

ENVISIONING VIRGINIA TECH

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**BEYOND** BOUNDARIES

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# A GENERATION FROM NOW

## Life and work will be

more global, mobile, technology-mediated, specialized, interconnected; less steady/stable

## Students will seek

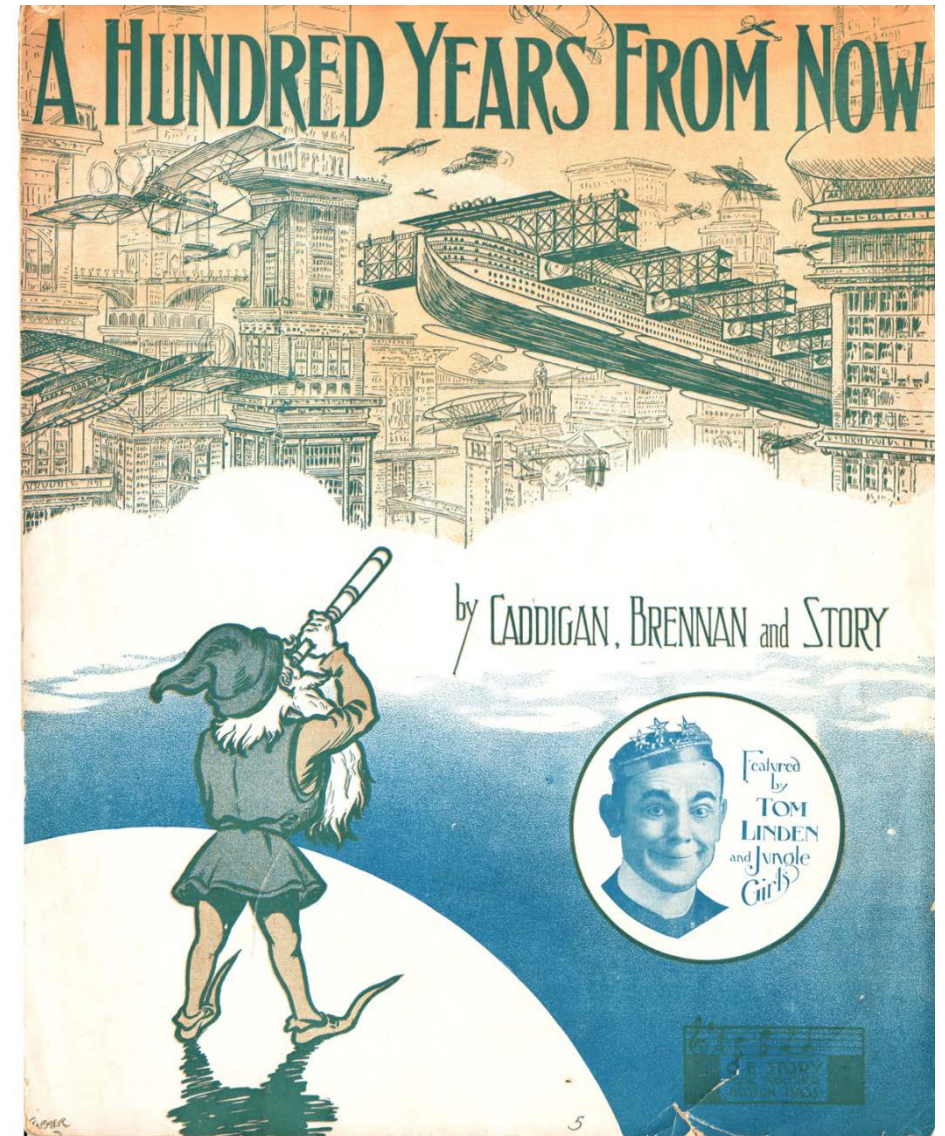
knowledge, expertise, opportunity, flexibility, *jobs*;  
but also *purpose* and *meaning*

## The campus will

comprise heterogeneous networks and innovation hubs  
facilitated by technology

## Virginia Tech must

reflect the world in which students live and work, differentiate itself with unique value and personalized education; be sustainable, adaptable, and reflexive



Brennan Caddigan, *A Hundred Years from Now*, 1914



# VT-SHAPED PEOPLE

‘VT-shaped’ students with:

Disciplinary depth

Interdisciplinary capacities

Purpose-driven engagement



# COMMUNITIES OF DISCOVERY

## Human-centered environments

Engage the whole person, cultivate empathy, inclusive, a culture of mentoring

## Empowering opportunities

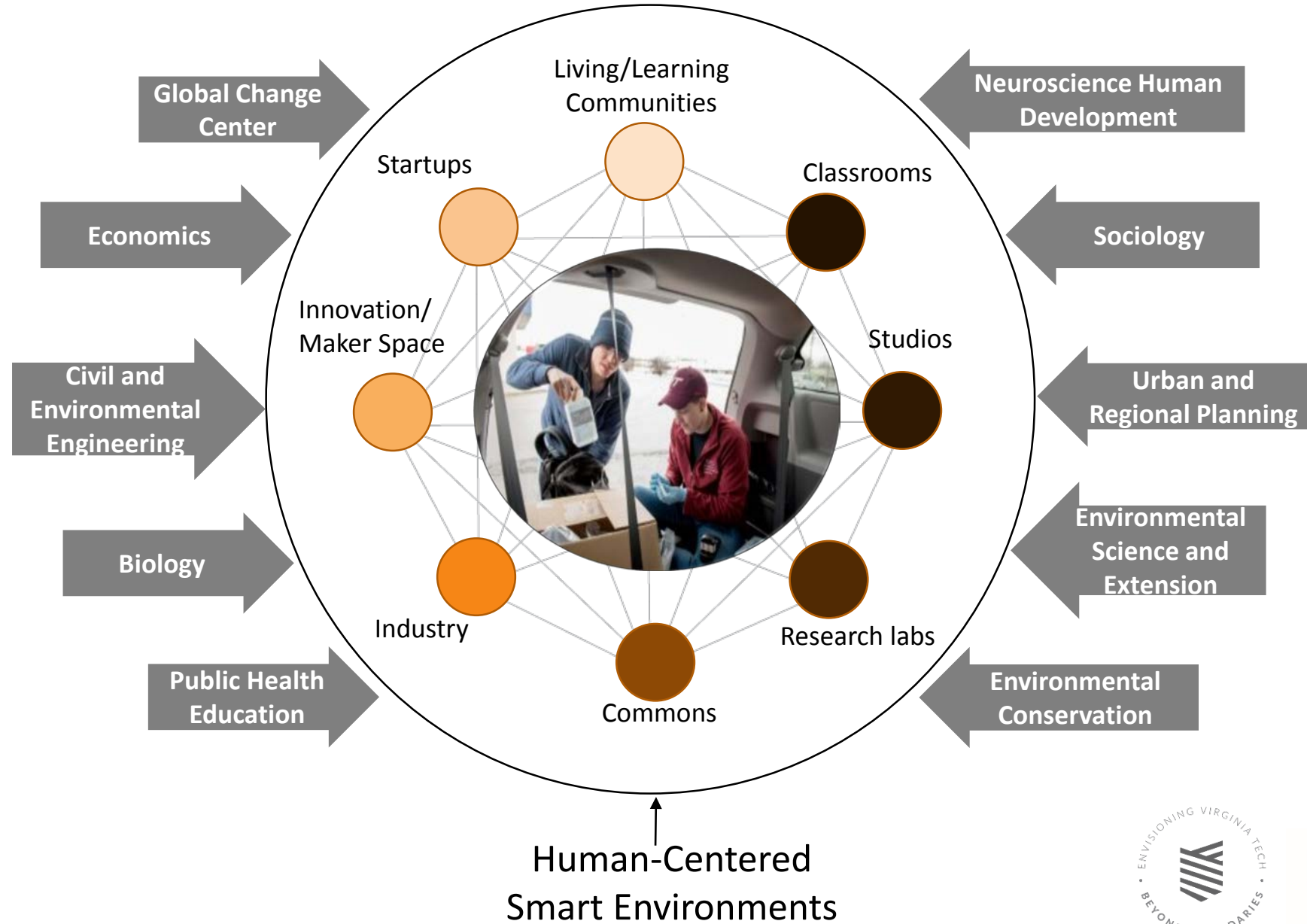
Flexible, experiential, interdisciplinary

## Purpose-driven learning

Real-world projects on matters of concern in collaboration with multiple stakeholders



