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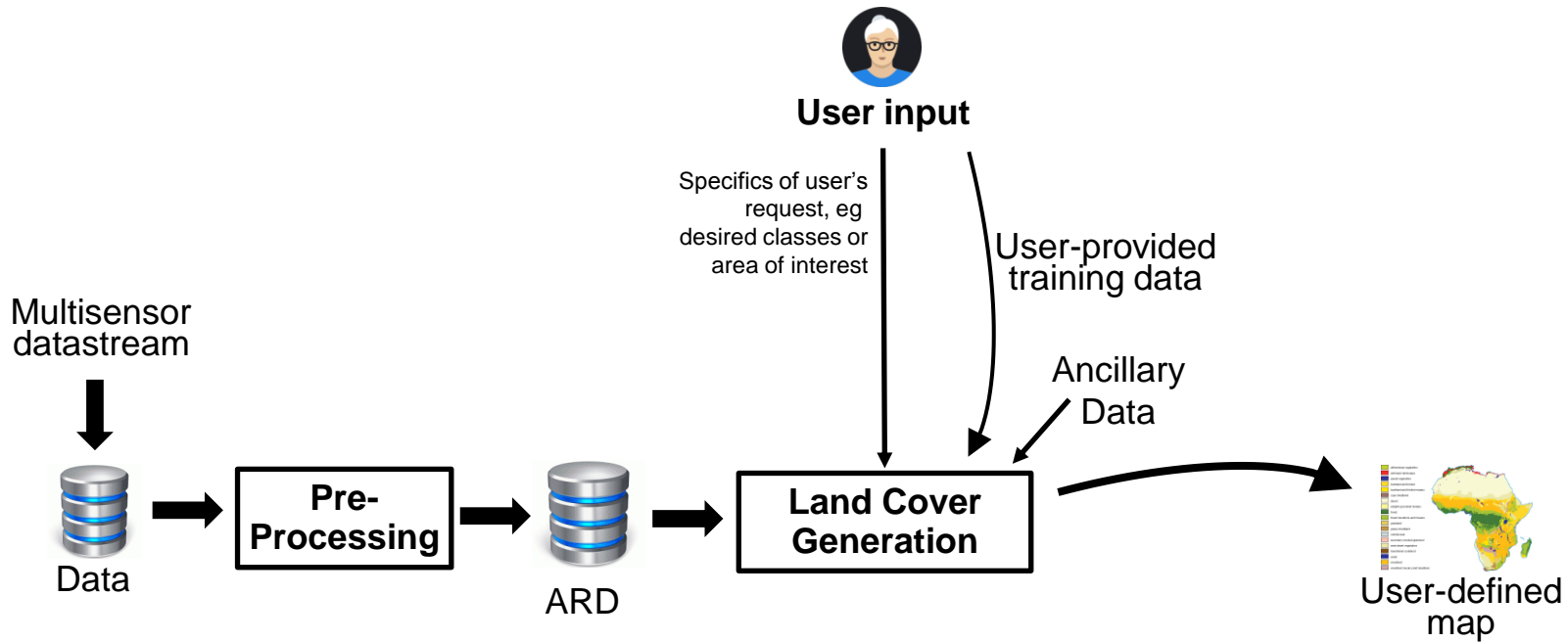
