

What is Cyberinfrastructure?

The Nature of Research Today

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The Nature of Research Today

- Discipline groups working on a common project.
- The groups are made of researchers from multiple institutions.
- They use CI in support of these Virtual Organizations (VOs)

A New CI Driver

NSF Proposal Requirement

Beginning January 18, 2011

proposals submitted to NSF must include a

Data Management Plan

in the form of a two-page supplementary document

<http://www.nsf.gov/bfa/dias/policy/dmp.jsp>

Teaching is Changing Too

Network Based Multimedia Resources

Real-time Communications with Class

Multiple Location Classes

Online Classes

Team Teaching

CI in Administration

- New CI tools and resources are being integrated into administrative Information Technology
- For example, Identity Management is needed for administrative applications as well as in research and teaching.

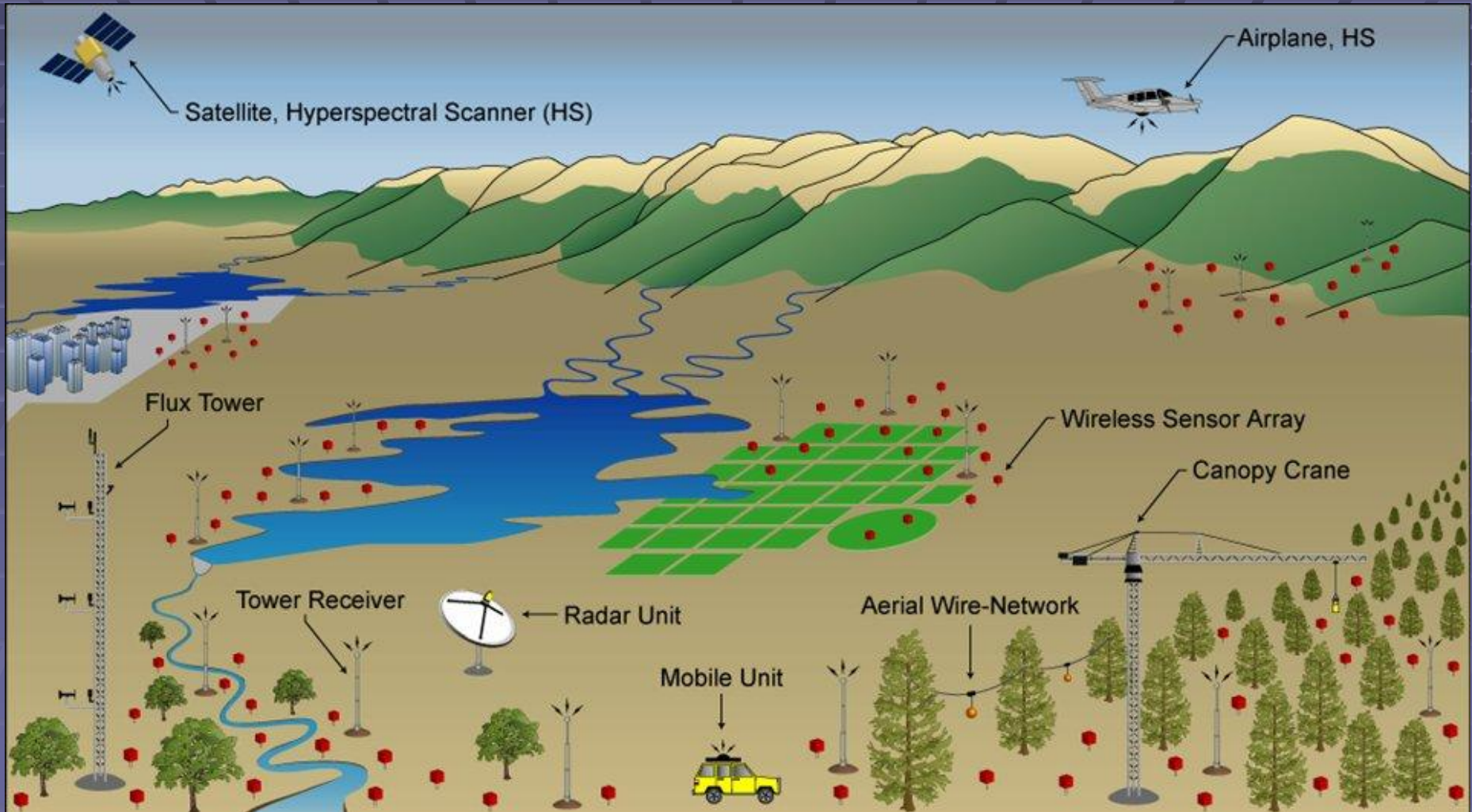
Example Researcher using CI

Jane is an environmental researcher and is going to find a solution to Global Warming. To do this she needs to collect and store data, do analysis of the data and run some simulation models to test her hypothesis. She will share ideas, data and results with her Discipline Group. Here are her steps in using CI