# INTEGRATIVE INNOVATION HUB



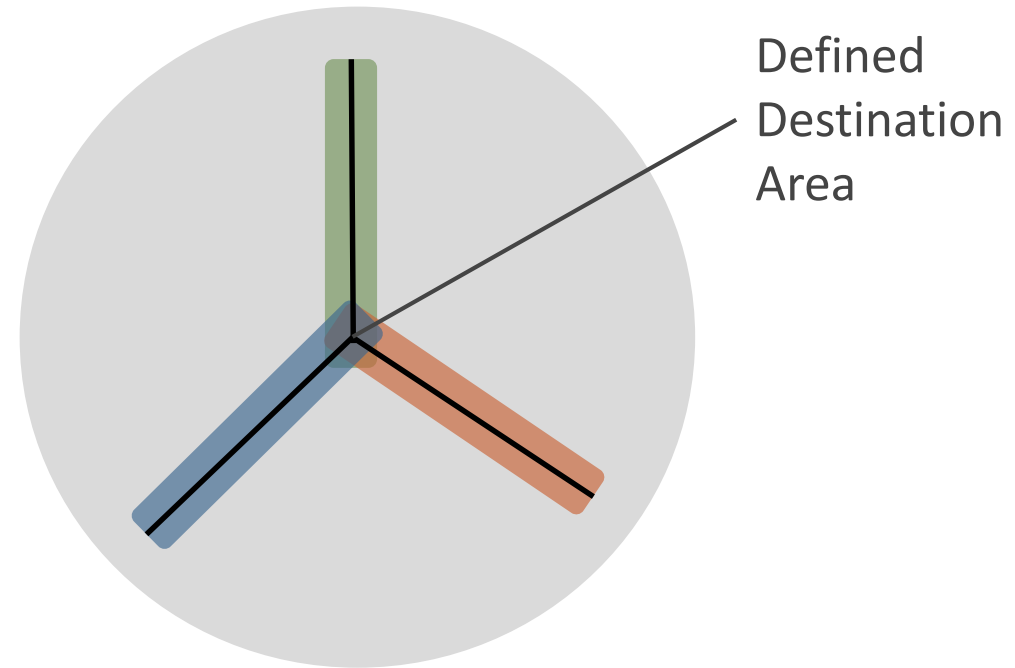
# APPLYING DISCIPLINARY EXCELLENCE TO COMPLEX PROBLEMS

Students and faculty from various disciplines join to work on a problem.

Solutions are found at points of intersection.

“Destination areas” emerge from disciplinary excellence applied in novel ways.

Complex Properties  
of a Societal Problem

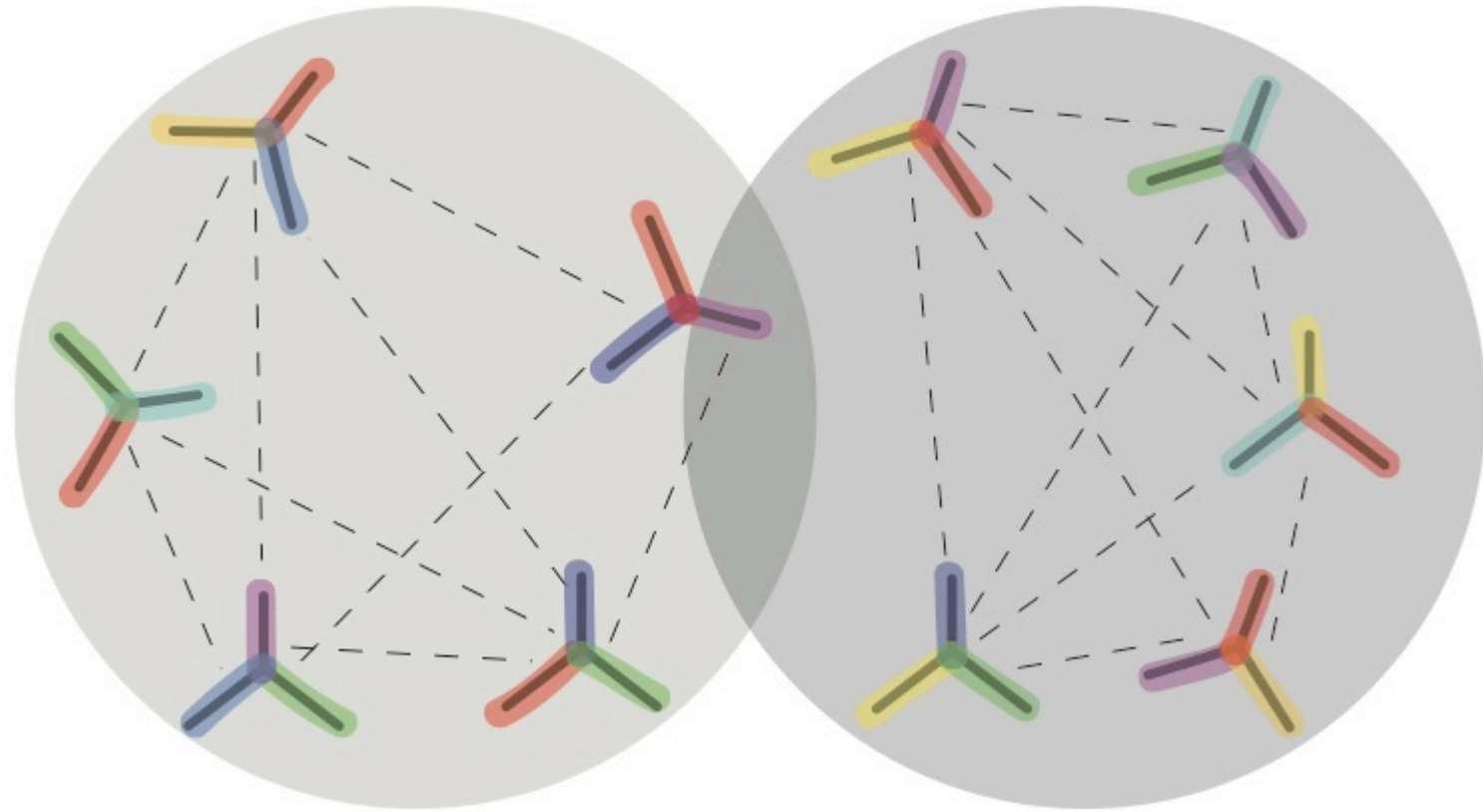


# GLOBAL LIVING LABORATORY

Multiple disciplines form  
unique intersections

Combine with partners  
outside the university

Living laboratories  
yield better results



Feed the World

Build the World



# 2047 FUNDING MODEL

## Agile funding strategies

- Generating new learner-centered revenues
- Developing world-class philanthropy
- Creating new partnerships
- Evaluating Value to Experience (VTX)



World-class  
research

*Ut Prosim*

Academic  
excellence





# 2016 → 2026 → 2047

## We are always students

VT cultivates discovery from childhood throughout lifetime

## Whole world is the campus

students access learning wherever and whenever they need it

## Evolving pathways

curriculum is adaptive, customizable, inclusive

## Framework for continuous innovation

ongoing evaluation, forward-looking



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**BEYOND** BOUNDARIES

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# DESTINATION AREAS



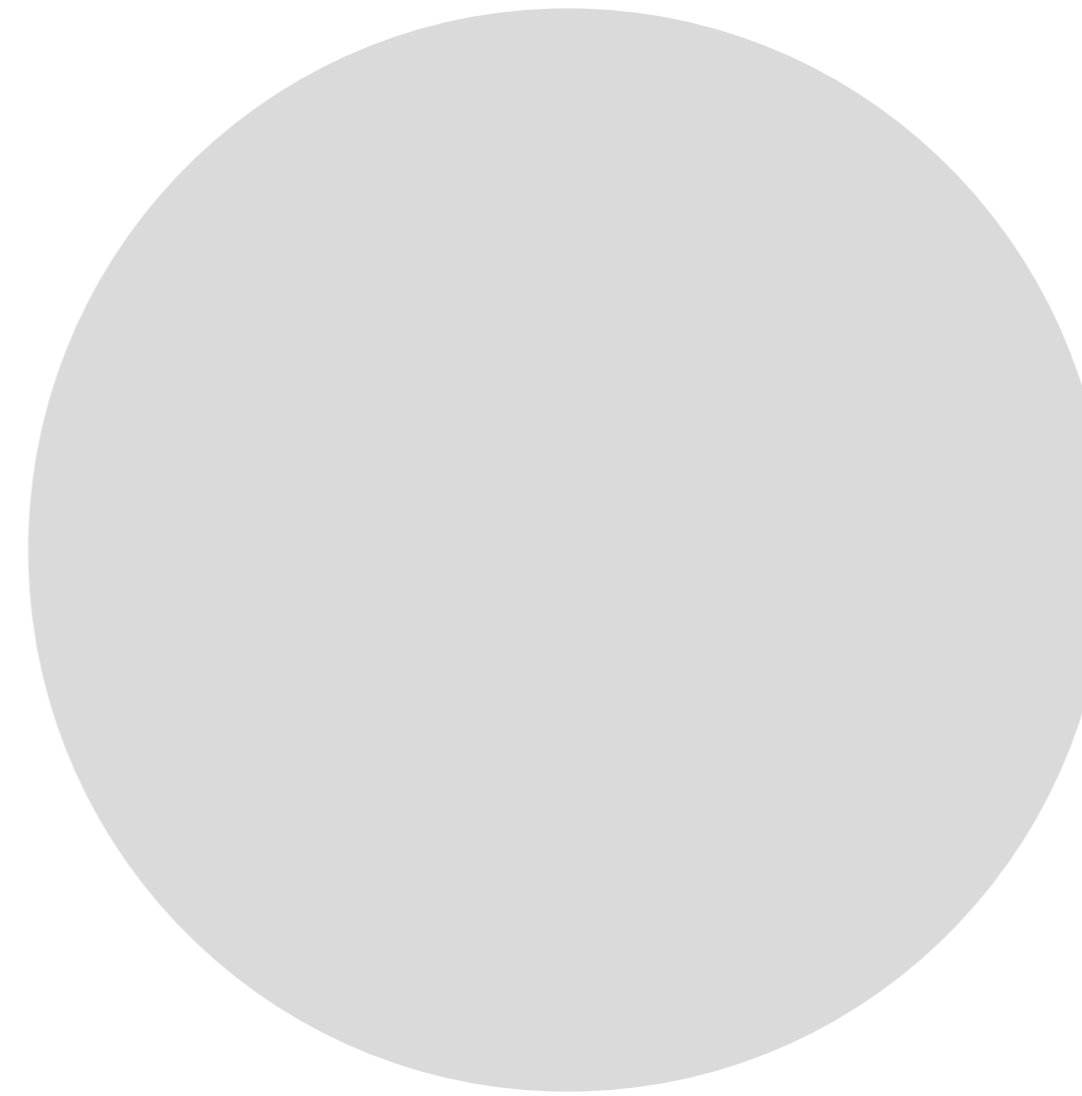
## Destination Areas: *a first pilot of the Beyond Boundaries Concepts*

