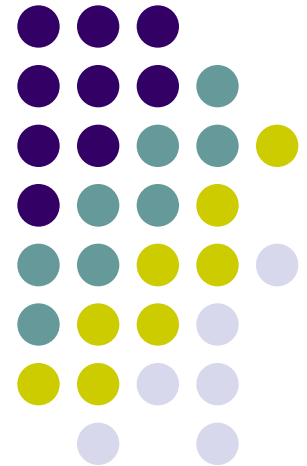


# **Solutions Networks Tools: Knowledge Bases for Harvesting NASA Earth Science Research**

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**Jim Aanstoos  
Presented at the  
Solutions Network Workshop  
April 2007  
University of Maryland**



# Project Team



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Daniel Anderson (ITD)  
Kent Hilbert (ITD)  
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Laura Pair (CSC)



## ***Spatial Information Solutions***

Charles O'Hara

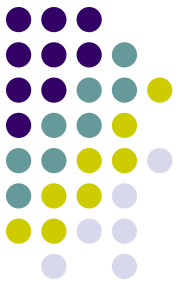
Sridhar Katragadda



## ***NASA***

Troy Frisbie, Callie Hall (Stennis)  
Fritz Policelli, Nabeel Keblawi (Goddard)

# The MRC Project

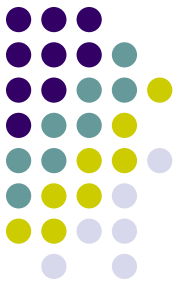


Developing, Deploying, and Strategically  
Evolving the NASA Earth Science  
Research Knowledge Database, Enterprise  
Architecture, and Future Solutions Network

Funded by NASA grant to the Mississippi Research Consortium

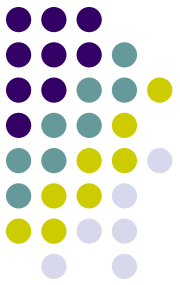
January 2006

# Task 1



- Develop, deploy, evolve the NASA Earth Science Research Projects Knowledge Base (RPKB)
  - Must be compatible with M2M (System Components Database)
  - Assess user requirements; incorporate in RPKB design

# Task 2



- Characterize the current state of NASA's network of partners and deploy database technologies for enhanced network analysis → Partners Network Knowledge Base (PNKB)
  - Collect data on contracts, grants, MOUs/MOAs
  - Catalogue current partnerships in Earth Science research
  - Establish contacts in partner agency/organizations
  - Map partner and NASA progress in Earth Science research, noting overlaps and gaps

# Task 3



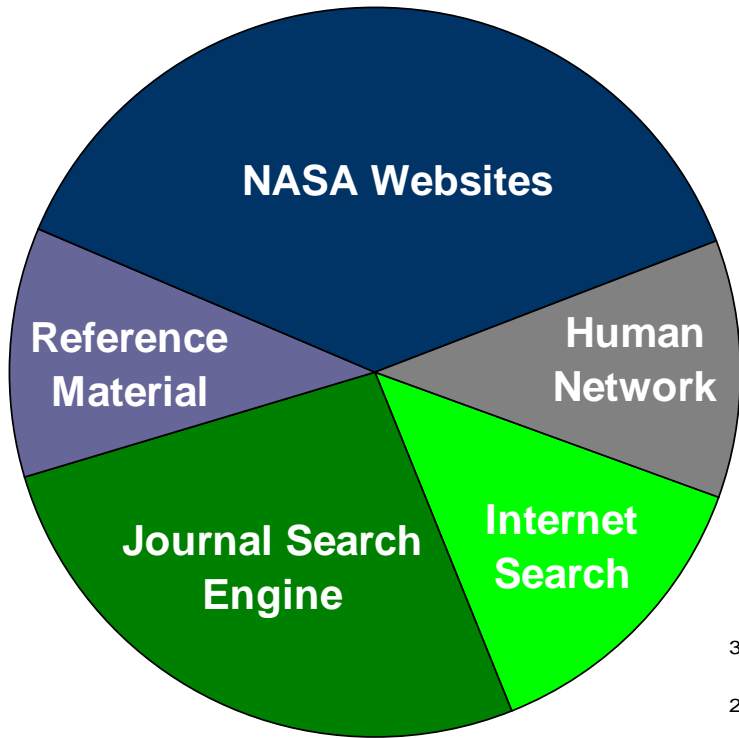
- Develop a strategic plan to evolve the NASA Earth Science Solutions Network
  - Client Applications
  - Web Interfaces
  - Data Discovery Agents
  - Web Services for Advanced Data and Results Publishing
  - Integrated Interfaces to NASA Enterprise Architecture



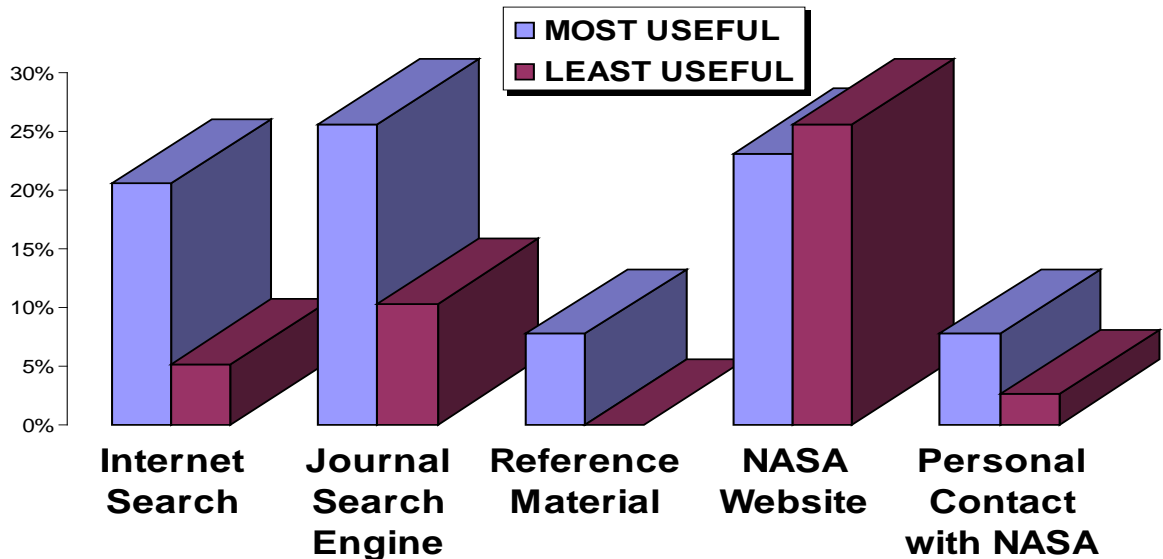
# Solutions Networks

- Marty Frederick 4/12/2007:
  - “Partnership building and creative thinking”
  - “Formulating ideas for extending research”
  - “Seeding the community with ideas”
- New knowledge bases can help!