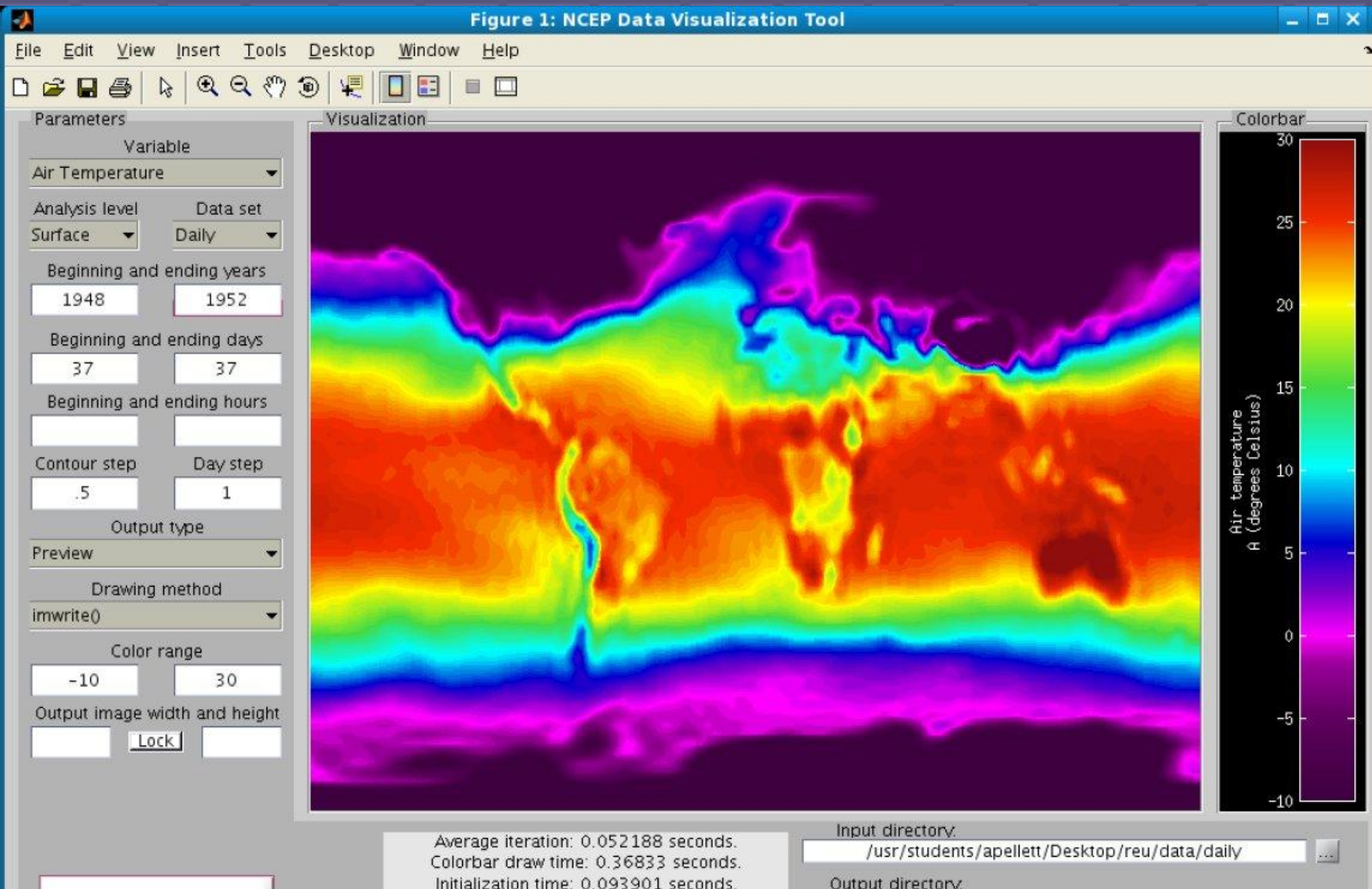
Local Climate Data Collection



Global Climate Data Collection



Climate Data Visualization

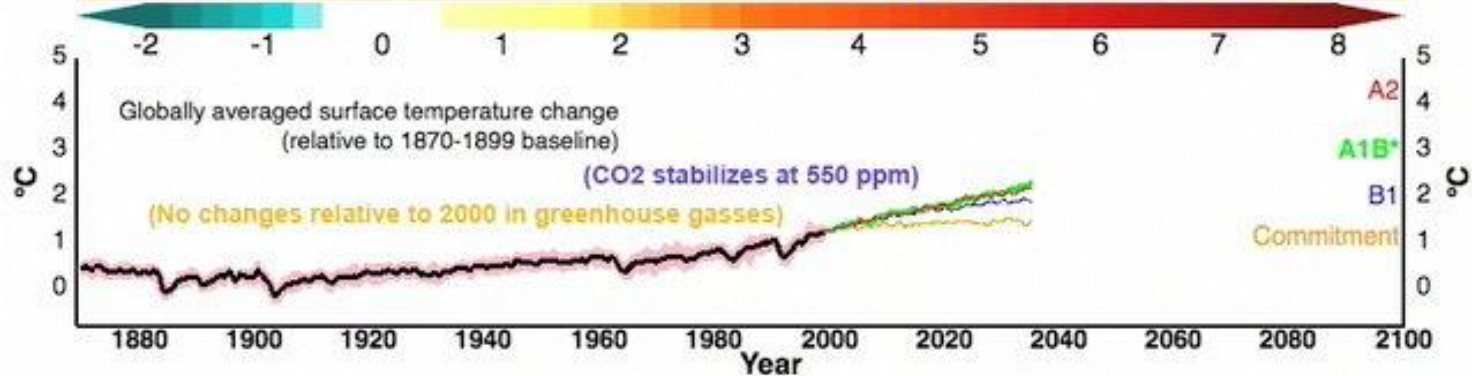
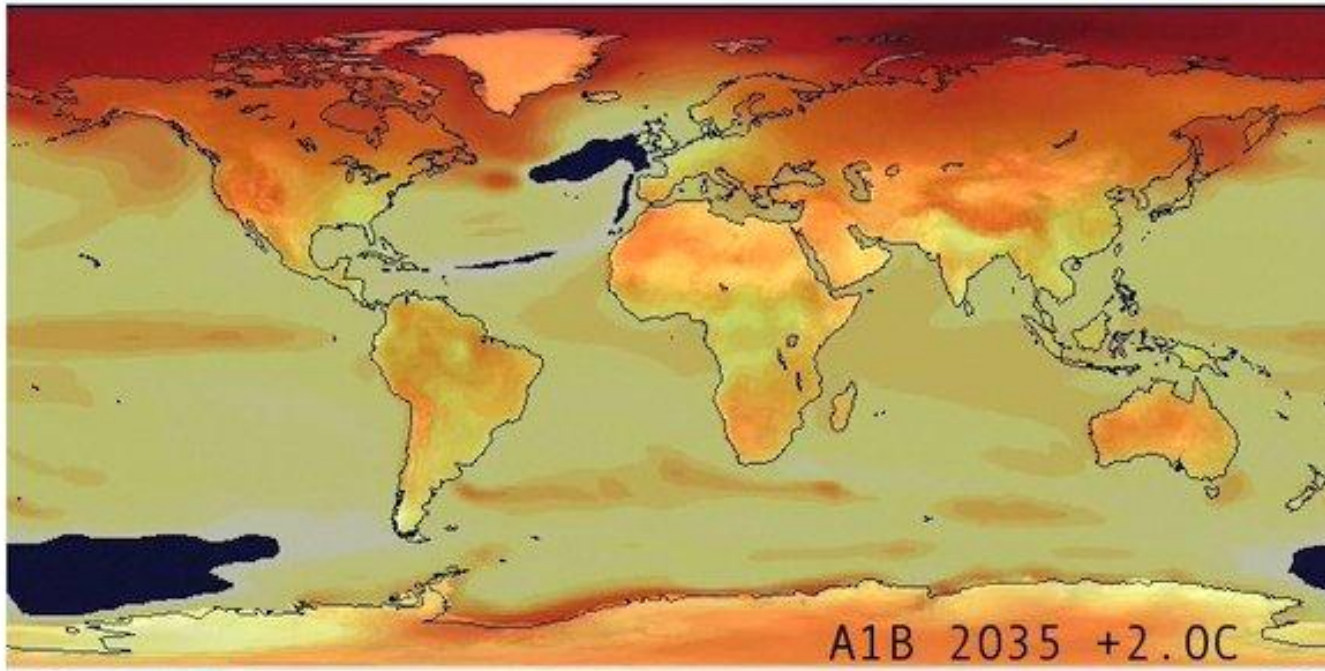


Climate Modeling



Model Visualization

Surface temperature change relative to 1870-1899 baseline CCSM3 IPCC AR4



Collaboration



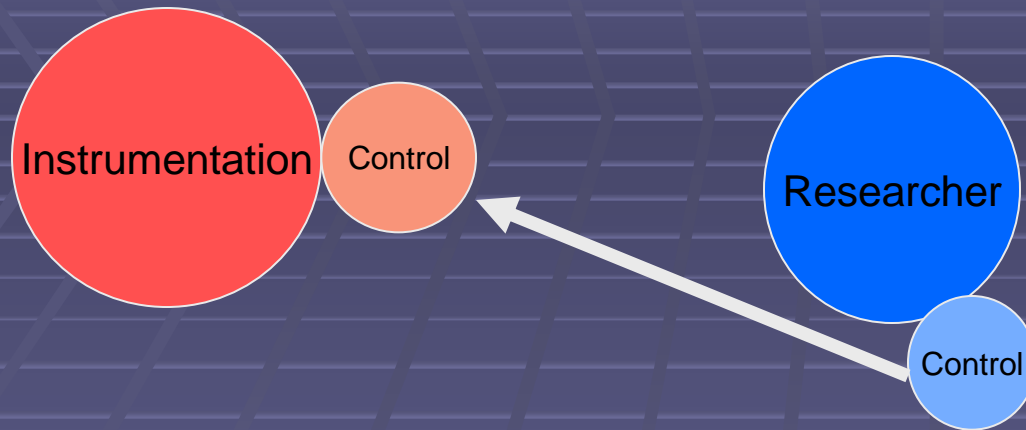
What is Under the CI Hood?

- Someday you will tell a car where to go and it will take you there

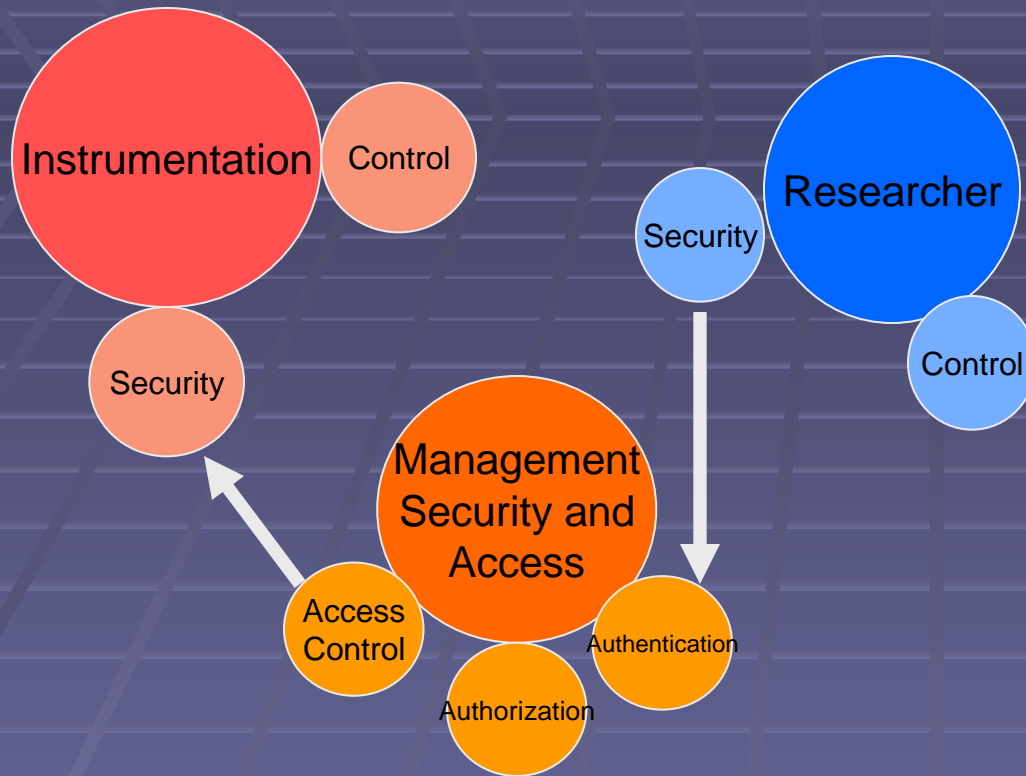
We aren't there yet

- You currently need to know that that a car has an engine, brakes, fuel system, etc
- Likewise with CI, you don't have to know all the details, but it is good to know about the parts
- Let's look at what Jane uses