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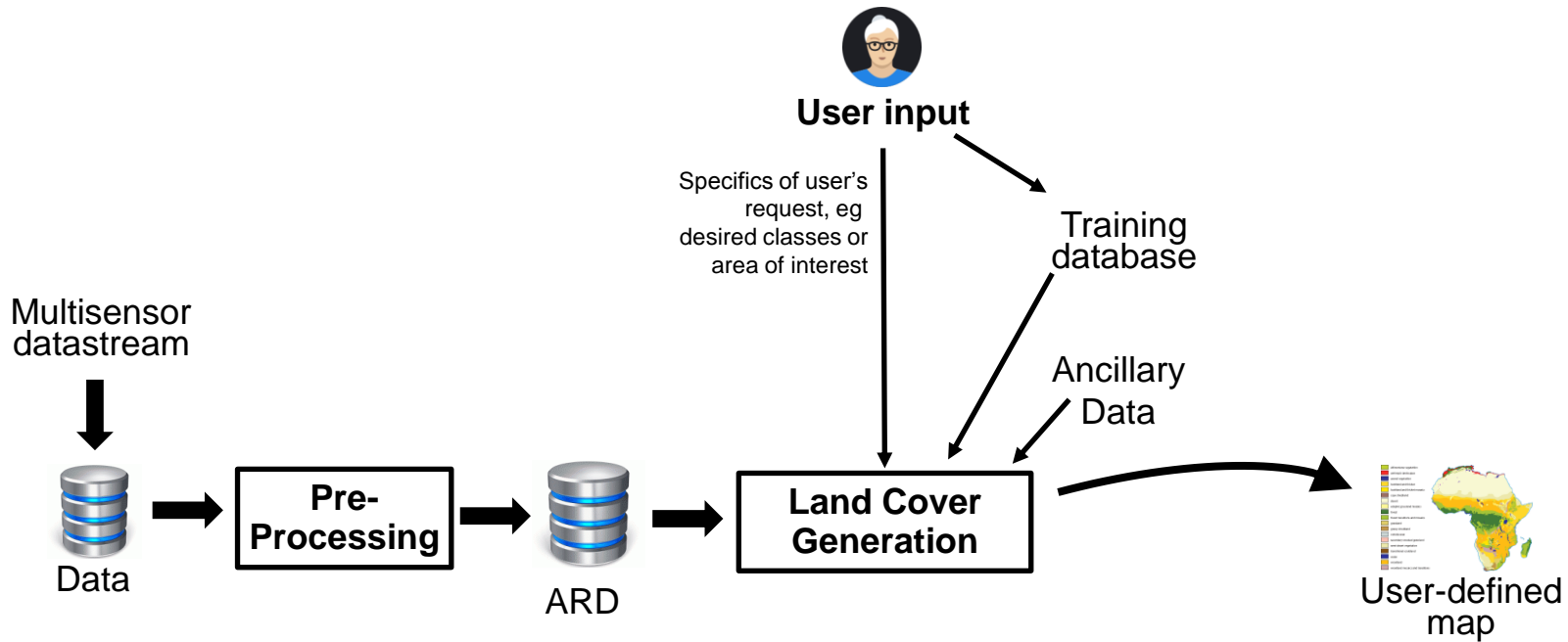
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