Importance and Incorporation of User Feedback in Data Stewardship
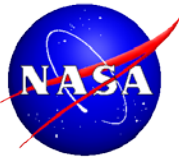
Hampapuram Ramapriyan[1,2] and Jeanne Behnke[1]
**[1]Goddard Space Flight Center, [2]Science Systems and Applications, Inc.**
**Presented at SciDataCon 2018, Gaborone, Botswana, Nov. 5-8, 2018**

Introduction

- **Data stewardship - A long-term responsibility**

- **Long-lived systems must evolve**

- **On-Going user feedback is critical for understanding needs and evolving as needs change**

- **We illustrate this through NASA's Earth Observing System Data and Information System (EOSDIS)**

NASA's Earth Observing System Data and Information System (EOSDIS)
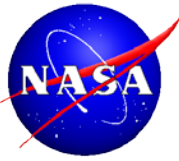
- **Managed by NASA's Earth Science Data and Information System (ESDIS) Project**
- **Implements NASA's free and open data policy in effect since early 1990s**
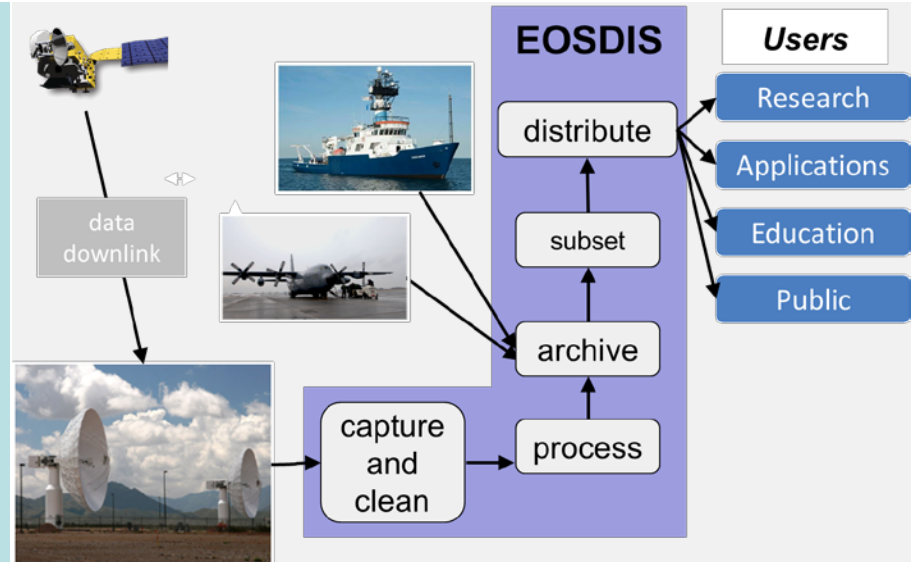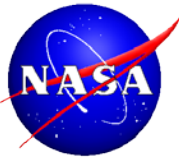

- **Provides end-to-end capabilities for managing NASA's Earth science data.**
  - ➢**Science Operations**
    - ❖**Science data processing**
    - ❖**Data management**
    - ❖**Interoperable distributed data archives**
    - ❖**On-line data access services**
    - ❖**Earth science discipline-oriented user services**

Missions, Datasets and Disciplines

Started in the 1990s, EOSDIS today archives and distributes over 11,000 data types