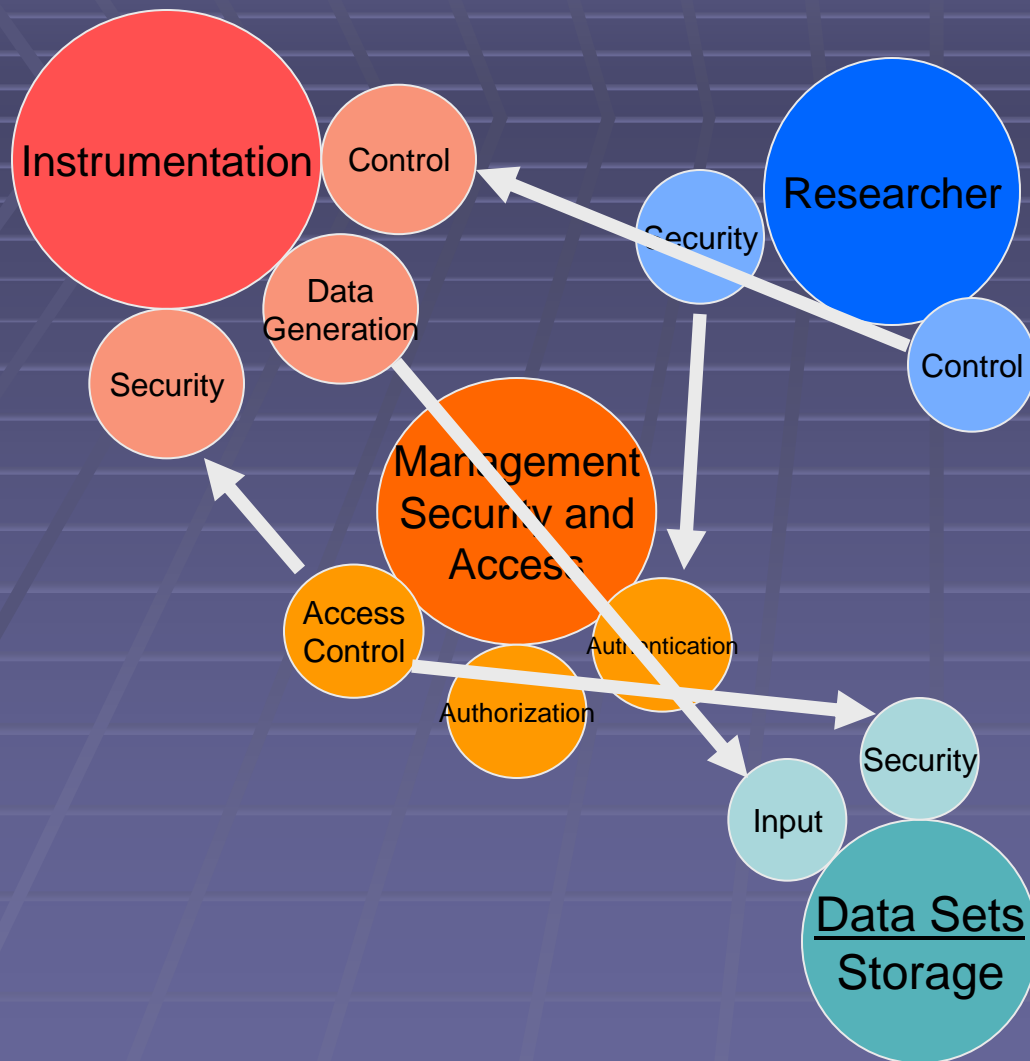
Control Instruments to Gather Data



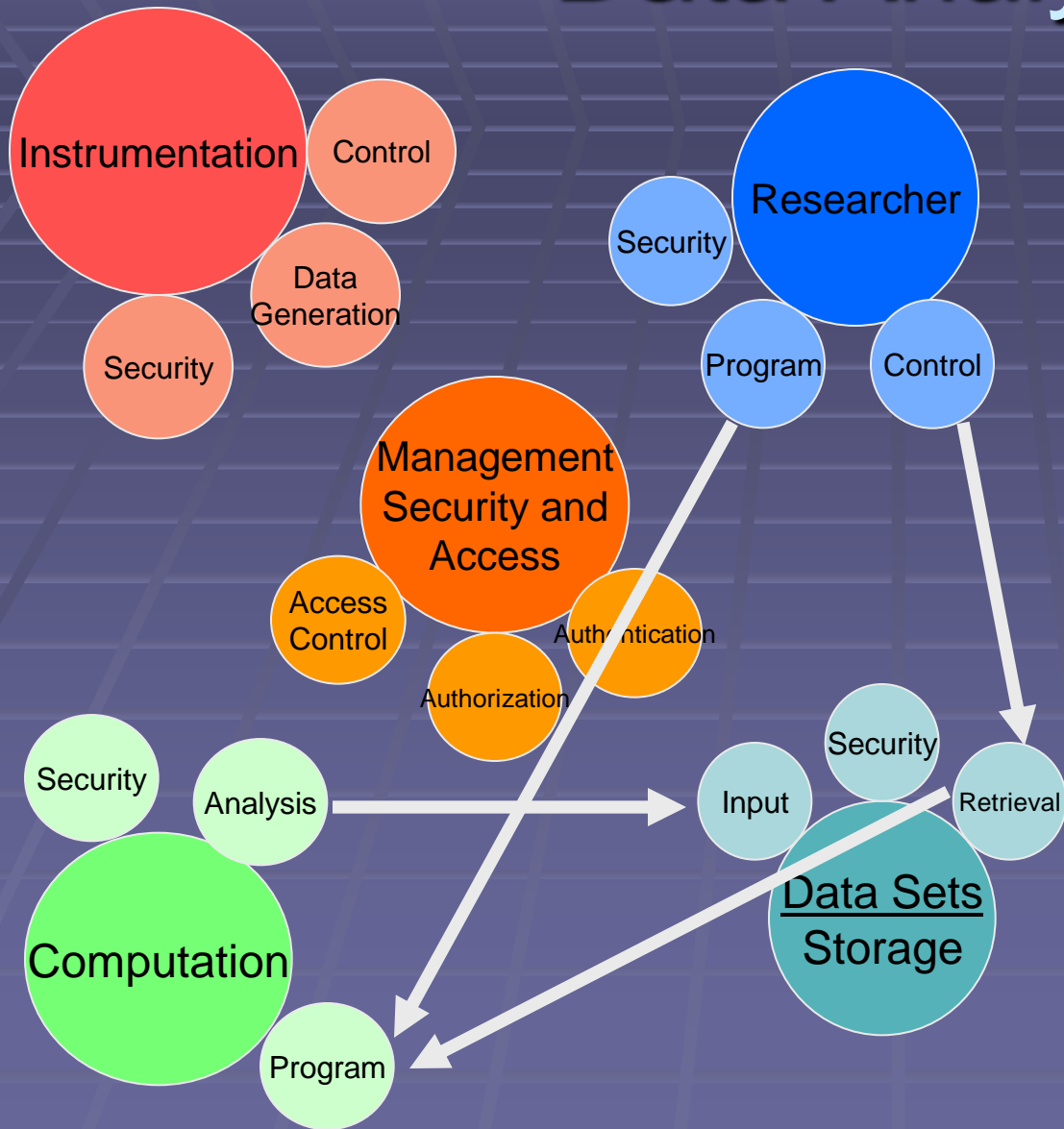
Security and Access Control