Thanassis Rikakis

*Provost*



# Disciplines and Complex Problems

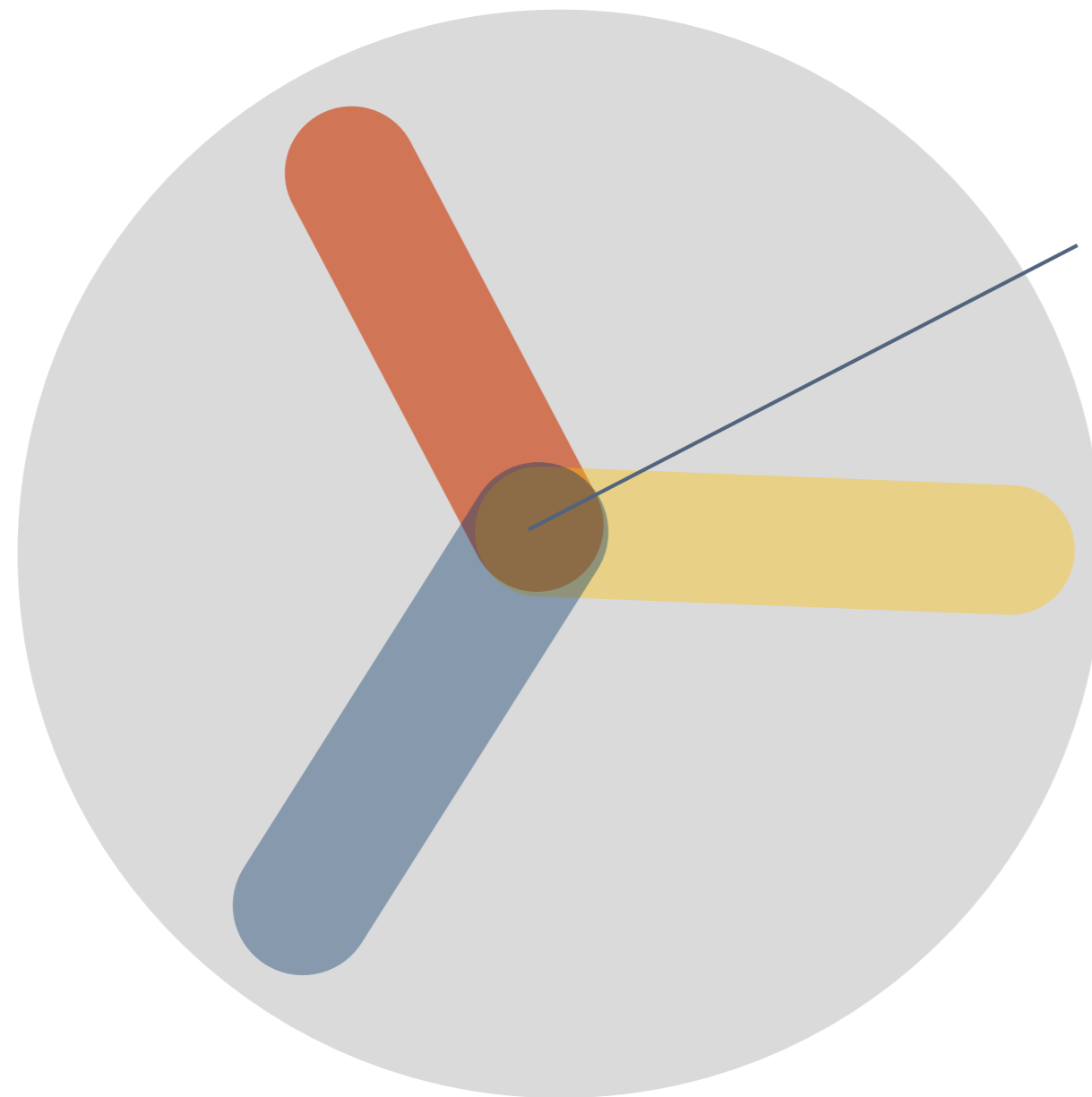


Complex Problem



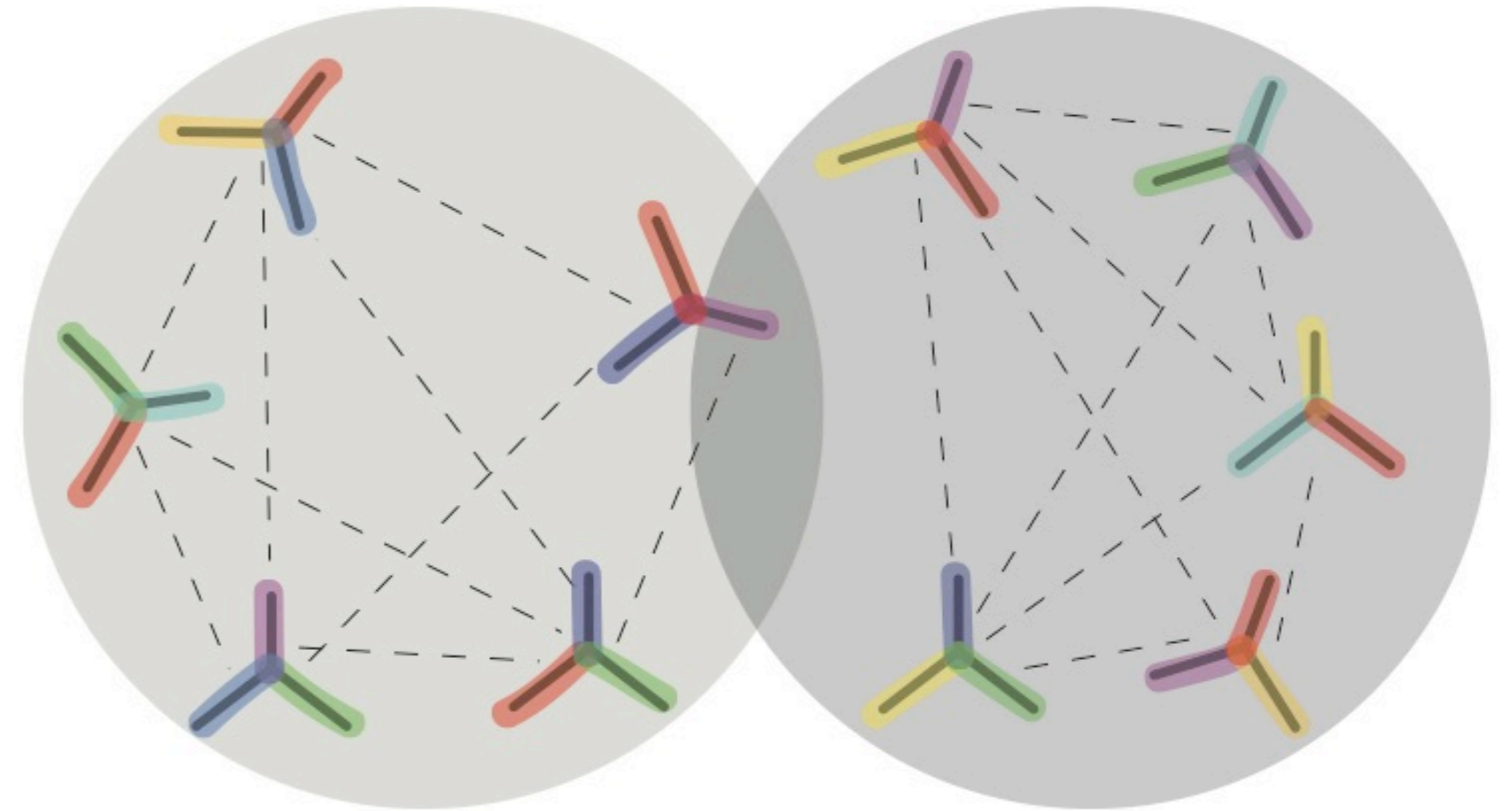
# Destination Areas

Complex Properties  
of a Societal Problem



Defined  
Destination  
Area Component

Feed the World



Feed the World

Build the World





# Destination Areas are driven by Faculty Clusters

- Faculty clusters develop cross-cutting curriculum and research
- Based in the discipline, connected to the cluster: 70-30 split (5 year term)
- Reporting also 70-30
- Faculty opt in because they want the collaboration and opportunity for complex research and education of scale and impact
- Departments support because of new resources
  - One new clusters line for two existing committed to cluster
  - Access to DA innovation hubs
  - Leadership role in university wide research and fundraising efforts
  - Incentives in budget
- Opportunity for distinction and national prominence
- Clusters are dynamic – integrate and evolve



## DEGREE: Bachelor of Science in [X]

**Pathways General Education** (42 hours)

***Pathways Minor (18 hours)***

**Degree Core:** (25% of total degree hours minus general education) (~21 hours)

The degree core is comprised of courses through which students may achieve the central learning outcomes of the degree. The degree core may include foundational as well as advanced courses, both within the discipline and from related areas of knowledge central to student learning.