- **Atmosphere**
  - » Winds & Precipitation
  - » Aerosols & Clouds
  - » Temperature & Humidity
  - » Solar radiation
- **Ocean**
  - » Surface temperature
  - » Surface wind fields & Heat flux
  - » Surface topography
  - » Ocean color
- **Cryosphere**
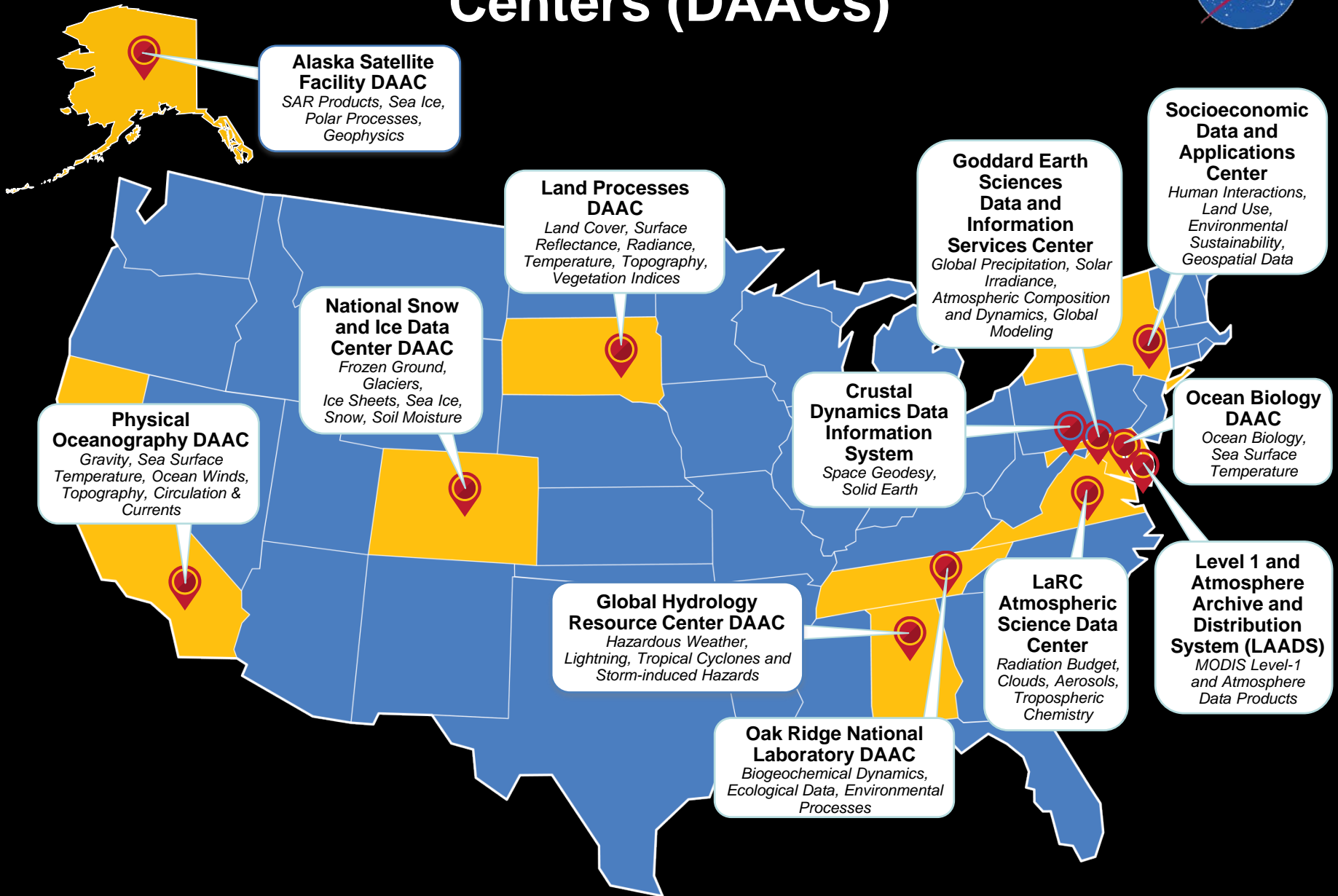 - » Sea/Land Ice & Snow Cover

Land
- » Cover & Usage
- » Soil Moisture
- » Topography & elevation
- » Temperature

Human Dimensions
- » Population & Land Use
- » Human & Environmental Health

Legend:
- Formulation
- Implementation
- Primary Ops
- Extended Ops

Landsat 9, TIR-FF · PACE · NI-SAR · SWOT · TEMPO · JPSS-2 (NOAA) RBI, OMPS-Limb · GRACE-FO (2) · ICESat-2 · CYGNSS · ISS · SORCE, TCTE (NOAA) · NISTAR, EPIC (NOAA's DSCOVR) · QuikSCAT · EO-1 · Landsat 7 (USGS) · SMAP · Terra · Suomi NPP (NOAA) · Aqua · CloudSat · Landsat 8 (USGS) · CALIPSO · Aura · GRACE (2) · OSTM/Jason 2 (NOAA) · GPM · OCO-2

Distributed Active Archive Centers (DAACs)

Alaska Satellite Facility DAAC
SAR Products, Sea Ice, Polar Processes, Geophysics