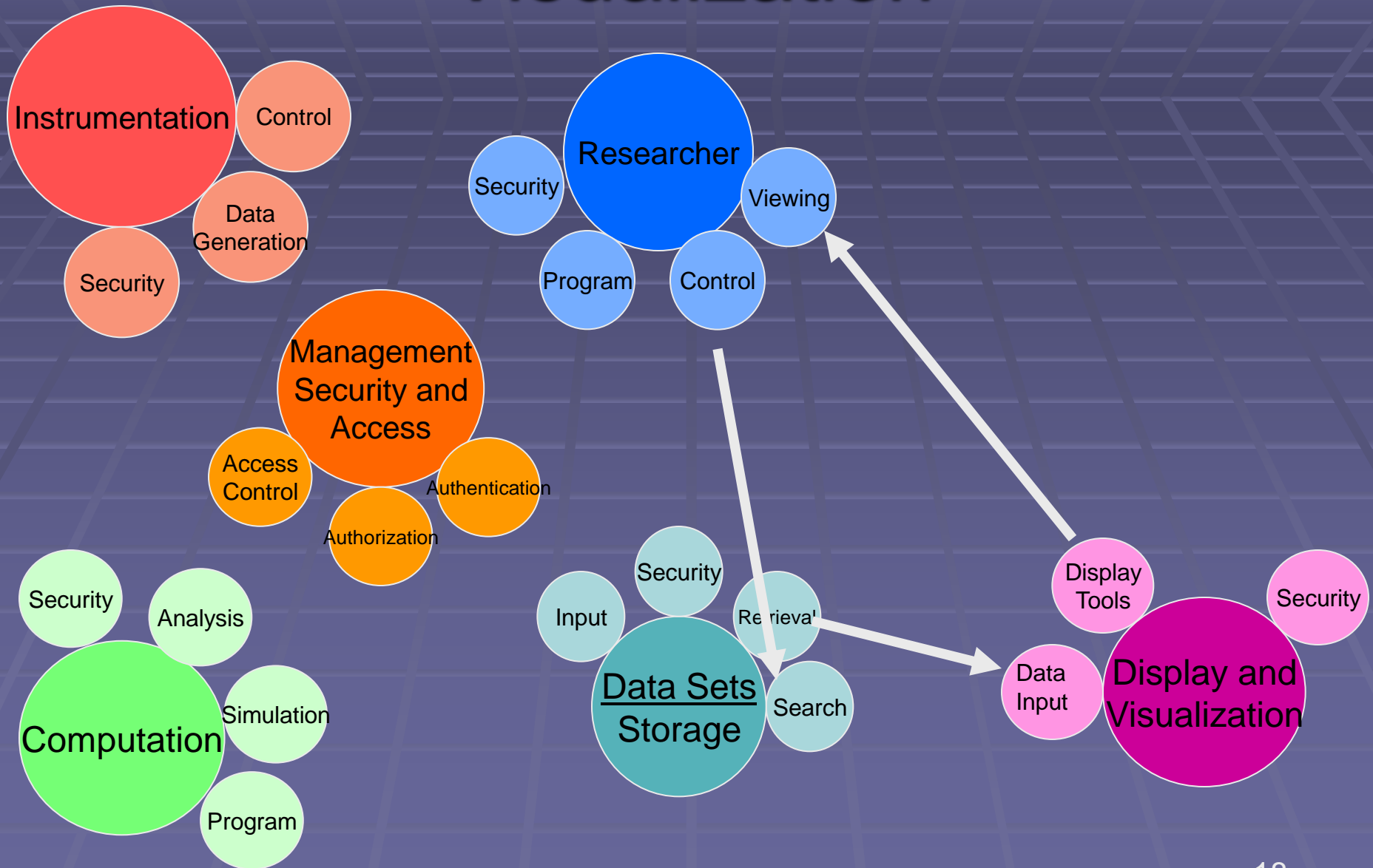
Data Transfer and Storage



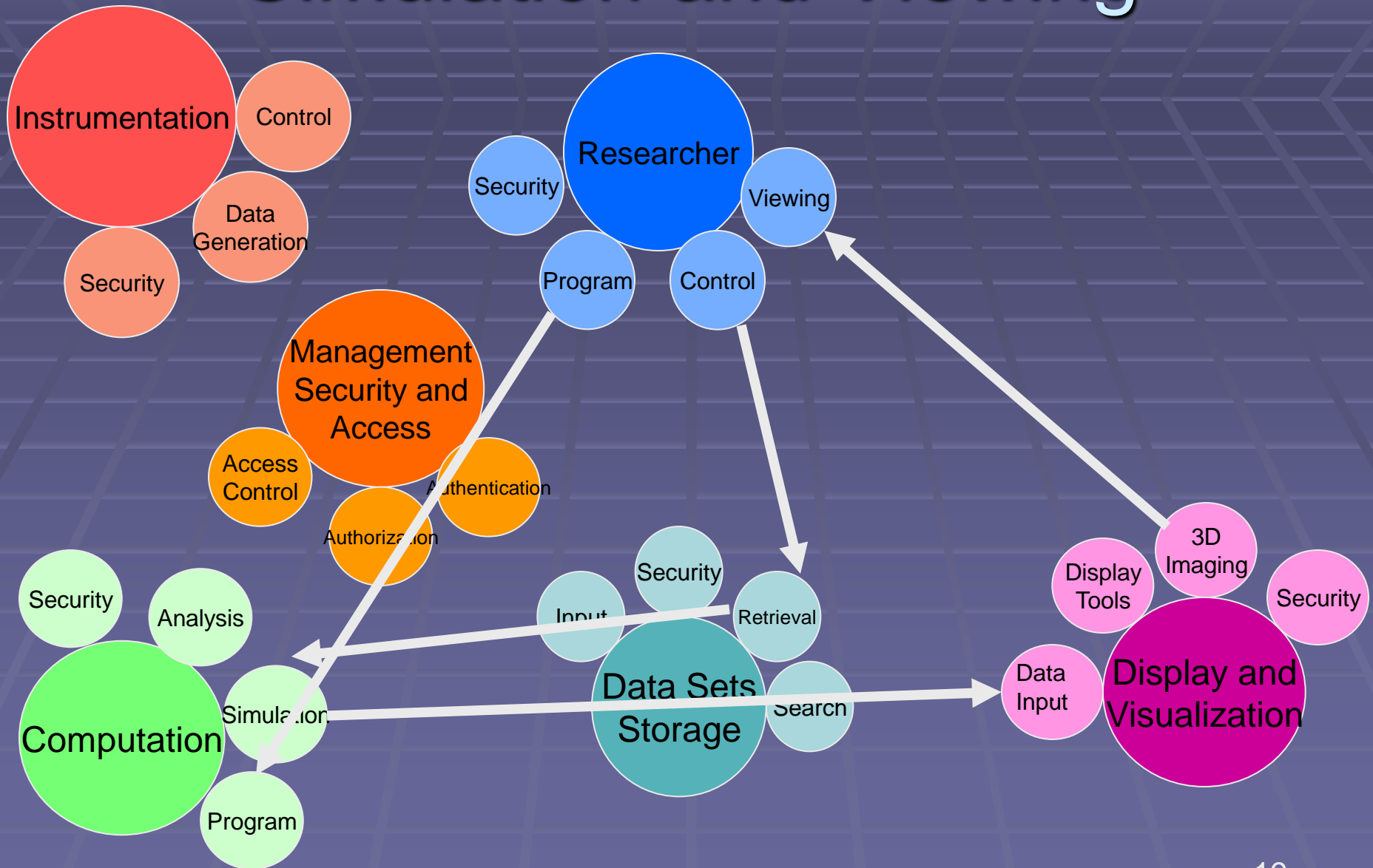
Data Analysis



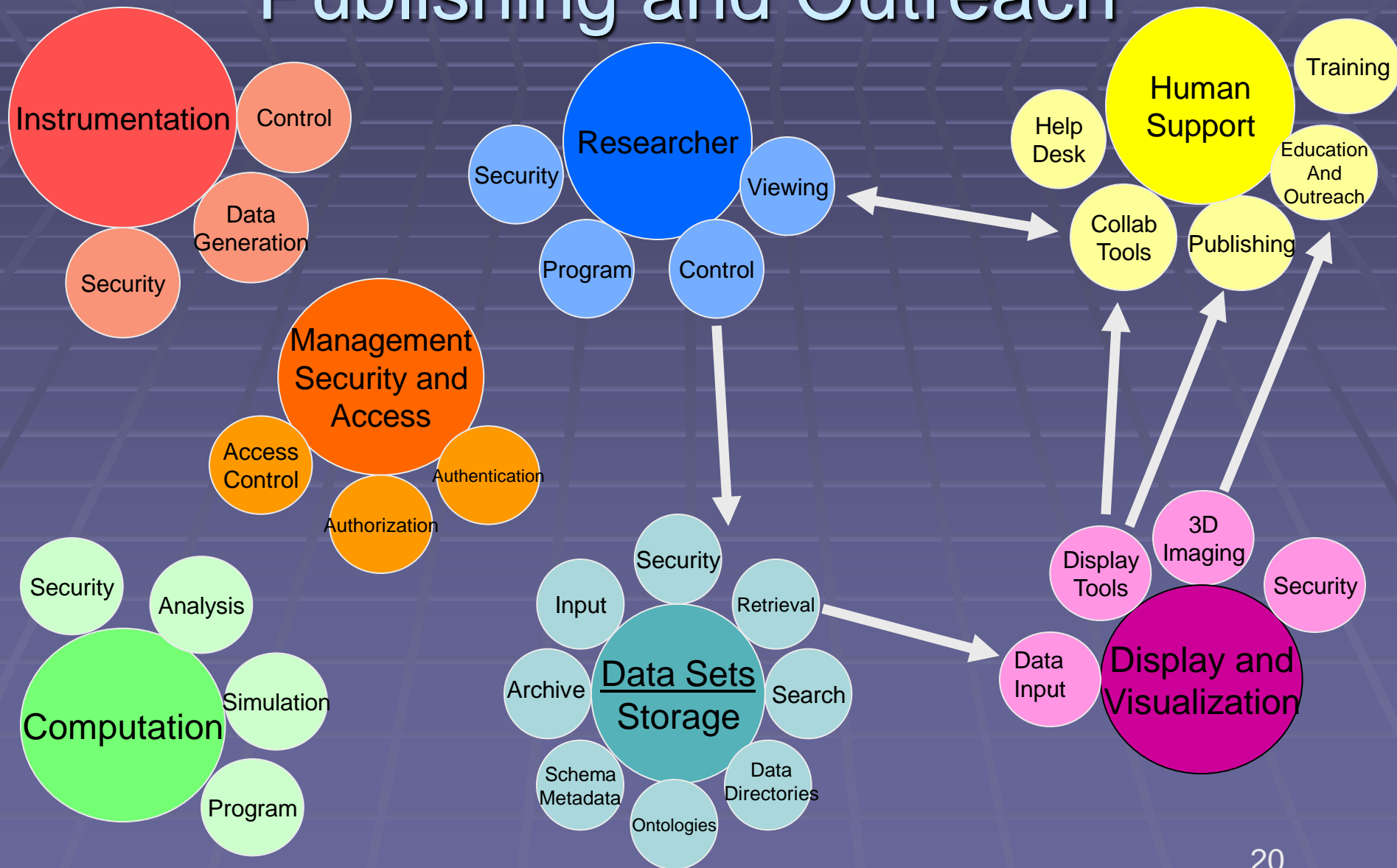
Visualization



