Central IT Organizations and How They Support Research in the U.S.

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Aristotle University of Thessaloniki

Clients, Customers, Users, Partners…

Administrative Functions – ERP Systems; Finance, Payroll, Asset Management, Facilities… more

Faculty, (Educators) – Learning Management Systems, Network Access, Internet, Assessment records, Classroom Technology…more

Students – Dormitory CATV, Wireless, Internet (Netflix/Google), Library Systems… more

Research – High Performance Network Access, Budget Tracking, Data Centers, System Administration…more

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This Research Initiative

Interviews with the Chief Information Officer at 3 Public and 5 Private Universities in the U.S. All are considered to be "Research Intensive" institutions. There were 68 questions across 4 categories: Institutional Profile, Campus Infrastructure, Research Support Services, and Funding Mechanisms.

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Demographics

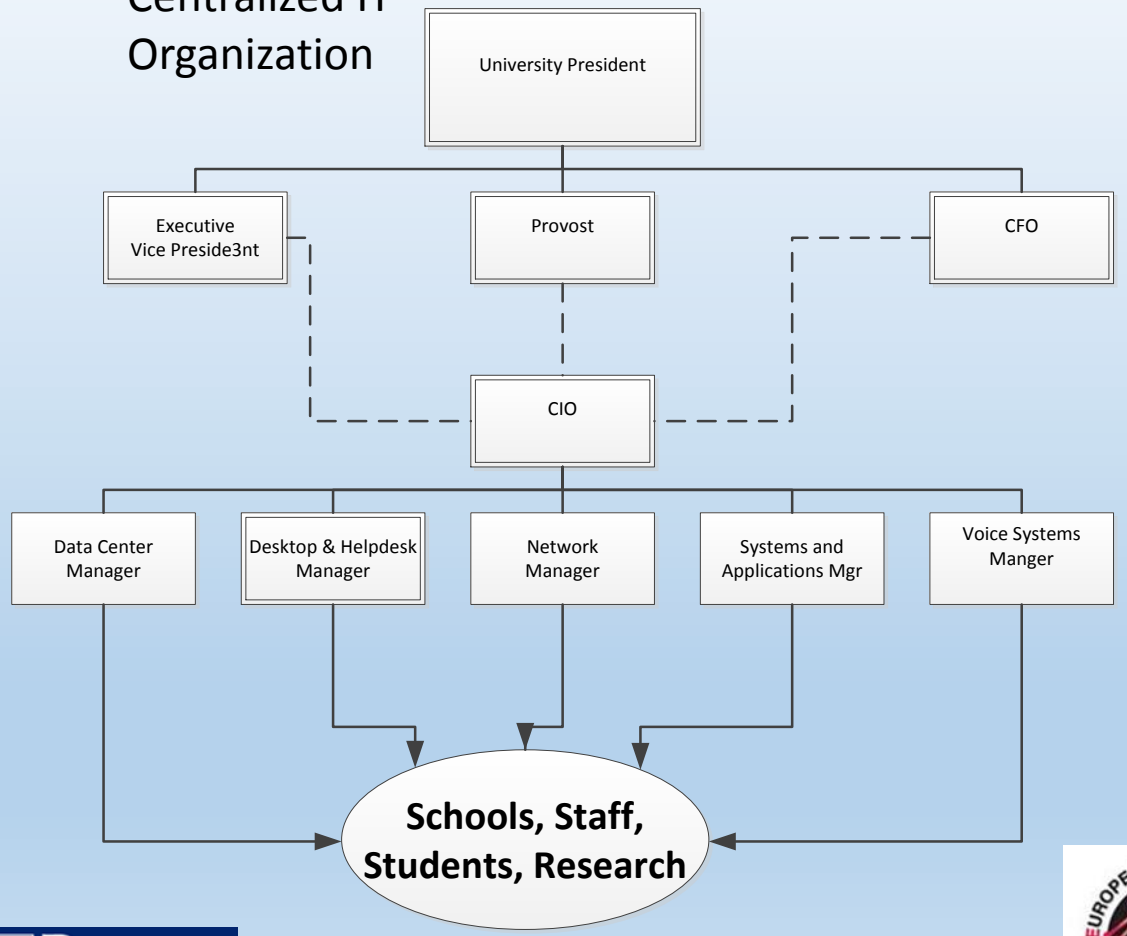
- Student Population Range: ~ 5,250 -> 28,500
  - Higher populations in public universities
- Graduate Student Population Range: ~ 2,700 ->18,600
  - 3 Universities with more Graduate students than undergraduate
- Educator/Faculty Population Range: 1,200 ->5,270
  - In some cases, adjunct lecturers were included in the count
- External Research Funding Range: (U.S. $'s) $201M -> $950M