Land Processes DAAC
Land Cover, Surface Reflectance, Radiance, Temperature, Topography, Vegetation Indices

Socioeconomic Data and Applications Center
Human Interactions, Land Use, Environmental Sustainability, Geospatial Data

Goddard Earth Sciences Data and Information Services Center
Global Precipitation, Solar Irradiance, Atmospheric Composition and Dynamics, Global Modeling

National Snow and Ice Data Center DAAC
Frozen Ground, Glaciers, Ice Sheets, Sea Ice, Snow, Soil Moisture

Ocean Biology DAAC
Ocean Biology, Sea Surface Temperature

Physical Oceanography DAAC
Gravity, Sea Surface Temperature, Ocean Winds, Topography, Circulation & Currents

Crustal Dynamics Data Information System
Space Geodesy, Solid Earth

Global Hydrology Resource Center DAAC
Hazardous Weather, Lightning, Tropical Cyclones and Storm-induced Hazards

LaRC Atmospheric Science Data Center
Radiation Budget, Clouds, Aerosols, Tropospheric Chemistry

Level 1 and Atmosphere Archive and Distribution System (LAADS)
MODIS Level-1 and Atmosphere Data Products

Oak Ridge National Laboratory DAAC
Biogeochemical Dynamics, Ecological Data, Environmental Processes

Science Investigator-led Processing Systems

NASA

Microwave Limb Sounder (MLS)

Measurements of Pollution in the Troposphere (MOPITT)

Visible Infrared Imaging Radiometer Suite (VIIRS) Atmosphere

MODIS Adaptive Processing System (MODAPS)

Ocean Data Processing System (OCDPS)

Advanced Technology Microwave Sounder (ATMS) and Cross-track Infrared Sounder (CrIS) Sounder

Ozone Monitoring Instrument (OMI)

Visible Infrared Imaging Radiometer Suite (VIIRS) Land

Tropospheric Emission Spectrometer (TES)

Advanced Microwave Scanning Radiometer for EOS 2 (AMSR-E/2)

Visible Infrared Imaging Radiometer Suite (VIIRS) Ocean

Ozone Mapping Profiler Suite (OMPS) Ozone

SIPSs perform forward processing of standard products, and reprocess data to incorporate algorithm improvements.
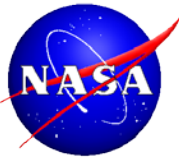
Key Metrics

Archive Volume & Growth

Volume (PB)

Data Distribution (Files)

Millions

Distinct Users of Data and Services	3.0 Million
End User Average Distribution Volume	53 TB/Day

