Delivering Earth's Shapes & Colors in Near-Real Time:

NPOESS Products and Their Characteristics for Users

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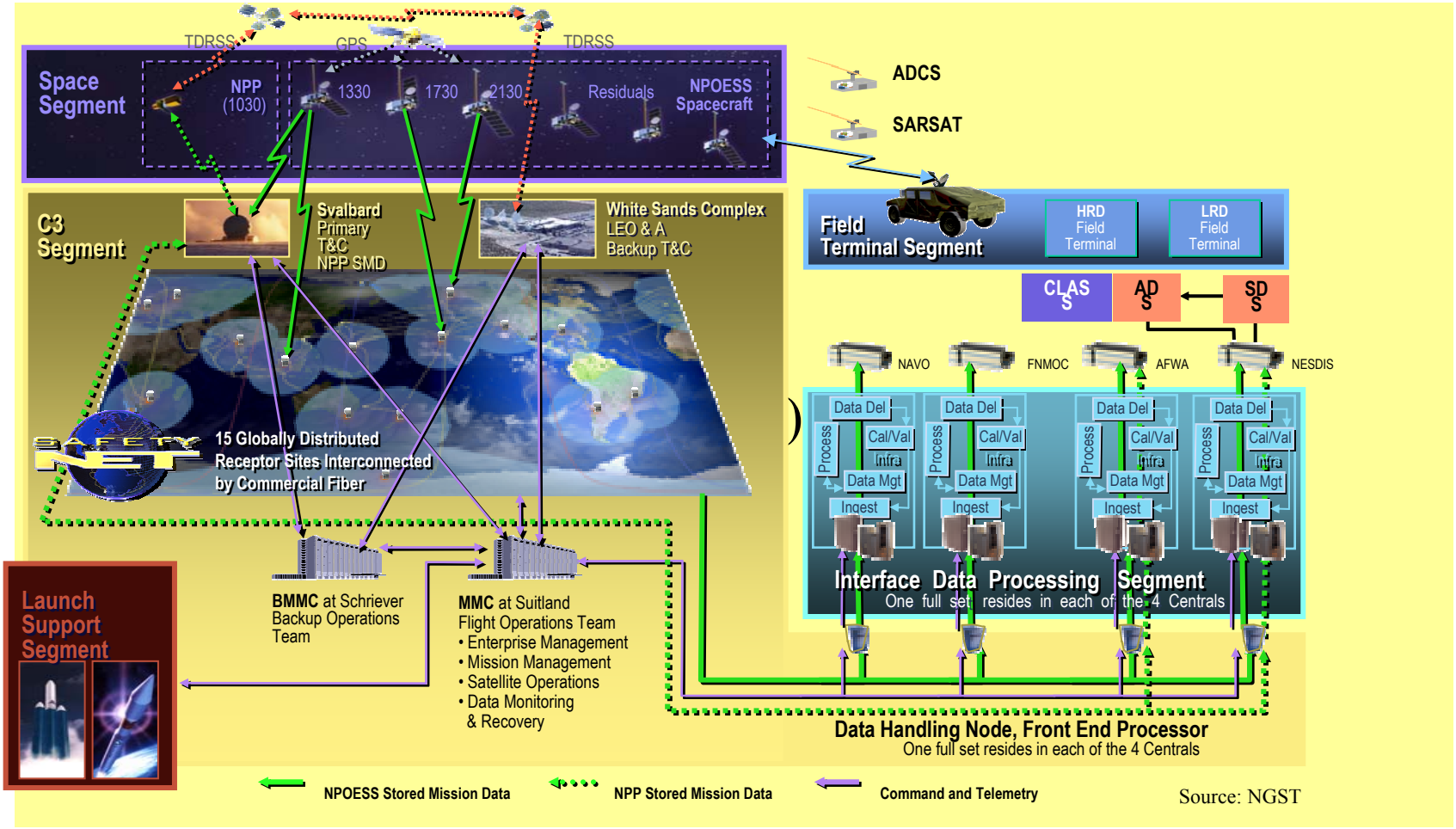
Approved for public release; distribution unlimited