Central IT Organizational Structures

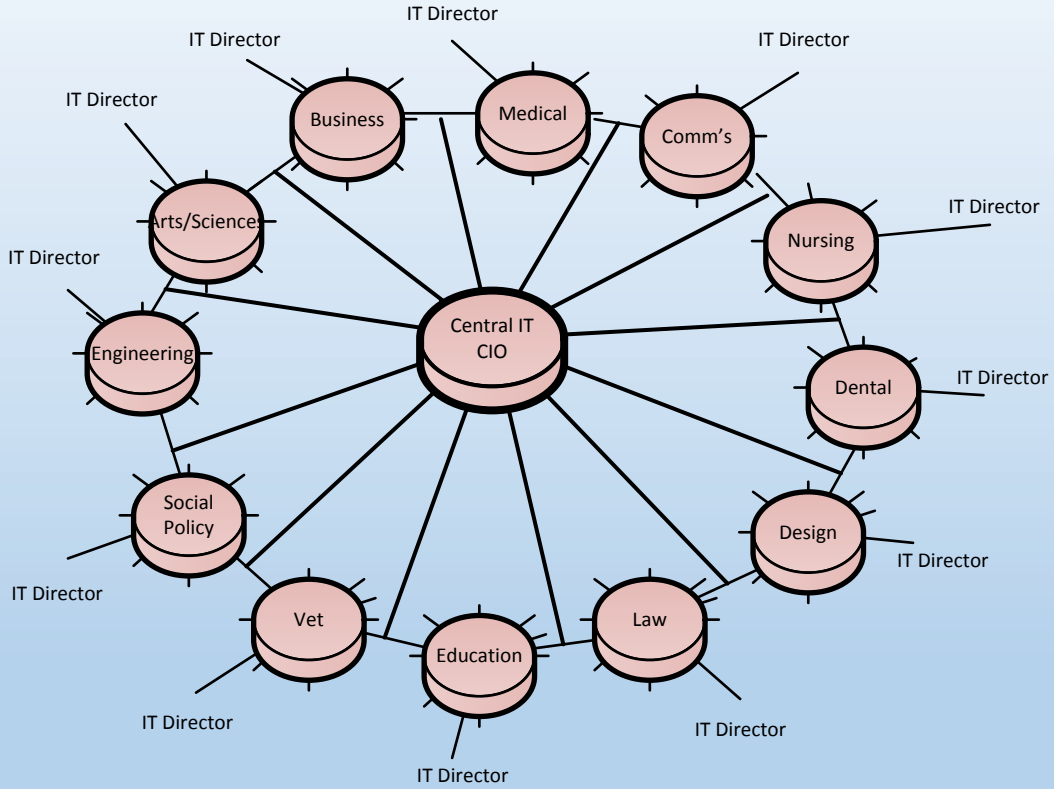
- 2 Types of Environments:
  - Centralized – Mostly, Universities controlled by the state governments
    - A large degree of control
    - Funding/budgets allocated through the Executive Vice President, or CFO
    - Strategic direction established by the President, and/or Provost with the CIO
    - Research support is basic infrastructure with customization by request
  - Decentralized – Multiple units with individual IT Directors
    - Central IT controls mainly campus-wide functions and ERP systems
    - Funding comes from a “tax” levied against each school, (faculty), or direct charges
    - Strategic direction established through committees, the CIO, and/or Executive VP, and/or Provost
    - Research support is reactive. Based on requests from IT Directors at the Faculties