Note: FY = Fiscal Year; FY 15 = (October 1, 2014 through September 30, 2015)
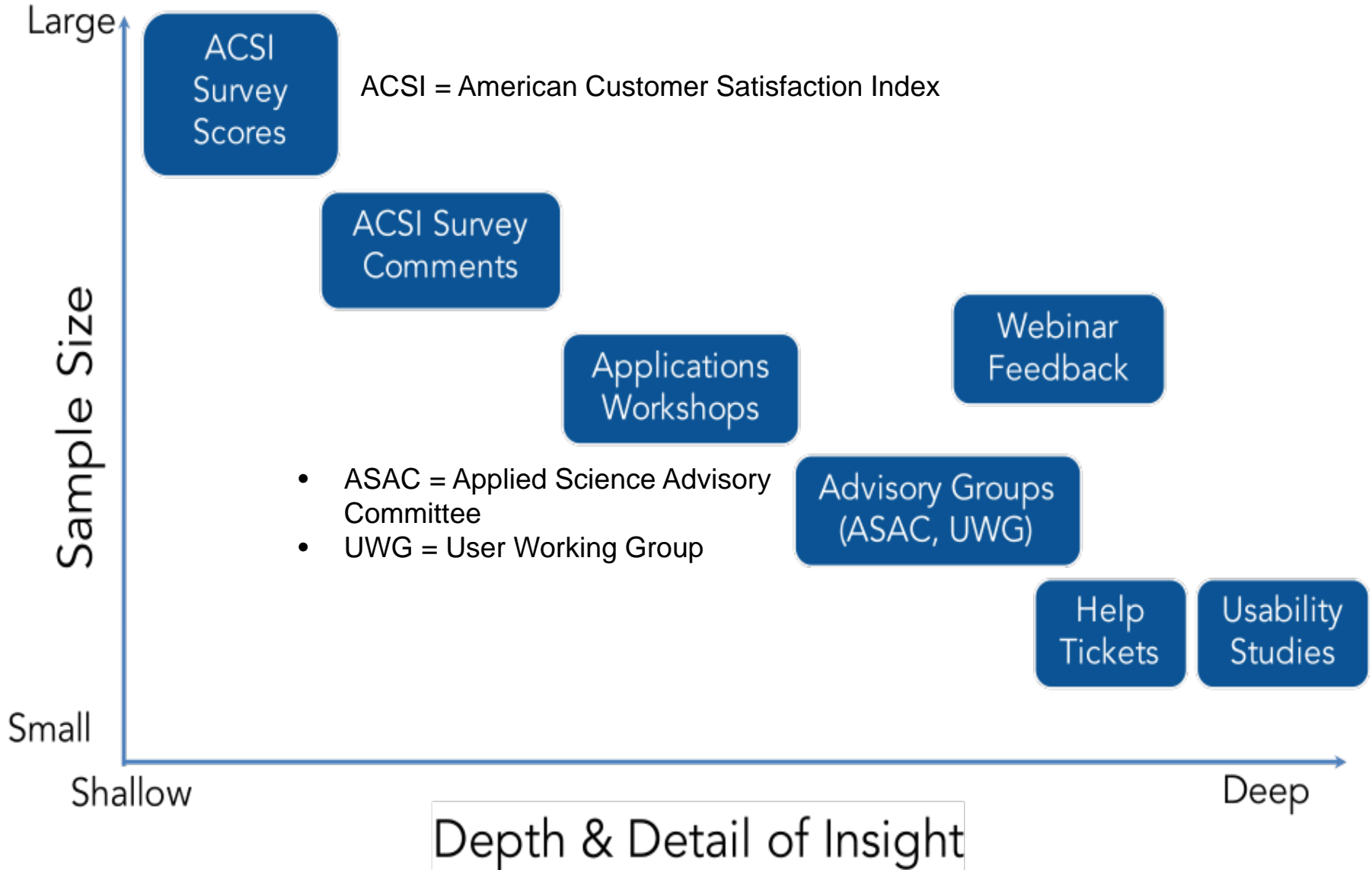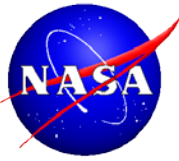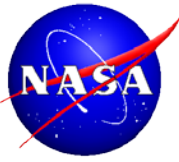
7