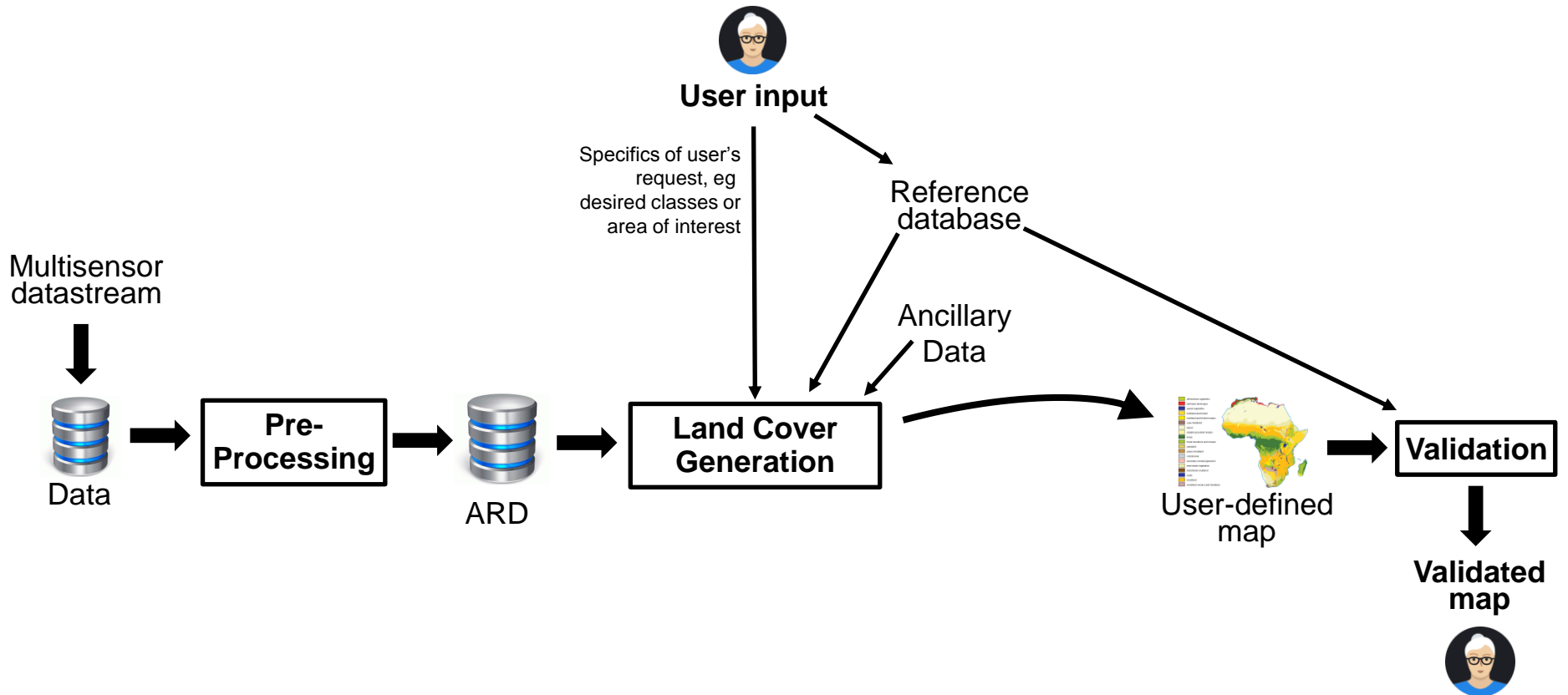
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