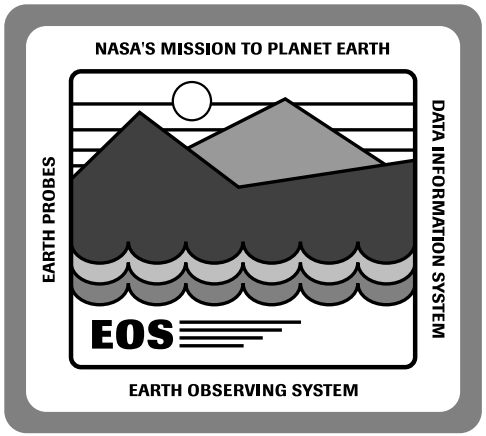
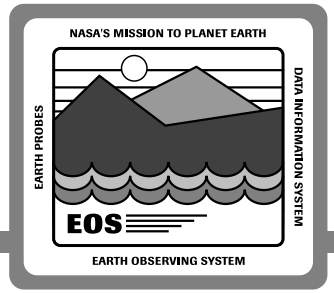


User/Data Modelling

Bill Bass

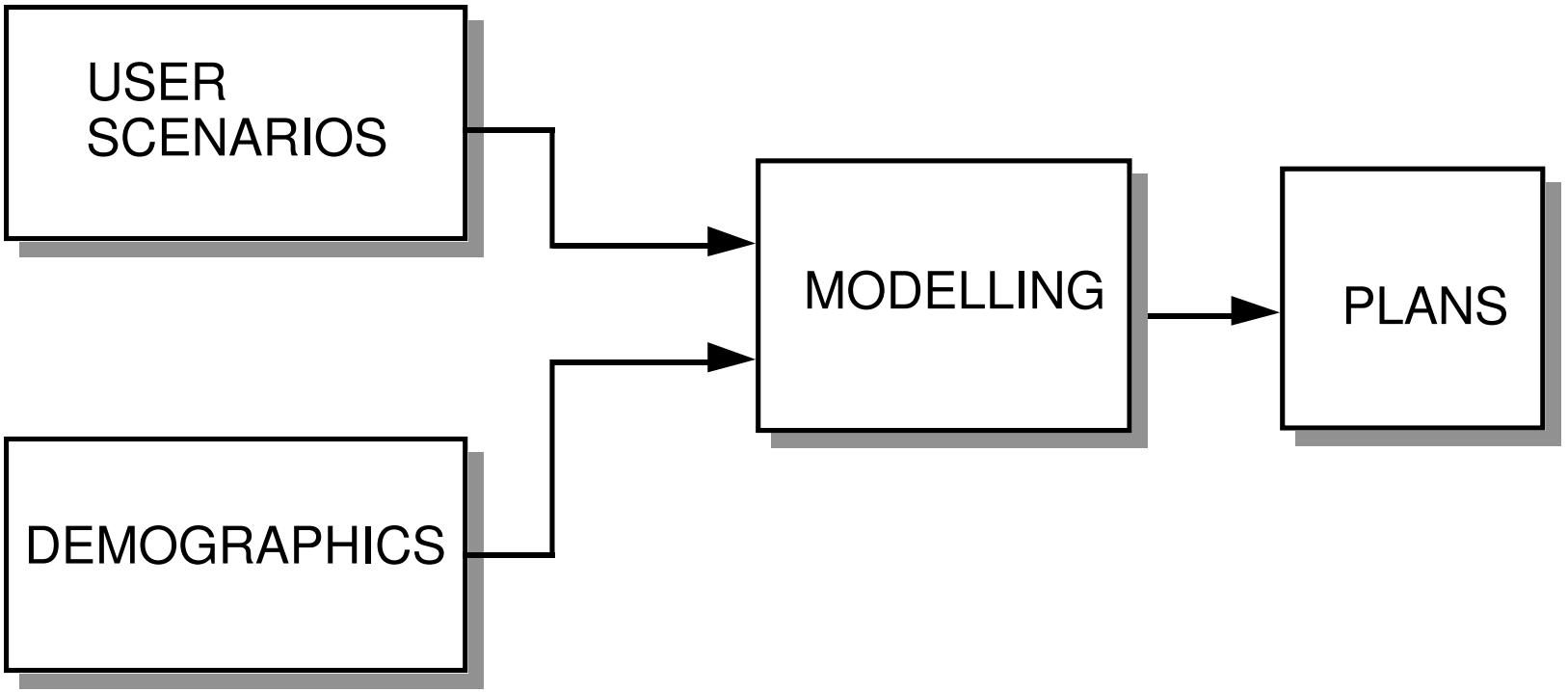
13 - 14 December 1993

Objectives

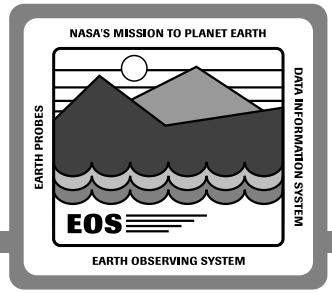


- **Improve understanding of how users will use the EOSDIS through requirements refinement and possibly requirements discovery**
- **Identify drivers and sensitivities and evaluate system sizing**
- **Anticipate changes in user community needs**
- **Modulate system architecture, design, and operations**