# Existing Process for Developing NASA-Funded Research

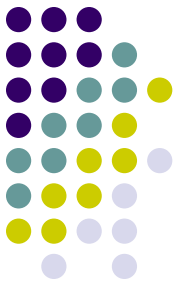


- Results from the MRC SN User Needs Assessment
  - Methods NASA Partners use to search for previously conducted NASA-funded research
  - NASA Partners rating of most useful and least useful

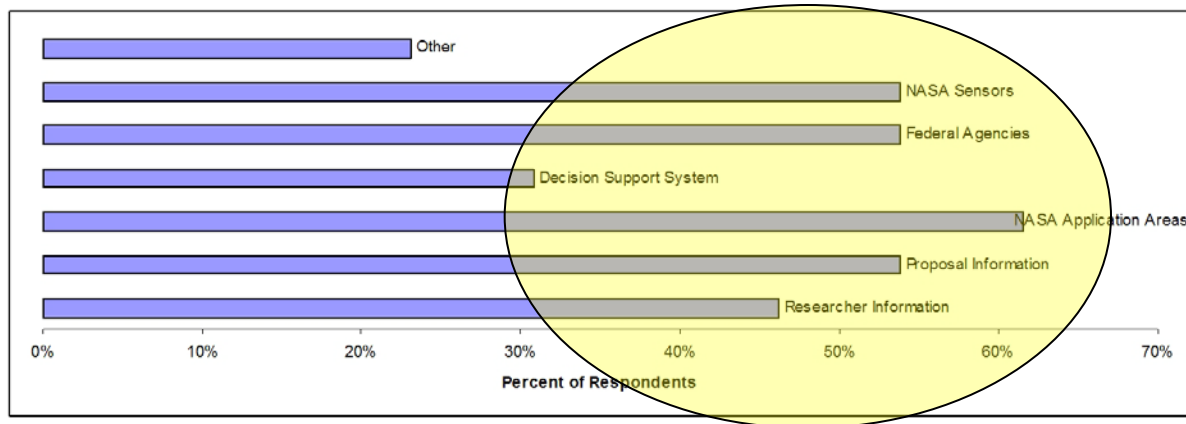




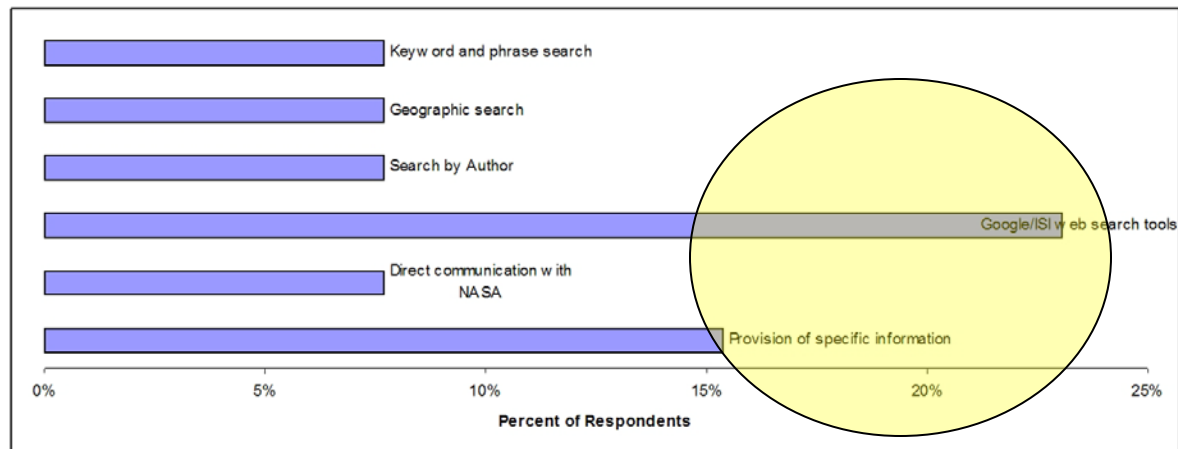
# User Needs and Content Delivery



What search criteria do you use to find information about NASA-funded research?



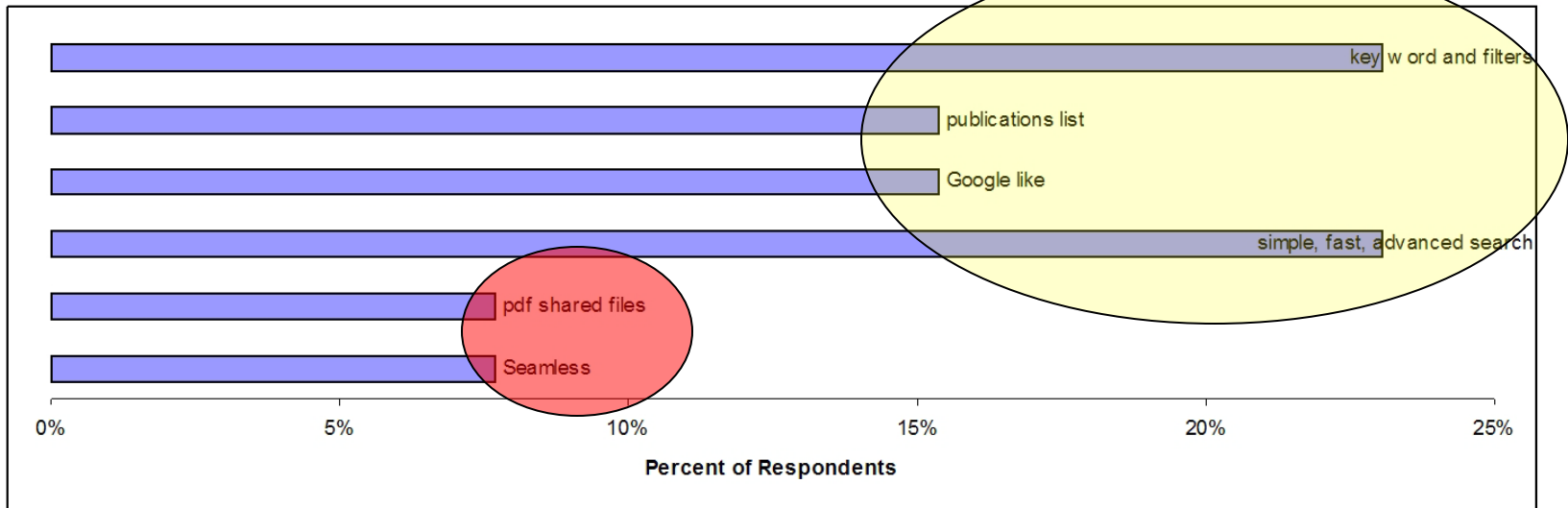
What information would you like available to you in the NASA research database?