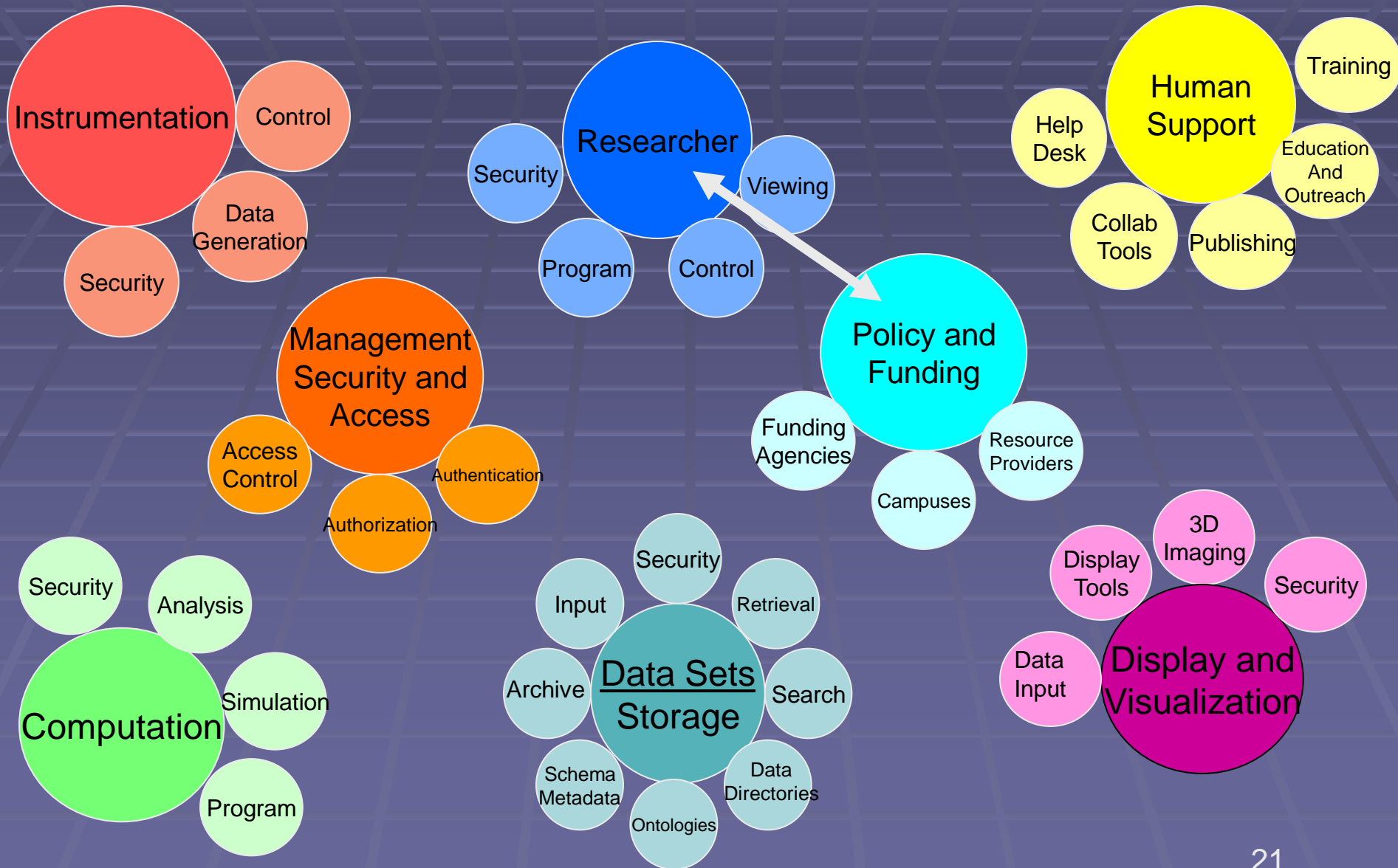
Simulation and Viewing



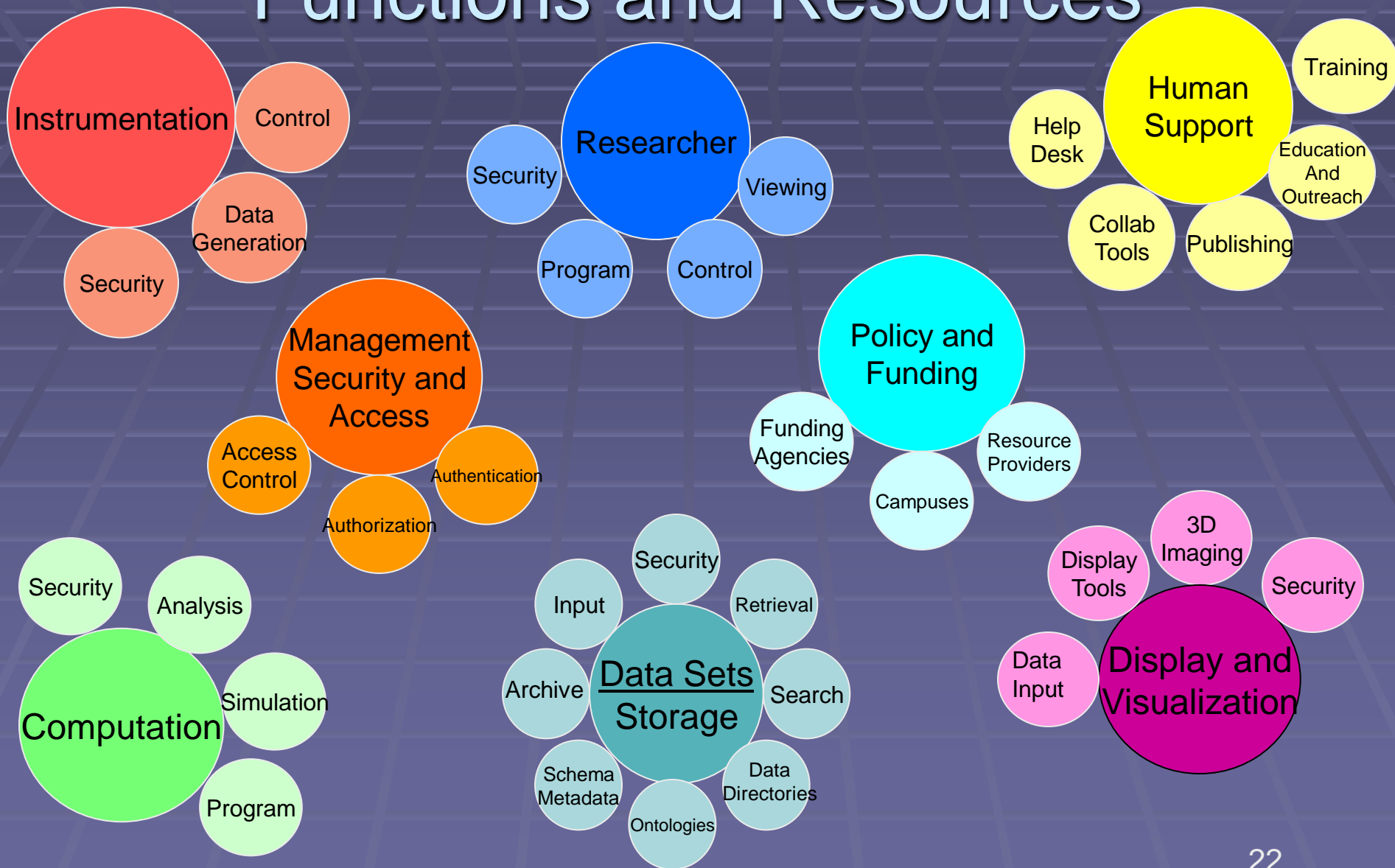
Sharing, Collaboration, Publishing and Outreach