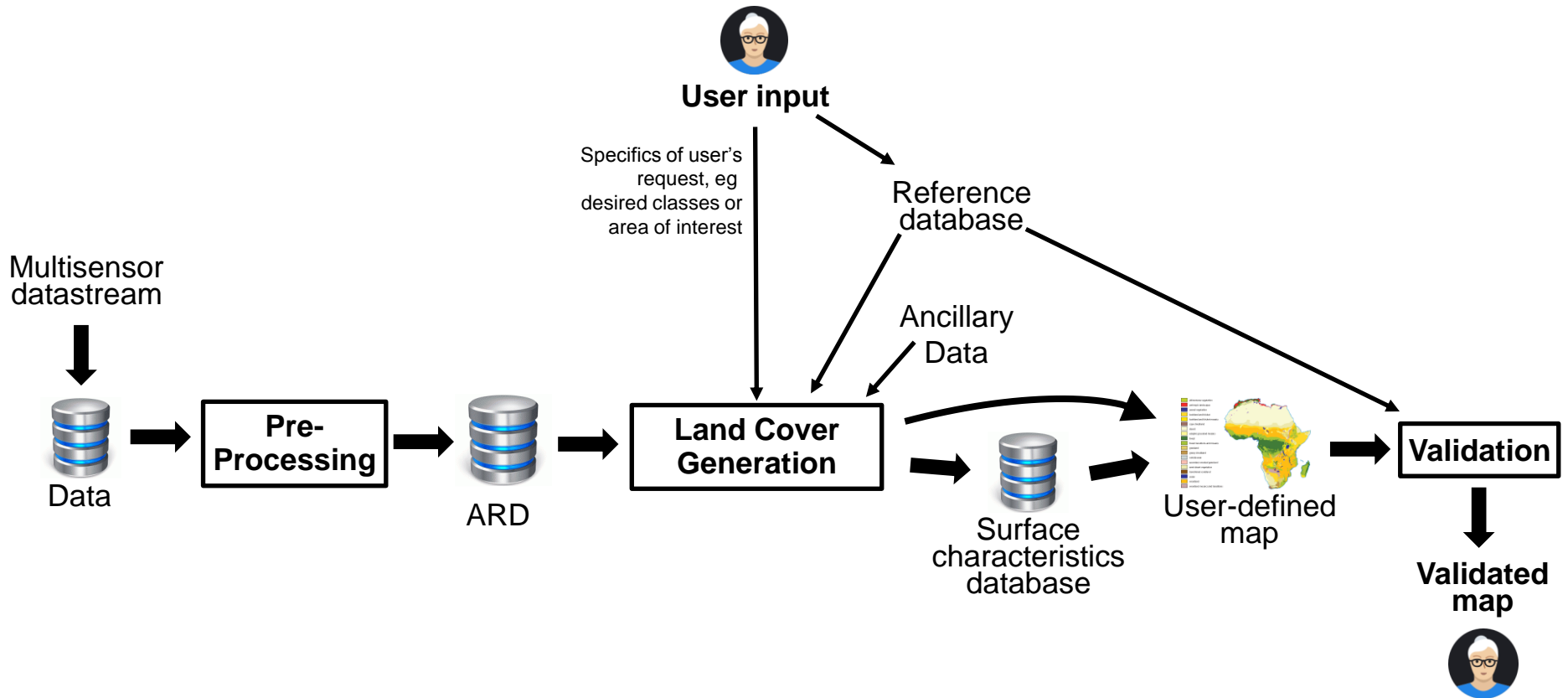
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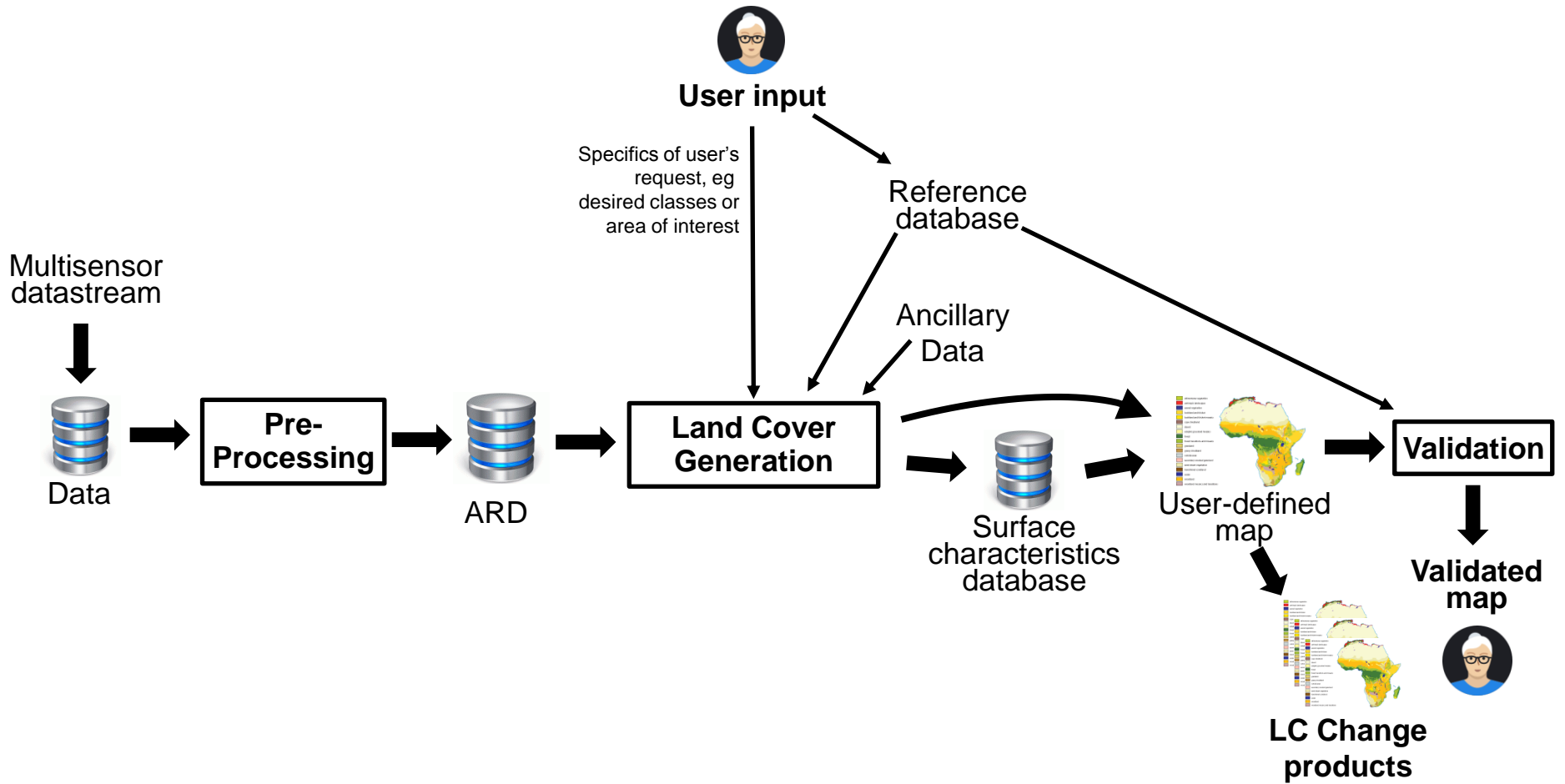
