San Diego Supercomputer Center

Mike Norman, Director

"Where computational science and data science come together for science and society"

SDSC SAN DIEGO SUPERCOMPUTER CENTER

UNIVERSITY OF CALIFORNIA

SDSC: 32 Years of Excellence in High Performance and Data Intensive Computing

- Established as a national supercomputer resource center in **1985** by NSF
- Became an Organized Research Unit in **1997** serving the UC system
- Largest at UC San Diego:
  - grant revenues (~$30M/yr)
  - people (~225)
  - 45% proposal acceptance ratio
- World leader in data-intensive computing and data management

SDSC's Vision

To deliver lasting impact across the greater scientific community by creating innovative end-to-end computational and data solutions to meet the biggest research challenges of our time.

Tagline: "Data to Discovery"

Mission: Enable

- **Enable the research of others through *collaboration* and our own innovative cyberinfrastructure RDD&E**

Gordon – World's First Flash-based Supercomputer for Data-intensive Apps

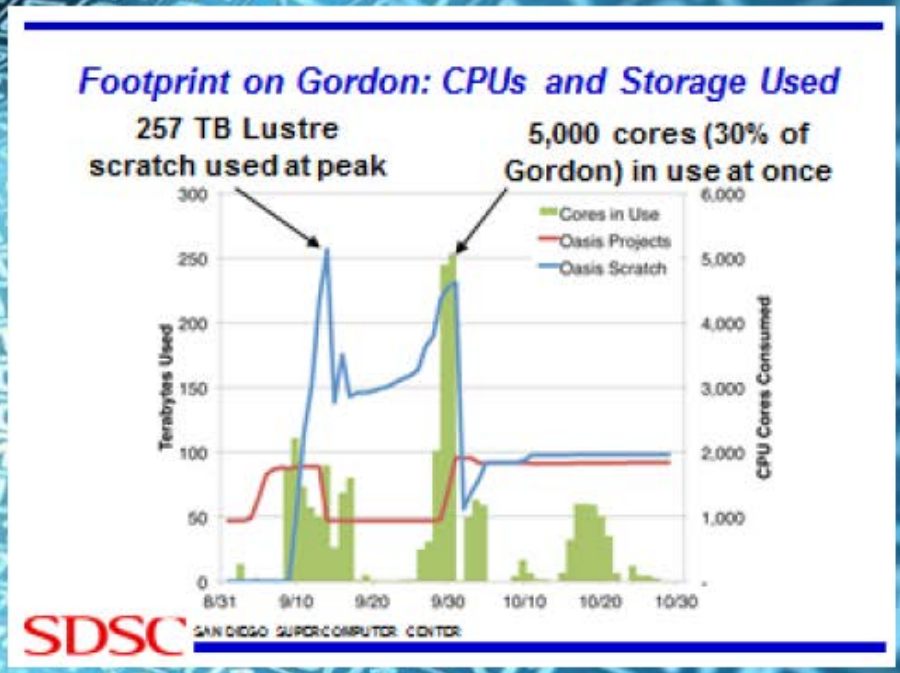
>300,000 times as fast as SDSC's first supercomputer

1,000,000 times as much memory

Gordon Supercomputer at SDSC (credit Alan Decker)

Genomic analysis

Collaborated with Janssen R&D to analyze 438 whole human genomes in less than 2 months for rheumatoid arthritis drug



