

# Sustainable Cyberinfrastructure at UW:

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**Research & Economic Development**



Trustees' Meeting,  
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# NWSC Major Elements

- Building
  - 150,000 sq ft
  - 25,000 sq ft of machine room floor
  - Major area for mass storage
  - 4-5 mega Watts of power
- Funding
  - \$74 million
  - \$20 million from Wyoming for construction
  - \$1 Million /year for 20 years
- Allocation Agreement
  - 20% allocation
  - Must be used in the Earth Systems Sciences
  - Must be based on a Federally peer reviewed and accepted proposal
  - Other requests must clear the NCAR/NSF process

**Technology has greatly changed  
the way we live our lives**

# Technology has greatly changed the way we live our lives

## Cameras





# Technology has greatly changed the way we live our lives

Finding information



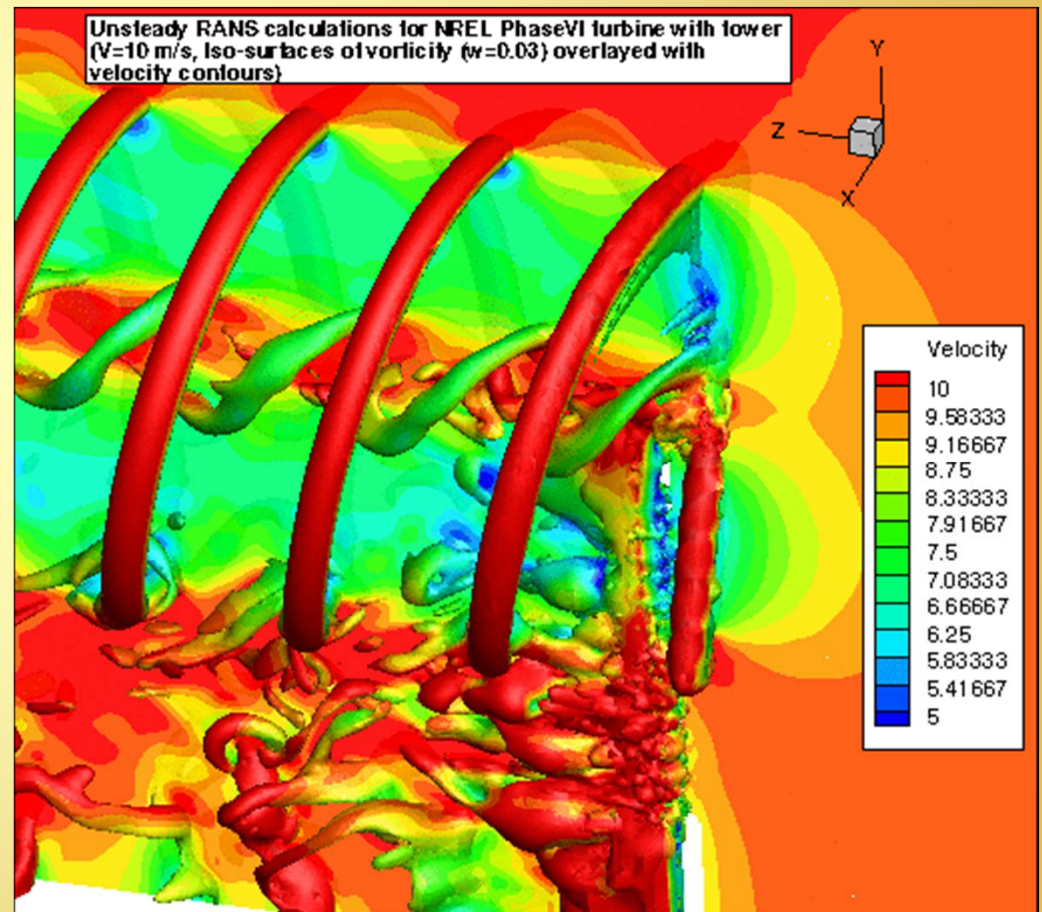
# Technology is changing research and education

Computational science has joined the  
experimental and theoretical methods  
as the **third leg of scientific inquiry and  
discovery**

# Technology is changing research and education



Jay Sitaraman  
Wind Energy Research Center





UW's planning documents have advanced a set of institutional areas of distinction, many of which have critical intersections with **High Performance Computing (HPC)**.