**Major:** A specialized area within the degree

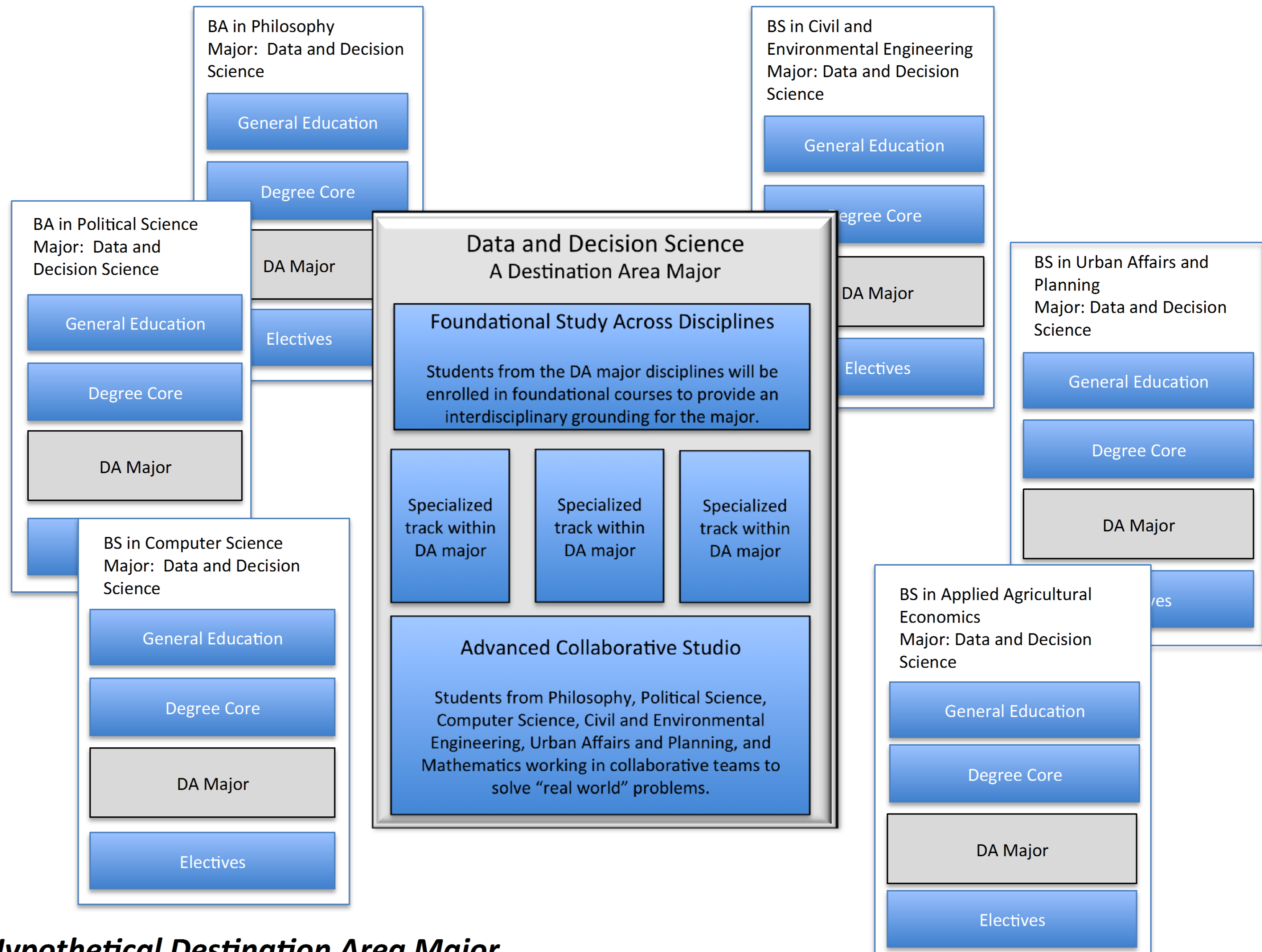
**Destination Area Major (~30 hours)**

**Destination Area Minor (~18 hours)**


**Remaining Hours (Electives)**

**Total hours**





***Hypothetical Destination Area Major***



# Destination Areas: Graduate Curriculum and Research

- Intersections of research interests with existing PhD programs
- 14 Interdisciplinary Graduate Education Programs (IGEPs) aligned with all Das; ~300 students
- Use the IGEP model for DA graduate concentrations
- Interdisciplinary research course (GRAD 5134)





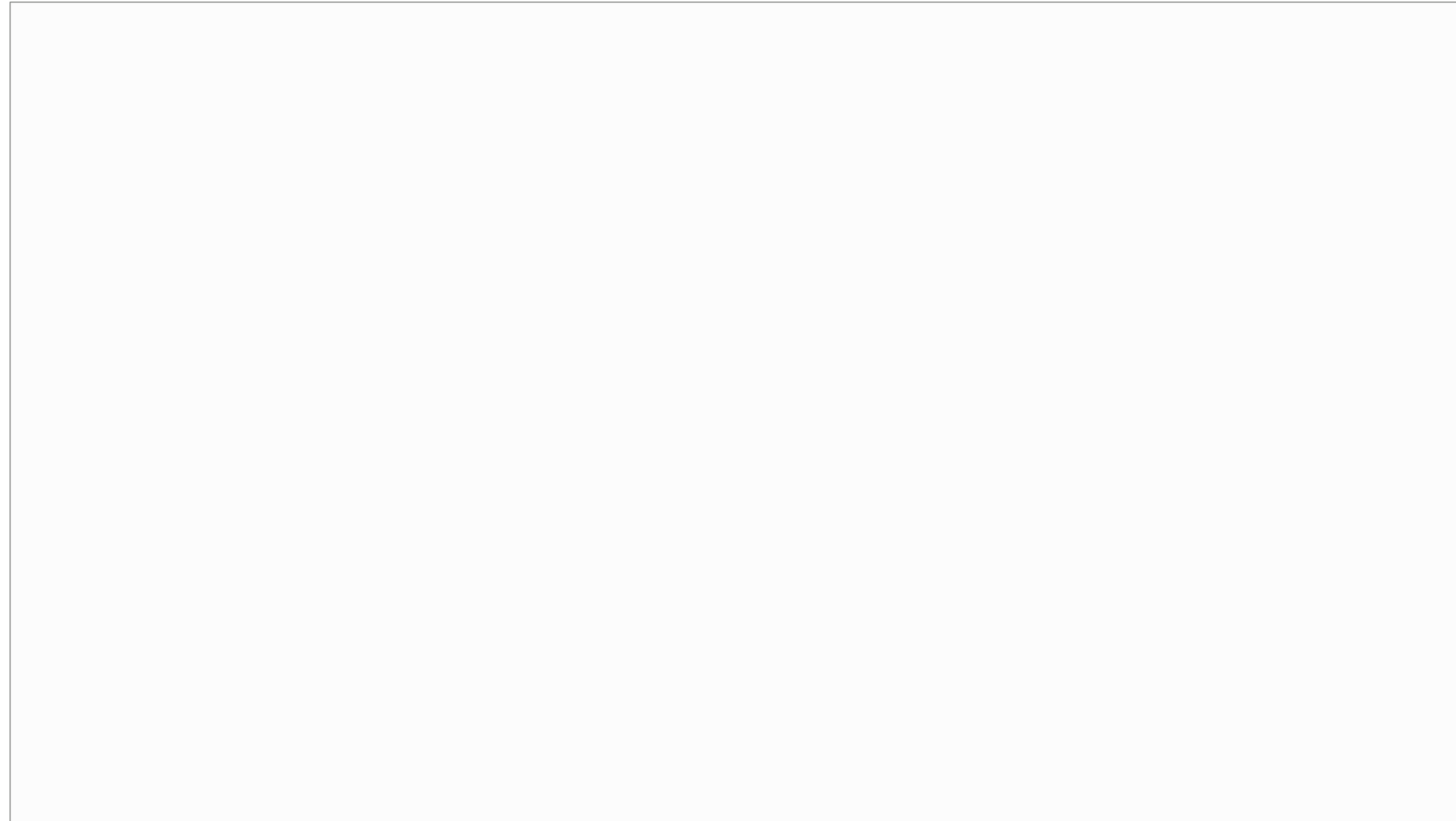
# Destination Areas and Innovation Hubs

- High-end cross-university facilities
- Industry and community partnerships
- Living labs
- Faculty, students and external collaborators
- Diverse and inclusive



