



EOSDIS

NASA'S EARTH OBSERVING SYSTEM
DATA AND INFORMATION SYSTEM

<http://earthdata.nasa.gov>

NASA Earthdata Cloud

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Earth Science Data & Information System (ESDIS)

June 2019



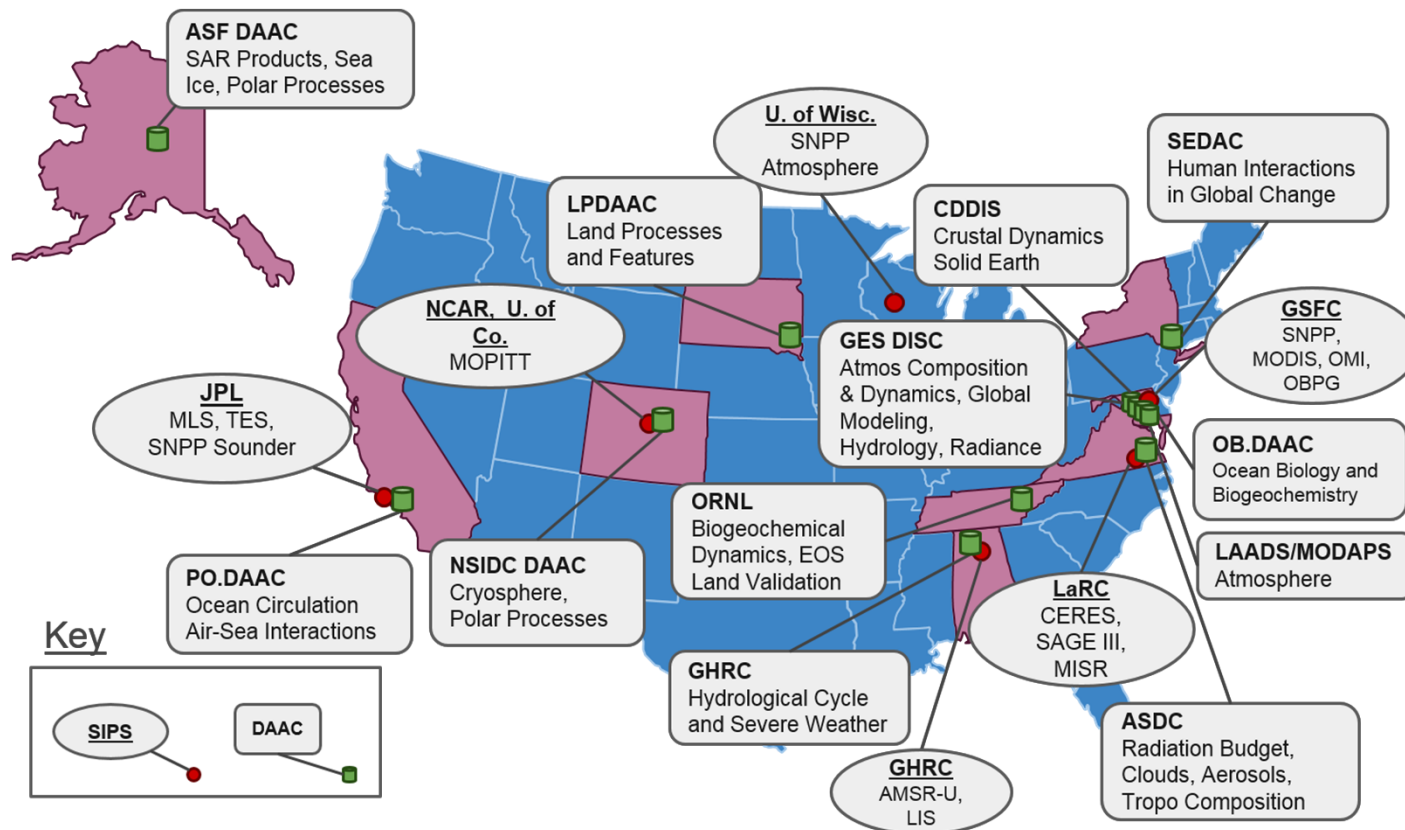
Earth Science Data Collections of the Earth Observing System Data and Information System (EOSDIS)

- Land
 - Cover & Usage
 - Surface temperature
 - Soil moisture
 - Surface topography
 - Ocean Dynamics
 - Surface temperature
 - Surface wind fields & Heat flux
 - Surface topography
 - Ocean color
 - Airborne
 - International Space Station
 - Field Campaigns
 - International Partners
- Atmosphere
 - Winds & Precipitation
 - Aerosols & Clouds
 - Temperature & Humidity
 - Solar radiation
 - Cryosphere
 - Sea/Land Ice & Snow Cover
 - Human Dimensions
 - socioeconomic data (e.g., population, infrastructure, ..)