janssen | PHARMACEUTICAL COMPANIES OF Johnson & Johnson

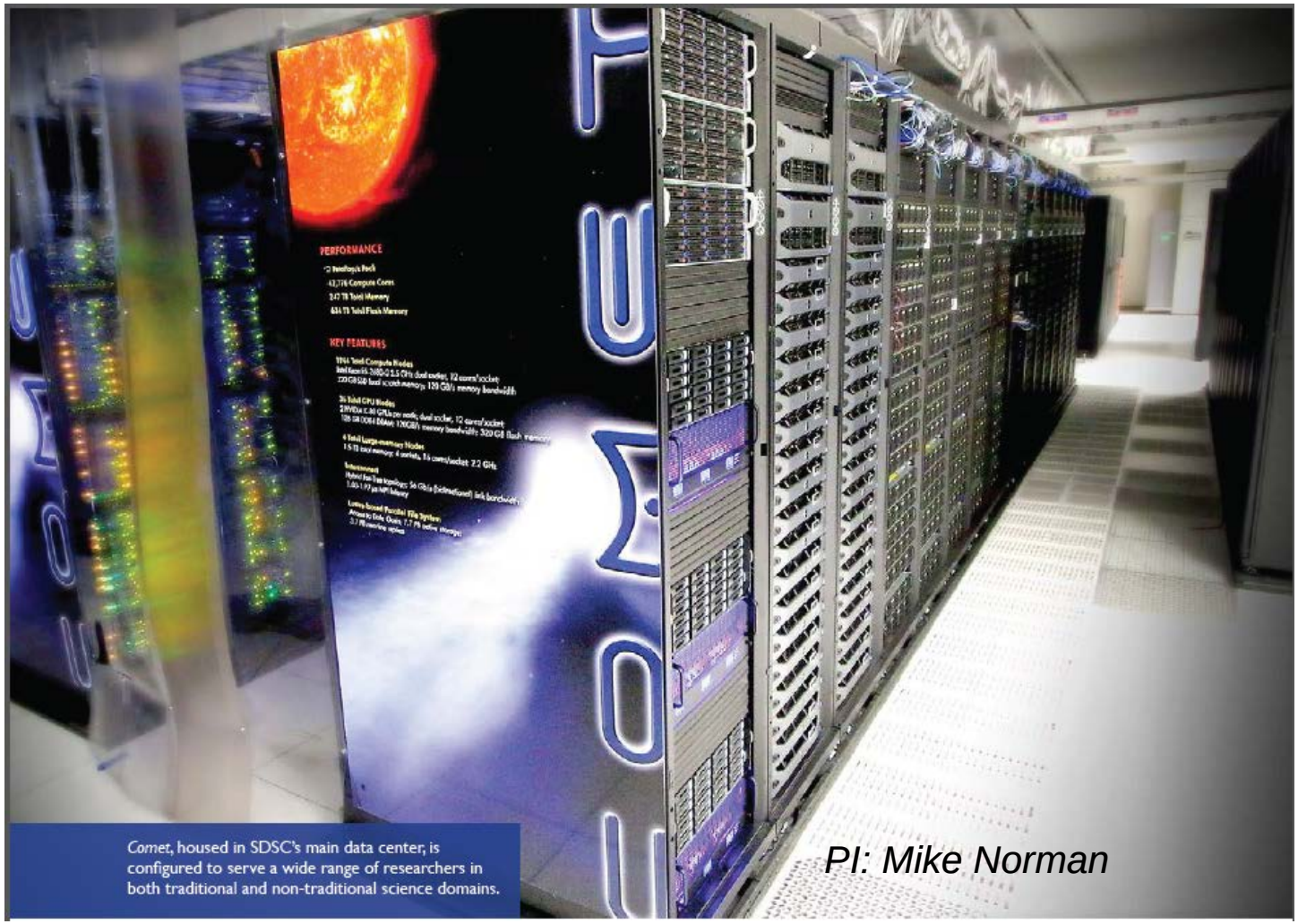
High energy physics

Prof. Frank Wuerthwein (UCSD) processed 125 TB of LHC data in 4 weeks for dark matter search

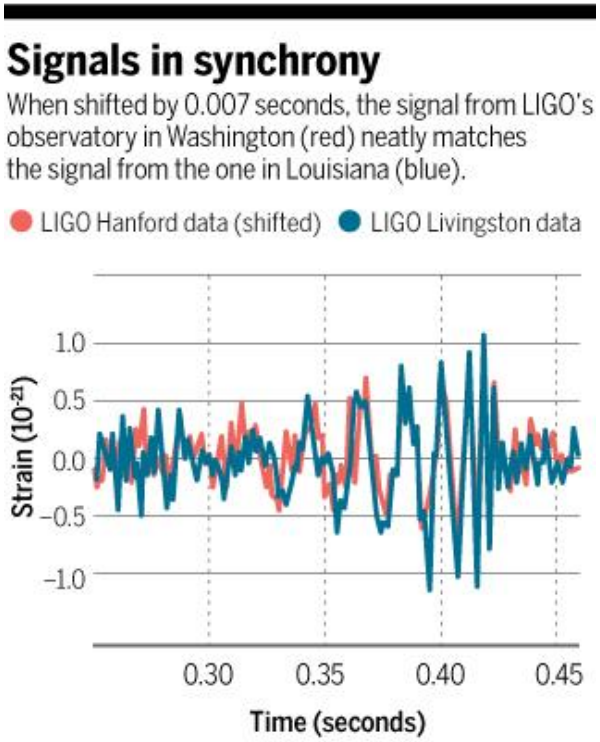
2X

Gordon effectively doubled the worldwide processing capacity

Comet: first virtualized HPC system, reaching new communities



Comet was instrumental in confirming the gravity wave discovery in 2016



COMET delivered 700,000 SUs to LIGO via OSG since inception

Human expertise is the key ingredient

- SDSC houses **over 100 researchers** developing and applying cyberinfrastructure to benefit science and society