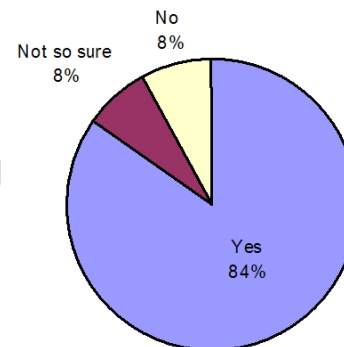
# User Needs and Content Delivery



Describe the ideal search tool to help you find NASA-related and /or NASA funded research in your area of interest?

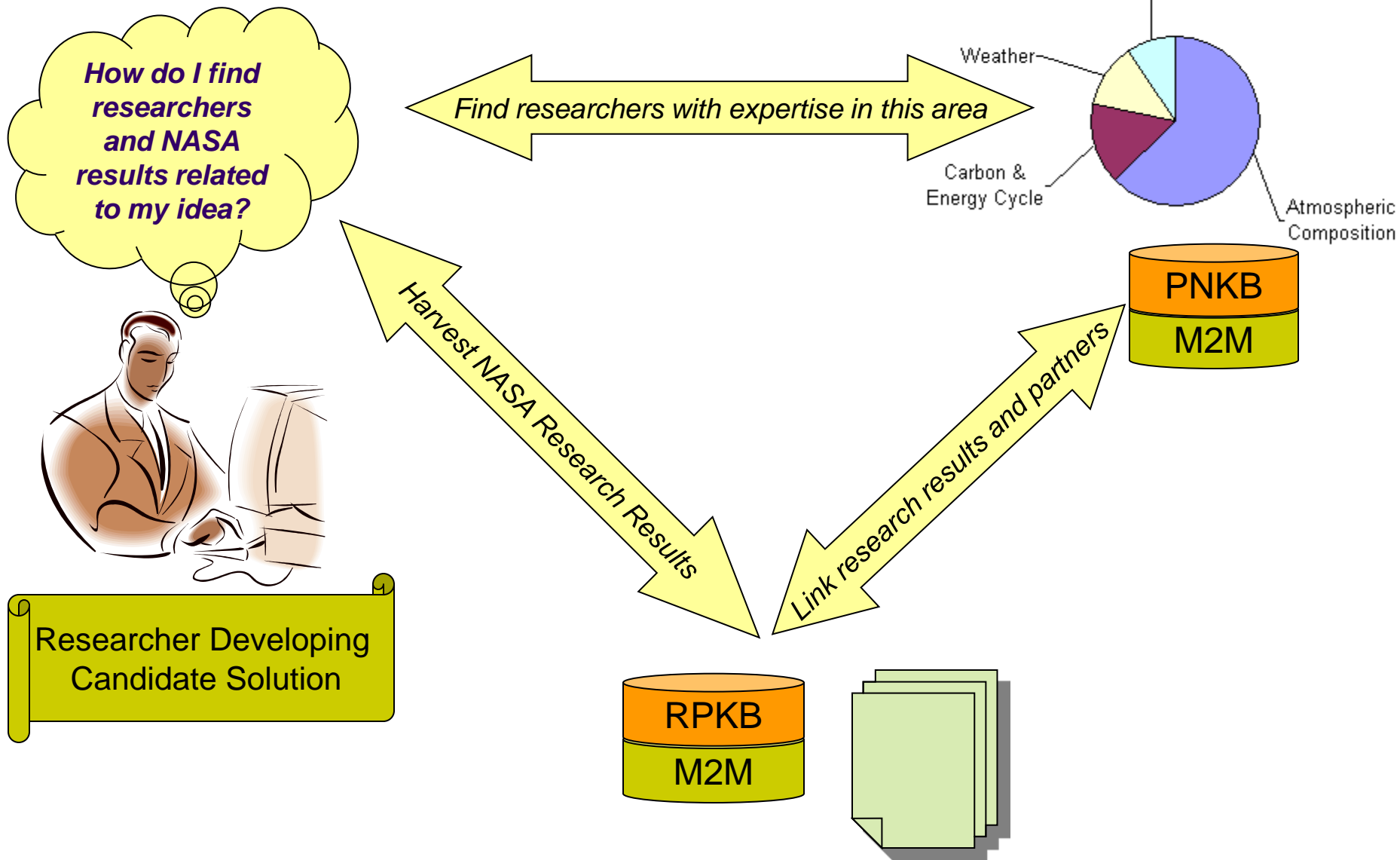


Once the NASA database is developed, it must be kept up to date. Would you be willing to submit information to it?