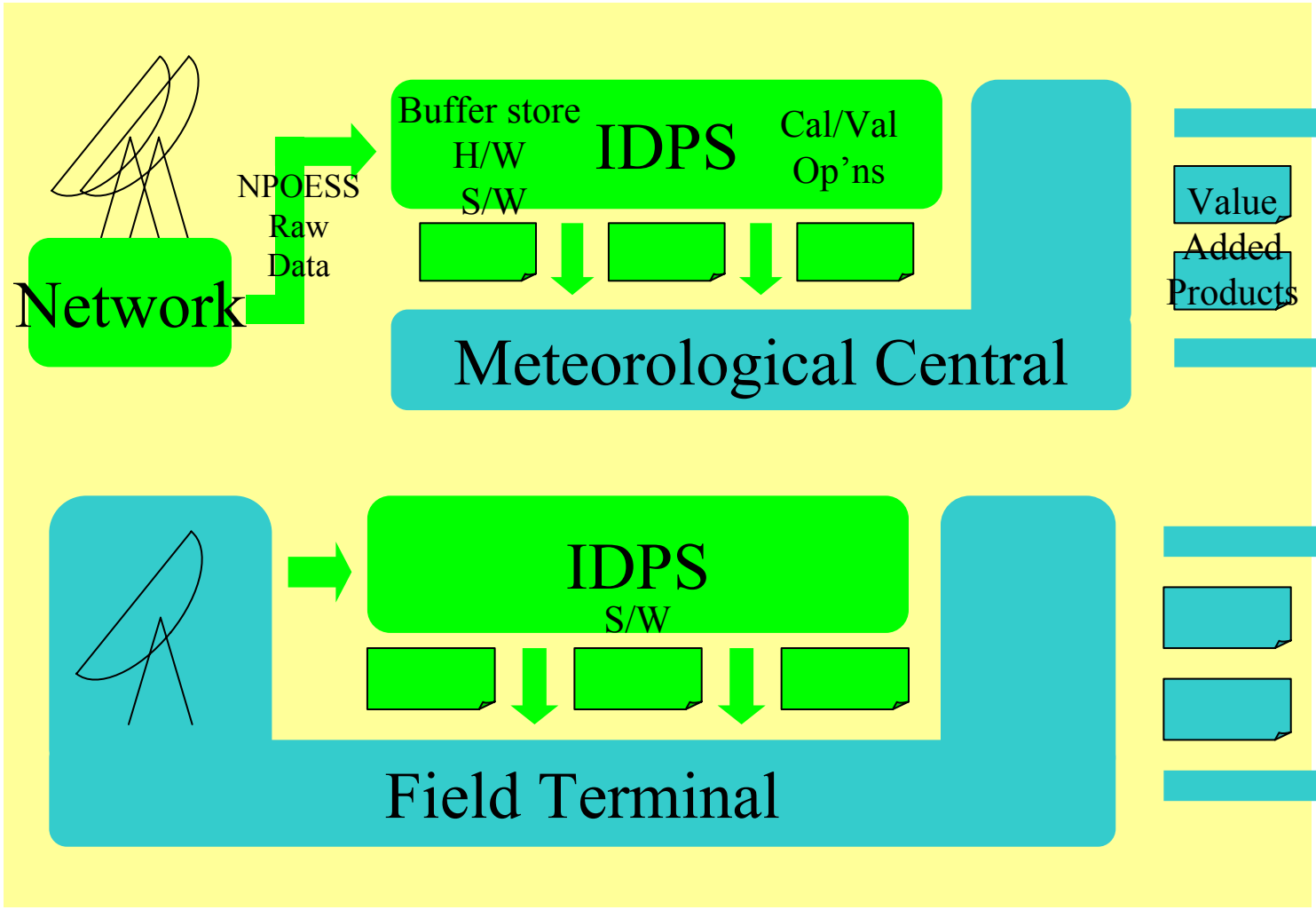
Production Environment

- **NPOESS will deliver products at the "wholesale" level**
  - 4 US operational hydrometeorological Centrals
    - - Domestic products and WMO distribution
  - Direct broadcast field terminals
    - - NPOESS software operating in user-provided ground stations
    - - Generally available worldwide
  - Archives – provided by NOAA CLASS initiative
    - - For researchers and public