User Feedback – Examples
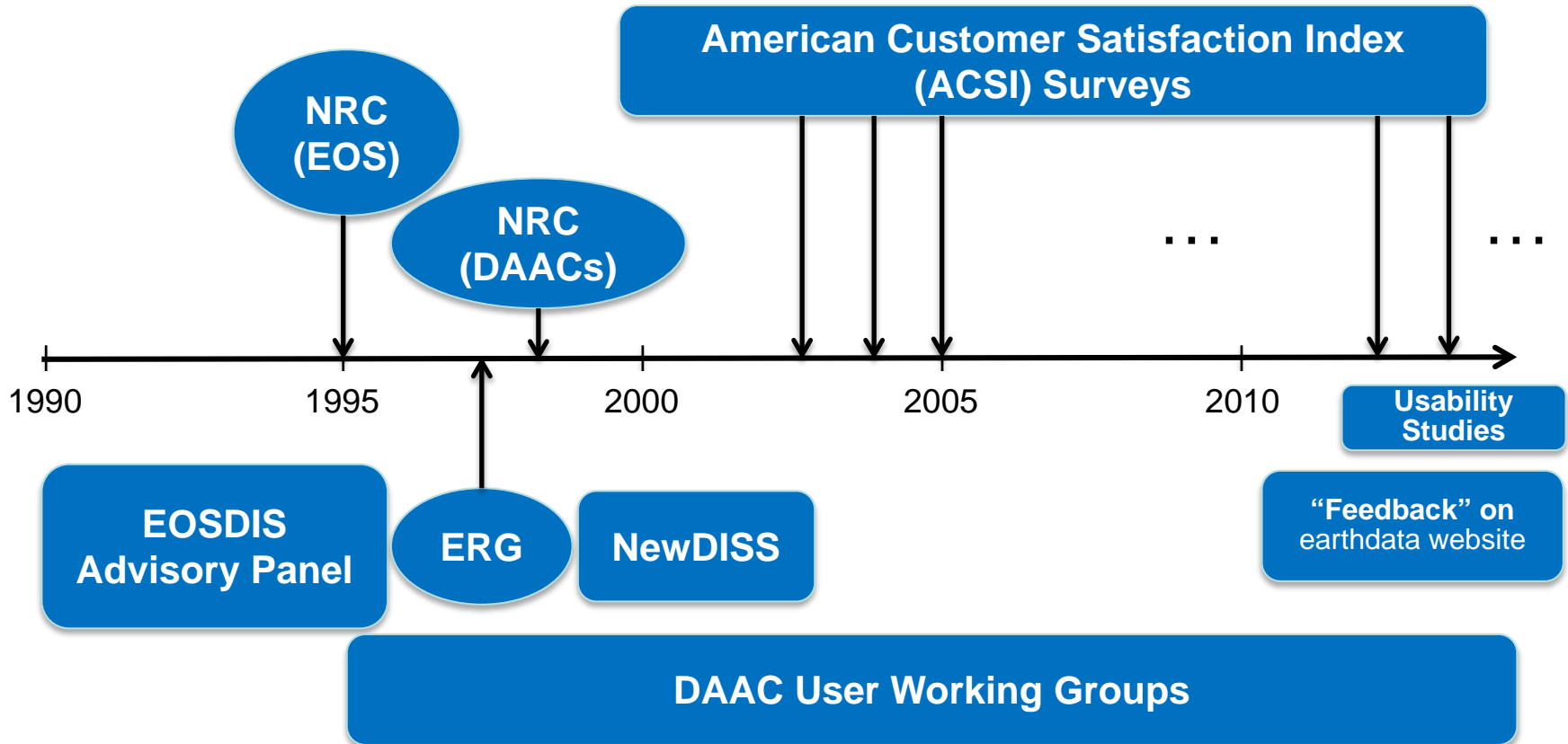
NRC: National Research Council
ERG: EOSDIS Review Group
NewDISS: New Data and Information Systems and Services (NewDISS) Strategy Team
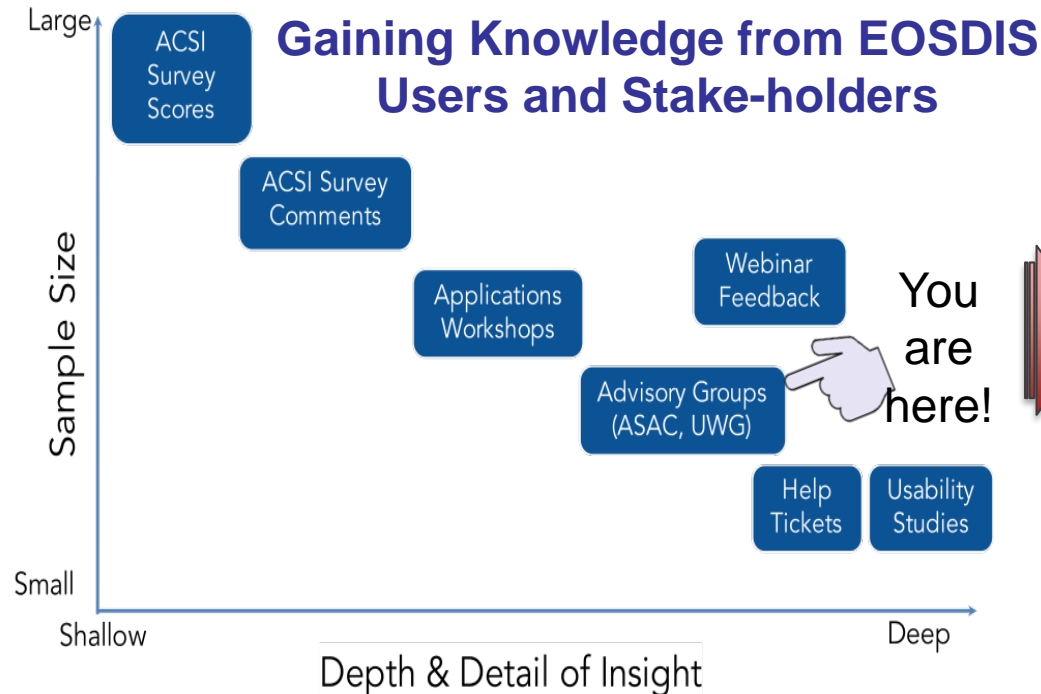
Gaining Knowledge from Users and Stake-holders