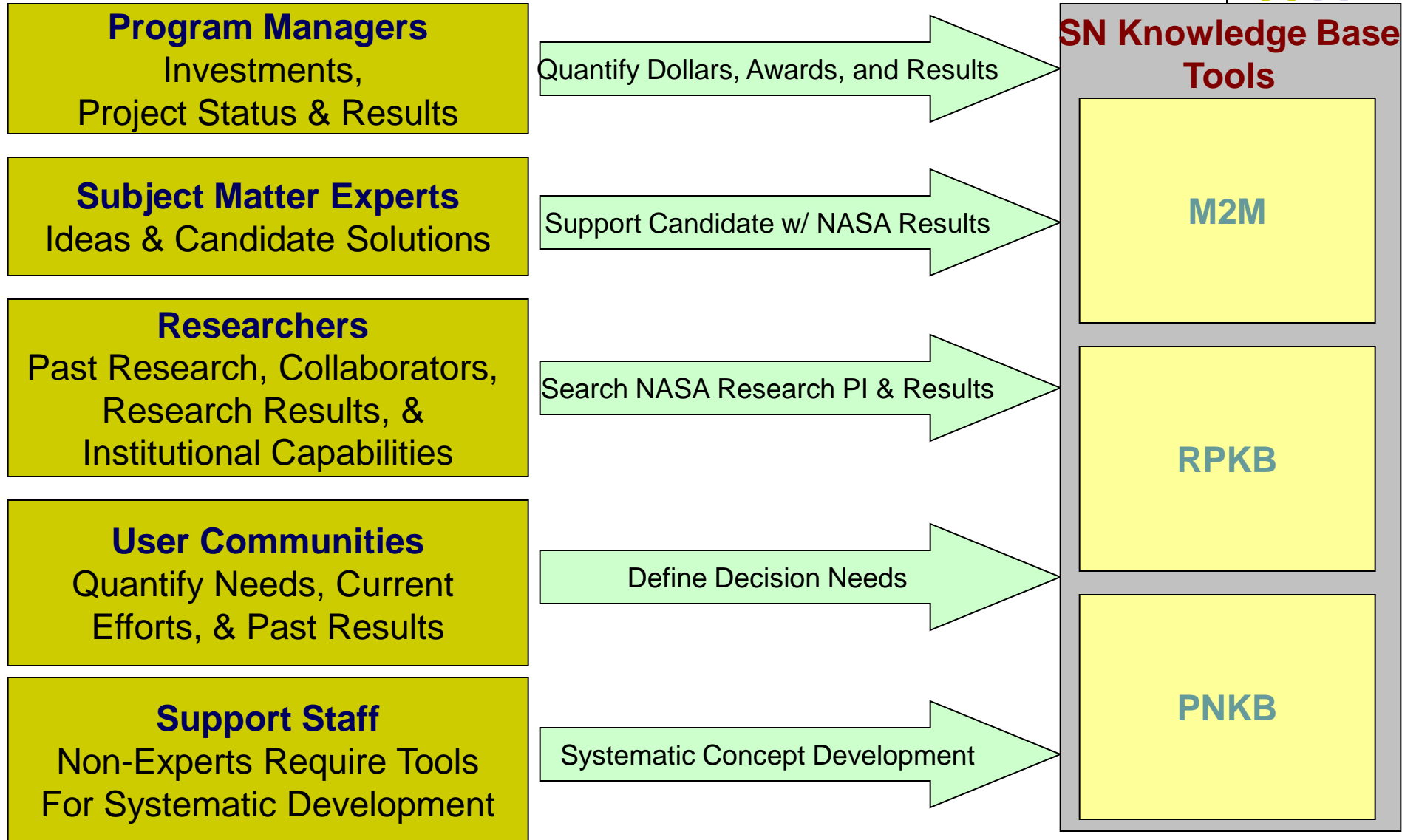


84% is a large number of willing contributors for updates

# Mining PNKB, RPKB, and M2M for Candidate Solutions



# Research Directions and Knowledge Base Support

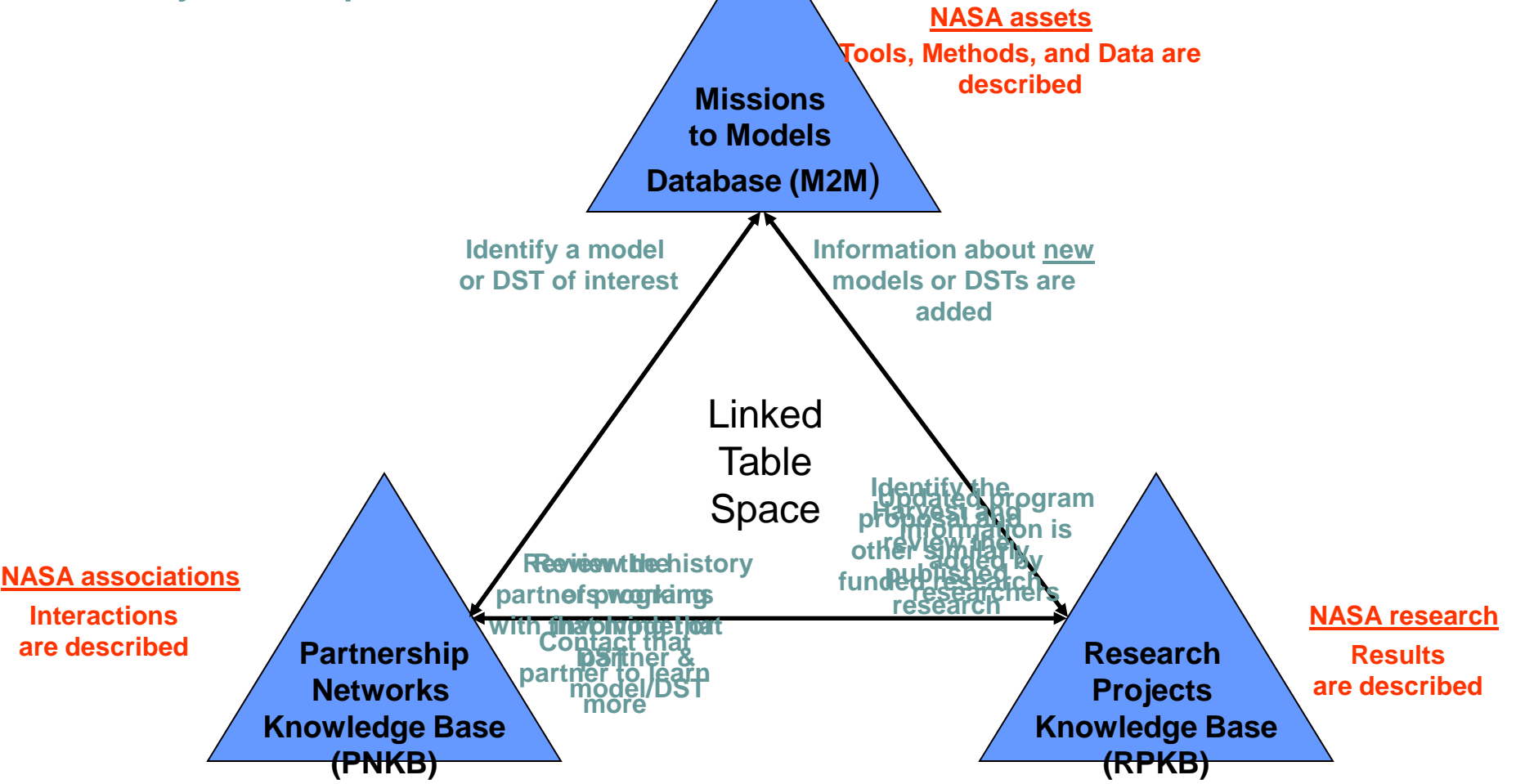


# Solutions Networks Knowledge Harvesting Tools

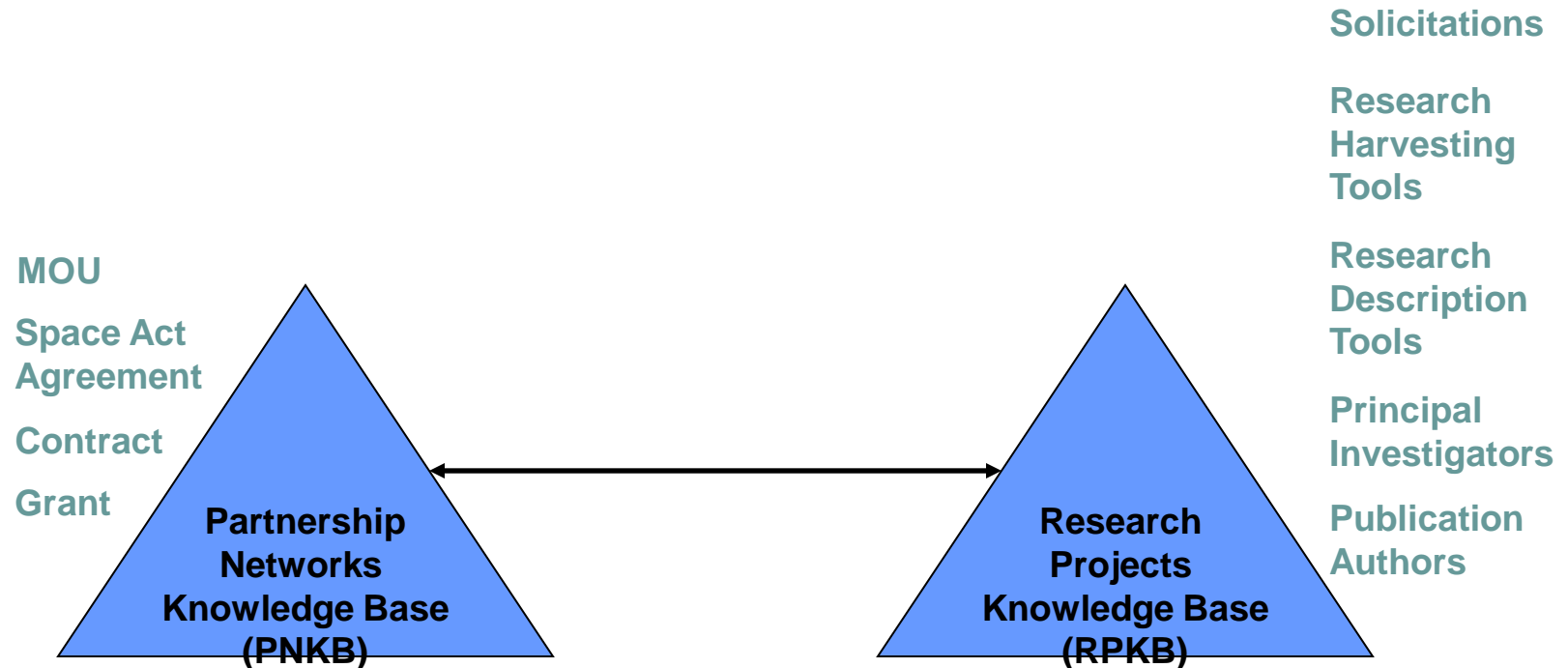


Lets Take a Closer Look at...