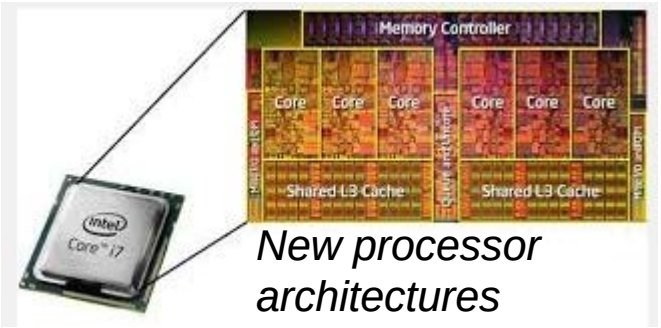










New processor architectures

Big data revolution

disruption

coursera

UDACITY

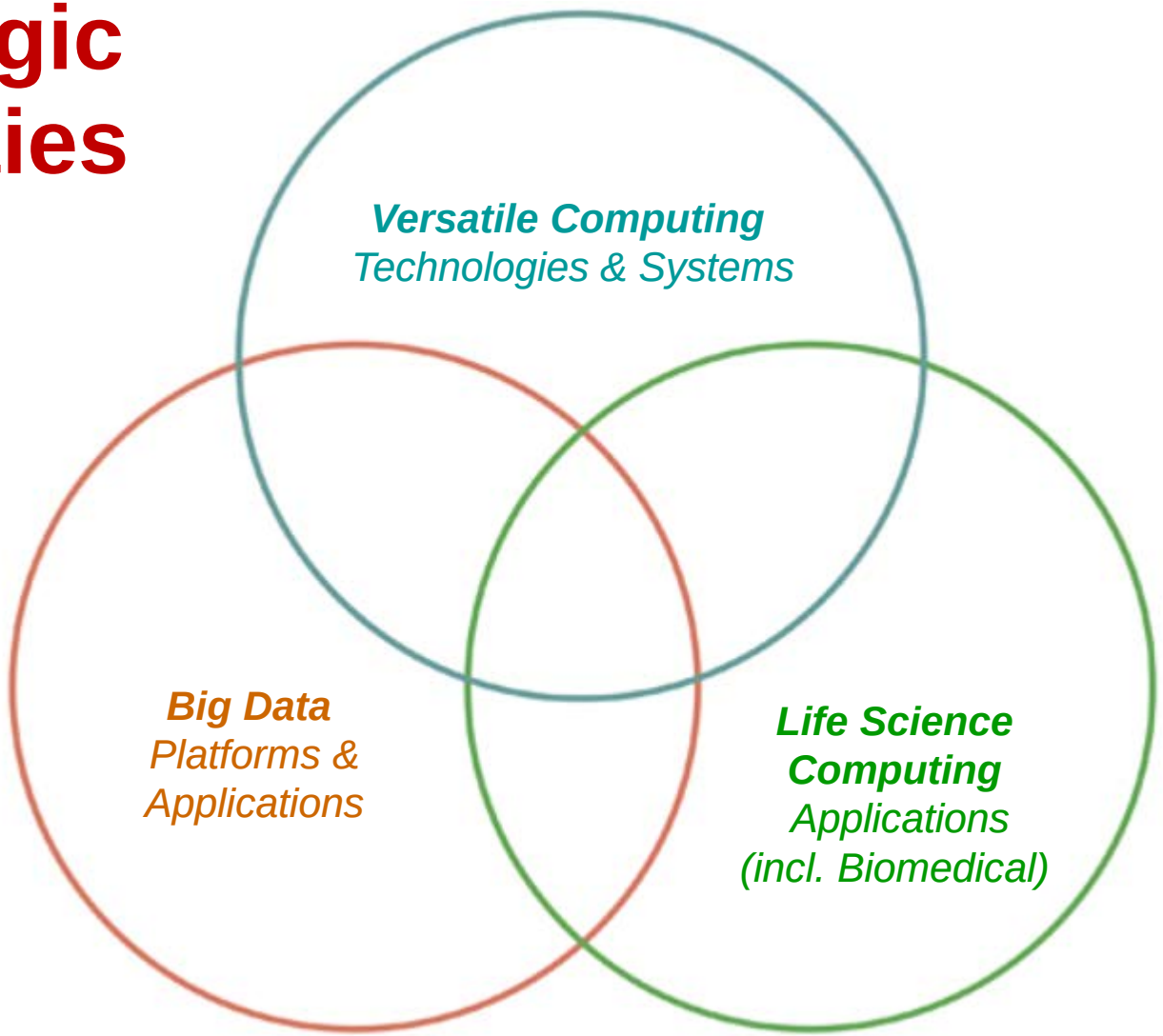
New education delivery platforms: MOOCs

Rise of the cloud

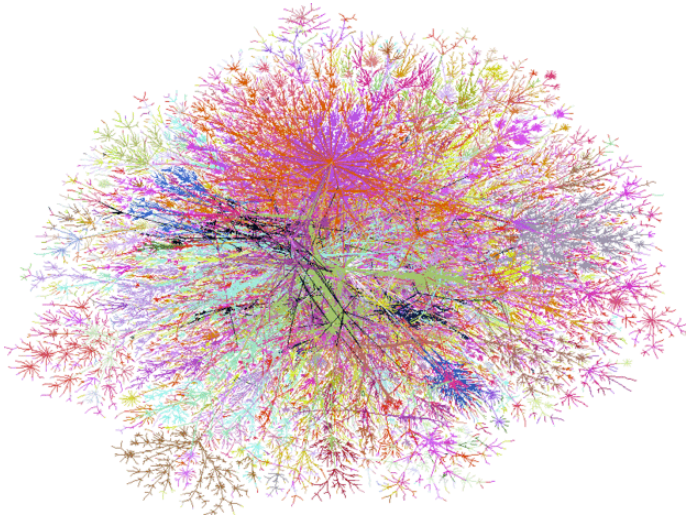
Gretsky's Dictum

"Skate to where the puck is going to be"

Strategic Priorities