Centralized and Decentralized Organizations

Centralized IT Organization



Decentralized IT Organization



Central IT Technological Infrastructure

- Network
  - Star and ring backbone topologies – Mostly 10G or multiple 10G, 1-100G
  - Some buildings still at 1G, most at 10G, but for the entire building
  - All are connected to research networks, 10G – 100G
- Data Centers
  - All Universities interviewed have data centers, VM's, HPC, Storage, Applications
    - Only one had customized space for researchers
- Cloud Services
  - Most are still struggling with when to use the cloud versus on-site
  - In the decentralized environments, schools are ahead of central IT

Central IT Research Support Services

- Research Support Staff
  - 4 had a dedicated research division, but minimal staff, 1 or 2
  - 3 had “relationship managers”
- Ticketing Systems
  - All have a system for tracking trouble tickets, 1 has a separate system for research
- Communications
  - VPR – Rarely, Quarterly, Monthly, Reactive
  - Direct to the researcher – Never, rarely
- Purchasing
  - Some s/ware with an institutional license, rarely joint h/ware purchases
  - Specialized equipment is the researchers responsibility

Central IT Research Support Services

- Collaborative Science – Building infrastructure and services to support and enable the research effort
  - Pre-Grant Technology Reviews - By request, never
  - Customized networking – rarely
  - Institutional security compliance – sometimes
  - Data Management Plan – By request, never
- Shared Computing/High Performance Computing
  - Shared systems available, but generally inadequate, ERP functions
  - HPC is available where a research division has been established, but generally within the schools or individual labs. Cloud computing on the rise.

Funding Mechanisms for Central IT

- The “Tax”
  - Schools provide funding for central services based on populations
    - Internet, Voice, Campus Cabling, Network, Internet2, etc.
  - Primarily used in private universities
- Budget Allocations
  - CFO, CIO determine an annual budget
    - Exceptions require stringent justification
- Direct Charge
  - Central IT operates on a cost recovery basis, all services have fees
  - Competitive with external vendors???

Current Challenges in Research Support

- Undergraduate research is rising very rapidly
  - An additional strain on school and central IT organizations
- National Funding Agencies are enforcing compliance demands
  - Data Management Plans
    - Public access to raw data and data outcomes
  - Collaboration – with applications, post publication
- Resource Inequalities
  - Endowments, gifts, student tuitions determine facilities and support access
- Territories – Revenue, (Sustainability) Dependent
  - Don’t talk to my people!

More Challenges

- Being Proactive
  - Poor communication across campus IT – Administration – Researchers
  - Lack of understanding about the needs of the research community
- Big Data
  - Not just the hard sciences: Humanities, Design, City Planning, …everyone
  - Capacity planning: Storage, HPC, VM availability, Application Development
- Cloud Services
  - When to go to the cloud? When to use facilities-based systems? What is the ROI? How to downsize the data center without affecting service functionality?

And of Course…

The Data Management Plan!

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Response to the Challenges – Rising Trends

- The Relationship Manager – Acting as the liaison between IT directors and/or deans at the schools and central IT for all technology related subjects. The research liaison focuses on enabling technical processes between all parties. ***Clear Communication!***
- Internal Campus Collaborations – Breaking down the "silos" that inhibit synergies and economies of scale, thereby diminishing scientific discovery and exploration.
- Defining the Cloud – New hybrid infrastructure that accommodates an economical balance between computing, storage, and API development.

More New Trends

- The Research Toolkit – A shared collection of custom and commercial software and analysis tools.
- Big Data – Use of the "Science DMZ" to accelerate large file transfers. Keeping active data on campus and inactive or post-publication data in the cloud, either in domain specific, funding agency, or private
- Dissemination Tools – Exploration of open source and commercial tools that interconnect:
  - Profiles
  - Publications
  - Datasets
  - Funding Agencies
  - Social Media, (Impact)
  - International?
  - Citations
  - Domain Specific

