

UNIVERSITY of WASHINGTON

eScience Institute

ADVANCING DATA-INTENSIVE DISCOVERY IN ALL FIELDS

An integrative, university-wide approach to data science

Sarah Stone

eScience Institute Executive Director

UNIVERSITY OF WASHINGTON

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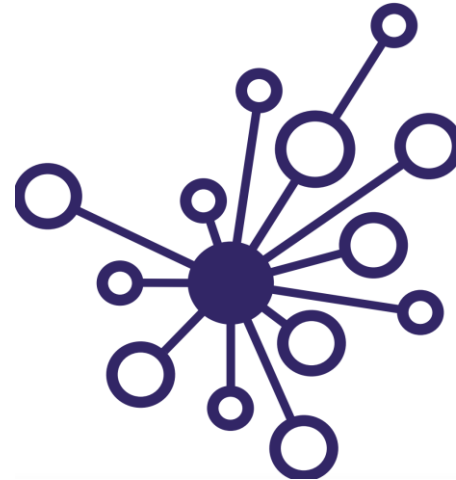
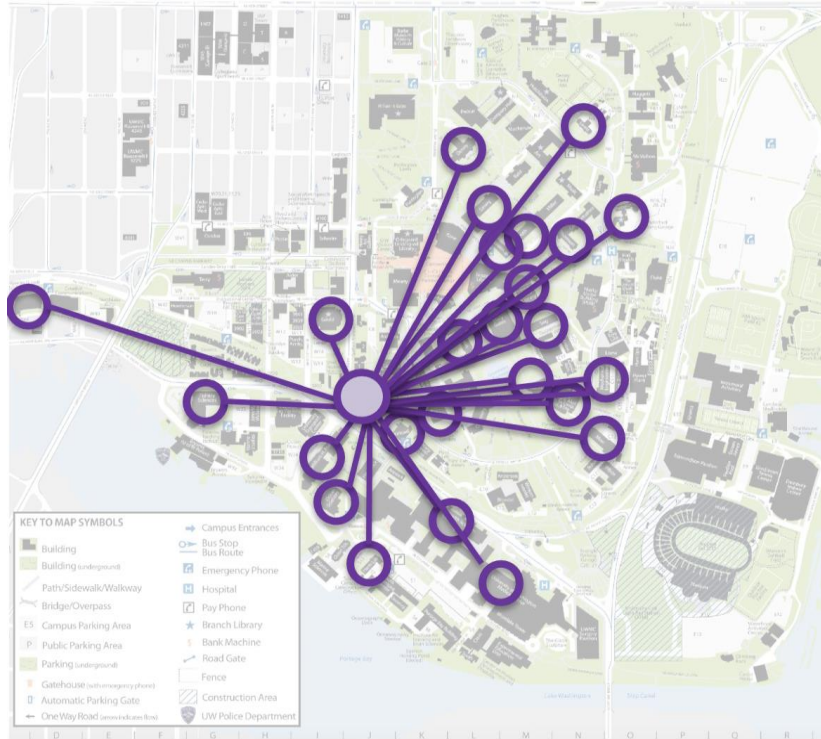
Institutional Framing, circa 2008:

“All across our campus, the process of discovery will increasingly rely on researchers’ ability to extract knowledge from vast amounts of data... UW must be a leader in advancing these techniques and technologies, and in making [them] accessible to researchers in the broadest imaginable range of fields.”



Key feature:

Neutrality



Governance - Executive Committee



Andy Connolly
eScience Director;
Professor Astronomy



David Beck
Director of Research;
Research Associate Prof.,
Chemical Engineering



Sarah Stone
Executive Director



Ed Lazowska
Professor, Paul G. Allen
School of Computer
Science & Engineering,



Cecilia Aragon
Director, Human-Centered
DS Lab; Prof., HCDE



Ginger Armbrust
Professor, School of
Oceanography



Magdalena Balazinska
Director Paul G. Allen
School of Computer
Science & Engineering,



Bingni Brunton
Associate Professor,
Biology



Steve Brunton
Professor Mechanical
Engineering



Rob Fatland
UW-IT Director of Cloud
and Data Solutions



Maryam Fazel
Professor, Electrical &
Computer Engineering



Bill Howe
Associate Professor,
iSchool; Former Associate
Director



Ben Marwick
Associate Professor,
Anthropology



Tyler McCormick
Associate Prof., Statistics,
Sociology



Colette Moore
Associate Prof.,
English

A&S Natural Sciences, A&S Social Sciences, Engineering,
Environment, iSchool, UW IT