Roadmap



User Scenarios



Define scenarios to characterize the user community and how it will use services and data

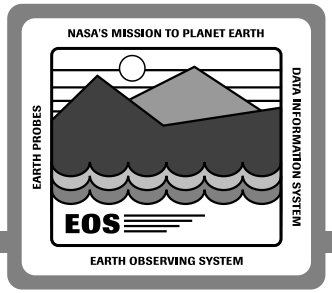
Characterize use in terms of modelling parameters (e.g., location, type, and volume of data accessed, number of accesses per day, etc.)

44 scenarios identified to cover multiple dimensions of user community;

14 completed at this time

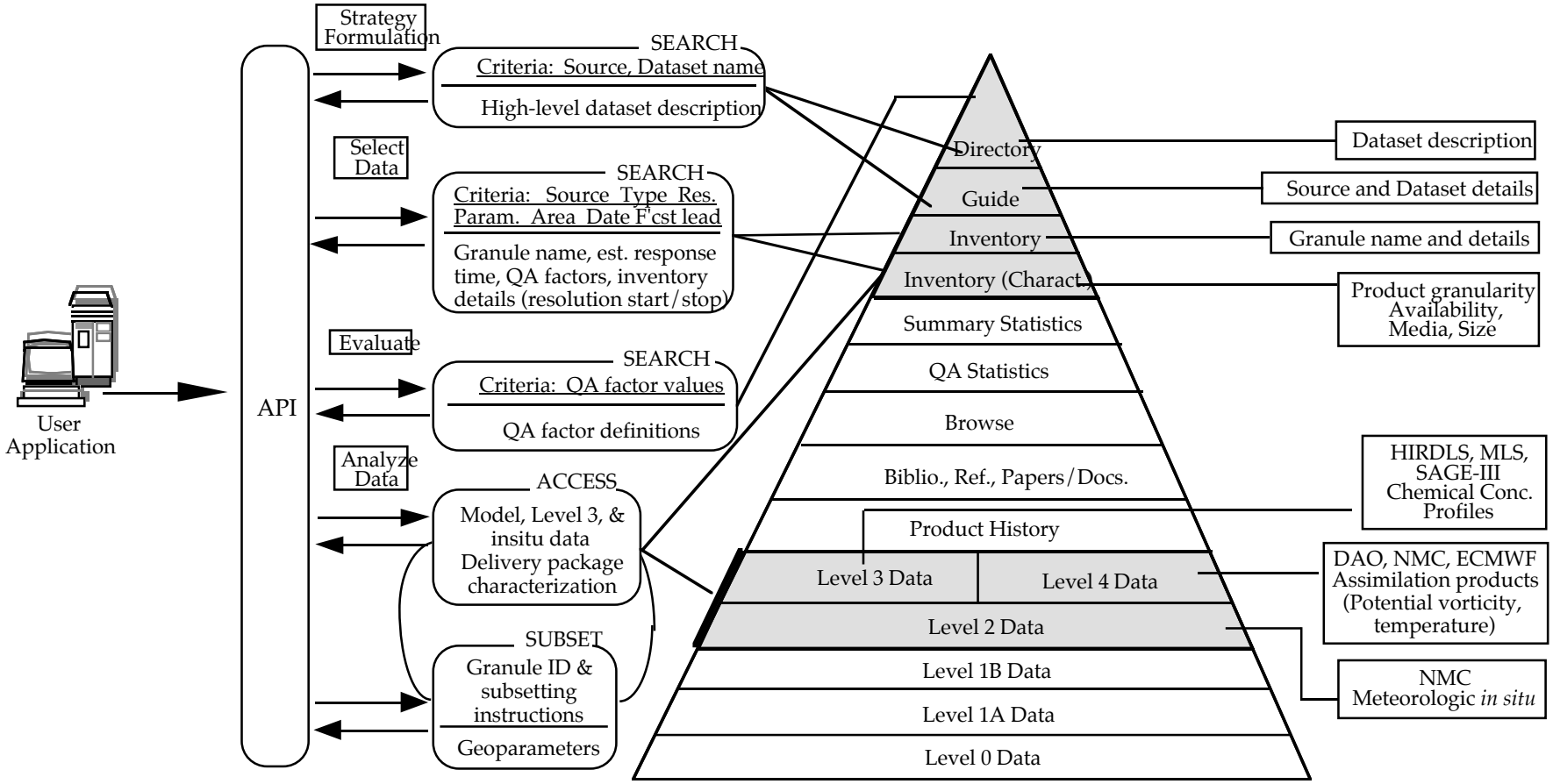
Scenarios need to be projected into three epochs to explore evolvability (1998 under consideration presently)