Source: NGST

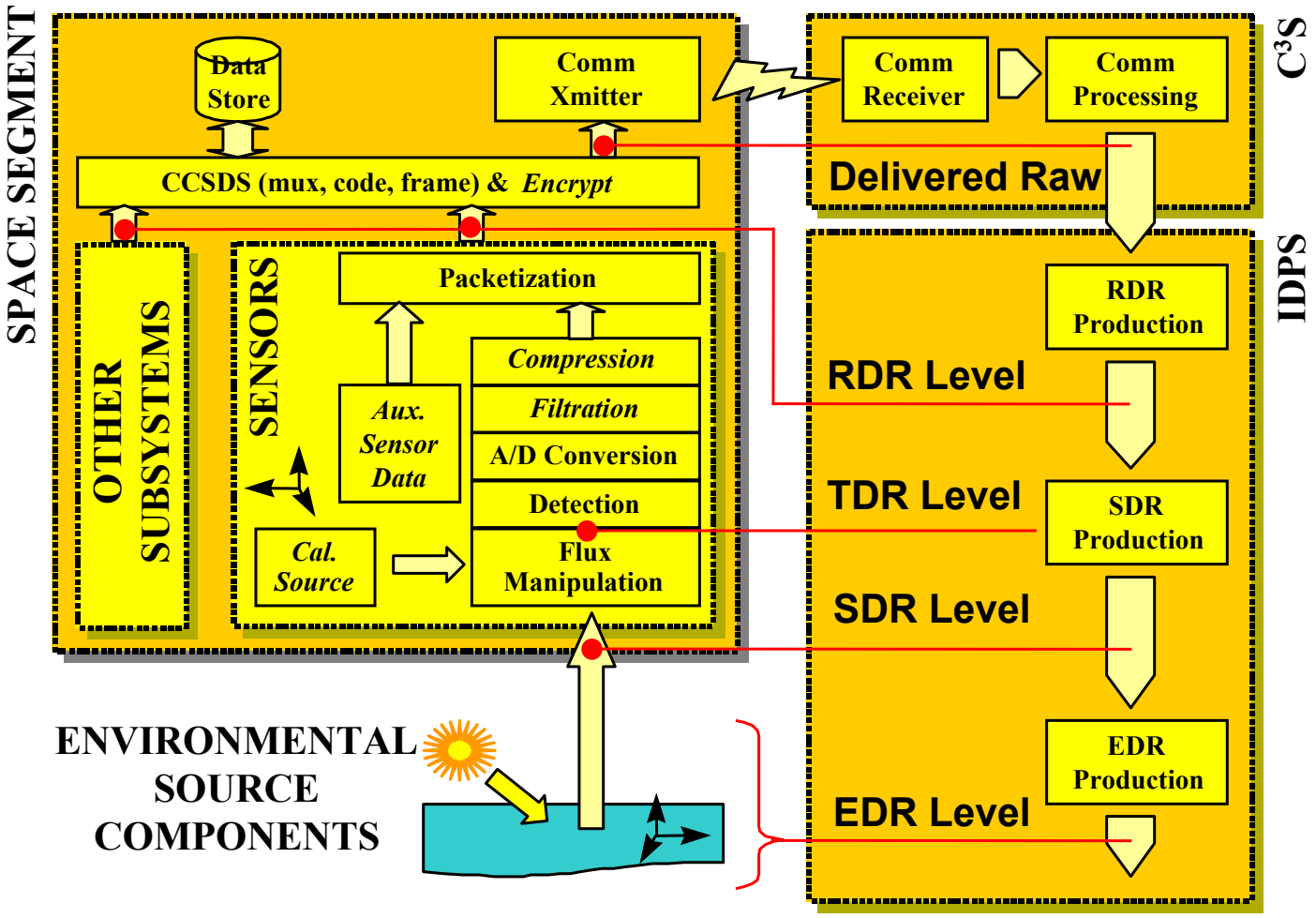
The National Polar-orbiting Operational Environmental Satellite System (NPOESS) is managed by the NOAA Integrated Program Office, on behalf of the U.S. Dept. of Commerce, Dept. of Defense, and NASA. Northrup-Grumman Space Technology is prime contractor, with Raytheon the subcontractor for ground processing & operations



A common Interface Data Processing Segment software suite will provide NPOESS-unique processing and product delivery at four Centrals and worldwide Field Terminals. At the Centrals, NPOESS provides supporting hardware, staff, calibration, and algorithm development resources, as well. Fusion with other data sources, display, value-added processing, and forward distribution are provided by IDPS hosts.