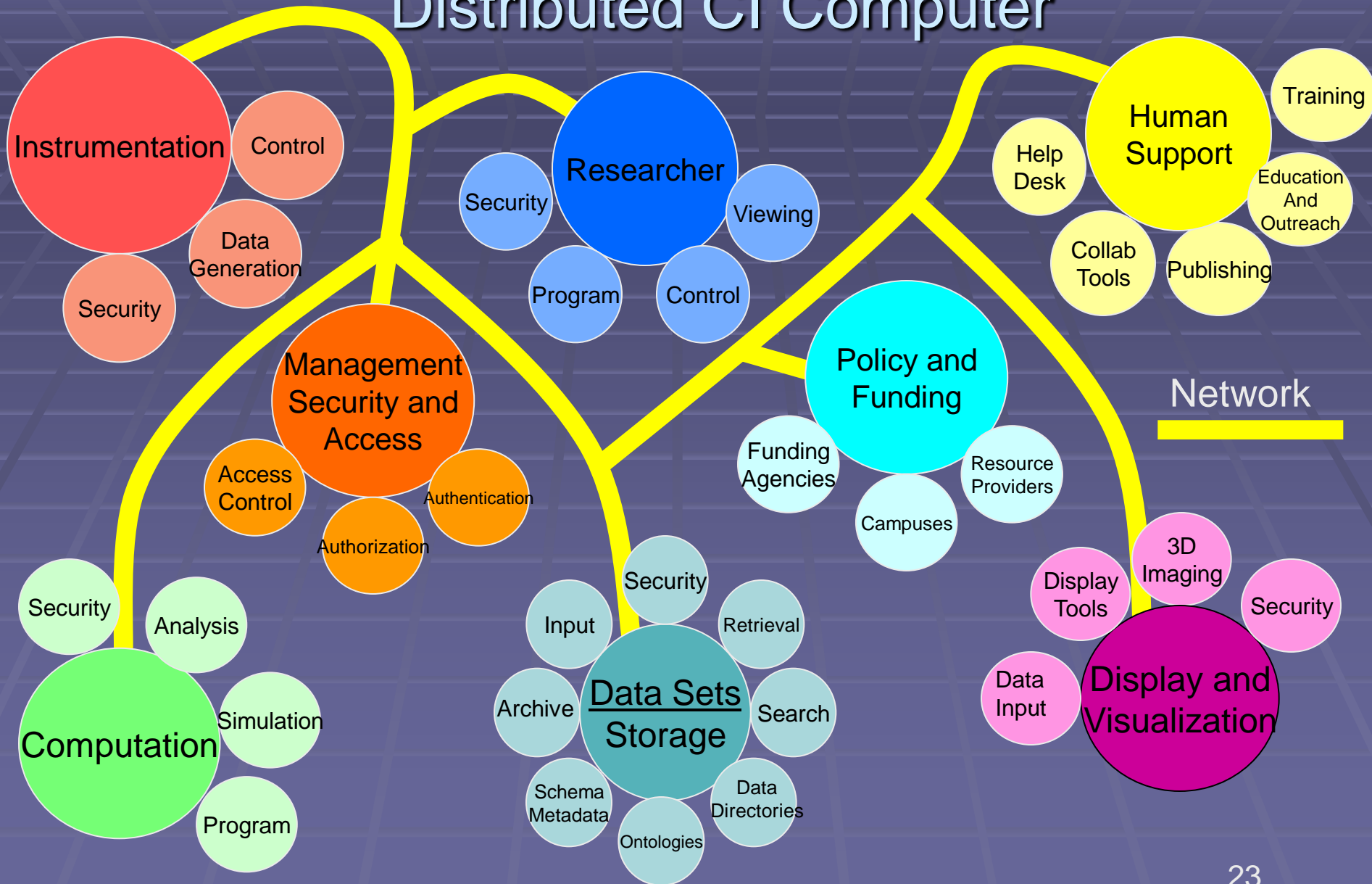
Jane goes after new grant



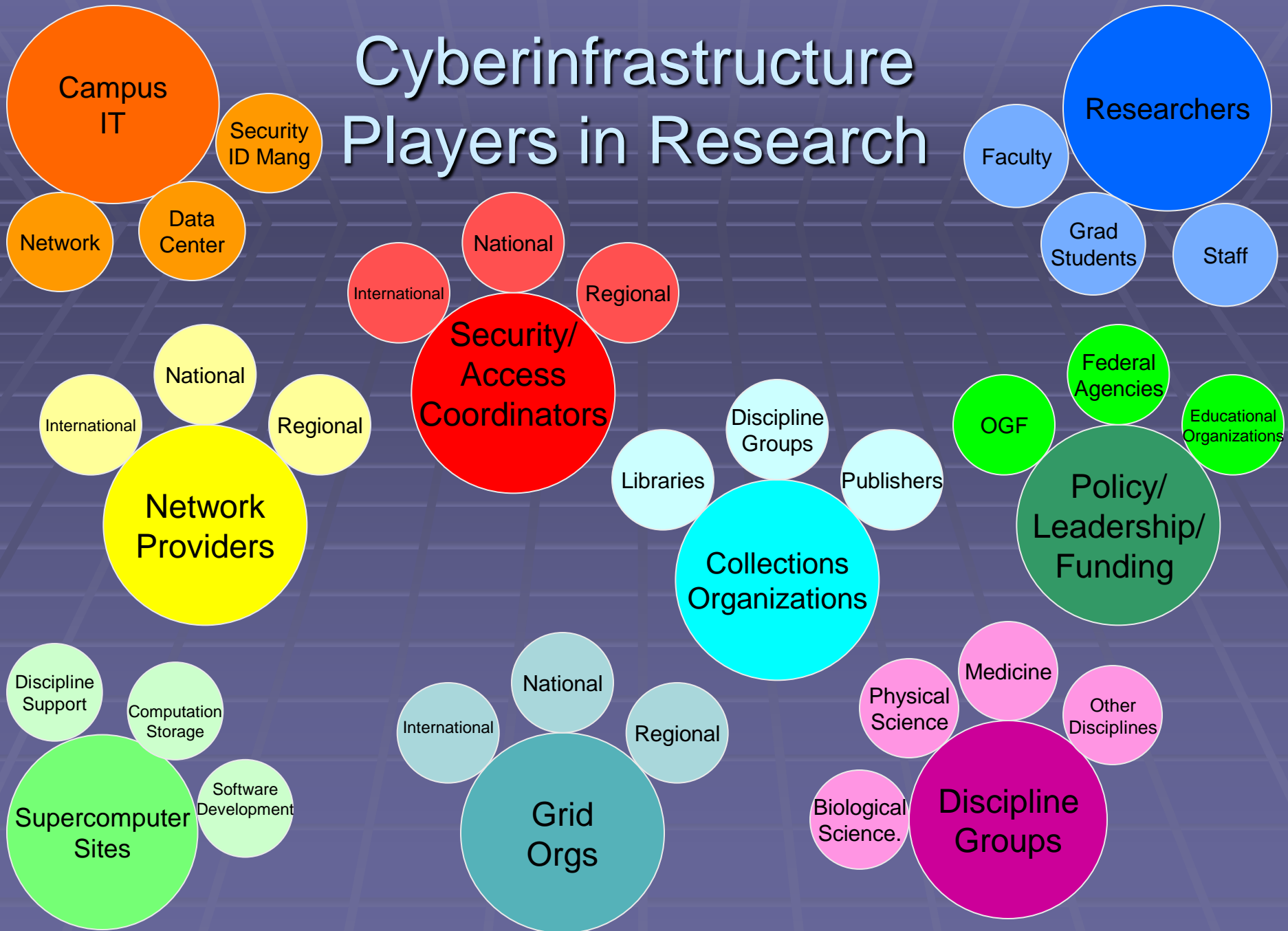
Cyberinfrastructure Functions and Resources