A Candidate Solution life cycle example:



# Linking Business Processes to Research Results

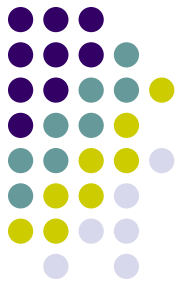


## Analyze Business Processes

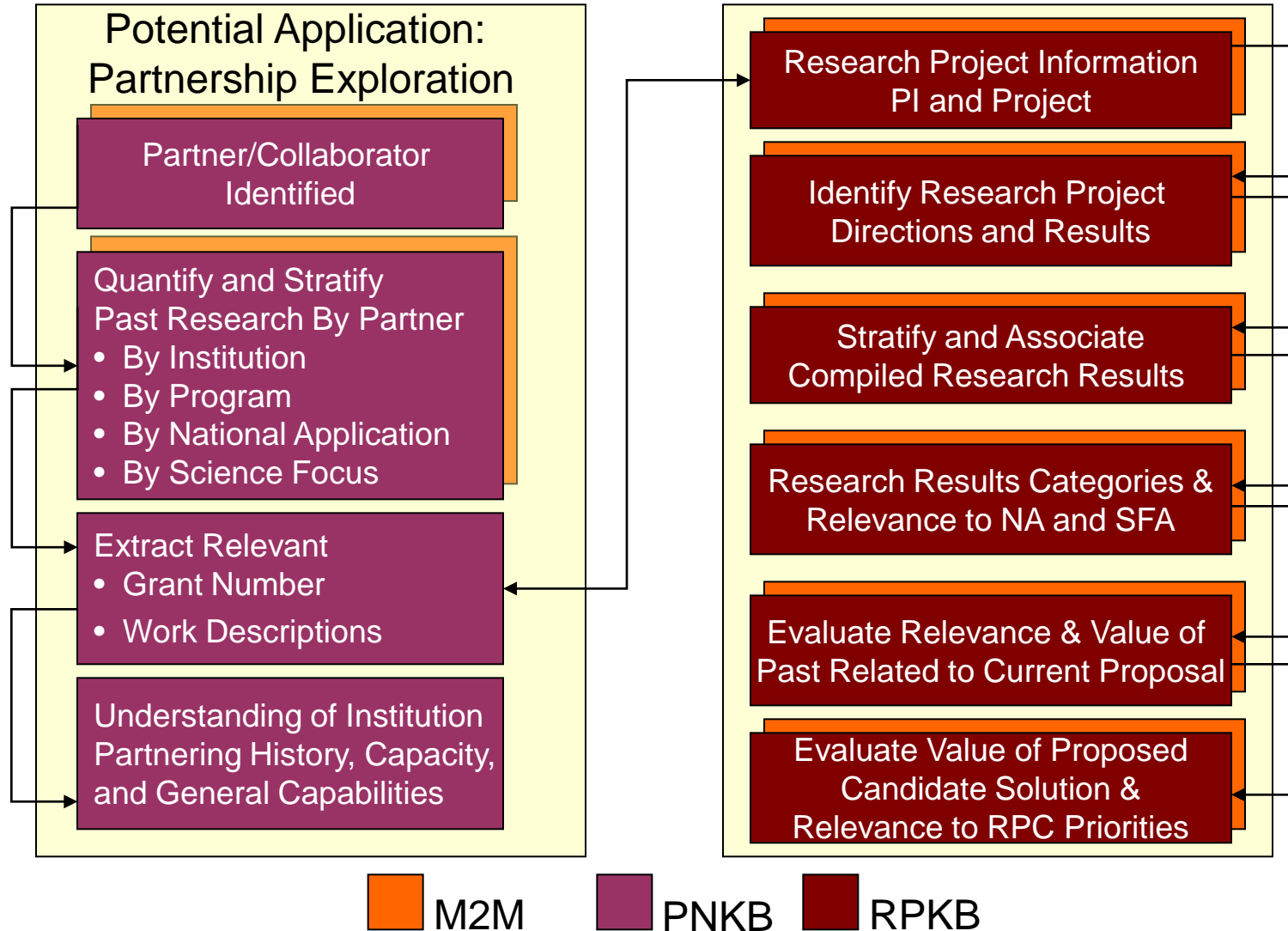
- Find gaps or overlaps in funding
- Ensure alignment with project plans
- Assess partner capabilities
- Contact potential collaborators
- Cycle of in-depth analysis can continue...