Reporting to 3 deans (A&S, CoE, Libraries) & Provost

Key feature:

Physical Space



Key feature:

Career Paths

– tenure AND non-tenure track

Emphasis on intellectual infrastructure

Data Science Faculty Hires



Zack Almquist
Sociology



Cecilia Aragon
HCDE



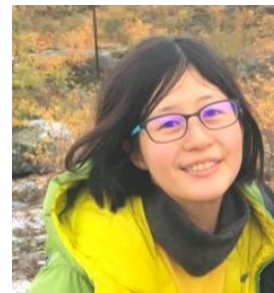
Sasha Aravkin
Applied Mathematics



Bingni Brunton
Biology



Steve Brunton
Mechanical Engineering



Karen Chen
Urban Design &
Planning;
Environmental &
Occupational Health
Sciences



Marine Denolle
Earth & Space Sciences



Zaid Harchaoui
Statistics



Mario Juric
Astronomy



Anna Preus
English



Mia Bennett
Geography

...plus more than 140 affiliated faculty spread over 65+ departments/units

**Director of
Research**



David Beck
Ph.D. Medicinal
Chemistry,
Biomolecular Struct.
& Design

Data Scientists



Anthony Arendt
Ph.D. Geophysics



Bernease Herman
B.S. Statistics
Formerly SE at Amazon



Valentina Staneva
Ph.D. Applied
Mathematics and
Statistics



Anissa Tanweer
Ph.D. Communication



Noah Benson
Ph.D. Biomedical
& Health Informatics



Joe Hellerstein
Ph.D. Computer Science
IBM Research, Microsoft
Research, Google (ret.)

eScience Research Team

Research Scientists



Nicoleta Cristea
Ph.D. Environmental
Engineering



Bryna Hazelton
Ph.D. Astrophysics
Physics



Scott Henderson
Ph.D. Geological
Sciences



Vaughn Iverson
Ph.D. Oceanography



Spencer Wood
Ph.D. Zoology

**Technical Education
Specialist**



Naomi Alterman
M.S. Electrical
Engineering

Postdocs and PhD Students



Michael Beyeler
Postdoctoral Fellow,
Neuroengineering
Postdoctoral Fellows
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Noah Brenowitz
Postdoctoral Fellow,
Atmospheric Sciences
Postdoctoral Fellows
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Sophie Clayton
Postdoctoral Fellow,
Oceanography
Postdoctoral Fellows
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Jamie Collins
Postdoctoral Fellow,
Oceanography
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Postdoctoral Fellow,
Communication
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Gwendolyn Eadie
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Astronomy
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Computer Science &
Engineering
Postdoctoral Fellows
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Fellow
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Alexander Franks
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Alumni, Postdoctoral
Fellows
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Postdoctoral Fellow,
Earth and Space Sciences
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Zachary Jones
Postdoctoral Fellow,
Anthropology
Postdoctoral Fellows
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Esrika Kaiser
Postdoctoral Fellow,
Mechanical Engineering
Postdoctoral Fellows
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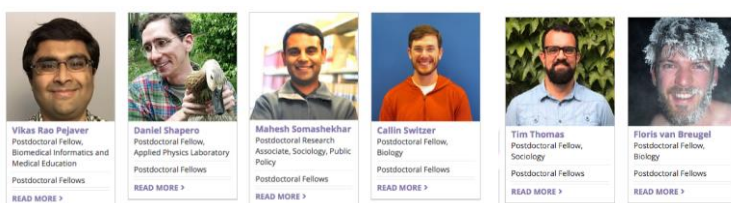