# The VT-shaped Individual

*Top 10 institution for this experience*

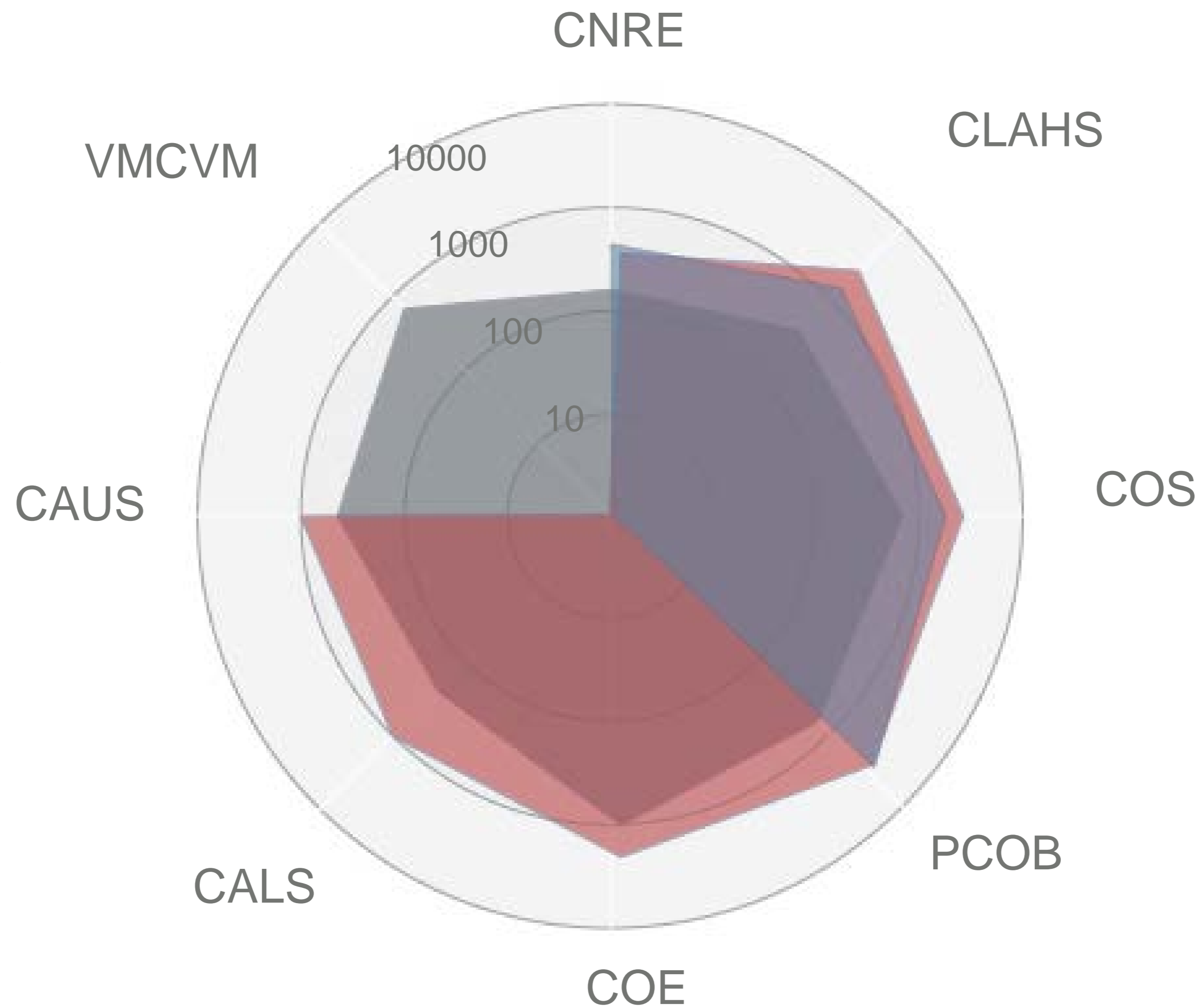




# Destination Areas: *research results*

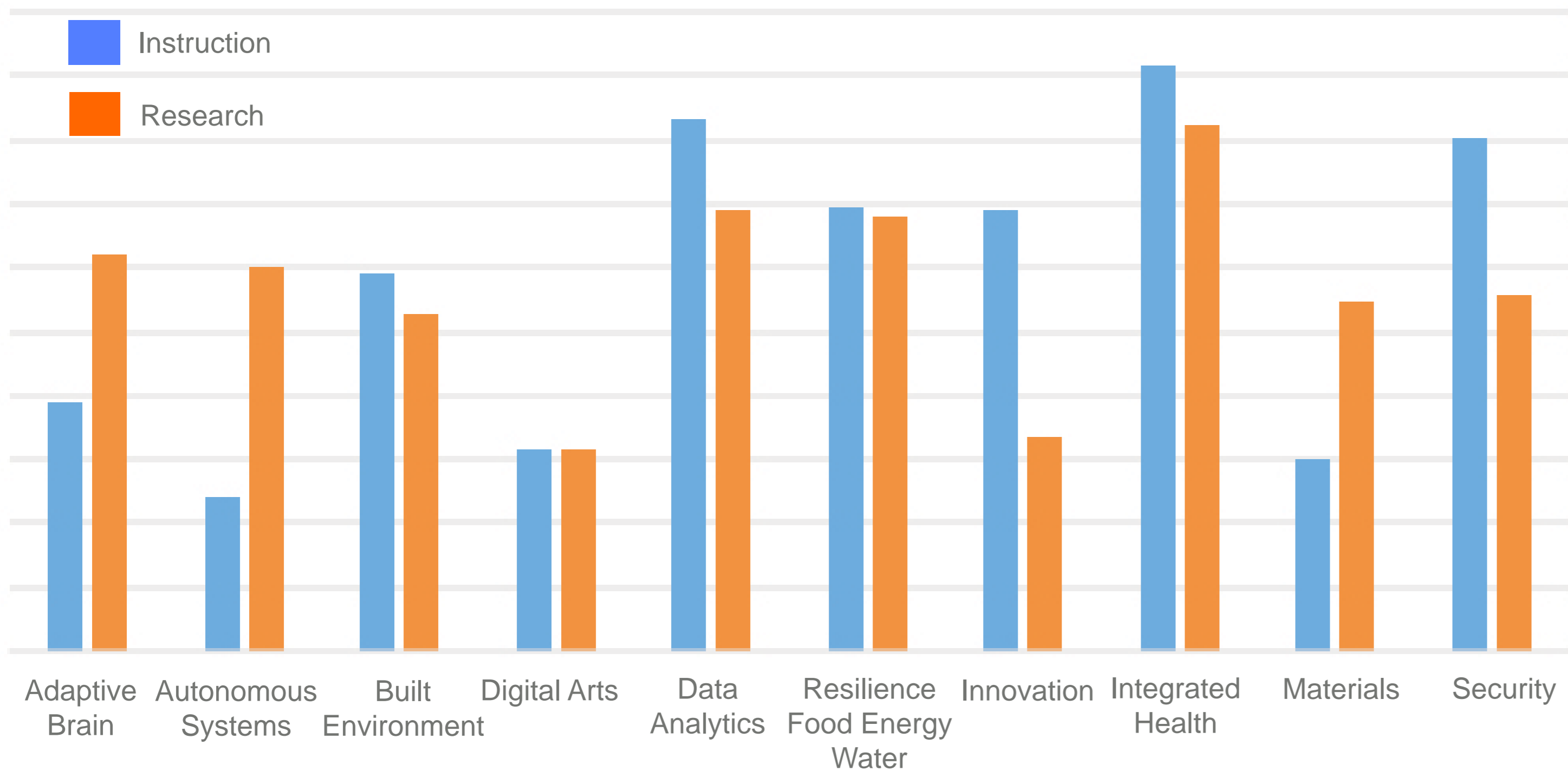
*Number of students actively pursuing data analytics*