- **User requirements and needs**
  - Embodied in a public *Integrated Operational Requirements Document*
  - *Comprehensiveness:* Products in processed and unprocessed forms; and comprehensive documentation
  - *Speed:* Products available in <30 min. from observation
  - *Accuracy and clarity:* Data Quality Act - integrity
  - *Delivery flexibility:* How often, how much, what regions, which products
  - *Continuous improvement:* Anticipate continuous improvement in sensor and environmental models

- **Programmatic constraints**
  - Initial and life cycle cost
  - Interoperability
    - - Both providers and consumers need to adopt standards
  - Conflicting requirements
    - - *e.g.*, speed and accuracy; applications and research
  - Security
  - Schedule



IDPS produces mission data sets which recreate or estimate signals at 4 points in the sensing chain. Ancillary data, brought from other systems and used in EDR processing, is captured. Auxiliary data, produced within the NPOESS system to support processing, is kept with the mission data or incorporated in documentation. Metadatata provided for all.

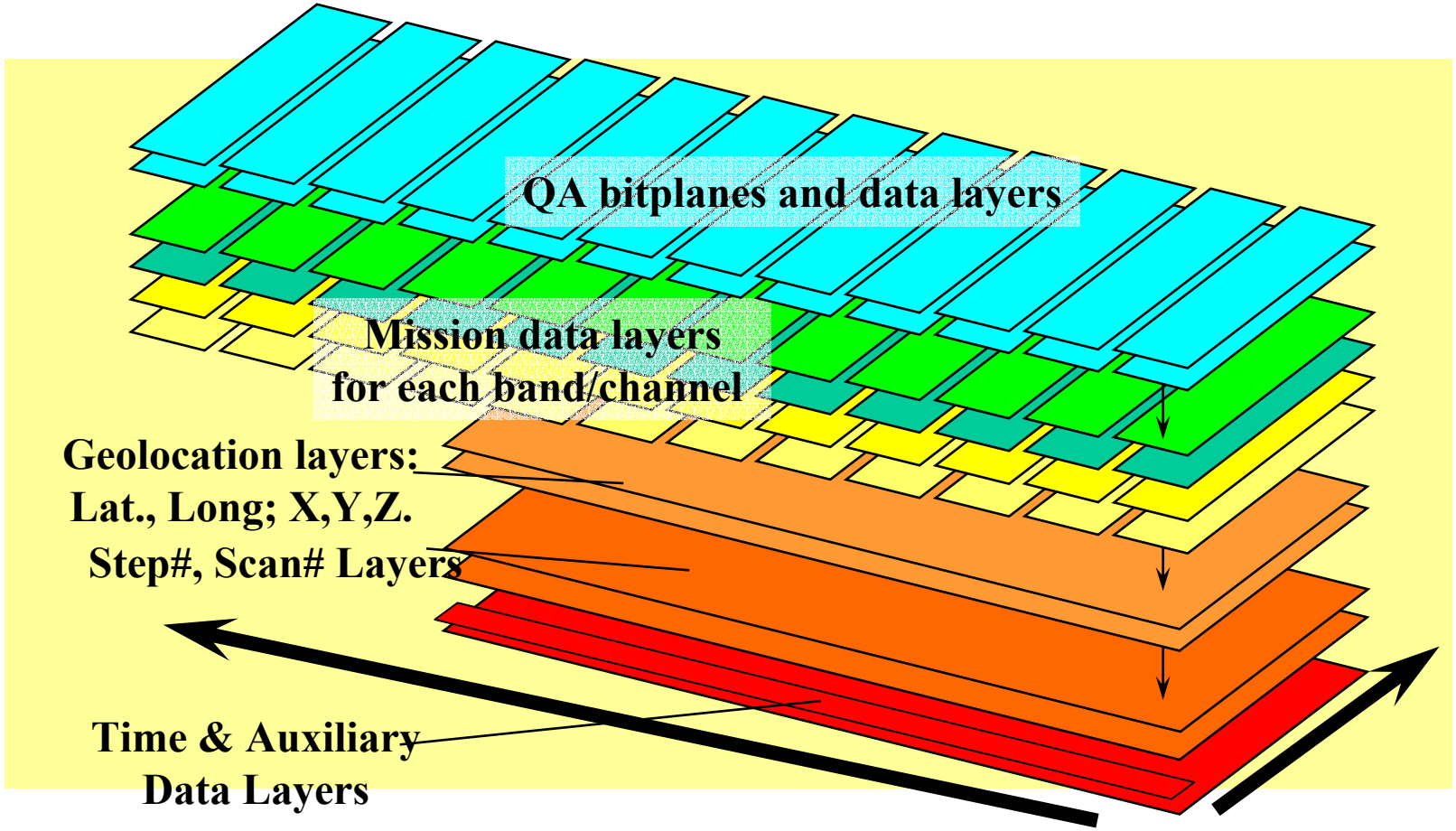
Product Type	No. of Products	Definition	Rate Estimate
Raw Data Record	~12 (one per sensor)	CCSDS application packets from sensors & associated auxiliary data	0.16 TB/sat/day
Temperature Data Record	~2 (one per micro-wave sensor)	Equivalent brightness temperature in the antenna pointing direction	1.14 TB/sat/day
Sensor Data Record	~33 (one per sensor or channel)	Geometrically & radiometrically corrected flux estimate at the aperture, from sensor model	
Environmental Data Record	~55	Geospatially located environmental parameter estimates, from an environmental model	0.81 TB/sat/day
Ancillary Data	as needed	Data from external systems, used to produce EDRs or calibration	~
Documentation	as needed	Full descriptions, processing history, calibration, & identification	~