NASA Earthdata Cloud (EDC) – <http://earthdata.nasa.gov>

EOSDIS Organization

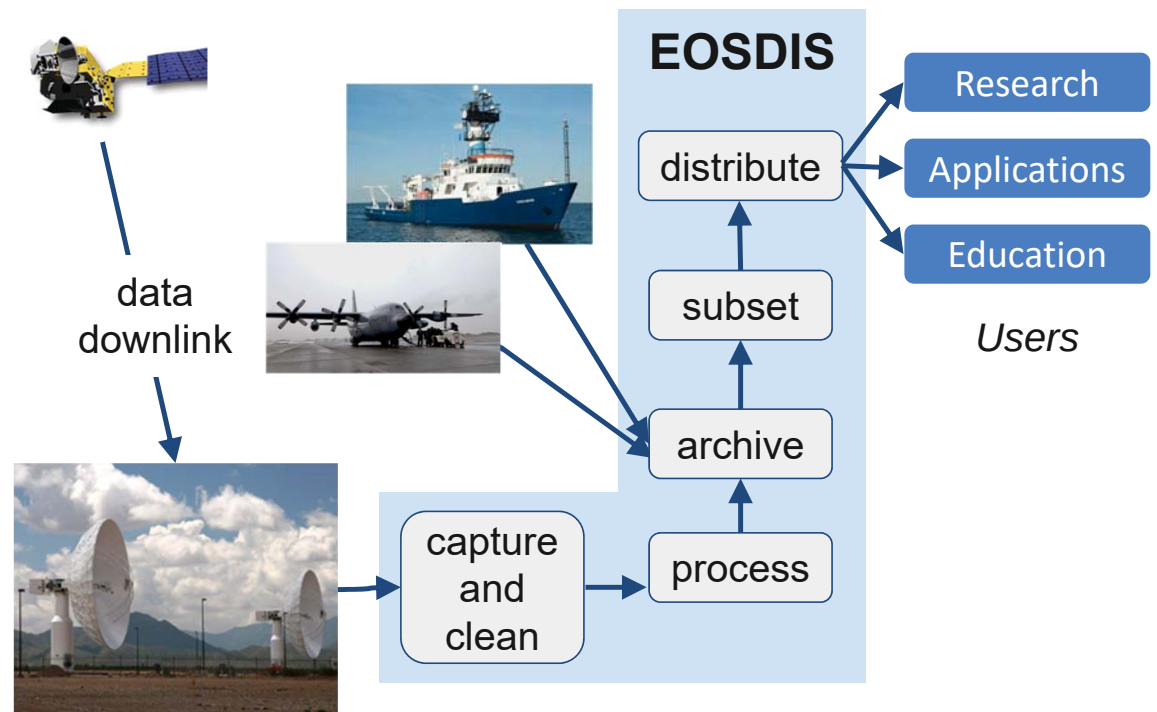


NASA Earthdata Cloud (EDC) – <http://earthdata.nasa.gov>

High Level EOSDIS End-to-End

NASA's EOSDIS provides end-to-end capabilities for managing NASA's Earth science data from satellites, aircraft, field measurements, and various other programs.

EOSDIS is responsible for a data collection that is large in volume and projected to grow rapidly over the next several years.