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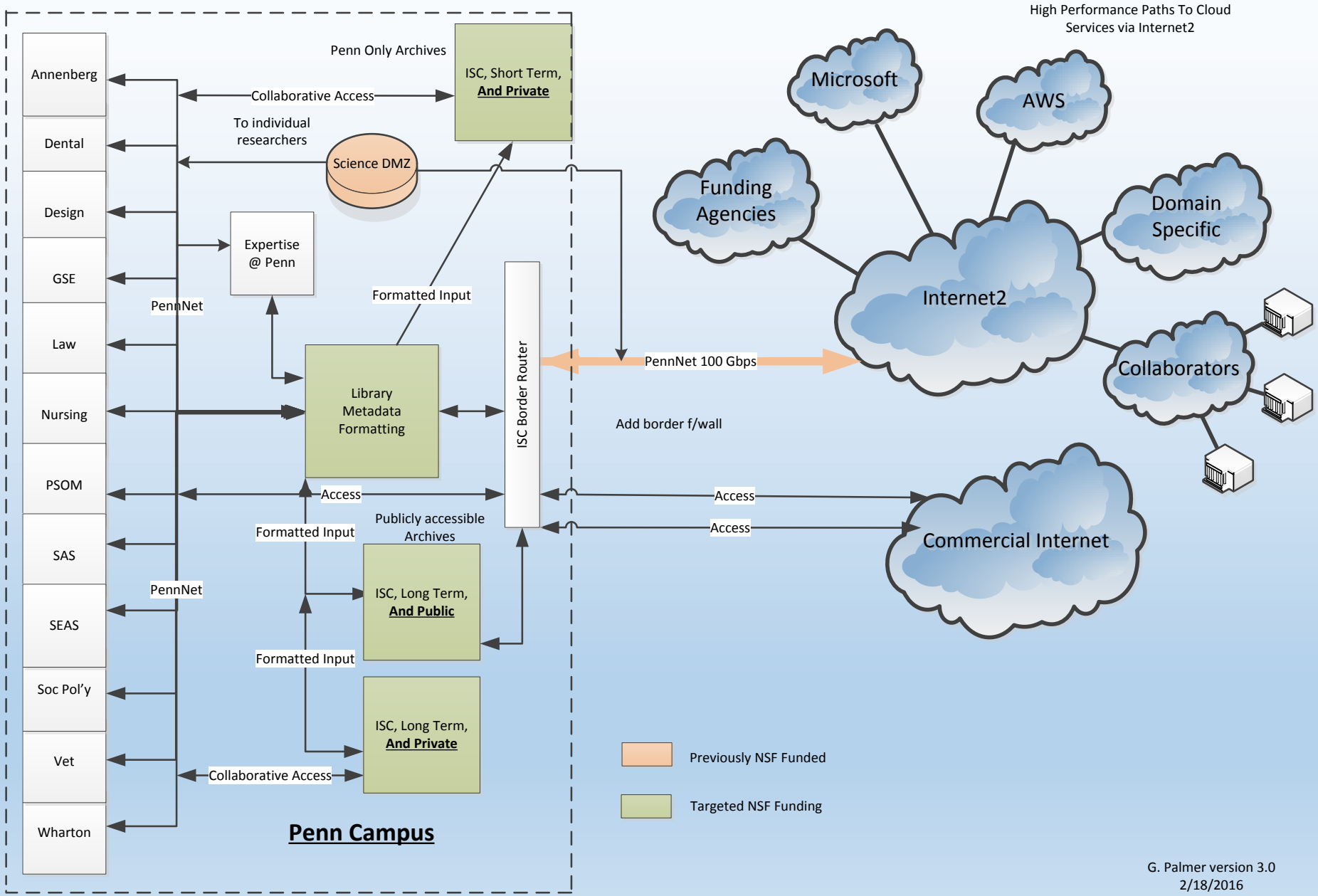
Shared and Archived Data Flows

Data input Process:
New faculty, new grants, publications, datasets. Tagged “Public” or “Private”
Multi-sourced within each school