Dynamic Data-Driven Decision Support for Science and Society



BIG DATA

BIG COMPUTE

Computational "Big" Data Science

Requires support for experimental work by a multidisciplinary group of experts and dynamic scalability on many platforms!

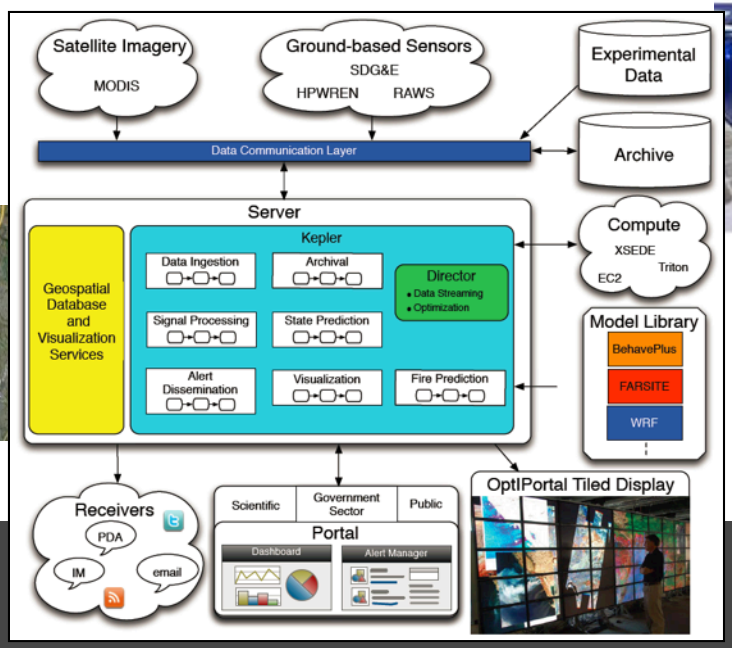
Using Workflows and Cyberinfrastructure for Wildfire Resilience