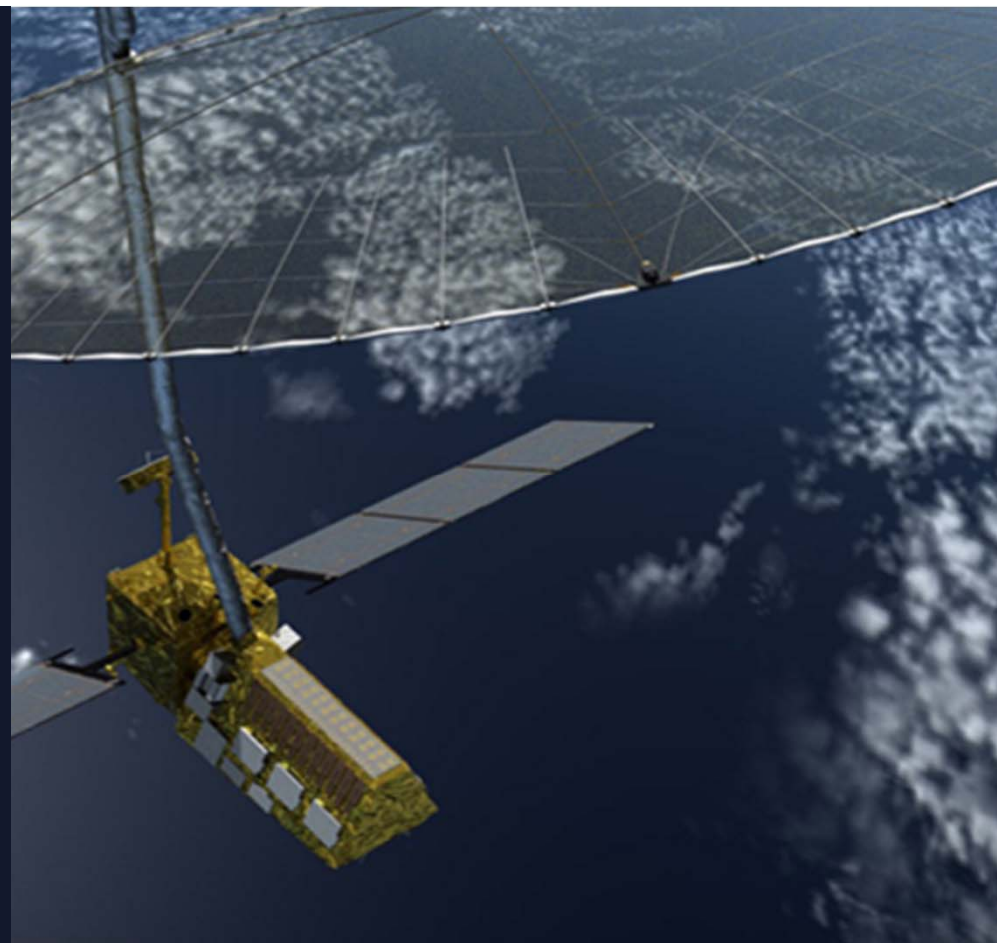
NISAR Mission

80 TBs/day
generation

400 TBs/day
reprocessing

300 GB
Granules

150 PBs @ 50 Gbps
processing speed for months



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NASA-ISRO Synthetic Aperture Radar (NISAR) 5

EOSDIS Data System Evolution

Motivation for Cloud

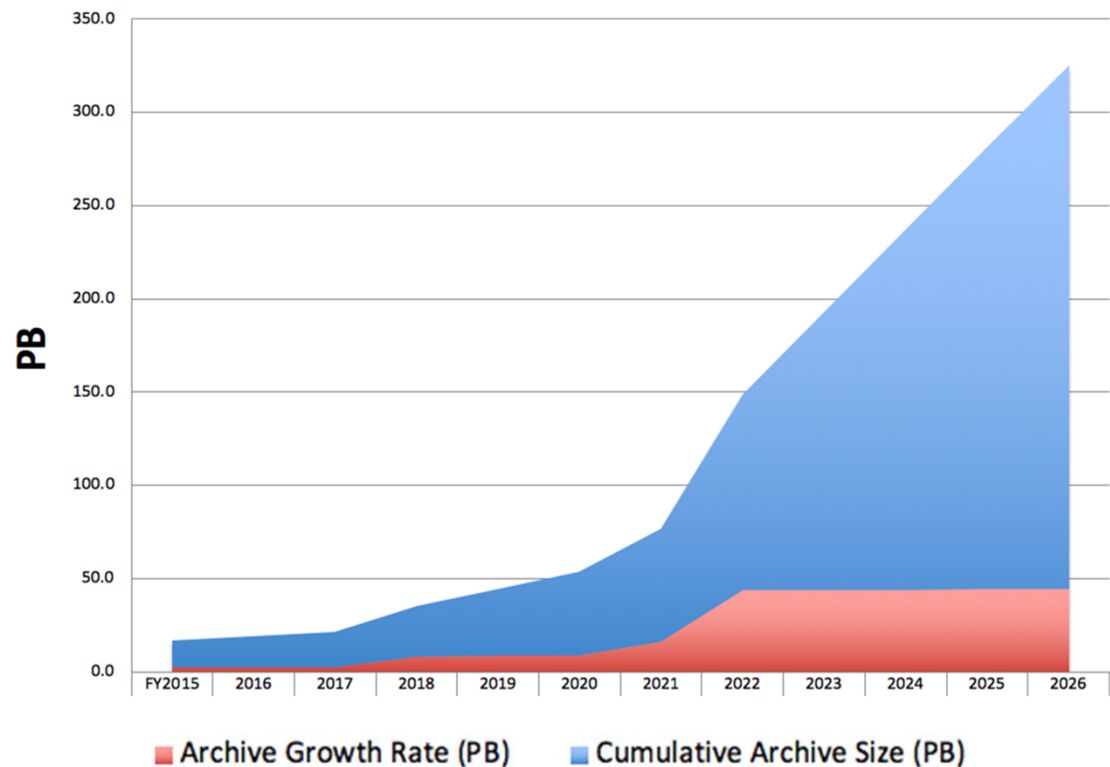
Growth of Mission Data & Processing:

Projected rapid archive growth and the need to effectively process significantly larger volumes of new mission data requires **rethinking existing architectures**.

Data Systems: More cost-effective, flexible, and scalable data system ingest, archive, and distribution solutions are needed to **keep pace with new mission advancement**.

Science Users: Significantly larger data volumes requires **additional ways to access and utilize this data**, with “Data Close to Compute” or Data Lake”