Interface Data Processing Segment

- **Ground data processing architecture**
  - How we produce data addresses most requirements
- - Include processes for user-initiated improvements
- - Robust algorithms for automated operations
- - Graceful degradation under abnormal conditions

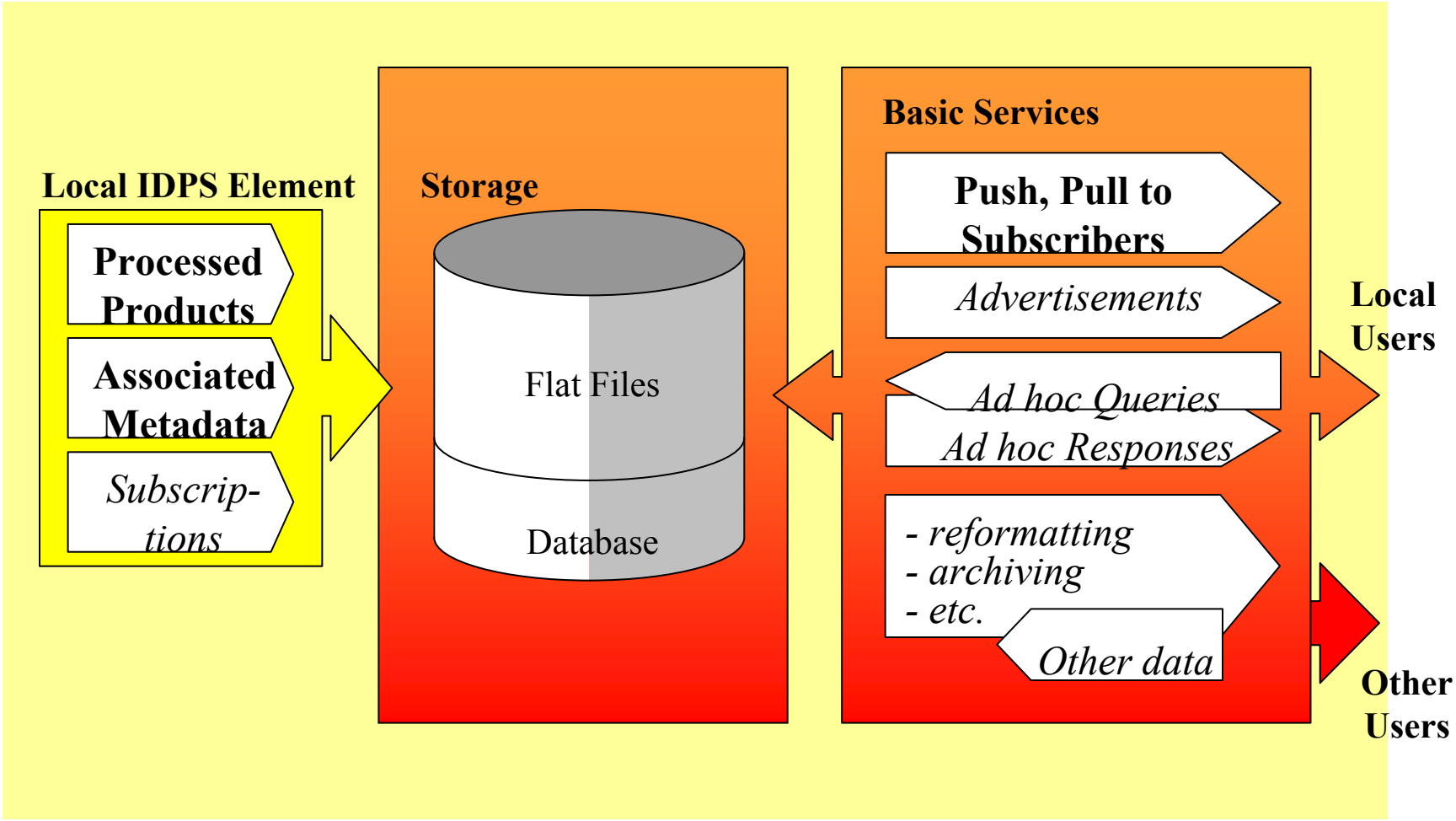
Products, contents, and structures

- What we produce as data addresses more
  - Annotated mission data products with full documentation of the collection and processing applied
- Metadata provides the details and connection with the future
  - Fully compliant with U.S. National Spatial Data Infrastructure, including remote sensing extensions
  - Syntactic, semantic, and structural
  - Dynamic metadata – describes unique attributes of each granule and aggregation
  - Semi-static metadata – describes attributes that change irregularly
  - Static metadata – describes the program, platforms, sensors, and processes



The product logical file structure will relate mission data, quality assessment, geospatial location, time, illumination, viewing geometry, and similar metadata items. Users may access subsets of the full data using HDF5 utilities. IPO intends to assure maximum commonality among file structures.

- **Data delivery features and interfaces**
  - How we deliver data addresses the rest
    - Identical products produced at 4 US locations to achieve delivery timeliness.
    - HDF5 for self-documenting products
    - Small granules as the basic unit of delivery and accounting