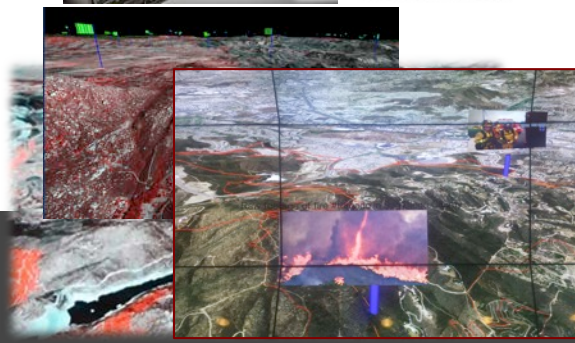
A Scalable Data-Driven Monitoring and Dynamic Prediction Approach -

Big Data

WIFIRE

Monitoring
Visualization
Fire Modeling





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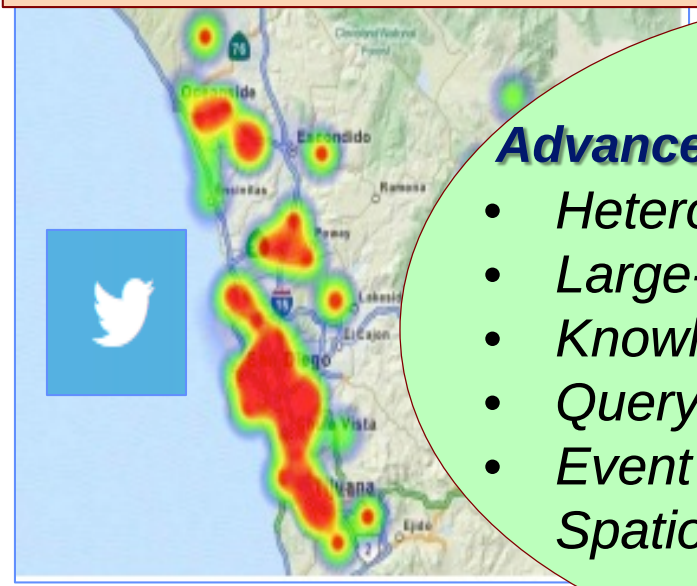
AWESOME: A Workbench for Exploration of Social Media

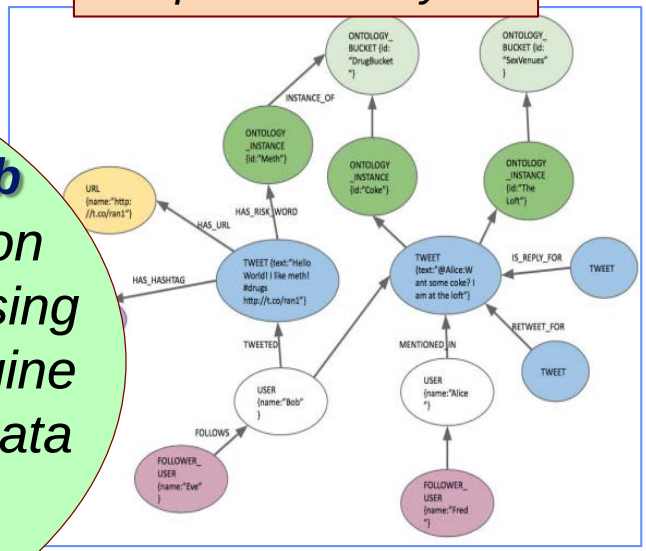
- A Polystore-Based Big Data Platform for Social Media Data -

AQP.sdsc.edu/AWESOME

At-risk HIV Candidates in San Diego



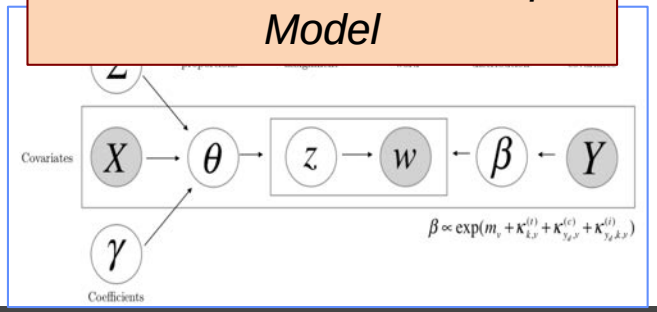
Graph Data Analytics



Advanced Query Processing Lab

- *Heterogeneous Data Integration*
- *Large-Scale Ontology Processing*
- *Knowledge-based Search Engine*
- *Query Processing on Graph Data*
- *Event Modeling with Spatiotemporal Data*

Parallelized Structural Topic Model



AsterixDB
more engine less trunk

NIF Neuroscience Information Framework *a Semantic Search Engine*
Find what you're looking for, *Faster.*
What can NIF do for me?