Projected Data Volumes



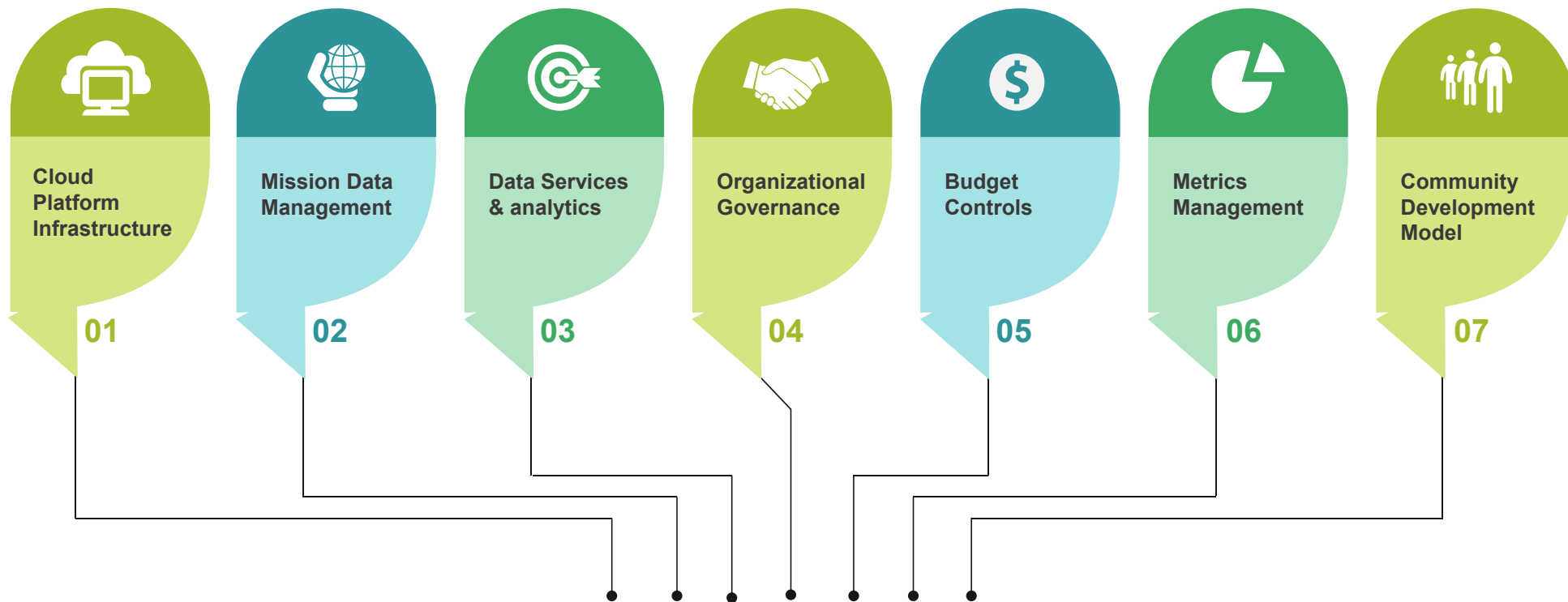


Earthdata Cloud (EDC)

- “Managed” commercial cloud for EOSDIS on AWS
- Improves the efficiency of NASA’s data systems operations – maintaining free/open data policy
- Designed for EOSDIS applications and mission data ingest, archive, distribution
- Increase opportunity for researchers and commercial users to access/process petabytes of data quickly without the need for data management.