User Scenario Matrix

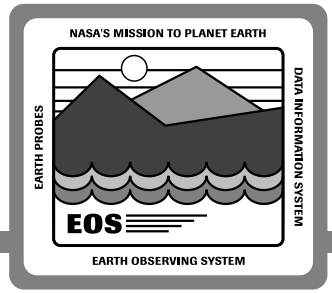


	General Info Searches	Reviews	Theoretical Studies	Case Studies	Field Studies	Climatologies/Global
Intermediary to Education or Policy Community (e.g., CIESIN, S4 proposals	Intermediary to Dept. of Education; high-level summary of meteorological data for grades K-12 *Bill Emery* 1	Lawyer hires intermediary; summary of snowfalls for lawsuit against a ski company *Edward Calvin* *Tyahla/Theobald* 2	Sociologist; hypothesis-people of means live upwind of industry in urban areas. *Dave Walker* *Tyahla/Theobald* 3	Writer for McGraw-Hill needs to prepare a text demonstrating EOSDIS via progressively complicated examples 4	Intermediary under contract to Dept. of Ed. prepares science lesson plans for Internet-wide distrib. 5	Sociologist-"people/park conflict"- 25 large game reserves in sub-Saharan Africa. *Michael Garstang* *Tyahla/Theobald* 6
Traditional User contacting EOSDIS directly	High School Teacher wants students to get radiance data to correlate with properties of river water samples *Donald Foss* *Lori Tyahla* 7	Virginia Coast Reserve Long-Term Ecological Res. Prog. - mapping and tracking vegetation dynamics *Raymond Deuser* *Tyahla/Theobald* 8	Test biological theory regarding vegetation competition in grasslands across the central U.S. *Don Stroebel* *Celeste Jarvis* 9	Insurance Co. Rep. wants geographical extent of Mississippi River Flood to verify claims *Bill Kennedy* *John Daucsavage* 10	Cryosphere; researcher using surface reflectance to determine age of ice surface on land *Chris Shuman* *Celeste Jarvis* 11	Intn'l Monetary Fund; wants data to verify credit worthiness of multi-billion dollar loan for irrigation project 12
Character text user	News reporter; wants before and after photos of Mississippi River flood area *Bill Kennedy* *John Daucsavage* 13	Undergrad. Student in intro to Remote Sensing needs to research what instruments data sets are cataloguing with senior thesis *Jan Poston* *Lori Tyahla* 14	NOAA researcher studying seasonal and diurnal variation in regional lightning distribution *Raul Lopez* *Lori Tyahla* 15	Forest Ranger preparing a report for a Department of Interior Policy Maker. Needs pre- and post-fores fire data to assess recovery. *Donald Ohlen* *John Daucsavage* 16	An oil company needs regional geological and vegetative data to determine best drilling sites. *Bill Kennedy* *John Daucsavage* 17	Political Science Professor at a small college wants to correlate NDVI data with global population and GNP data *Jeff Eidenshink* *John Daucsavage* 18
Data Consumer (Moderate Access)	A local government near LA wants daily ocean color data delivered once/month (algal growth) *Carolyn Whitaker* 19	Earth Science Researcher wishes to access electronic journal *Jeff Dozier* *Lori Tyahla* 20	NSIDC Scenario #2 Snow depth and Extent; Polar Jet Stream *John Walsh* *Khalsa/Kaminski* 21	MSFC Scenario #2 Global wind field detection; aerosol backscatter-case study oriented *Dave Emmitt* *Theobald/Tyahla* 22	ISI Global Water Cycle;, includes model verification through field studies; *Eric Barron* *Lori Tyahla* 23	NSIDC Scenario #1 Surface and top of atmosphere radiative fluxes over sea ice durnn summer (2 yrs.) *Jeff Key* *Khalsa/Kaminski* 24
Data Browser (Frequent Access)	Research Librarian *Cristina Sharretts* *Tyahla/Theobald* 25	Investigation of algorithms involving a wide range of EOS instruments which will provide detection, tracking, and warning of volcanic events and ejectamenta. 26	Earth Science Community User; e.g., University Prof., Radiation Budget *Barkstrom (CERES)* *Haldun Direskinelli* 27	Instrument Support Terminal User; e.g., ASTER Team Member *Bob Hekl* *Tyahla/Theobald* 28	Use of Cryospheric System to Monitor Global Change in Canada; *Rejean Simard* *Lori Tyahla* 29A Arctic ice pack response to weather *John Heiserich* *Celeste Jarvis* 29B	Changes in Biogeochemical Cycles; *Berrien Moore, III* *Mike Theobald* 30
Analytical User (Frequent Access)	31	*H. Grant Goodell* *Tanya Furman*	Stratospheric chemistry and dynamics *Lesile Lait* *Mike Theobald* 33	Detection and classification of transparent cirrus clouds. *Dan Baldwin* *Tyahla/Theobald* 34	Interdisciplinary Ocean/Atmosphere Field Campaign (a la TOGA-COARE *Jim Wang & David Short* *A. K. Sharma* 35	Climate, Erosion, and Tectonics in Andes and other mountain systems; *Bryan Isacks* *Theobald/Tyahla* 36
Production User (Frequent Access)	37	*Tyahla/Theobald*	MSFC Scenario #1 Validation of passive microwave algorithm for precipitation retrieval *Michael Goodman* *Danny Harden* 39	Commercial User; value-added products *John Daucsavage* 40	Interdisciplinary Investigation of Clouds and Earth's Radiant Energy System; *Bruce Wielicki* *Mike Theobald* 41	GCM Modeler *Jim Slobie* *Celeste Jarvis* 42A EOS Instrument Investigator; e.g., MODIS, Polar GHP *Mark Abbott* *Celeste Jarvis* 42B
Advanced Technology User	43	44	Intn'l Interdisciplinary PI; e.g., will event recognition software work on L4 data to flag a particular event? *Mouginis-Mark* *Lori Tyahla* 45	Development of Automated Snow Mapping Procedure (Seattle 2000 Scenario) *Walter Rosenthal* *Lori Tyahla* 46	Calibration/Validation of MODIS-Ocean Products *Bob Evans* *T. Neblald & Tyahla* 47	AIRS Team 48