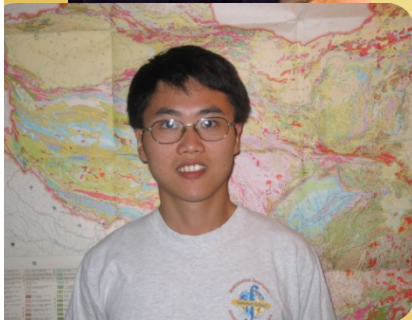
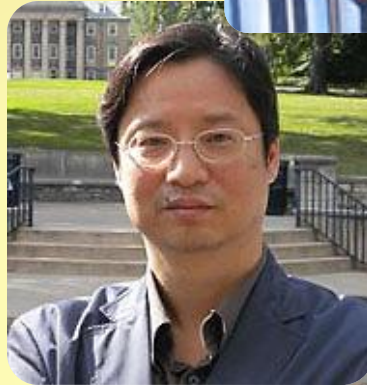
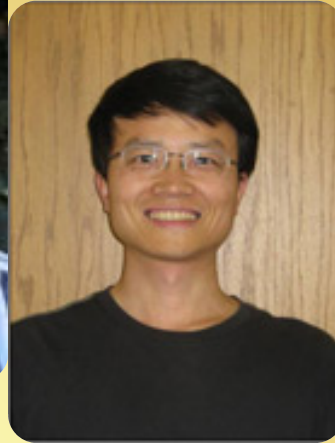


Supporting these areas of distinction requires UW to develop a robust, sustainably funded cyberinfrastructure.



1999-2004 Plan: **Computational science** identified as an area **critical to** UW's goal of **achieving distinction** in science and technology.

2004-2009 Plan: We envision a **strong community of computational scientists** and engineers at UW, spanning several disciplines and providing a permanent basis for internationally **competitive research and high-caliber undergraduate and graduate education.**





# UNDERGRADUATE RESEARCH at UW enabled by HPC

- Tow Load Indicator with LCD Display
- Statistical Analysis of the Natural Gas Future Prices from 1995
- Mathematical Model for HIV Focusing on High Risk Populations in Yunnan, China
- Triaxial Braid Composite Modeling
- *Musca domestica* Based Machine Vision Sensor
- Experimental Validation of Transient State Heat Transfer in a Residential Attic Space
- 3-D Education: Biological Anthropology Explored
- PESB: Physics Engine for Soft Bodies
- eMachine Learning System to Learn what Users Find Attractive in On-line
- Study of the Effects of Wind Power To Establish Fatigue Design Criteria for High-Mast
- An Integrated Approach to Secondary Oil Recovery & Simulation of Slattery South
- Information Security Management System (ISMS) for the Small Business
- Fly-Eye Sensor Automatic Calibration System
- Haven the Video Game
- Assessing the Impacts of Climate Change on Wine Production in the Columbia Valley American Viticultural Area, Washington
- Study of climatic conditions leading to low streamflows in the headwaters of the Colorado River

## 2009-2014 Plan

Identifies computational science & engineering as a field that “warrants special strategic emphasis”

Establishes action items to

- to develop undergraduate and graduate curricula in scientific computing
- develop a plan to provide sustainable high-performance computing