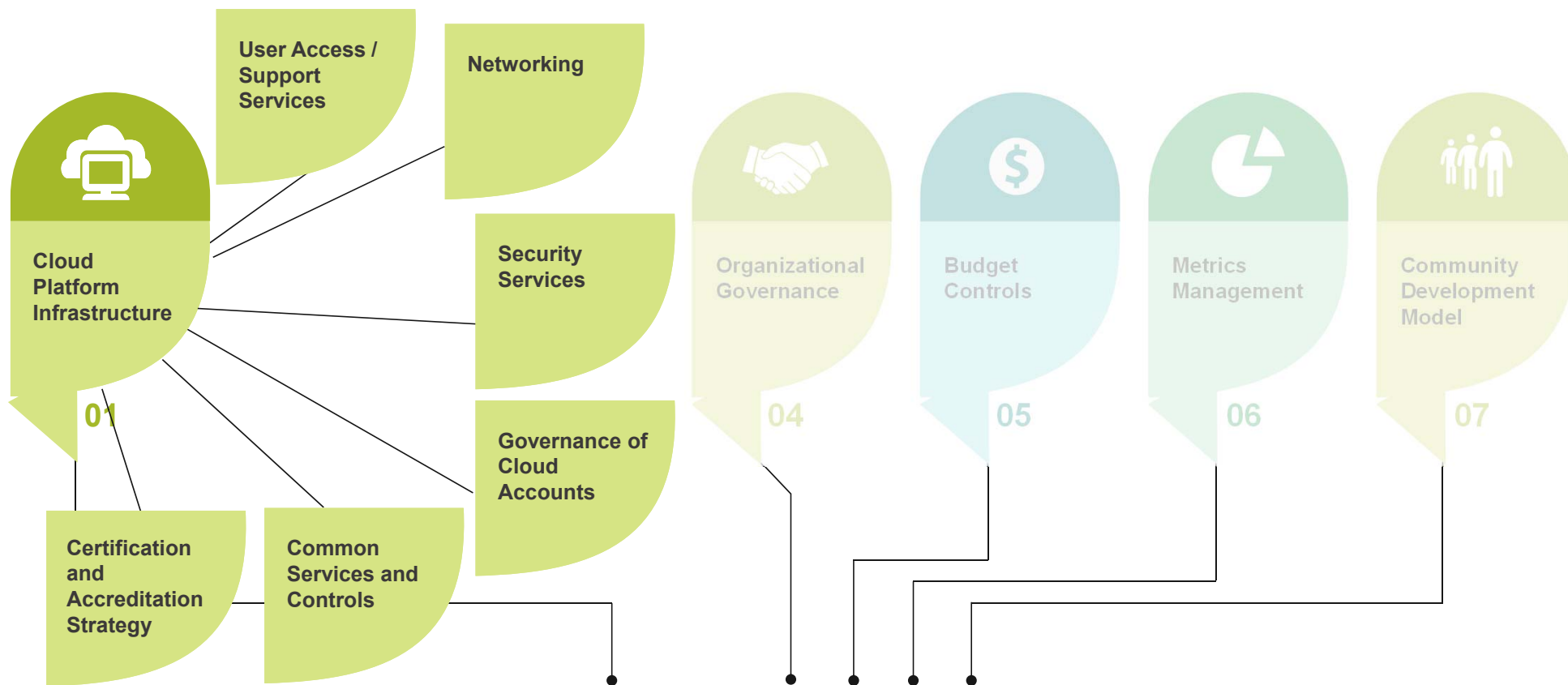


NASA Earthdata Cloud (EDC) – <http://earthdata.nasa.gov>



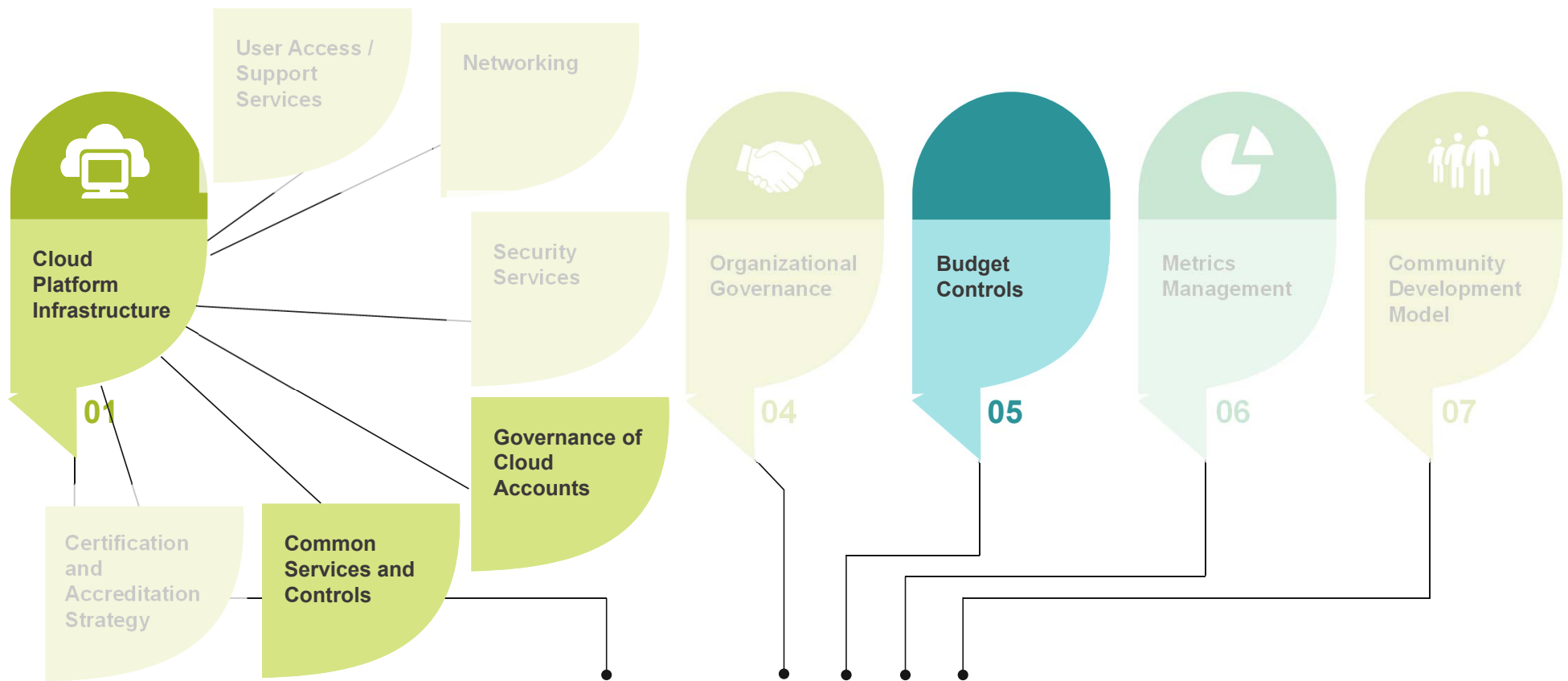
Components of the Earthdata Cloud





Project Level Components and Core Elements





Project Level Components and Core Elements



Earthdata Cloud Platform Infrastructure

A multi-account, Infrastructure-as-a-Service (IaaS) cloud platform operating on AWS under a single top level “payer account”, providing shared cloud services and controls to EOSDIS.