ACSI = American Customer Satisfaction Index

- ASAC = Applied Science Advisory Committee
- UWG = User Working Group

Sample Size (Large → Small)

Depth & Detail of Insight (Shallow → Deep)

- ACSI Survey Scores
- ACSI Survey Comments
- Applications Workshops
- Webinar Feedback
- Advisory Groups (ASAC, UWG)
- Help Tickets
- Usability Studies

DAAC User Working Groups: Community Insights

The UWGs duties are principally to:

- **Assist in accomplishing science goals**
- **Provide guidance on data management priorities**
- **Provide guidance on DAAC Core activities**
- **Provide input to annual work plans and long-range planning**
- **Help coordinate science issues between ESDIS and HQ**

The UWGs

… provide community input into the operation of the DAACs and EOSDIS.

… provide oversight and guidance/on-going reality check of DAAC goals and objectives - are these being met?
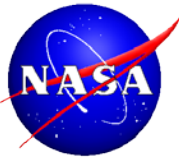
Gaining Knowledge from EOSDIS Users and Stake-holders

Large

- ACSI Survey Scores
- ACSI Survey Comments
- Applications Workshops
- Webinar Feedback
- Advisory Groups (ASAC, UWG)
- Help Tickets
- Usability Studies

You are here!

Small

Shallow ——— Deep

Sample Size

Depth & Detail of Insight

The UWG

… members represent a specific community of data users and have a depth of experience with the DAAC's data and services.

# Sample Recommendations by UWGs (Data Search)
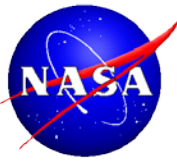
- **Obtain user input on the design and usability of the <u>Earthdata Search Client</u>. Search relevance should be based on user experience in addition to the characteristics of the data.**

- **Provide multiple avenues to access data holdings so that different types of users have tools appropriate for their needs.**

- **Make data more readily searchable to a non-technical audience. Develop a data search page intended for inexperienced and non-specialist users, containing popular data products and explanations of these products.**

- **Make filtering and refining more obvious on web pages ("Amazon style").**

- **Add ability to save a search/search parameters.**

- **Allow users to rank search results in order of "popularity" based on, for example, the number of previous downloads (search relevance by popularity).**

- **Add ability to filter by spatial and temporal resolution.**

# Independent Survey of Customer Satisfaction

- **NASA's ESDIS Project conducts an annual survey of DAAC performance and customer satisfaction through an independent organization (CFI Group)**

- **CFI group assesses American Customer Satisfaction Index (ACSI) across various industries and organizations in U.S.**

  - **>**235 companies and >130 customer programs and services at federal agencies

- **For 14 years, EOSDIS has consistently exceeded the Federal Government average**

- **Ratings in the mid to upper 70s are considered "very good/world class" by the CFI Group**