Information Discovery using Domain Knowledge
www.neuinfo.org

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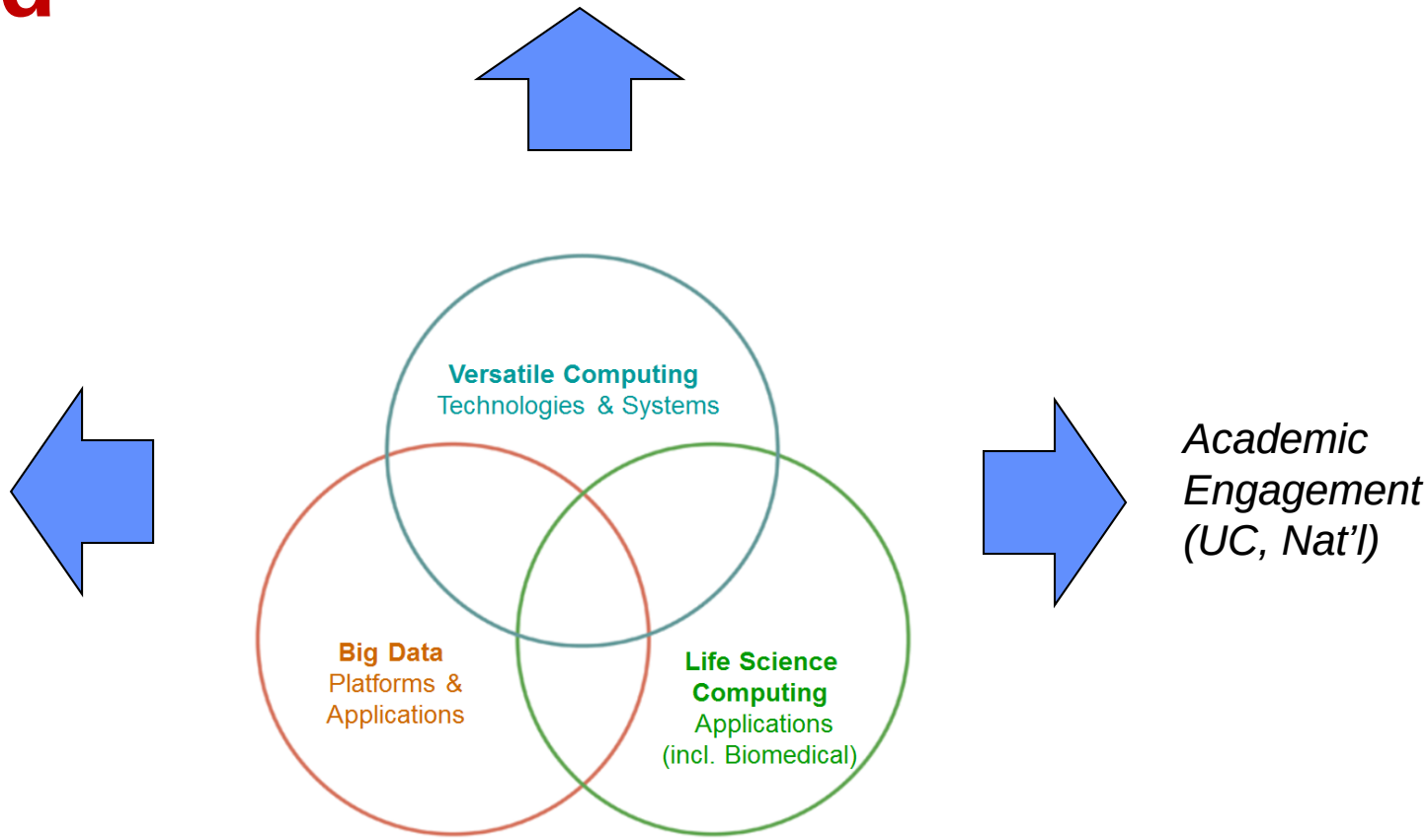
Going Forward

Federal Grants



Industry & Community Engagement

Academic Engagement (UC, Nat'l)

SDSC IS EAGER TO BE YOUR INNOVATION PARTNER: TALK TO US!