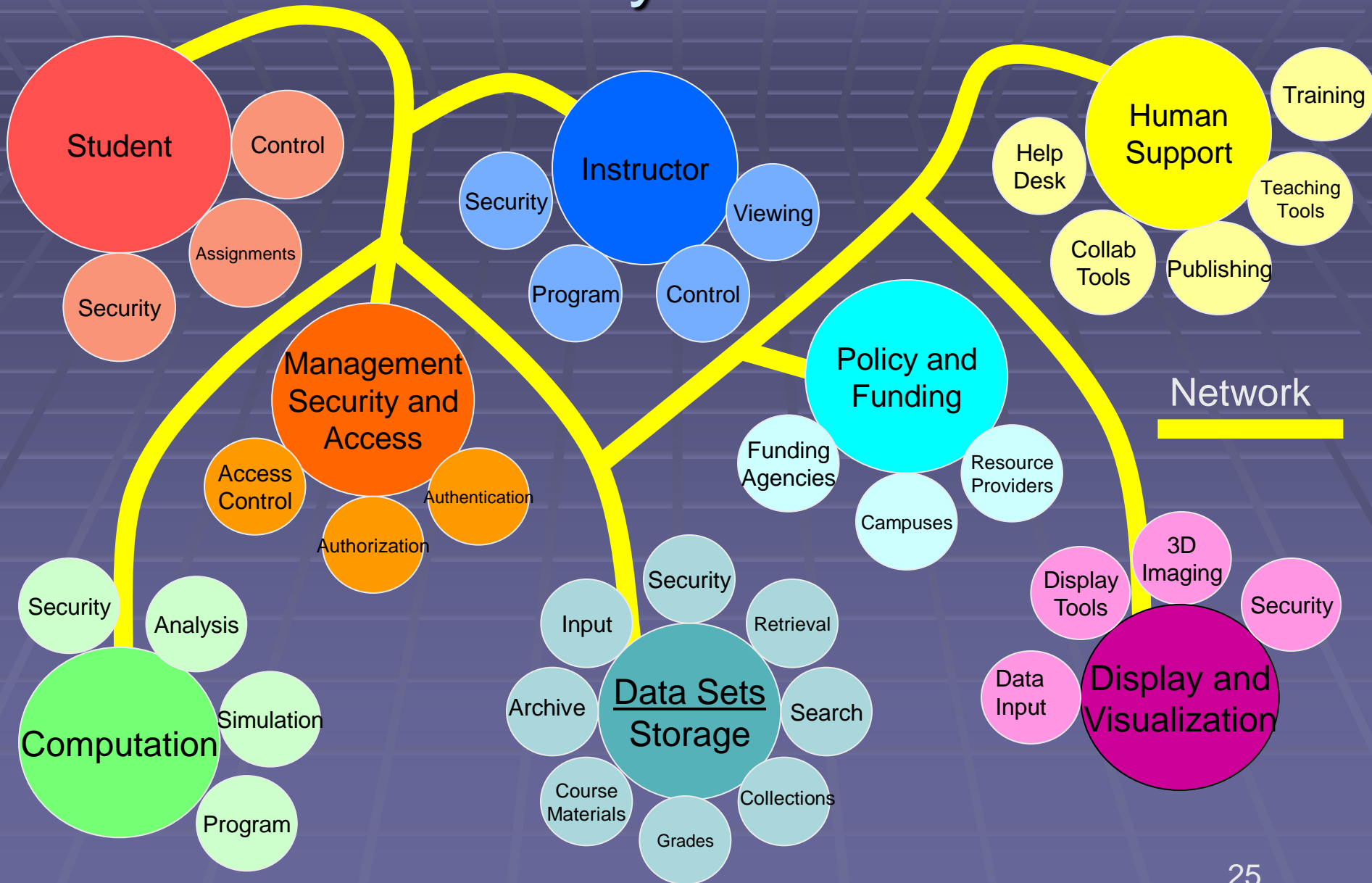
The Network is the Backplane for the Distributed CI Computer