# Scientific Computing Landscape

Tier 1: Leadership class

1-2  
Peta-  
flops

Tier 2: Large-scale  
campus computers

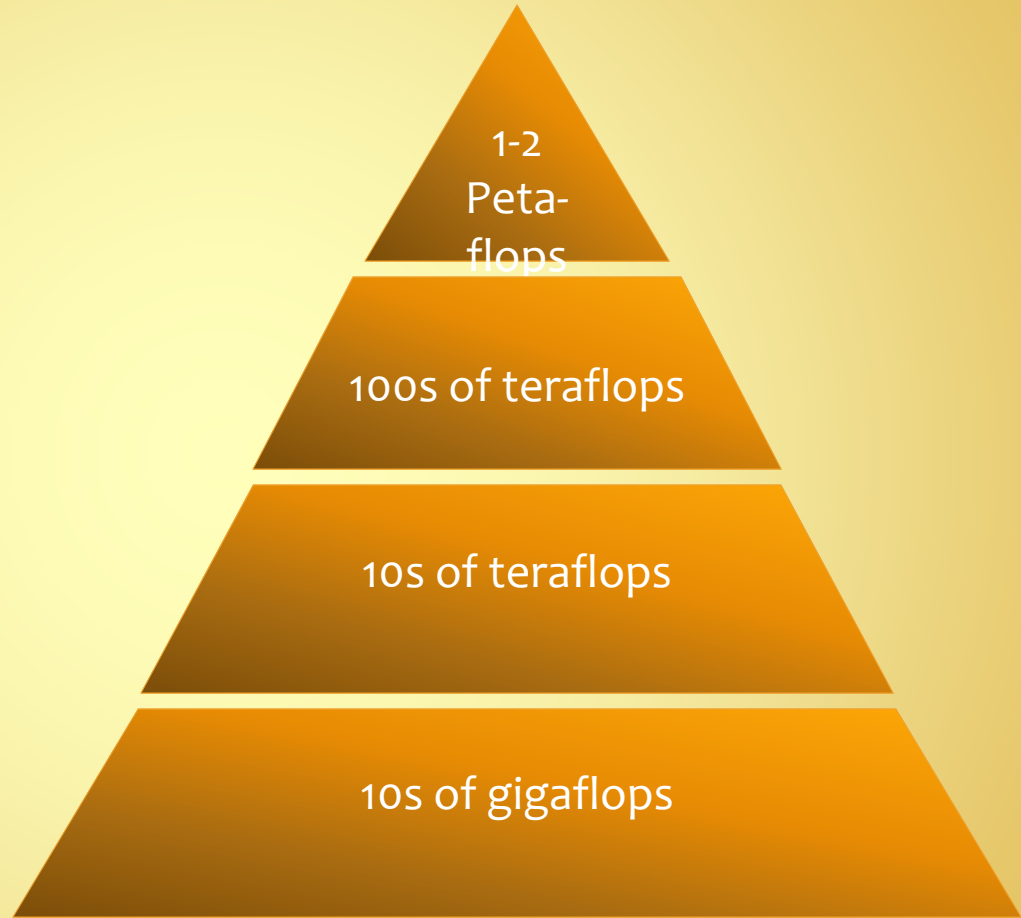
100s of teraflops

Tier 3: Small-scale  
campus clusters