Emily Kalah Gade
Acting Assistant Professor,
Political Science
Postdoctoral Fellows
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Postdoctoral Fellow,
UW
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Peter Krafft
Postdoctoral Fellow,
Earth and Space Sciences
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Xiaofeng Meng
Postdoctoral Fellow,
Earth and Space Sciences
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Vikas Rao Pejaver
Postdoctoral Fellow,
Biomedical Informatics and
Medical Education
Postdoctoral Fellows
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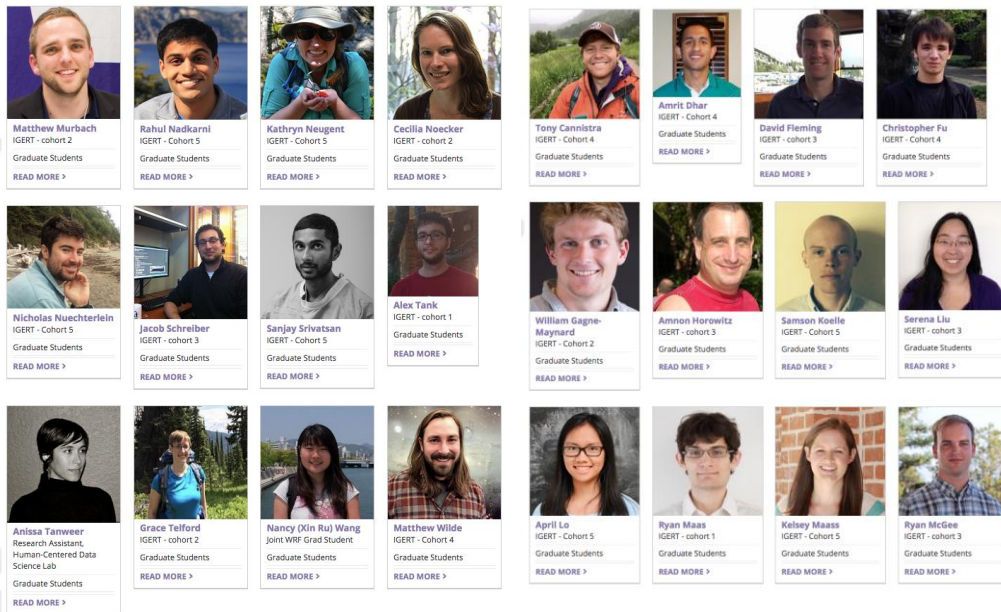
Daniel Shapers
Postdoctoral Fellow,
Applied Physics Laboratory
Postdoctoral Fellows
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Mahesh Somashekhar
Postdoctoral Research
Associate, Sociology, Public
Policy
Postdoctoral Fellows
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Sociology
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Floris van Breugel
Postdoctoral Fellow,
Biology
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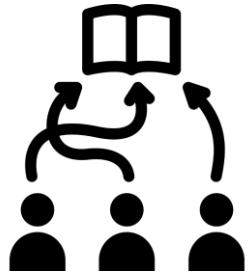


NSF IGERT (2013)
NSF NRT DIRECT (2016)
NIH BDGN T32
Future Rivers NRT
DOE Computational Training

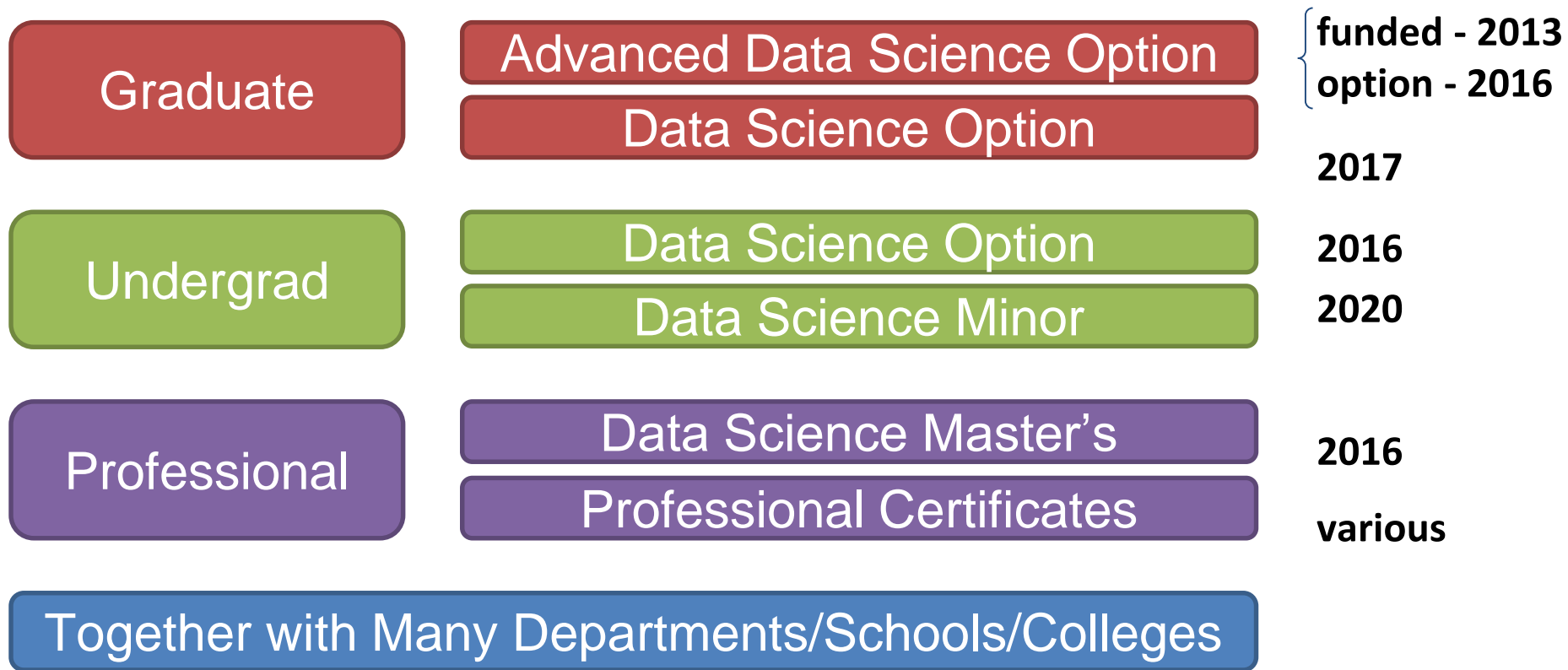
Key feature:

Education Pathways

– formal AND informal training



Formal Education: tailored to department needs



Informal Education: increasing engagement

Office hours

Free consultation covering a broad range of research and methods



Bryna Hazelton
brynah@phys.washington.edu

Expertise

- ▶ Fourier and image analysis
- ▶ Statistical and mathematical modeling
- ▶ Monte Carlo simulations
- ▶ Python
- ▶ SQL
- ▶ IDL
- ▶ Java

Hours

Will resume in the fall.



In 2021-2022

100+ individuals served
from > 35 departments

Data Science Incubator

Quarter-long program pairing researchers with our team DS

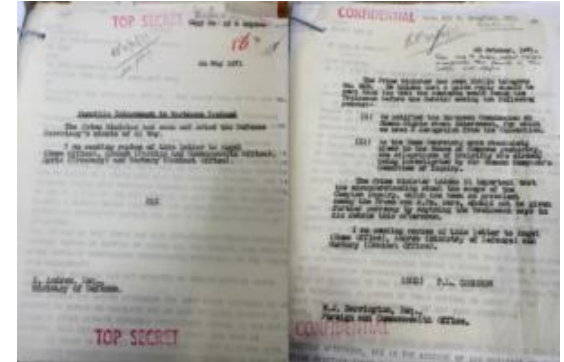
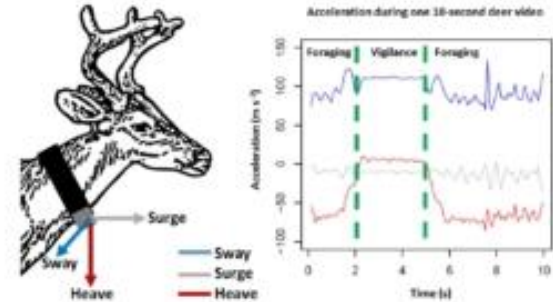


Since 2014

55 projects from 30 departments

Examples of Incubator Projects

- Deer Fear: Accelerometers, Video Collars, and GPS to Explore Deer Reactions to Wolves
 - Environmental and Forest Sciences
- British Justifications for Internment without Trial: NLP Approaches to Analyzing Government Archives
 - Political Science
- Data Analytics for Decoding and Demixing Patterns of Population Neural Activity Underlying Addiction Behavior
 - Anesthesiology and Pain Medicine



Informal Education: foundational training

University-wide Seminar Series

...thought-leading speakers and researchers who showcase data science in the arts, engineering, humanities and sciences...



"Historical Trends in English Sentence Length & Syntactic Complexity"

Mark Liberman, Professor of Linguistics at the University of Pennsylvania, and Director of the Linguistic Data Consortium

- View Mark Liberman's presentation [here](#)



"Behavior-Driven Optimization for Interactive Data Exploration"

Leilani Battle, Assistant Professor at the UW Allen School of Computer Science & Engineering, and co-director of the Interactive Data Lab



"Tackling Climate Change with Machine Learning"

Priya L. Donti, PhD Candidate at Carnegie Mellon University and co-founder and chair of Climate Change AI

- View Priya Donti's presentation [here](#)

Weekly seminar for three quarters

Workshops, e.g.