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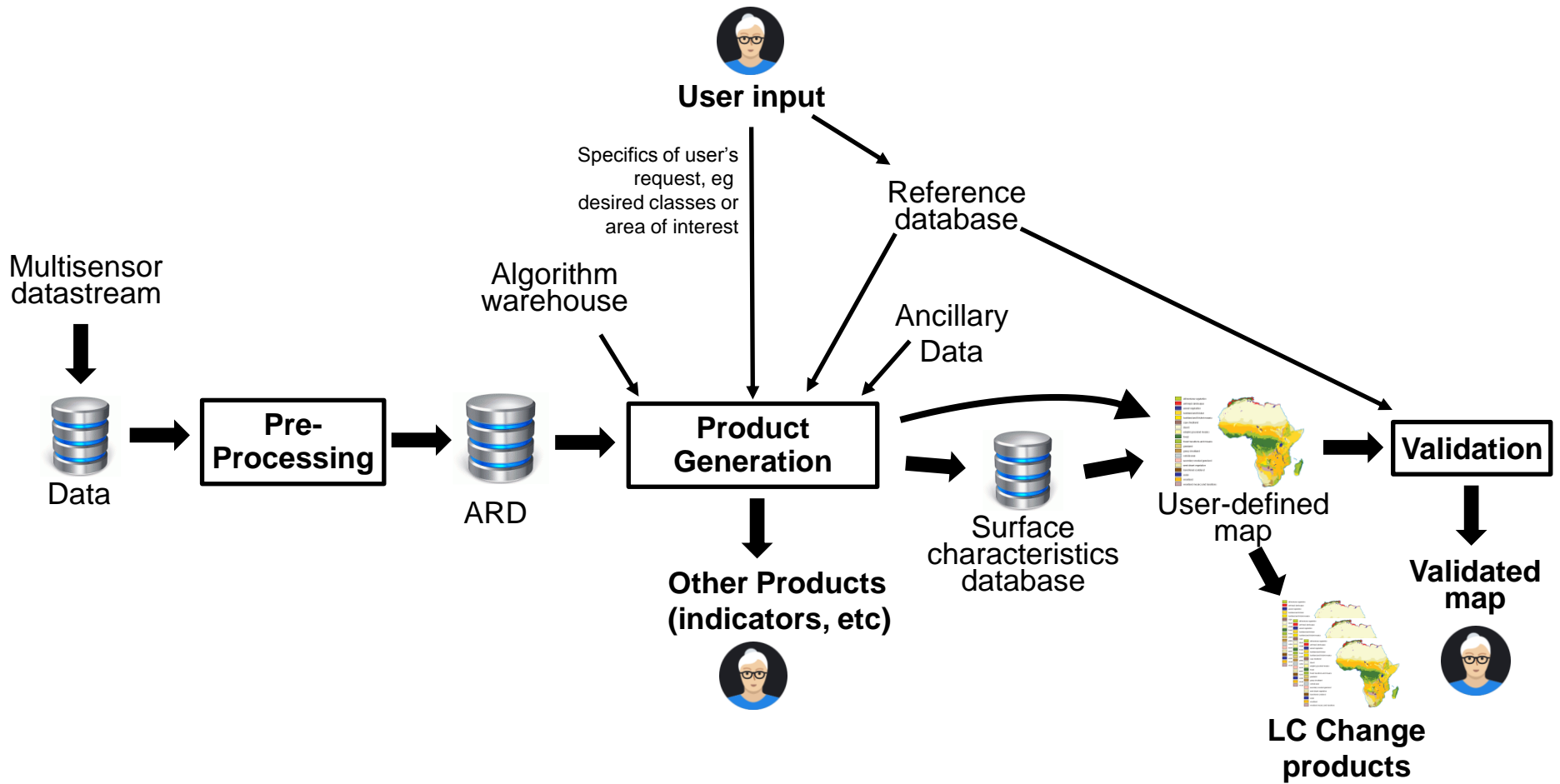