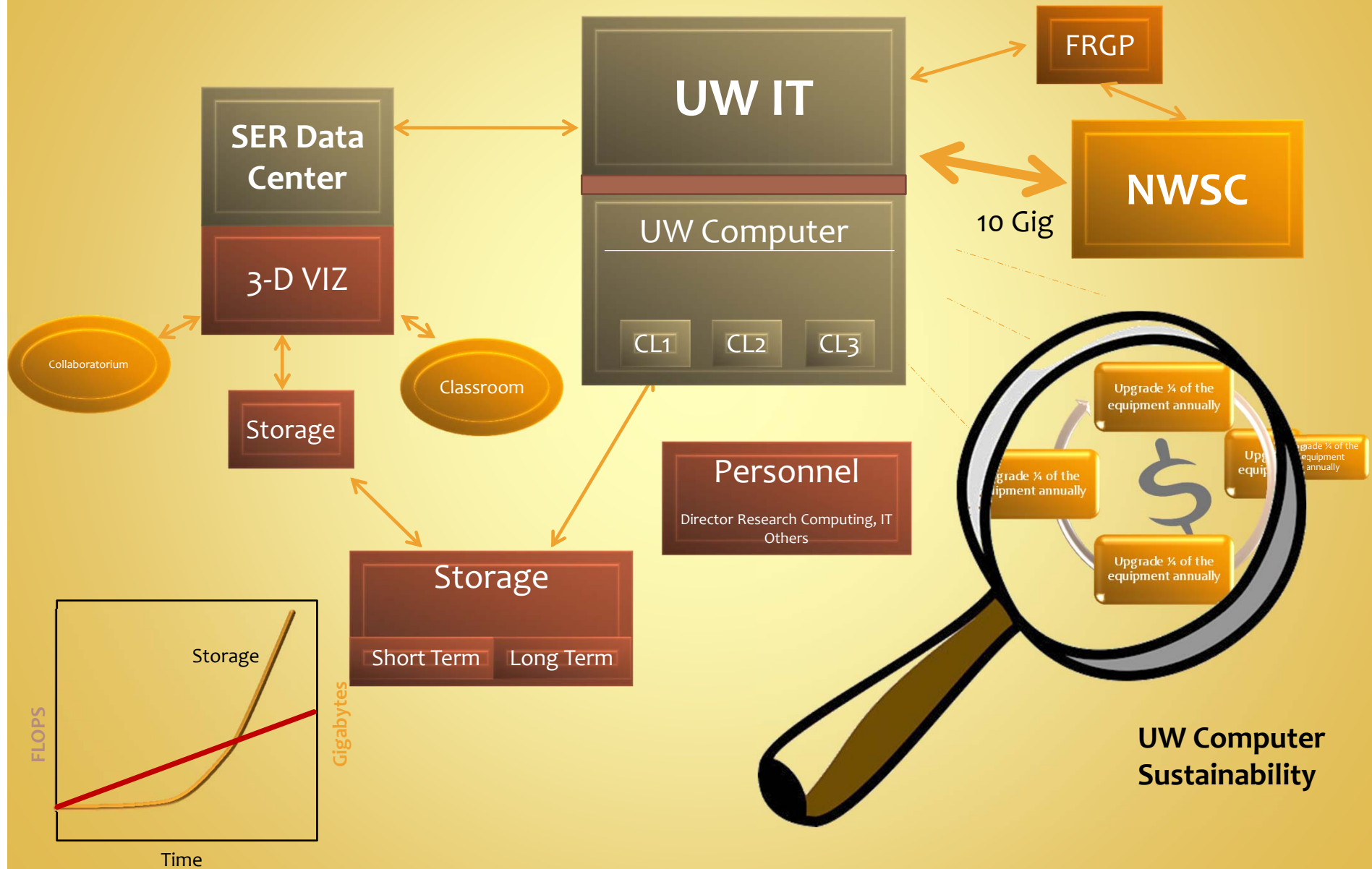
10s of teraflops

Single user desktop PCs

10s of gigaflops

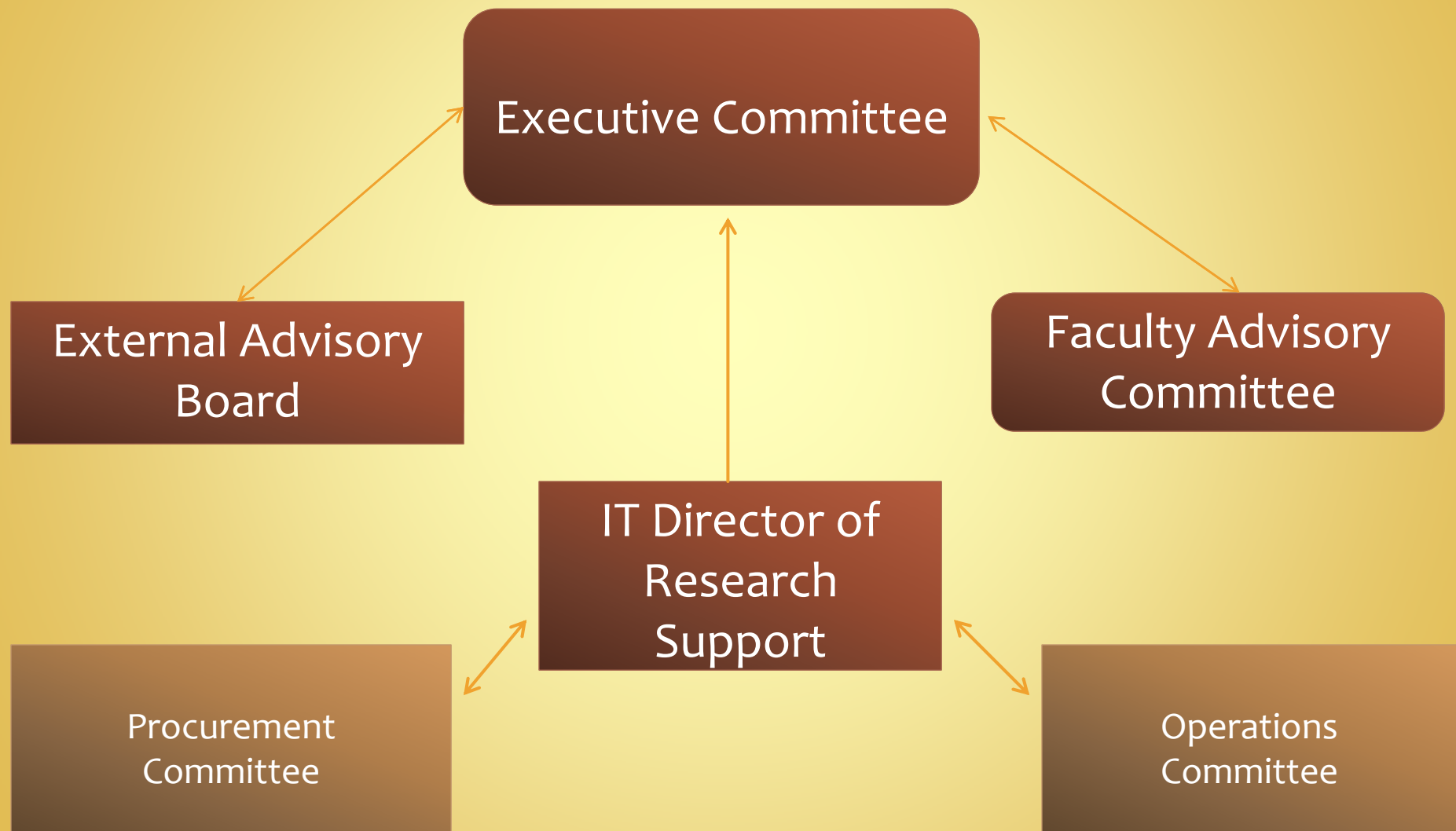


# Elements of UW Research Cyberinfrastructure Governance

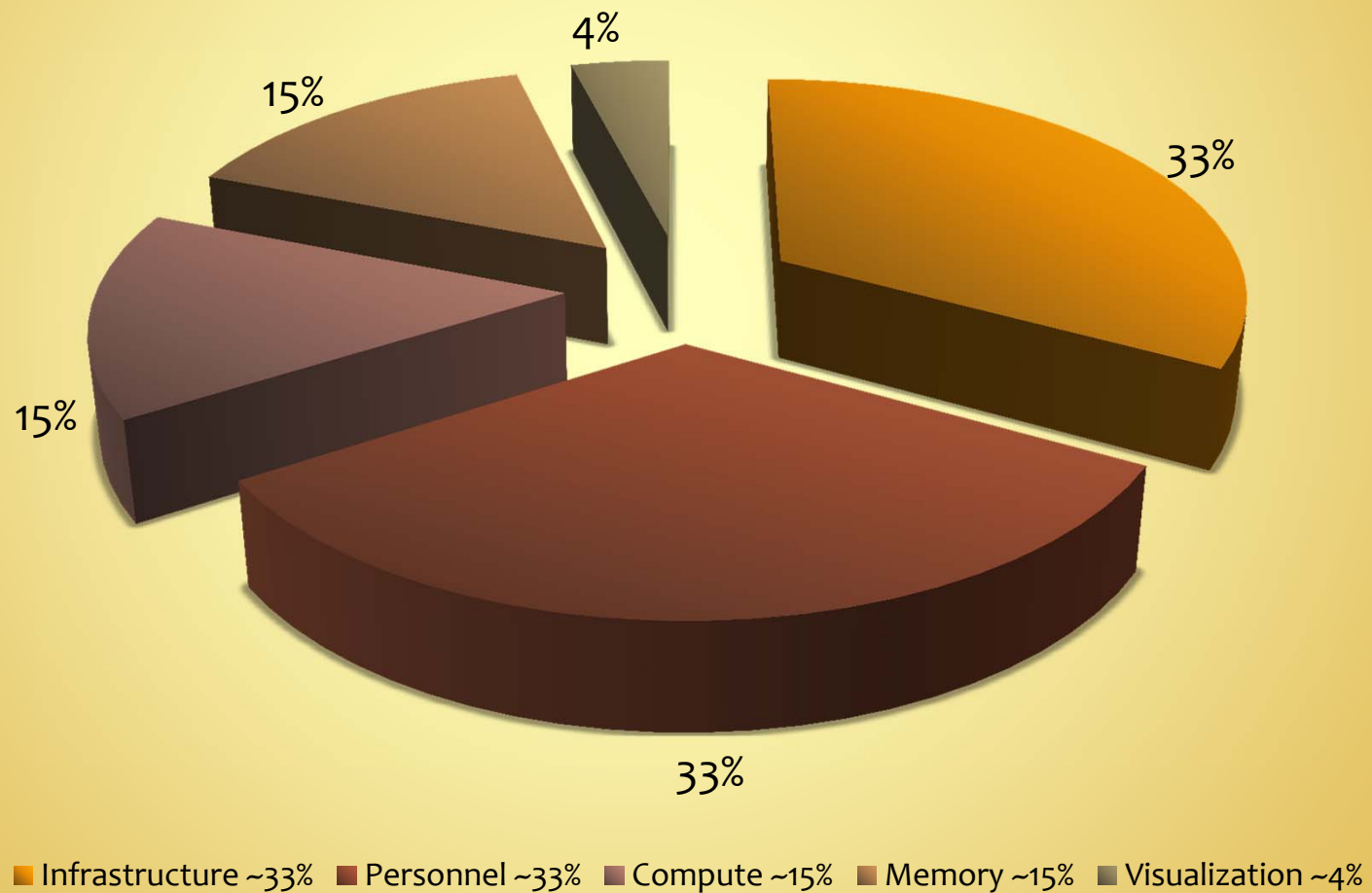


# Governance

## UW Research Computing Administrative Structure



# Long-term investment distribution





Proposed sustainability plan that would provide initial computing capabilities in the ranges of