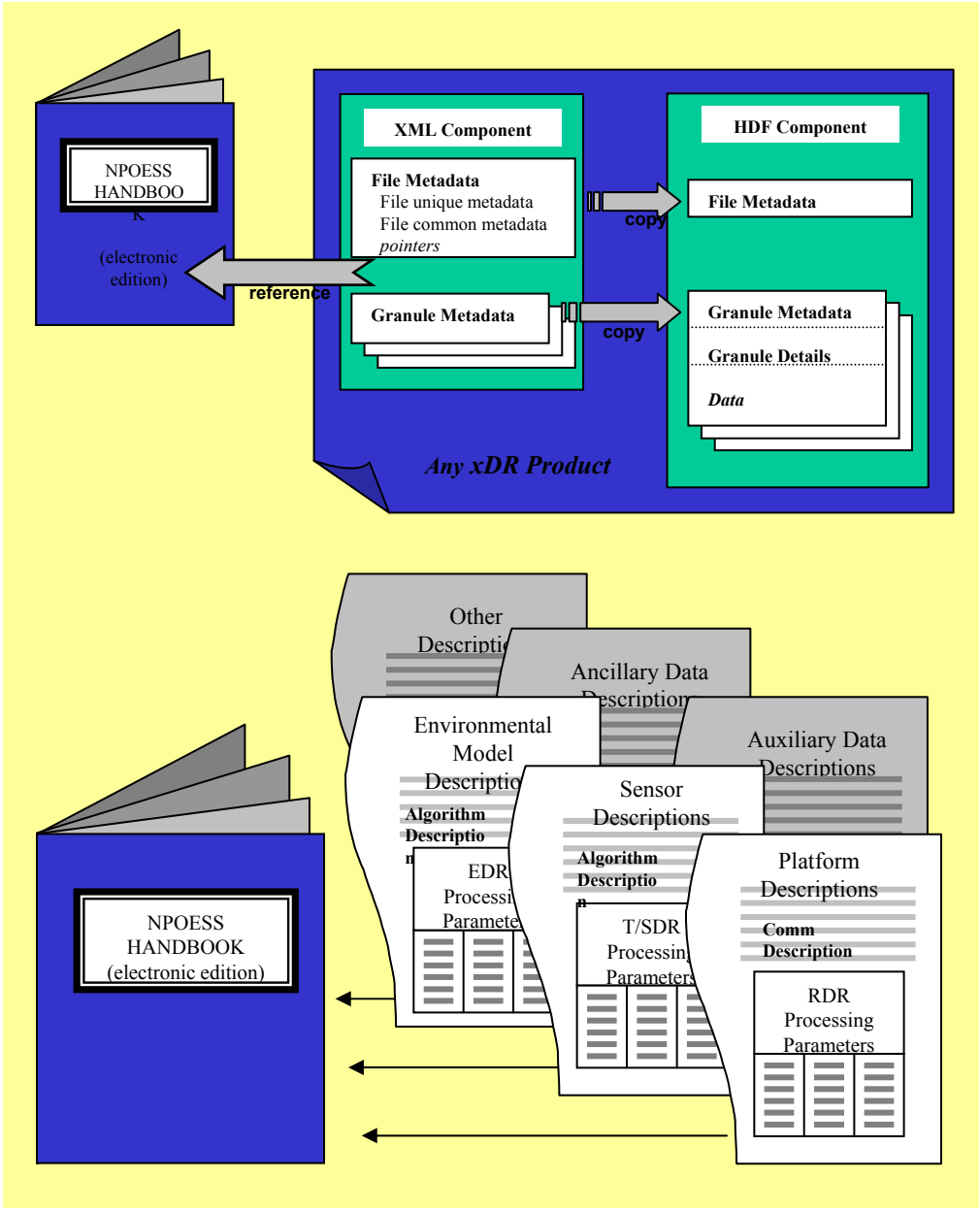


Centrals and archives will have several ways to access current products from IDPS. They will continue existing distribution services to their customers and other users.

Efforts Underway

- **Coordinating the development**
  - *Interface Control Documents* with direct users
    - - Refining the substantive contents to be delivered to users and archives
    - - Distribution mechanisms to users
  - *Data Format Control Book* (DFCB)
  - - Documenting in one place the raw data formats, the sensor data formats, and the environmental data formats
  - - Includes common characteristics, as well as unique
  - - Relates mission data, attributes, and supporting data
  - Ongoing meetings
  - - Contractors, Government, and users' representatives

- **Some issues being worked**
  - Standards
  - Profiles
    - - best practices, conventions, annotation
    - - data dictionary
  - Horizontal consistency between products
    - - *e.g.*, geolocation algorithms, coordinate orders
  - Risk reduction in NPP
  - Techniques for archived data volume reduction



FGDC Metadata Items:

~100 static & quasi-static metadata items in Handbook

~20 external dynamic metadata, for identification

~30 internal dynamic metadata, for structure

Multiple granules of the same type will be combined to form aggregated products. Dynamic metadata will be associated with each granule, and summarized with each product file. Metadata items appropriate for file identification will be associated in an XML record. Static and quai-static metadata will be maintained in an e-Handbook, and referenced from the product file.

- **References**
  - This and other NPOESS presentations can be found at
    - http://www.ipo.noaa.gov/library_NPOESS.html
  - More information on NPOESS Field Terminals
    - IGARSS03 paper by Overton, TU09_0920
  - More information on NPOESS data product formats
    - **IGARSS03 paper by Goldberg, 03.1893, TH10_1140**

      A Framework for Data and Metadata Models