- Major
- Minor
- Graduate

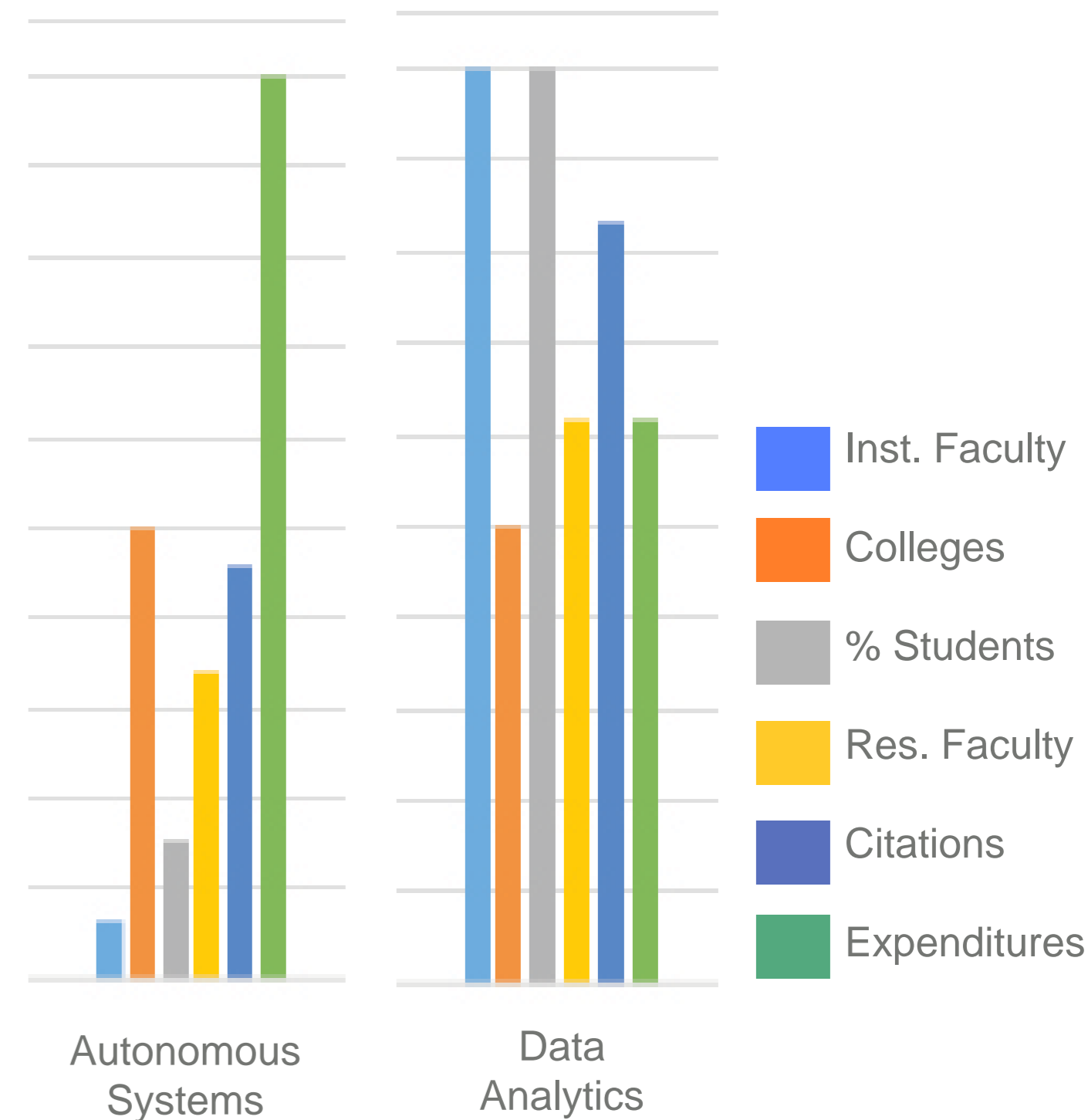




# Destination Areas: *research results*

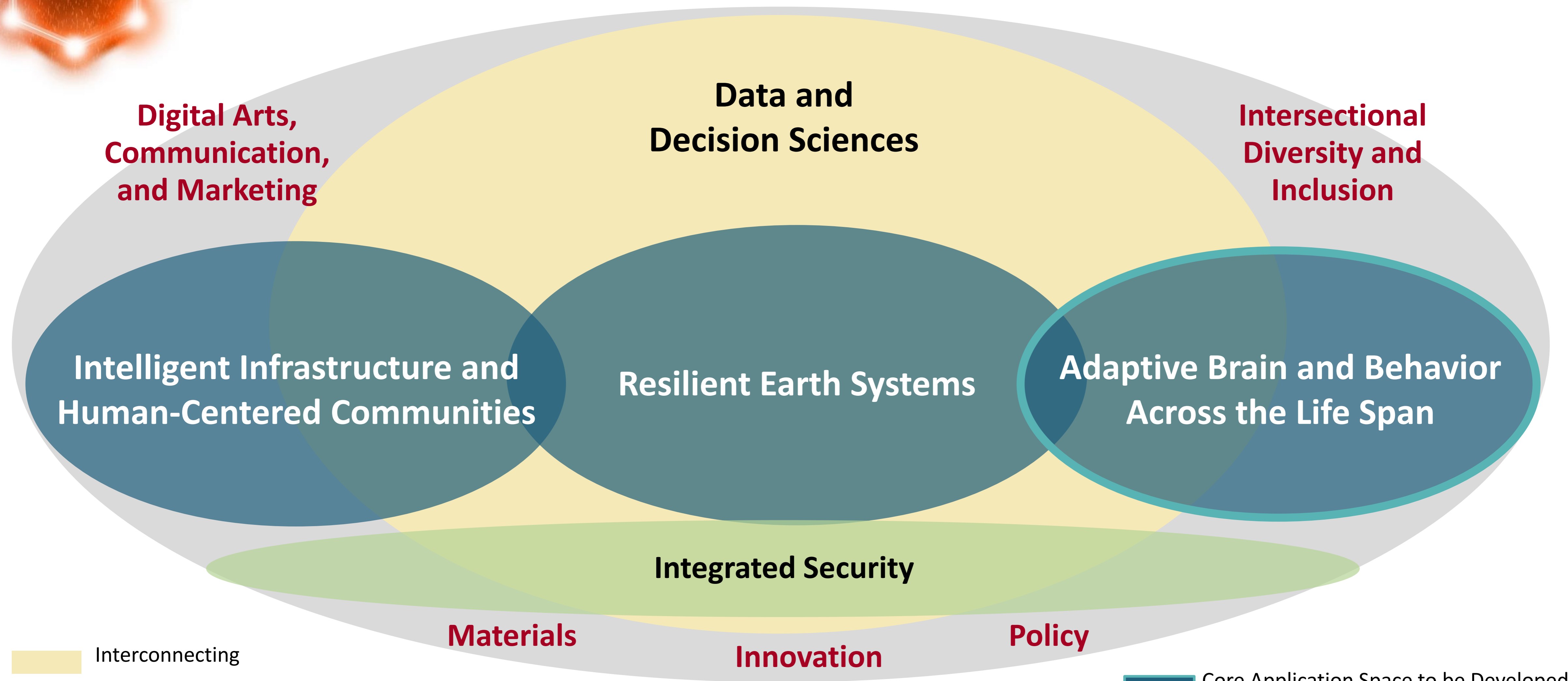


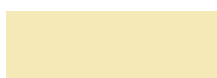


*Data normalized from six criteria into two criteria: instruction and research*





*Data of two DAs showing all six criteria (i.e., why data rose above autonomous systems)*

# Destination Areas: visualization



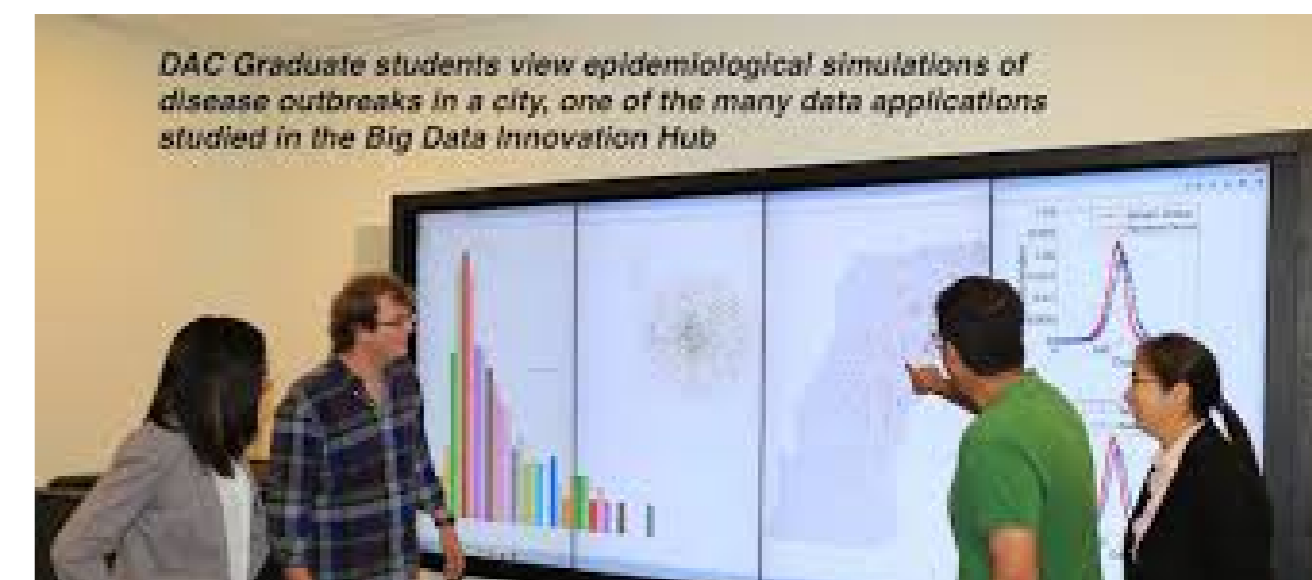
-  Interconnecting
-  Core Application Space Ready to Launch
-  Interconnecting and Embedded

-  Core Application Space to be Developed
-  Supportive Requiring Development



# Data and Decision Sciences

Visualize, explain, and predict the response of massively interacting systems to address pressing challenges in health, habitat, and well-being