Example User Scenario
Scenario 33, Dr. Leslie Lait



Highlights from Scenario 33



General Comments from Dr. Lait

- **Consistency in climatic datasets is a priority**
- **The easier EOSDIS can make it to access data, the better**
- **He uses data, not images**

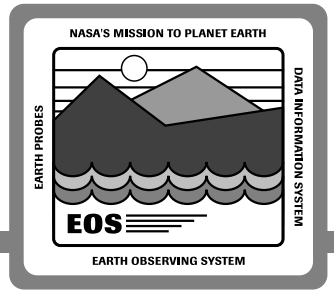
Functional

- **There are many users in his group (and many applications), but single point of access to data**
- **Access to data is from within applications (API)**
- **Needs consistent means of reading data from similar datasets**
- **Needs interoperability with ADCs**
- **Is already relying on electronic collaboration**

Resource

- **Daily access of the following data (total daily volume (subsetted) = ~ 600MB):**
  - **DAO assimilation products**
  - **NMC station meteorologic data**
  - **NMC forecasts, assimilation products**
  - **ECMWF forecasts, assimilation products**
- **Monthly access (total monthly volume = ~1520 MB):**
  - **Satellite retrievals of stratospheric chemical concentrations (HIRDLS, SAGE-III, MLS)**

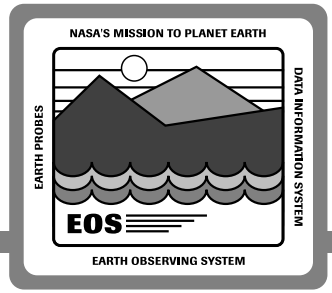
Examples of Insights Gained



Architecture

- **Users want machine-to-machine search and access capabilities**
  - **4 of 14 scenarios described this capability**
  - **Architecture provides capability through API and 10%**
- **Users want to be able to extend the query language**
  - **1 of 14 scenarios described this capability**
  - **APIs should provide query language extensibility**
- **Users want to be able to access data, manipulate and process it without ever having to receive it**
  - **2 of 14 scenarios described this capability**
  - **Architecture provides capability through API and 10%**
- **Users want to use ECS to access non-EOS data, including auxiliary, ancillary (GIS) and in-situ data. Users may log on to ECS and never request EOS data**
  - **11 of 14 scenarios requested non-EOS data**
  - **User DIS provides interoperability and common user interface**

Examples of Policy Insights Gained



Insight 1

- **Location of sophisticated analysis varies across the user scenarios**
  - **3 users want EOSDIS to provide analysis capabilities**
  - **11 users want EOSDIS to just provide data**
- **Architecture accomodates both users**
- **Policy needs to guide resource allocation**

Insight 2

- **Donald Foss (teacher use scenario) has students log onto EOSDIS**
  - **Feels EOSDIS interaction is as important to students' education as using the data**
  - **Could teach other teachers to use EOSDIS. This would result in a boom in student/teacher use**
- **User DIS architecture will accomodate student use**
- **Policy needs to guide resource allocation**