Quarterly, introductory programming workshops, ~150 people per year

**Python,
your personal
research assistant**



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ADVANCING DATA-INTENSIVE DISCOVERY IN ALL FIELDS

With UW Libraries, intro to python for digital humanities - 186 registrants for 60 slots!

Cloud Builders: Zero to Jupyterhub

Naomi Alterman, Rob Fatland // May 2022

For department IT providers

Key feature:

Immersive & Inclusive Programs



Informal Education: research focused

Hackweeks as a service

Collaborative workshops focus on a single research area that combine lectures, tutorials and hands-on projects



Sense of Belonging



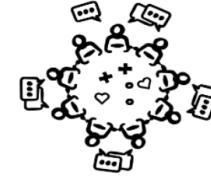
We foster a welcoming, diverse and inclusive environment.

Education



We gain experience in conducting data-intensive research.

Immersive Learning



We encourage immersive, interactive and collaborative learning.

Co-creation



We incorporate elements of co-creation with participants.

Networking



We provide opportunities for people to build their networks.

Code of Conduct



We adhere to and enforce a shared Code of Conduct.

Key feature:

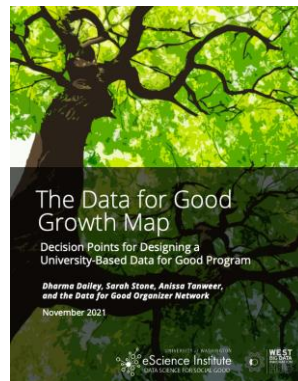
Ethical & Responsible Technology



Societal Impact: Bringing data science to government and NGOs

UW Data Science for Social Good *Timely, publicly relevant projects*

- Student Fellows work on collaborative projects sourced from academia, public agencies, & non-profits
- Since 2015: 23 projects and 100+ Fellows



White paper
roadmap for
organizations
that want to
build out similar
programs

W
UNIVERSITY of WASHINGTON

***Learning and Doing
Data for Good:***
*A conference for academics and
their partners*

Conference Dates: September 9-11, 2022

Conference in Sept
2022 highlighting
student work across
8 DSSG programs

Examples of DSSG Projects

- Global Open Sidewalks: Creating a shared open data layer and an OpenStreetMap data standard for sidewalks – [Taskar Center for Accessible Technology](#)
- Developing an Algorithmic Equity Toolkit with Government, Advocates, and Community Partners – [Information School in partnership with ACLU](#)
- Exploring new understandings of the cost of living at a basic needs level using the Self-Sufficiency Standard database – [Center for Women’s Welfare, School of Social Work](#)



Open Sidewalks: Anat Caspi



**Algorithmic
Equity
Toolkit**

Key feature:

Service & Community Building



Partnering to support data science proposals

We collaborate with UW researchers on research and grant proposals

- Letters of Support
- Programmatic, technical & administrative backbone
- **~\$450k in cloud credits** made available to UW researchers



Center Grants

- NSF: Institute for Foundations in Data Science (IFDS)
- NSF: AI Institute in Dynamic Systems
- NSF: Harnessing the Data Revolution Accelerated Artificial Intelligence Algorithms for Data-Driven Discovery (A3D3)
- Schmidt Futures: LSST Interdisciplinary Network for Collaboration and Computing (LINCC Frameworks)



Community Support & Development Grants

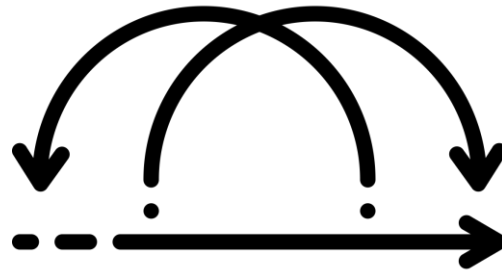
- **NSF West Big Data Innovation Hub**
- **NSF CloudBank**

=> both to the eScience Institute, UC San Diego, and UC Berkeley



Key feature:

Iterative & Reflexive



Looking forward to new initiatives...



AI@UW: Increase visibility and collaboration among researchers using AI across our campus - including 10 funded AI/ML centers. Forming the AI@UW education working group and *Discovering AI@UW 2023*.



Scientific Software Engineering Center (SSEC): Schmidt Futures supported initiative to build a team of software engineers on campus to support researchers – Hiring Now!

<https://escience.washington.edu/uw-scientific-software-engineering-center/>



Thank You!

GORDON AND BETTY
MOORE
FOUNDATION



Washington Research
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