## Analyze Research Results

- Assess the ability to develop solutions
- Review DST/model requirements
- Explore new observation relevancy
- Identify subject matter experts
- Identify previous successful solicitations
- Generate Candidate Solutions
- Enter data about awarded programs



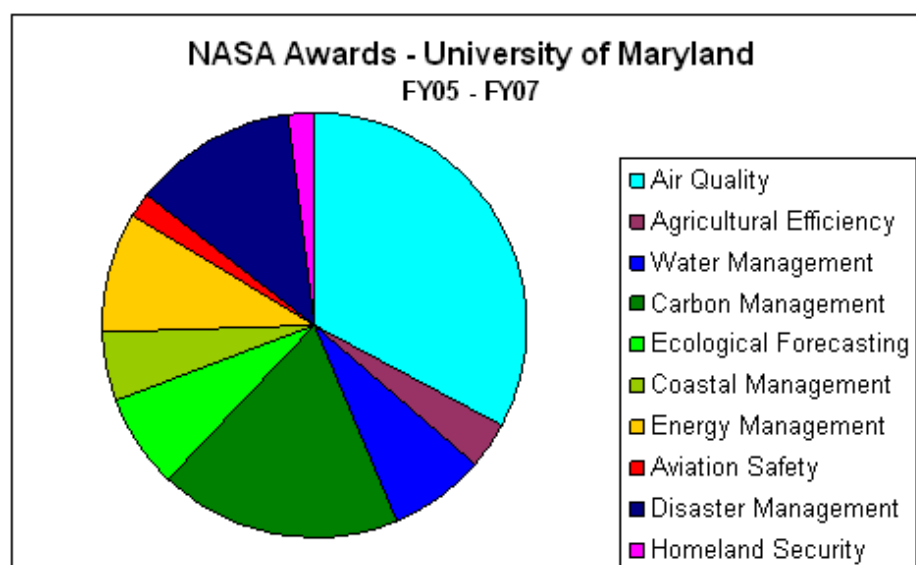
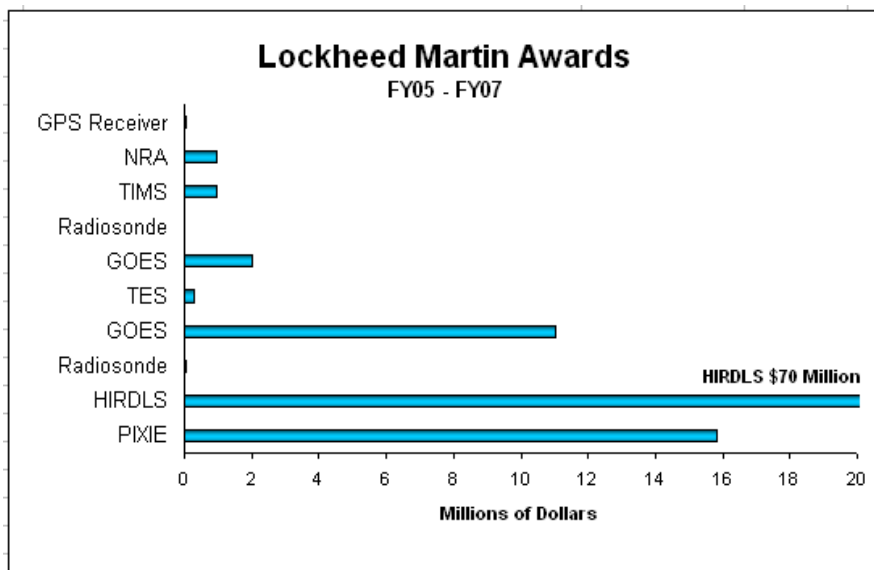
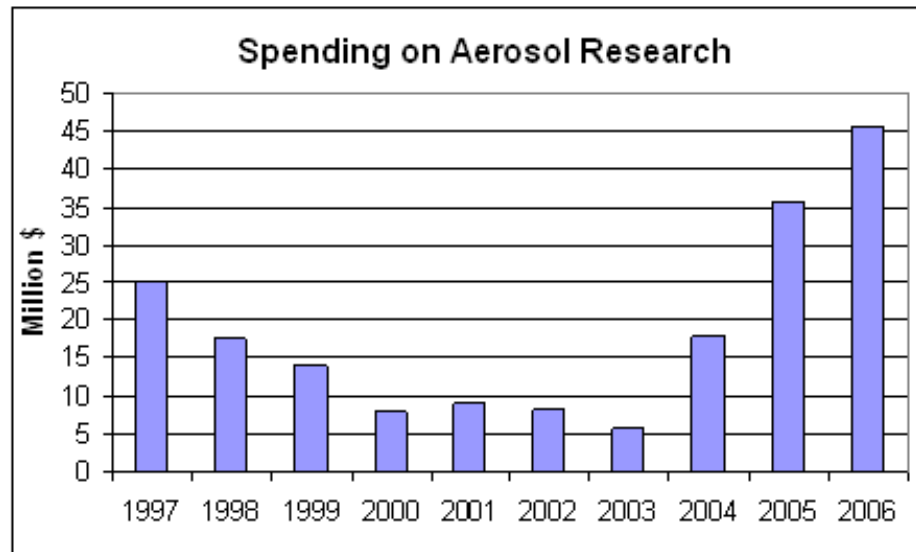
# Candidate Solution Selection Process