Maximizes Autonomy

Be a platform, not a gate; foster experimentation/innovation and support production needs of application owners



Maximizes Flexibility

Provide projects the freedom to implement solutions that fit their problem domains

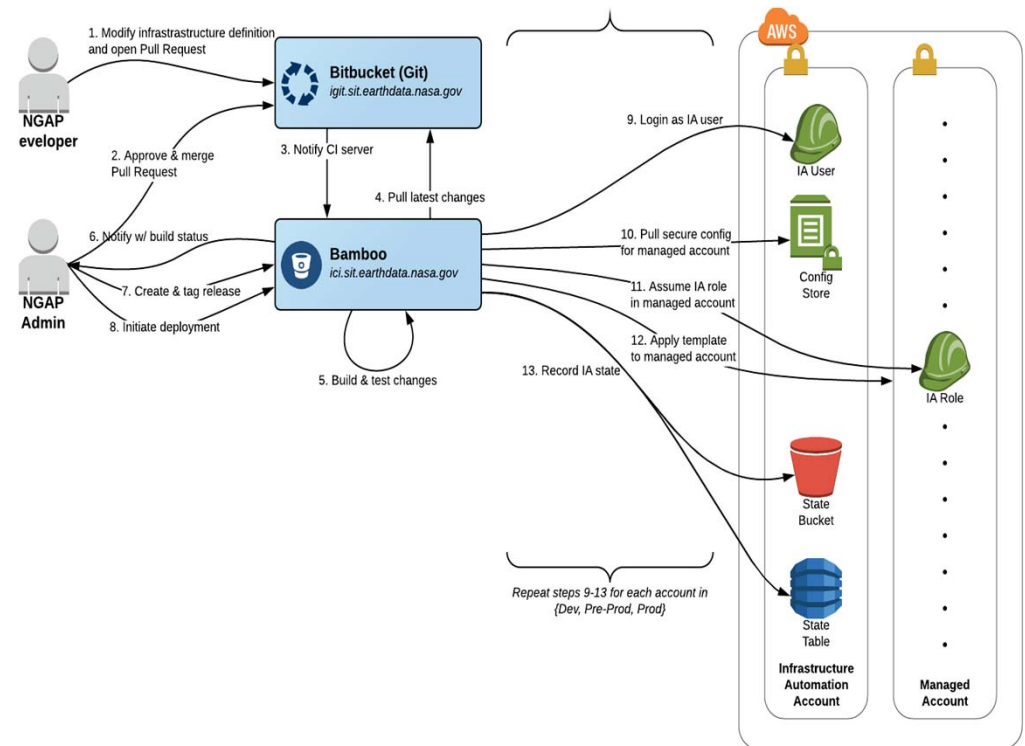


Shared Services & Controls

Platform manages common shared services & controls to reduce duplication, system complexity, and cost across EOSDIS



- 1. NASA-Approved Amazon Services** - vetted AWS and third- party SAAS services and process to add new. Focus is on using AWS cloud-native services
- 2. Code Deployment Services** - DevOps CICD Pipeline to security scan code, build, and deploy into EDC
- 3. Use of Infrastructure as Code** including re-useable template to define a multi-account ecosystem
- 4. cloudtamer.io Identity and Access Management** to:
 - Rotate AWS access keys
 - Apply session limits
 - Provide role-based access control



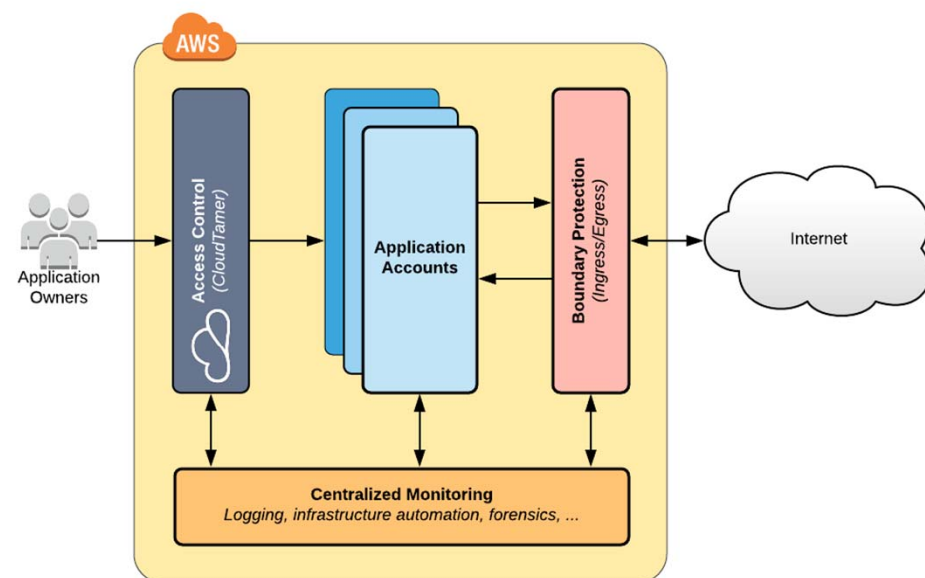
User Access

1. User Authentication

- Grant uniform access and experience to end users from multiple identity management systems (NAMS (SAML) / Internal directory / Active Directory)
- Enforce and validate minimum authentication levels via two-factor authentication
- Ensure that users only have access commensurate to the authentication type with cloudtamer.io
- Secure PIV/Token login, NASA NAMS account provisioning