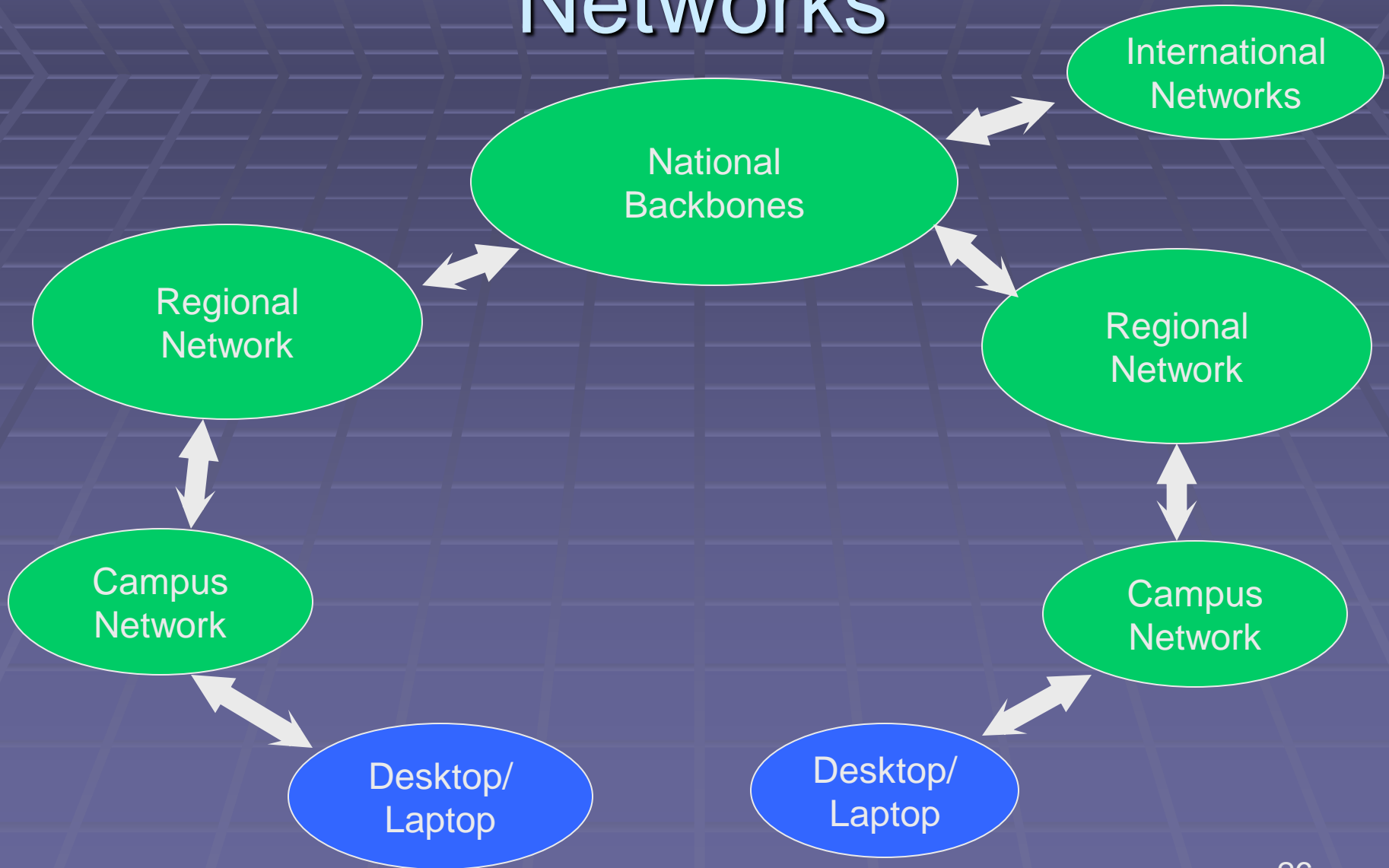
Cyberinfrastructure Players in Research



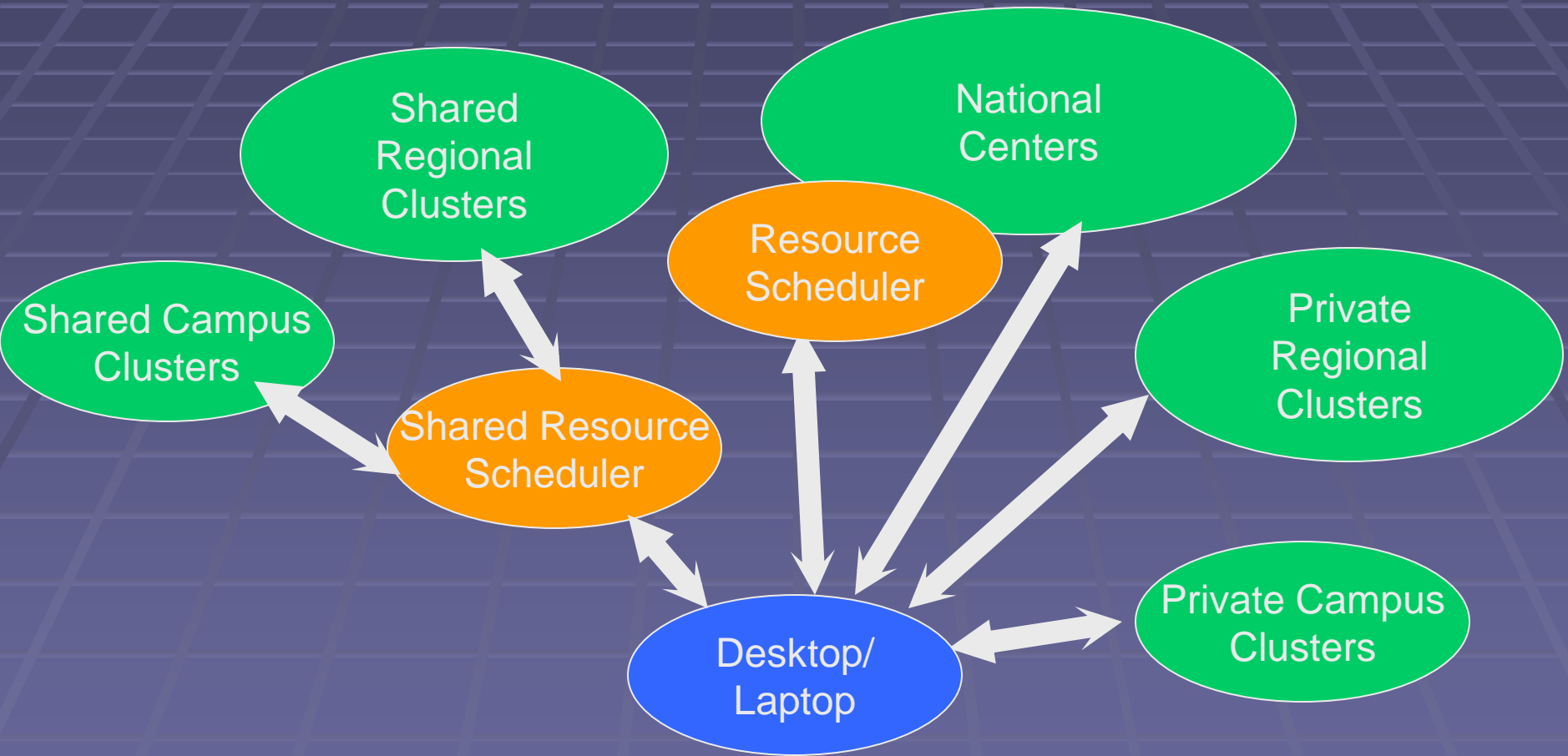
Other Ways to Look at CI



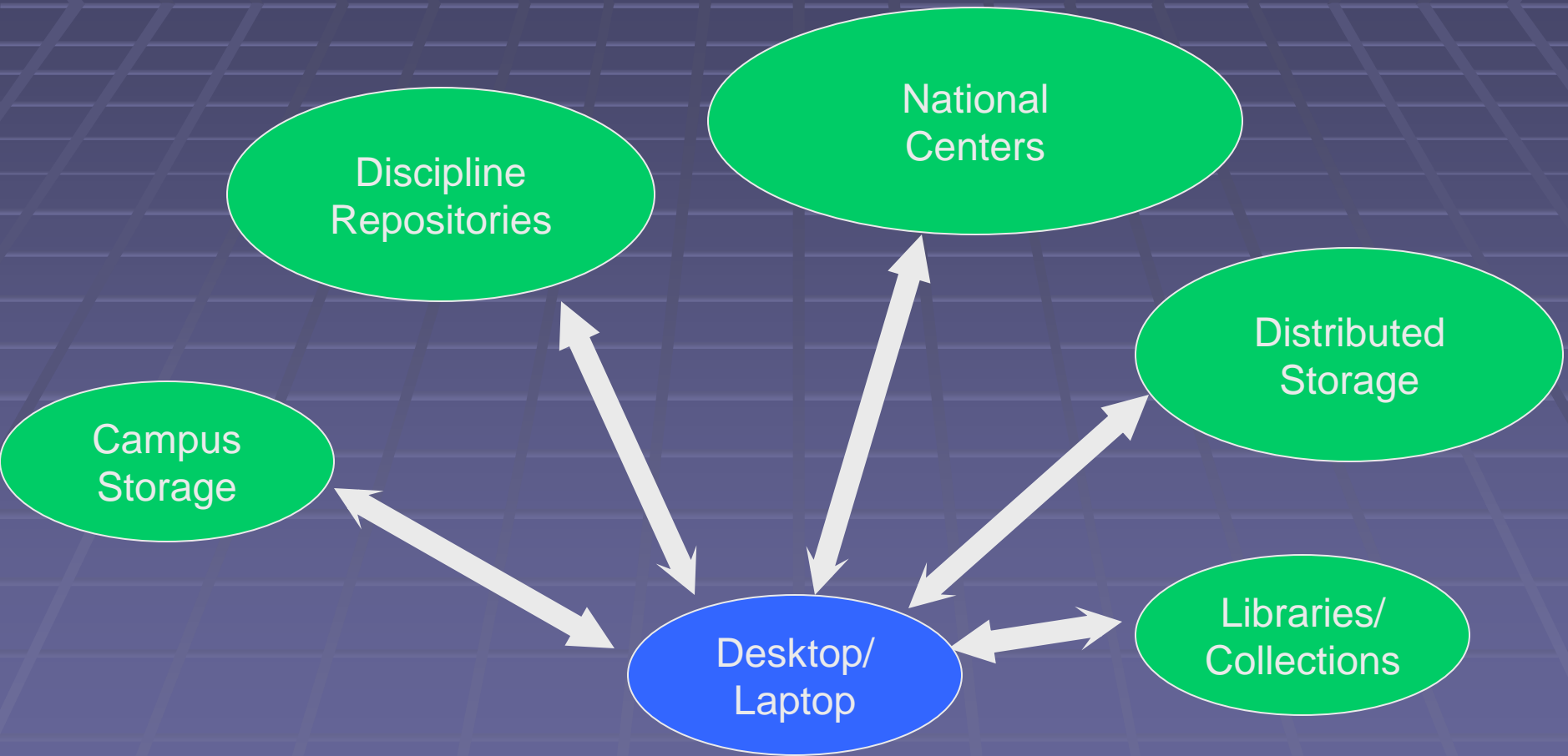
The Research and Educational Networks



Computational Resources



Storage Resources



Pulling it all together

- Gateways
 - Common Software
 - Common Data Formats and Schema
 - Performance and Monitoring Tools
- ... and a lot more!

Researchers that use CI

- There are those that have become CI experts and create their own CI environment
- There are those that do not want to become CI experts and want to focus on their discipline
- All researchers would like CI to be easier

Is Cyberinfrastructure Too Hard?

- Should you have to worry about the
 - Network?
 - Computers?
 - Storage?
- Shouldn't you just be able to use the application?

The “Cloud”

- Really means “Someone else takes care of the technology for you”
- It can be provided by the commercial sector or by the academic community.
- Questions to ask about using the Cloud
 - Do you trust them? Can you rely on them?
 - Do you have an alternative if it doesn't work out?
 - Can you easily transition to another service?

Why is Advanced CI Not More Widely Used?

- You have to learn a new user interface for each application
- Performance and Reliability is inconsistent

<http://campusbridging.iu-pti.org/node/23>

Russ' CI Vision

Set of tools and resources that allow:

- Computation and Storage to easily allow transition from the desktop, to the campus resource, to the regional center, to national super centers using the same software.
- Data repositories in formats and locations to allow ease of sharing among all interested disciplines (the real digital library!)
- Tools to allow people to easily construct systems to analyze, visualize and simulate their research subjects.
- Collaboration tools that allow people to work together like they are in the same room, even if they aren't.

More Info

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