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Generalized Architectural Concept

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Challenges

- **Need good reference data:**
 - **Share training and validation data**
 - **Develop tools for sharing**
 - **Develop curated database**
- **Data volume (for large areas):**
 - **Downloading impractical**
 - **Cloud-based approach**
 - **Processing resources**
 - **Technically do-able**

Gary:

Accuracy is probably more dependent on good data and good reference data than on new algorithms

Challenges

- **Accuracy of automated methods:**
 - High quality training data
 - Lots of input data
- **Validation**
- **Non-technical challenges:**
 - Funding
 - Capacity

Gary:

Accuracy is probably more dependent on good data and good reference data than on new algorithms

Should We Be Optimistic?

- **YES!**
- **USGS LCMAP system**
- **Tsinghua University automated processing system**
- **Single layer products**
- **Google Earth Engine**
- **Geoscience Australia Data Cube**
- **CEOS “Data Cube in a Box”: push-button infrastructure**
- **More data available**
- **Improved algorithms**
- **Increased computing capabilities**

Implementation Scenarios

- **Top down, centralized approaches:**
 - **Global or coordinated regional**
 - **Valuable, but concept needs broader acceptance regarding practicality**

- **Bottom up, organic approaches:**
 - **Multiple, independent activities already happening**
 - **USGS LCMAP, GA data cube**
 - **Tsinghua University LC portal**
 - **GEE; additional single layer products**
 - **Others?**
 - **Option to use CEOS “Data Cube in a Box”**

- **Combination**

Looking Ahead

- **Specific activities:**
 - **Develop coordinated LC reference database and system**
 - **Develop shared validation tools**
- **More generally**
 - **Address challenges one at a time**
 - **Expand incrementally**

Gary:

The specific activities are needed regardless of the approach.

For now, incremental expansion will probably be organic.

Later, the need for and practicality of a more coordinated approach may emerge. Broader acceptance of the approach is probably needed before discussions on that can get traction.

Thank you



User Need Categories

- **Classes**
- **Temporal frequency and regularity**
- **Latency**
- **Consistency (time, and space)**
- **Spatial location and extent**
- **Spatial resolution**
- **Accuracy**
- **Control/trust in the process**