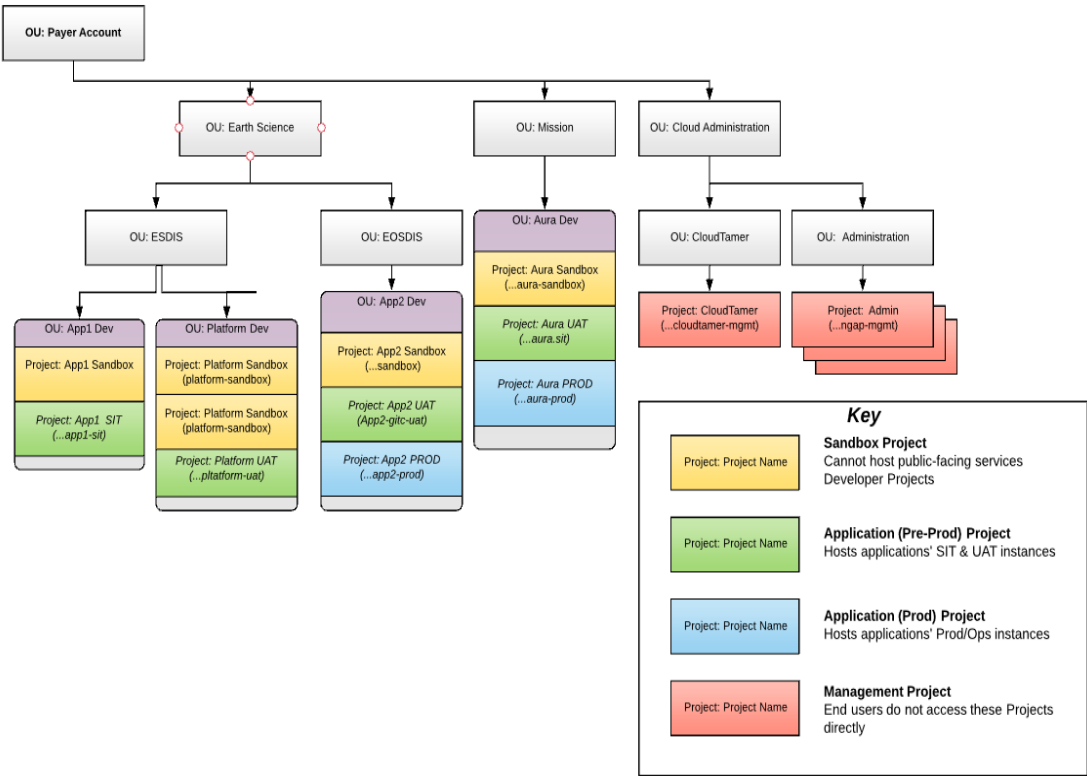
2. User Authorization

- Control who views finances, who accesses AWS resources, and who manages finance
- cloudtamer.io manages AWS IAM roles and policies at an organization level



Account Structure

- Single Payer Account using AWS Organization and Consolidated billing
- Multi-Account structure divided into NASA / Mission-defined organizational units
 - Isolation based on organizational units
 - Isolation based on application development, test, and production accounts
 - Isolation of Management and Security accounts from end user environment
 - Track AWS expenses to NASA organizations and funding sources



The Antideficiency Act (ADA) and Pay-as-You-Go

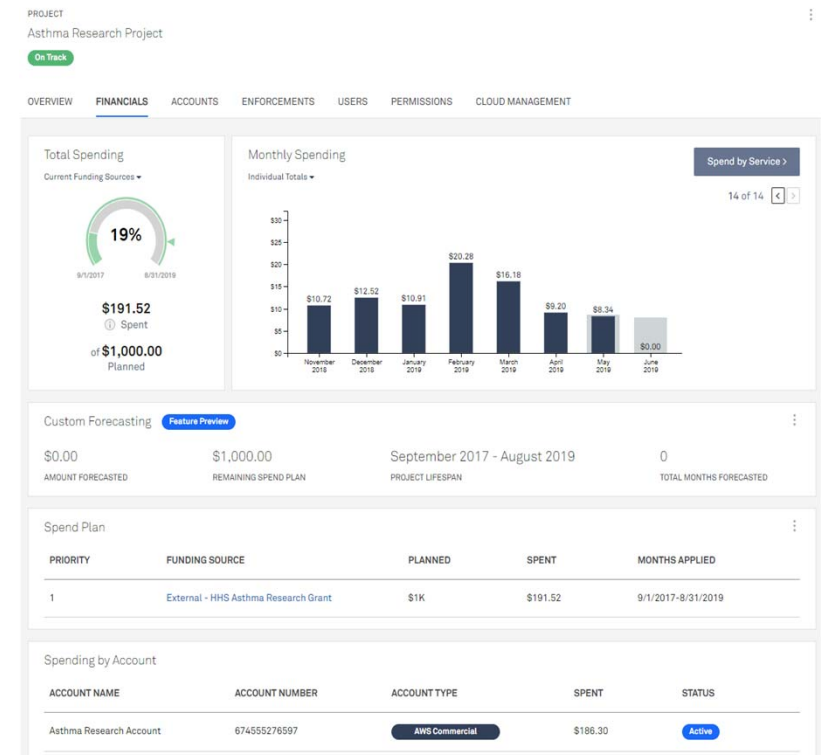
The ADA act prohibits federal agencies from obligations or expending federal funds in advance or in excess of an appropriation, and from accepting voluntary services.