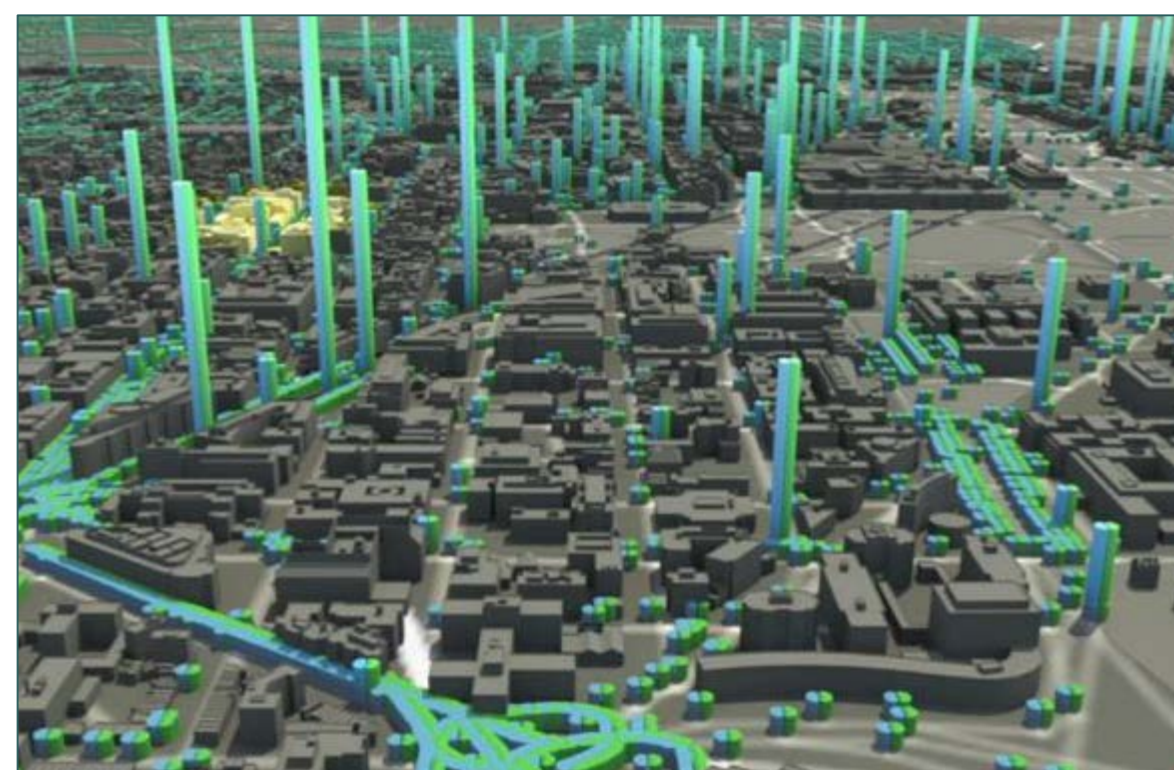
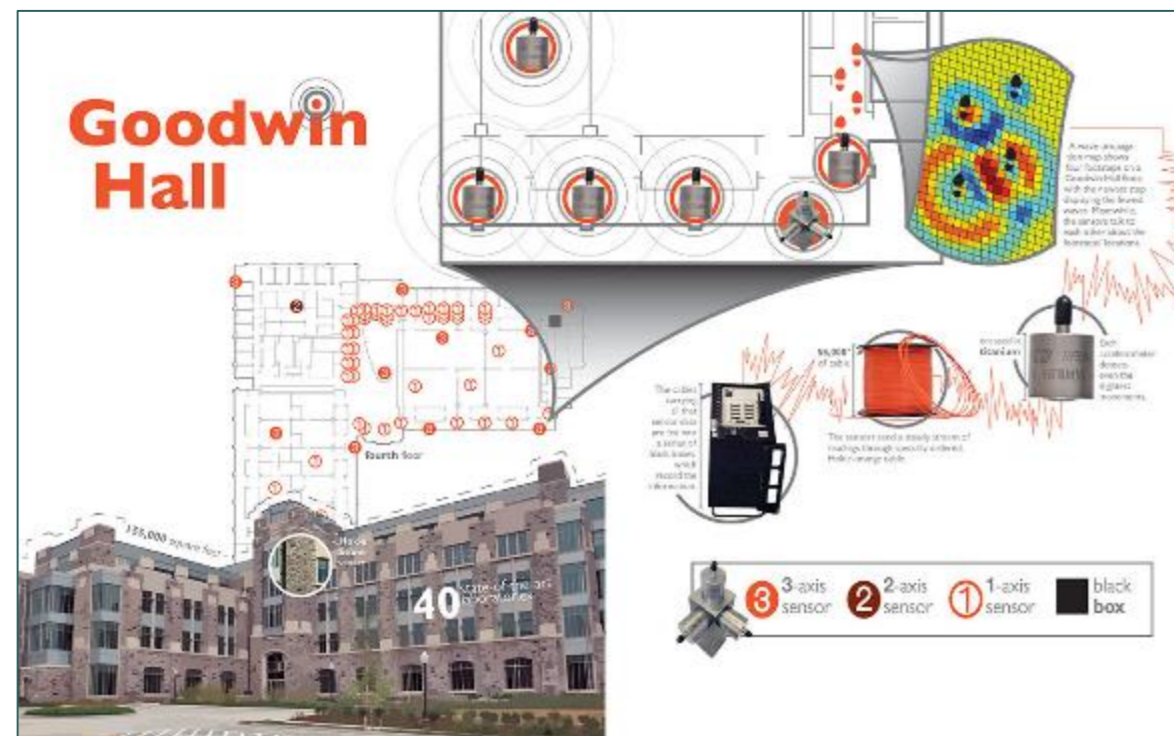






# Data and Decision Sciences

## Differentiators for Virginia Tech



- One-of-a-kind instrumented facilities and testbeds
- Partnerships with local, state, federal agencies
- Contextual data from disparate sources
- Human-in-the-loop analytics
- Synthetic information to simulate global populations
- Integrated framework for decision making
- NSF interdisciplinary grad training program



# Integrated Security

## Summary

Reduce vulnerability to emerging threats to critical infrastructure networks informed by public needs and policy. Address the impact of environmental, biological, and agricultural security on national and international security.





# Integrated Security

## Differentiators for Virginia Tech

- Critical infrastructure protection
- Cybersecurity technology, governance, and citizenship
- Defense technology, strategy, and policy
- Biological, environmental, and agricultural security





# Intelligent Infrastructure and Human-Centered Communities

Create resilient human-centered communities with the mobility and communication systems that connect them, the power systems that energize them, and the built environments that house them in the presence of limited natural and economic resources, rapid population growth, and uncertain climates