# PNKB Business Analysis

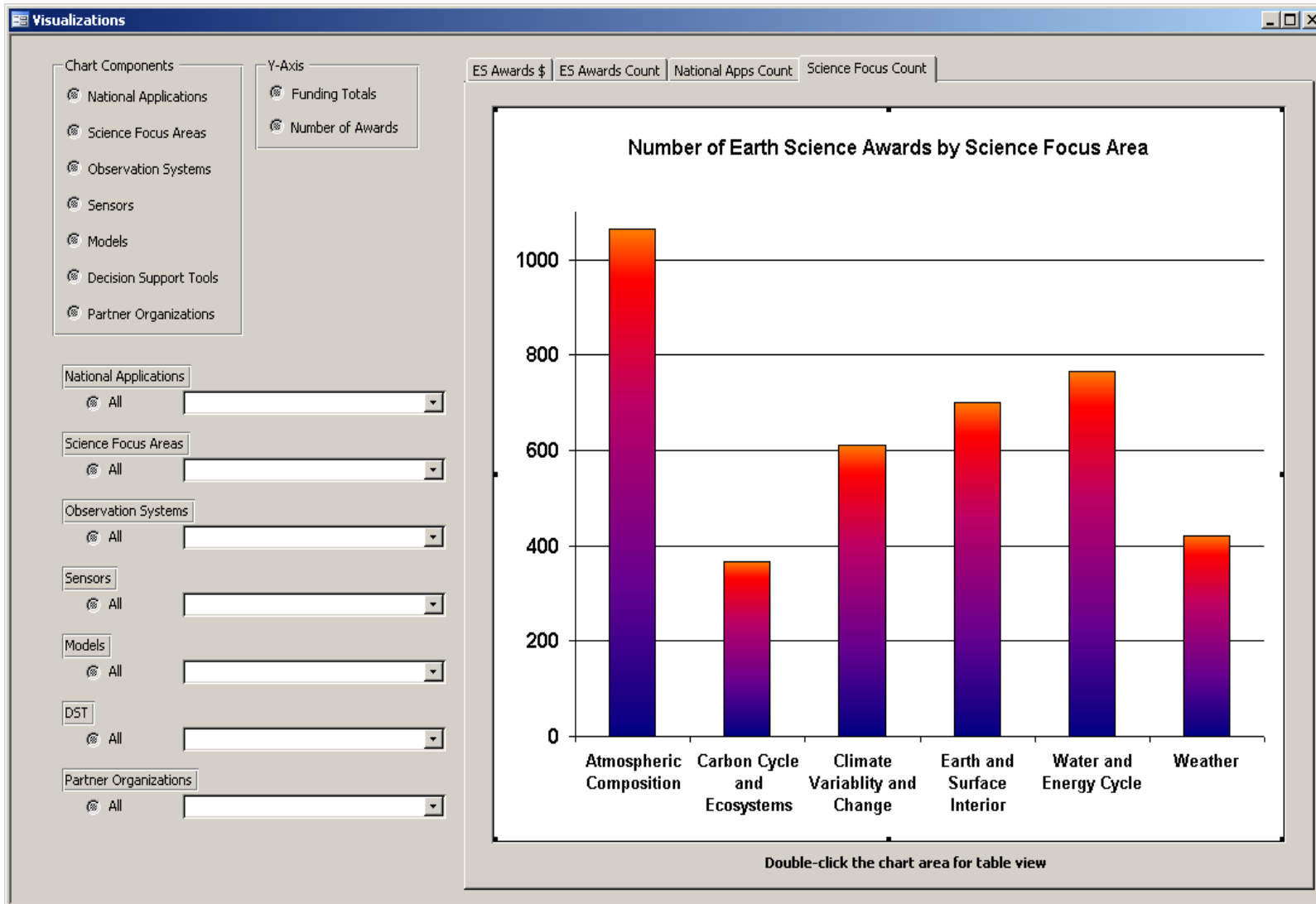


- Funding Trends & Gaps
- Areas of Expertise
- Program or Partner History





# PNKB Interface [Friday 9:30 DEMO]



# RPKB Interfaces [Friday 9:30 DEMO]



## Research Results Exploration

This screenshot shows a search interface for finding research papers. It includes a search bar with the text 'Find Published Research Papers Using Grant Numbers (NSF 2007-2009)'. Below the search bar, there are filters for 'File Type to Search using Google' (None, pdf, doc, ppt) and 'Select Required Item(s)'. The main search results are displayed in a list format, with the first result titled 'Great Plains Hydroclimate Variability: The View from North American Regional Reanalysis - group of 4'. The interface also features a sidebar with 'Solitations Details' and 'Proposed Title' sections.

## M2M Keyword Integration

This screenshot displays the 'RPKB Fast Access to System Components Knowledge Base Keywords' interface. It features a 'Select Keyword Type:' section with options like 'Observation Systems', 'Sensors', 'Data Products', 'Models', 'Decision Support Tools', and 'Project Keywords'. There is also a 'Select Topics:' section with a list of topics including 'AGRICULTURE', 'ATMOSPHERICS', 'ATMOSPHERE', 'BIOSPHERE', 'CLIMATE INDICATORS', 'OCEANOGRAPHY', 'HUMAN DIMENSIONS', 'HYDROSPHERE', 'LAND SURFACE', 'OCEANS', 'PALUDICINATE', 'SOILS/ EARTH', 'SPECTRAL/ENGINEERING', and 'SUN/HEATH INTERACTINGS'. A 'Select Variables:' section lists various variables such as 'CALCIUM', 'CARBON', 'CATION EXCHANGE CAPACITY', 'IDENTIFICATION DATE', 'ELECTRICAL CONDUCTIVITY', 'HEAVY METALS', 'HORICAL ELECTRICAL CONDUCTIVITY', 'MAGNESIUM', 'MERCURY', 'NICKEL', 'NITROGEN', 'ORGANIC MATTER', 'PERMANENT', 'POTASSIUM', 'SILICATE/NITROGEN/VEGETATION/RESTORATION', 'SOIL ABSORPTION', 'SOIL CHEMISTRY', 'SOIL CLASSIFICATION', 'SOIL COLOR', 'SOIL COMPACTION', 'SOIL CONSISTENCY', 'SOIL COVER', 'SOIL DEPTH', 'SOIL PROVISION', and 'SOIL FERTILITY'. The interface also includes a 'Select Variables:' section with a list of variables.