- **Comments in surveys help define DAAC system improvements**

EOSDIS ACSI History
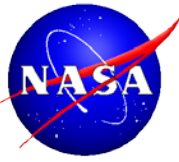
EOSDIS ACSI Scores consistently exceed the Federal Government Overall Score
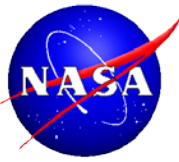
User Needs Assessment
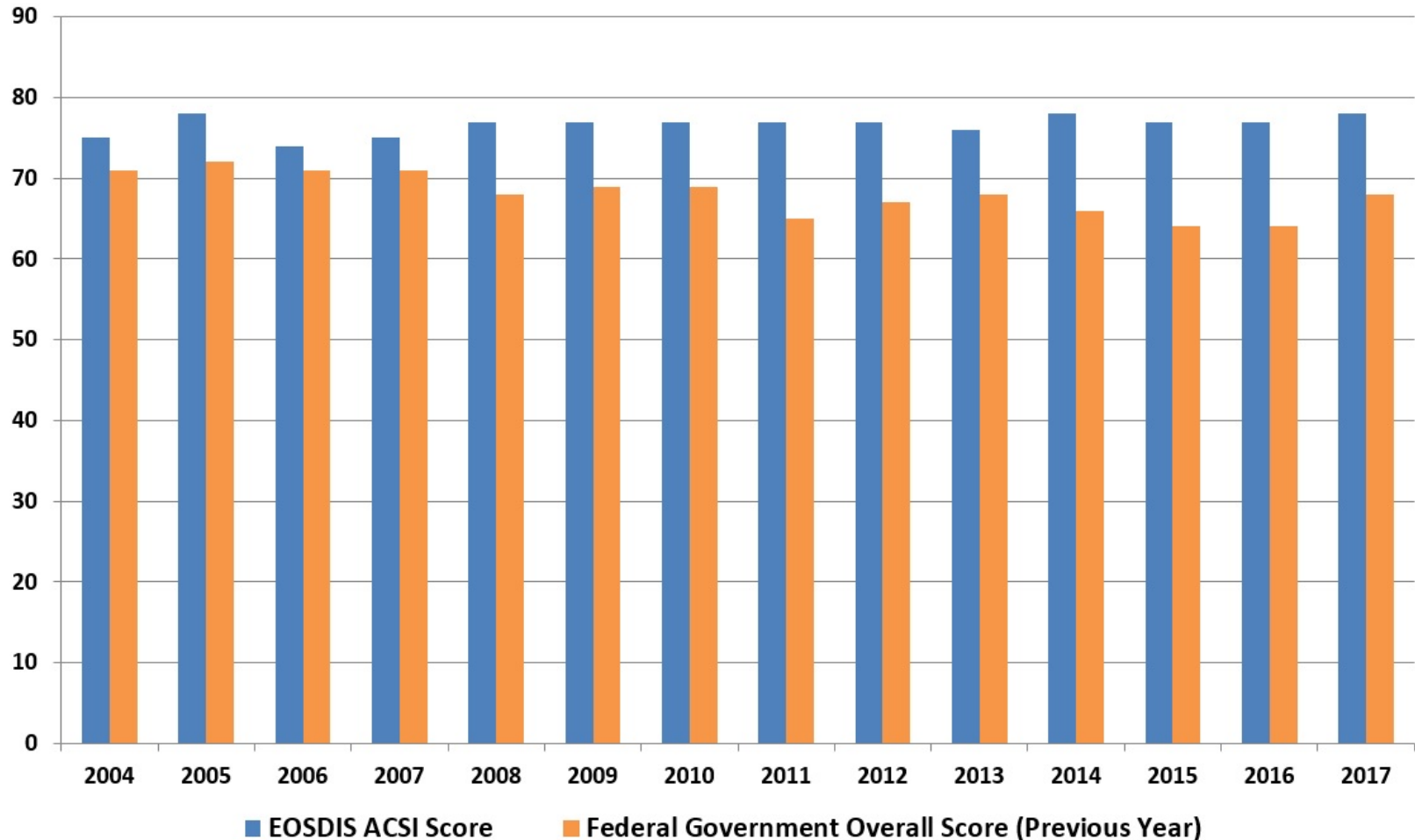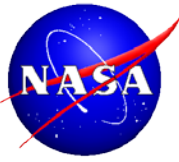
- **Annual activity by a focus group with representatives from DAACs and ESDIS Project**

- **Analyze user needs and arrive at actionable recommendations**

- **On-going follow-up on action item status**

User Needs Assessment
Sample Recommendations for Action

- Create new version of **"getting started guide"**

- Scope and establish a **Customer Relationship Management tool**

- Formalize **science communications activities** across EOSDIS

- Conduct a new **usability study for end-to-end journey** of accessing and using data

- Explore options for **cross-DAAC synergies to collective UWG recommendations**

- Investigate ways to **measure impact of social media and outreach**

- Continue to track bulk download-related recommendations to **ensure a positive user experience for bulk download**

- Explore, define, and document benefits of **common user experience on EOSDIS APIs**

- Determine the **next set of services** that should be part of **Earthdata Search**

Conclusion
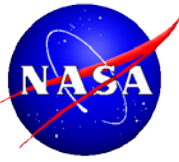
- **As a long-lived system EOSDIS has had many forms of input from users**

- **Receiving user feedback and responding to them have been extremely valuable in evolving EOSDIS from the initial concepts to today's major system that serves a global community with consistently high user satisfaction ratings.**