# Intelligent Infrastructure and Human-Centered Communities

## Differentiators for Virginia Tech

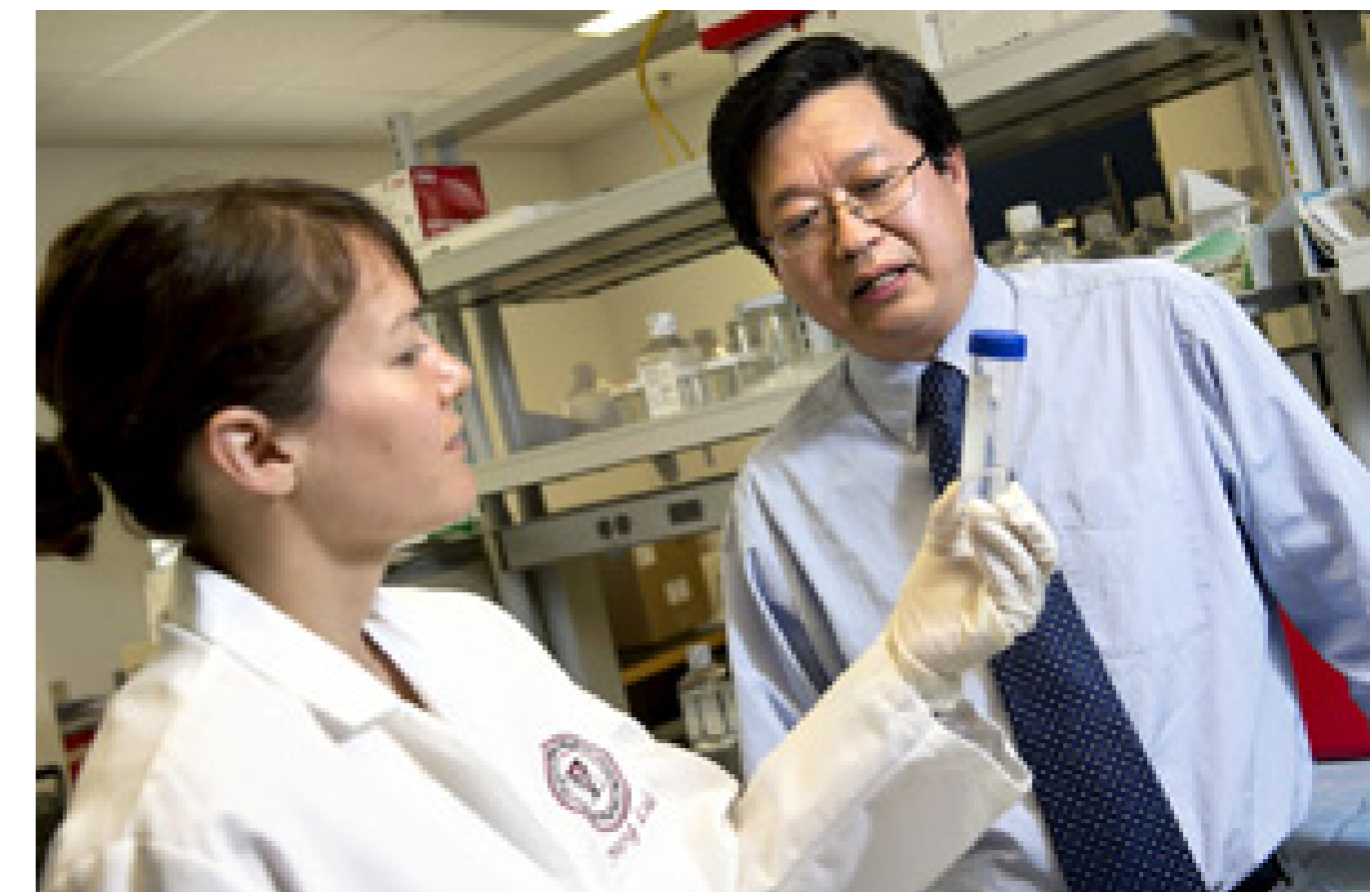
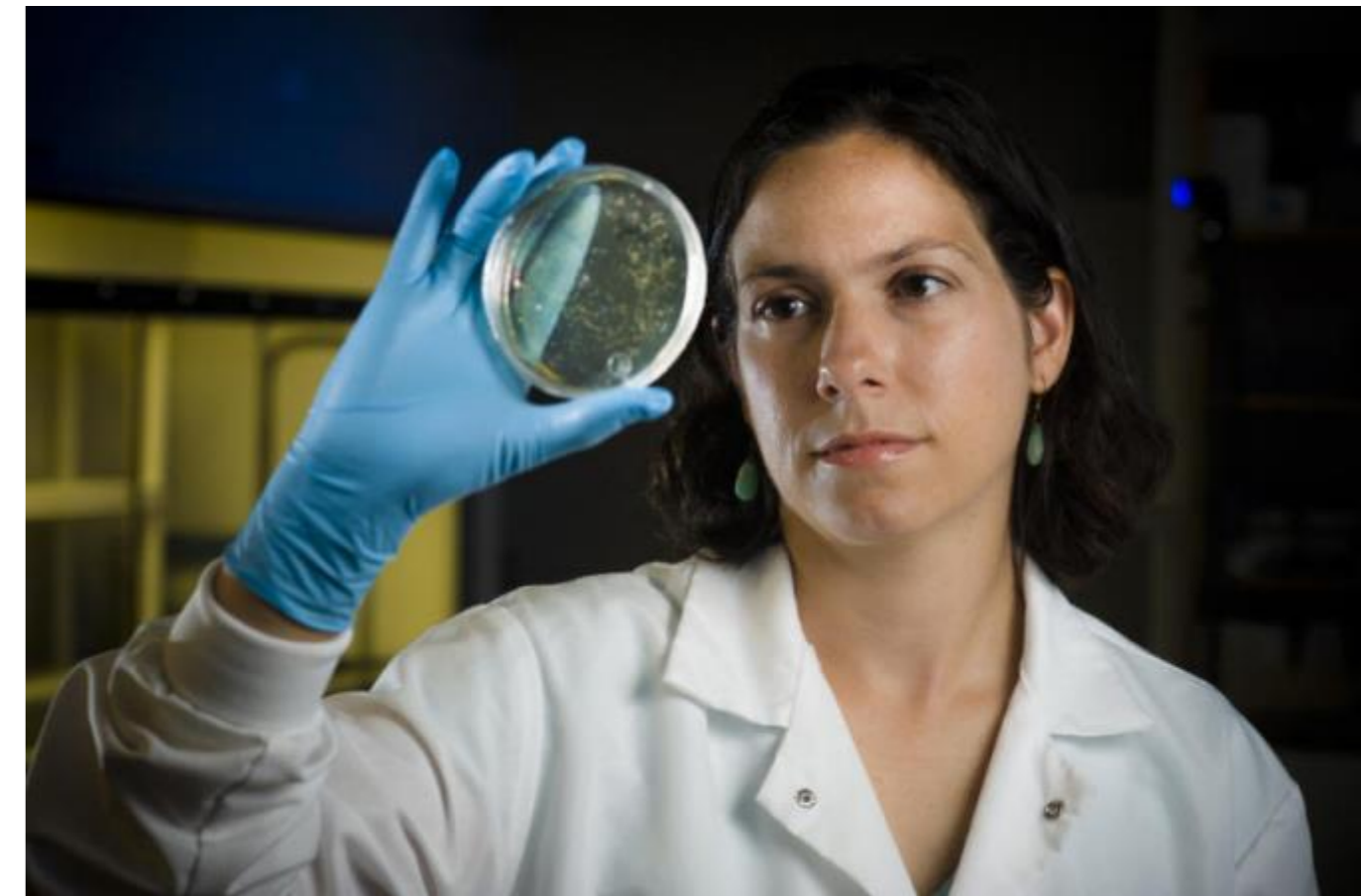
- Large-scale experimental test sites
- Socio-technical system simulation environment
- Connected and automated vehicles, safety, infrastructure
- Wireless and power electronics
- Human-centered building design and construction
- Service to the public, policy, and ethical implications
- Integrated environmental impact and climate





# Resilient Earth Systems

Create practical solutions to pressing environment-society challenges in the presence of highly interconnected and rapidly changing global systems at the interfaces between ecosystems, food, water, energy, and health





# Resilient Earth Systems

## Differentiators for Virginia Tech



- Water quality and environmental sciences
- Host-pathogen-environment interactions and microbiomes
- Computational approaches in microbiology & ecosystem sciences
- Remote sensing, modeling, and forecasting of global processes
- Agriculture in response to pollution, bio-invasions, & climate change
- Coastal processes, biodiversity, and sustainable nanotechnology
- Six interdisciplinary graduate programs




# Adaptive Brain and Behavior Across the Lifespan

Produce a clear dynamic picture of the brain to provide new scientific insights that enable treatments of disorders to improve human health across the lifespan

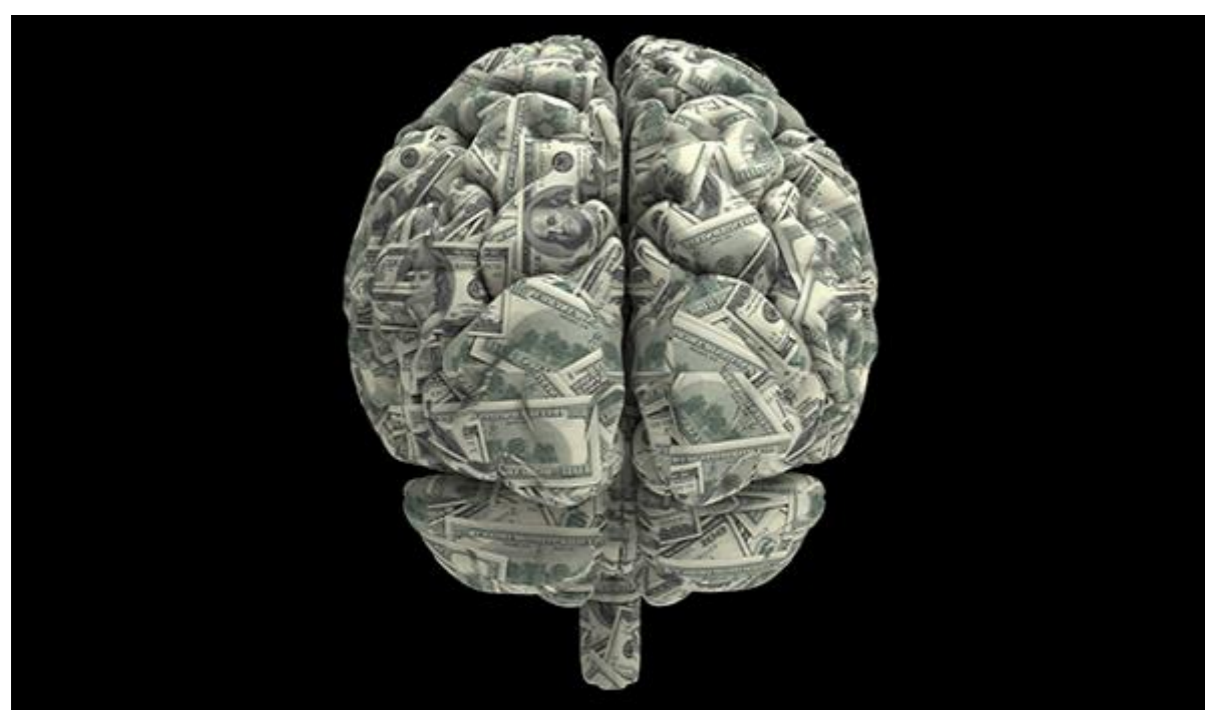






# Adaptive Brain and Behavior Across the Lifespan

## Differentiators for Virginia Tech



- Biomarkers that support dysfunctional behaviors
- Functional brain imaging of multiple interacting individuals
- Developmental health and aging from biology to sociology
- Animals as patients to study and treat disease
- Traumatic brain injury and recovery
- Therapeutics, drug discovery, and translation
- Implementation science and public policy/public opinion