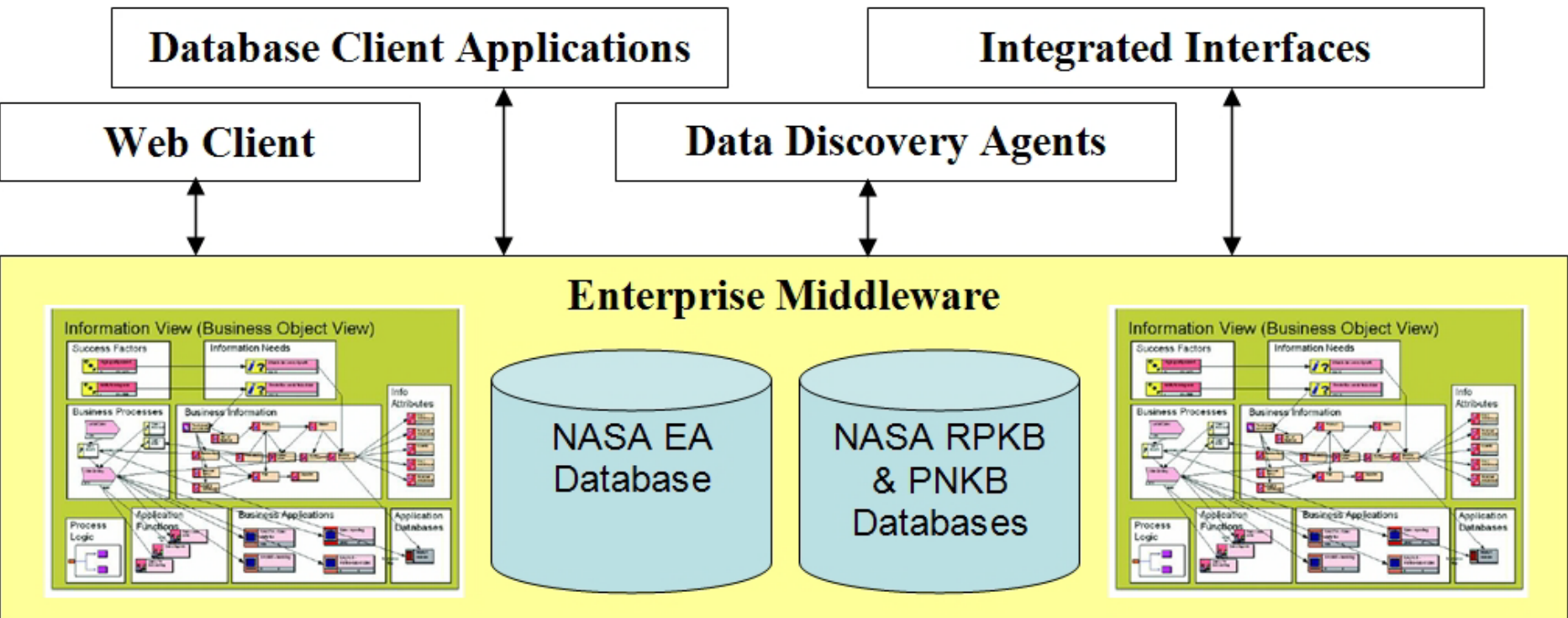
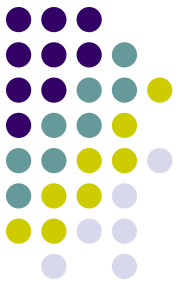
## Automated Search for RPC Relevance

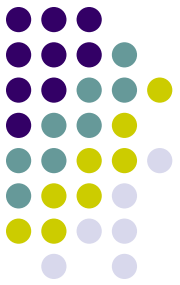
This screenshot shows the 'RPKB Automated Views - Searching Published Research Papers for Keyword Occurrences' interface. It includes a 'Select the Category of Keywords:' section with options like 'National Applications', 'Areas of Research', 'Observation Systems', 'Models (Short Names)', 'Problems (Short Names)', 'Sensors (Full Names)', and 'Sensors (Short Names)'. There is also a 'Select a Solitation Number:' section with a dropdown menu and a 'Select A/D:' section with a dropdown menu. The main search results are displayed in a list format, with the first result titled 'Seasonal and interannual variations of top-of-atmosphere irradiance and cloud cover over polar regions derived from the CERES data set'. The interface also features a sidebar with 'Project Keywords' and 'RPC Priority Keywords' sections.

## SFA, NA, and OS Relevance Plus PNKB Info

This screenshot displays the 'RPKB - Published Papers by Science 7 Area/National Application/Observation system/Sensor' interface. It features a 'Select a Science Focus Area:' section with a dropdown menu, a 'Select a National Application:' section with a dropdown menu, a 'Select an Observation System:' section with a dropdown menu, and a 'Select a Sensor:' section with a dropdown menu. The main search results are displayed in a list format, with the first result titled 'Potential nighttime contamination of CERES clearly fields of view by optically thin cirrus during the CRYSTAL-FACE campaign'. The interface also features a sidebar with 'Partner Information (PNKB)' and 'RPKB - Published Papers by Sensor Relevance:' sections.

# The Evolved NASA SN

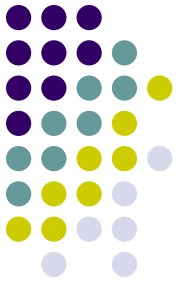




**Thank you!**

**Please plan to attend the MRC SN  
Knowledge Base Tools Demo at  
9:30 tomorrow!**

# Backup Slides



# Future Directions -- PNKB



- **Incorporate all 11 years of Awards Data**
- **Develop robust keyword system to identify all Earth Science awards**
- **Align all applicable Earth Science awards to NASA's objectives and/or assets**
- **Refine user interface including a dynamic network visualization component**
- **Transfer to SQL Server backend and web deployable front-end**
- **Utilize PNKB and RPKB in generation of Candidate Solution Reports**
- **Develop Recommendations for PNKB Evolution**

# Solutions Networks