Federal employees who violate the Antideficiency Act are subject to two types of sanctions: administrative and penal. Employees may be subject to appropriate administrative discipline including, when circumstances warrant, suspension from duty without pay or removal from office. In addition, employees may also be subject to **finances, **imprisonment**, or **both**.**

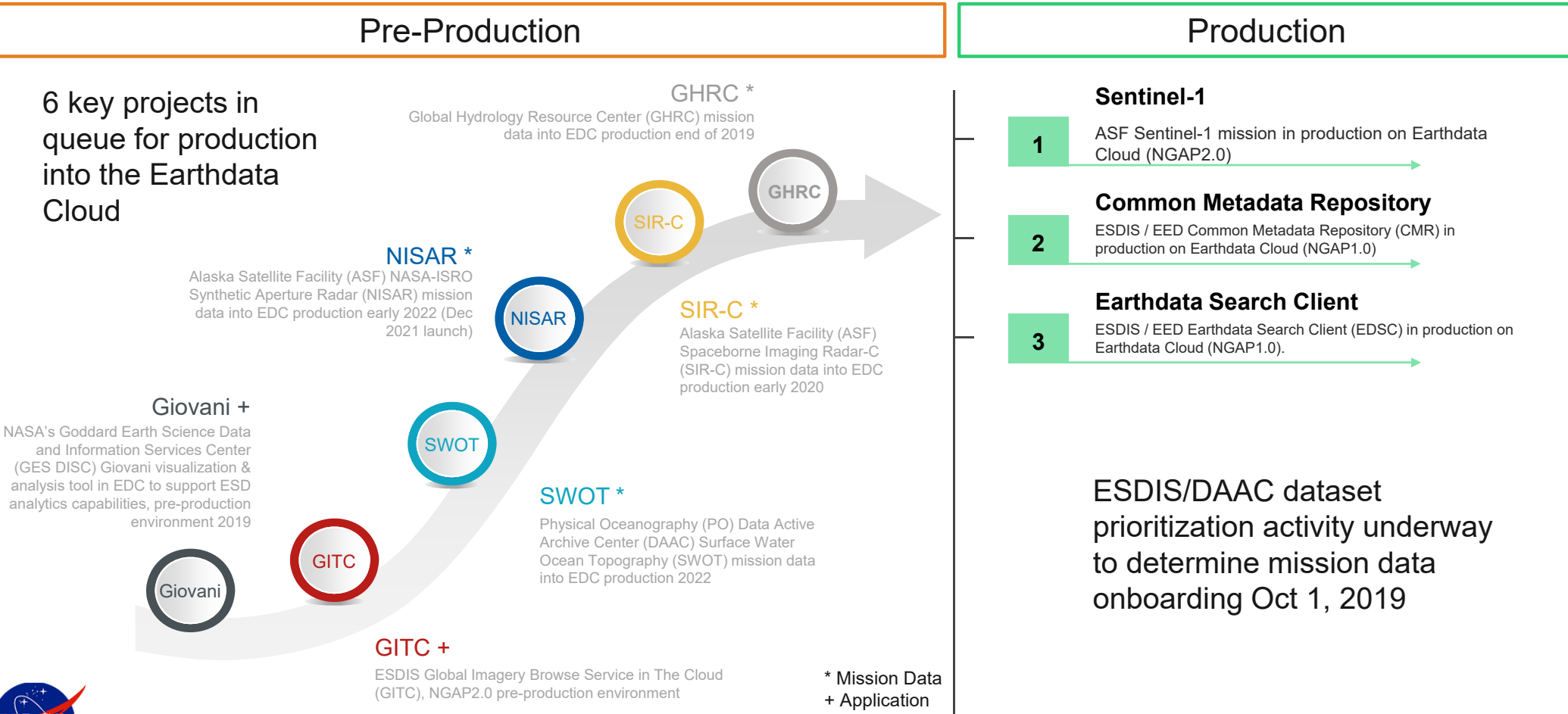


The cloudtamer.io account-level view

- Enforces individual AWS account-level budget through “budget caps”
- Provides account alert spend monitoring and budget control actions
- Allows for flexible access levels:
 - Top-level view for ESDIS management & business teams
 - Account view for APP-Admins & Developers as needed



Near-term Application and Data Onboarding



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