27-53 teraflops

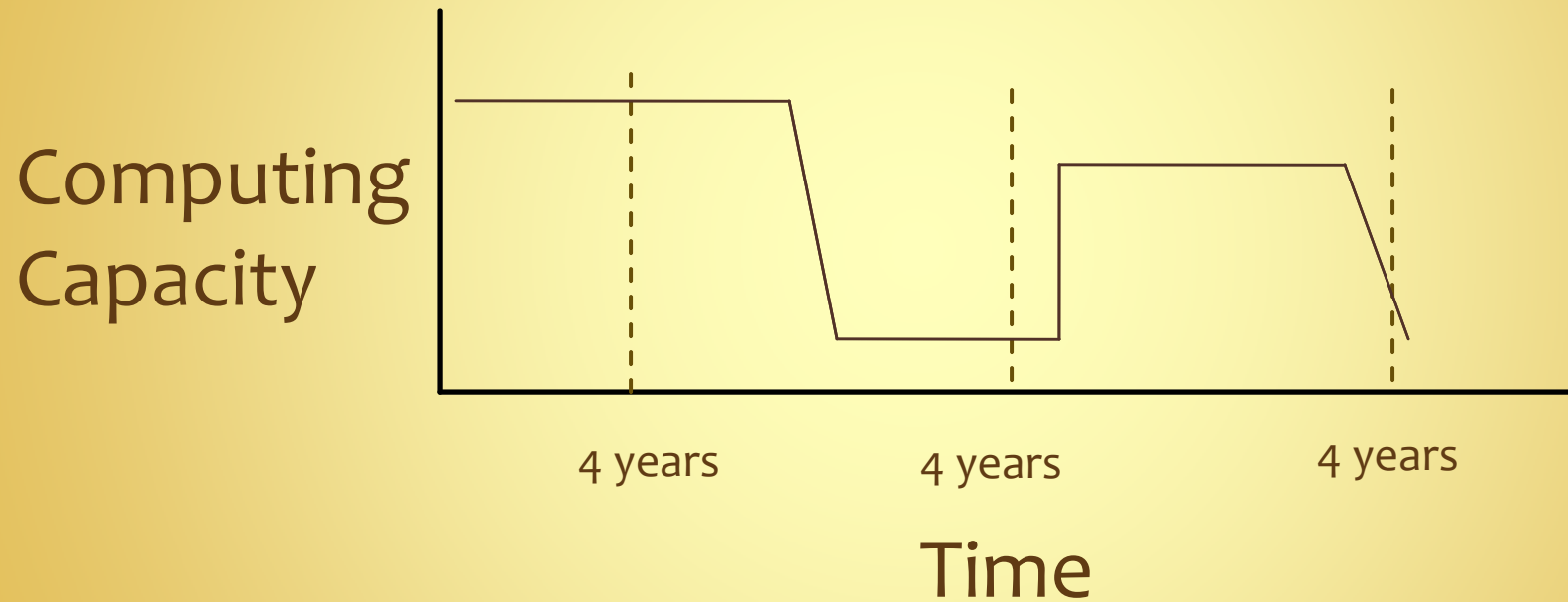
.5-1.5 petabytes of short-term storage

2.5-7.5 petabytes of archival storage

3-5 Research IT positions

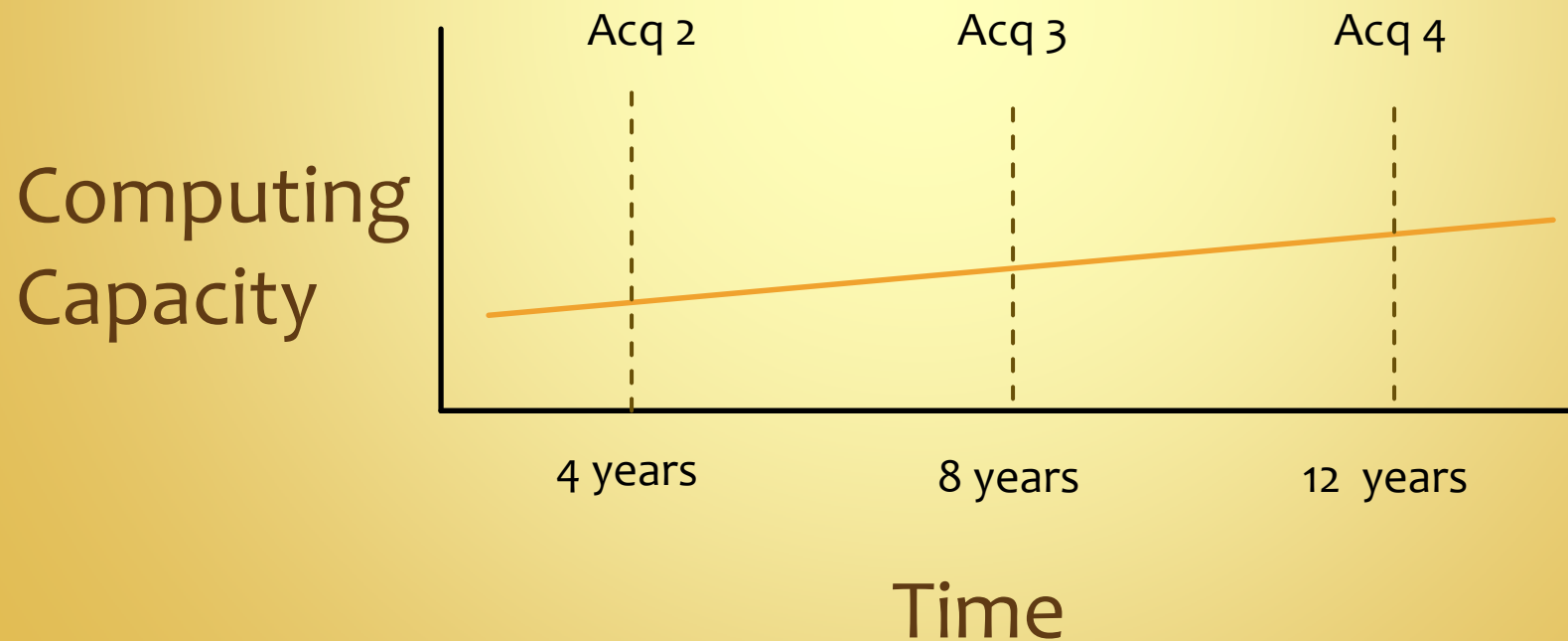
Requires approximately \$1 million/year in funds.

# Non-sustainability



# Sustainability

- Computing capacity and capability
- Storage both short and long term
- Network accessibility



# Initial investment in Research Computing Cluster

## UW-CI funds that will be spent over next 6-12 months

Faculty start-ups and research funds	\$235,000
Research Office	\$250,000

## Near-term possible funding

EPSCoR Track I	\$400,000/year
5 years, UW Match.	
EPSCoR Track II	\$300,000/year
3 years	



## On-going activity

Use the \$485K in available funds to invest in

- Power & cooling upgrades at ITC to support future clusters
- Core of UW-Research Computer
- Bridge funding for Research IT Manager and system administration positions.

Procurement process started with goal of having computing system installed next Fall.

# What does this mean for UW?

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- Distinction in Science & Technology
- Opportunities for faculty and students to work on today's grand challenges
- Enhanced recruitment and retention of faculty
- Provides computing environment to support non-NWSC research and for scaling up projects to NWSC