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The Science DMZ

Frictionless Data Transfer

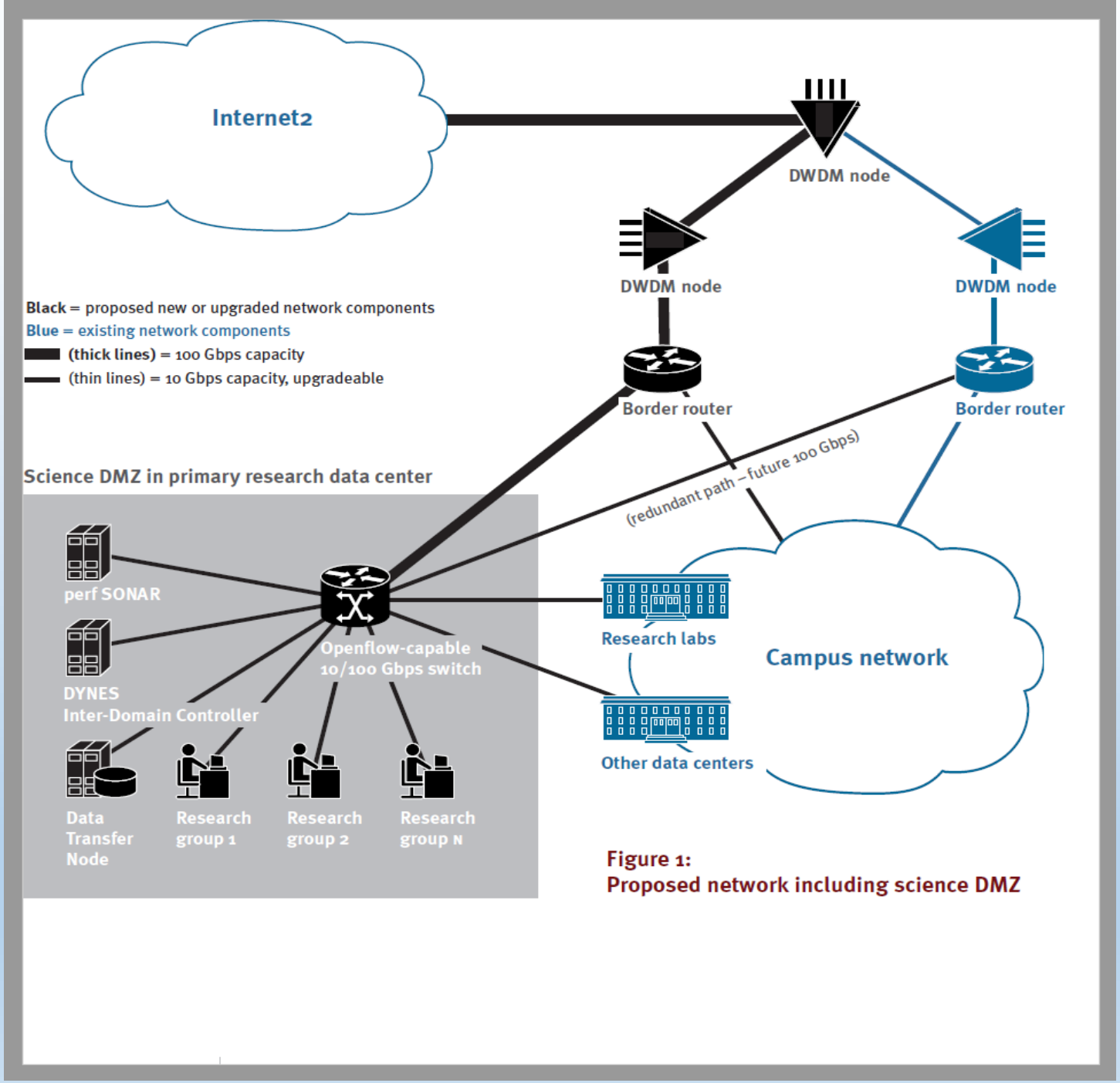

Figure 1:
Proposed network including science DMZ

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In Conclusion

- Great progress is being made in the area of cross-campus communication between central IT, the Research Office, the IT Directors, and the Research Community.
- The In-Campus collaborations are proliferating. Through the Offices of the Vice Provosts for Research, awareness of like-minded research projects. Central IT is identifying those areas that make the most sense for efficiency and economies of scale.
- New tools are being explored that will enable data and software applications to be made accessible both on-campus, within the U.S., and at some point, (I hope), international.

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