SciTech Northwest '16

LET'S CREATE THE FUTURE

November 9, 2016
The Edgewater Hotel
Seattle, Washington

Let's create the future. *With a track record of inventive research and successful technology startups, the Northwest is known for its entrepreneurial climate. SciTech Northwest '16 is the first-ever event to showcase the latest innovations from Washington's three premier research institutions: Pacific Northwest National Laboratory, University of Washington, and Washington State University. In partnership with the Technology Alliance, we invite businesses, universities, and investors to find and capture opportunities for collaboration, technology licensing, and business growth.*

#SciTechNW

Pacific Northwest
NATIONAL LABORATORY

W UNIVERSITY *of* WASHINGTON

WASHINGTON STATE
UNIVERSITY

TechAlliance

Refreshments provided by:

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INTELLECTUAL PROPERTY LAW

IN THIS PROGRAM

AGENDA & SPEAKERS

November 9, 2016

Technology Booths Open .... *3:30 - 7:00pm Olympic Ballroom*

Registration & Networking .... *3:30 - 3:45pm*

Welcoming Remarks: *Rosemarie Truman, PNNL* .... *3:50 - 4:00pm Olympic Ballroom*

Speakers

Deborah Fuller, UW .... *4:00 - 4:25pm Terrace Room*
What's Old is New Again: The Rise, Fall & Rebirth of Gene
Gun DNA Vaccines

Adam Hahn, WSU .... *4:30 - 4:55pm Terrace Room*
Continuous Cybersecurity Monitoring Techniques in the Smart Grid

Featured Speaker: *Matt McIlwain, Madrona Venture Group*   *5:00 - 5:30pm **Olympic Ballroom***
Technology-Driven Outlook for the Northwest

Rosemarie Truman, PNNL .... *5:35 - 6:00pm Terrace Room*
Innovation Collaboration Makes Unicorns & Dragons: Powering Impact

Bill Howe, UW .... *6:05 - 6:30pm Terrace Room*
Urban Analytics and Responsible Data Science

Jon M. Oatley, WSU .... *6:35 - 6:55pm Terrace Room*
Food for Future Sustainability: WSU's Role in the Revolution
of Animal Biotechnology

Adjourn, Technology Booths Close *7:00pm*

FEATURED SPEAKER
Matt McIlwain
Managing Director, Madrona Venture Group

Named on *Forbes'* Midas List of Tech's Top Investors, Mr. McIlwain is known for his leadership in the venture capital community, as well as his service on the Fred Hutchinson Cancer Research Center Board and the Washington Policy Center Board. He will talk about applications of the future, key innovation trends, and our region's innovation ecosystem.

Deborah Fuller
University of Washington

Dr. Deborah Fuller played a key role in the earliest studies investigating the feasibility of DNA vaccines from animals to human clinical trials and led a team that distinguished the gene gun (PMED) as the first DNA vaccine strategy to induce protective levels of immunity in humans. She will discuss her current work to develop a therapeutic HIV vaccine, and a broad spectrum antiviral for flu. Dr. Fuller is co-founder of Virvio, Inc., which aims to develop and commercialize novel small proteins as antivirals, and Orlance, Inc., which aims to develop novel DNA vaccine approaches and delivery strategies for immunotherapy.

Adam Hahn
Washington State University

As the electric power grid becomes increasingly dependent on digital communication and control, new techniques are needed to evaluate the cybersecurity of the grid's communication networks and protect them from various attacks. Dr. Adam Hahn will discuss the risk of attacks along with various techniques to evaluate the security of the current and future grid. He will also demonstrate how the Smart City Testbed supports various research areas at Washington State University.

Rosemarie Truman
Pacific Northwest National Laboratory

Increasing the commercial impact of science and technology programs is an essential part of the mission of Pacific Northwest National Laboratory. Ms. Truman, who has been recognized for launching innovative entrepreneurial initiatives by the White House, government agencies, and national business media, will describe opportunities for connecting with PNNL, including a new national startup challenge.

Bill Howe
University of Washington

The first decade of data science was characterized by what *can* be done: How can we extract actionable information from massive, noisy, heterogeneous, streaming datasets? The next decade will be characterized by what *should* be done: Identifying the right projects, ensuring accountability, and guarding personal privacy – while also avoiding algorithmic bias, and political inequities. Dr. Bill Howe will describe some of the projects at the eScience Institute and the Information School that are addressing these challenges.
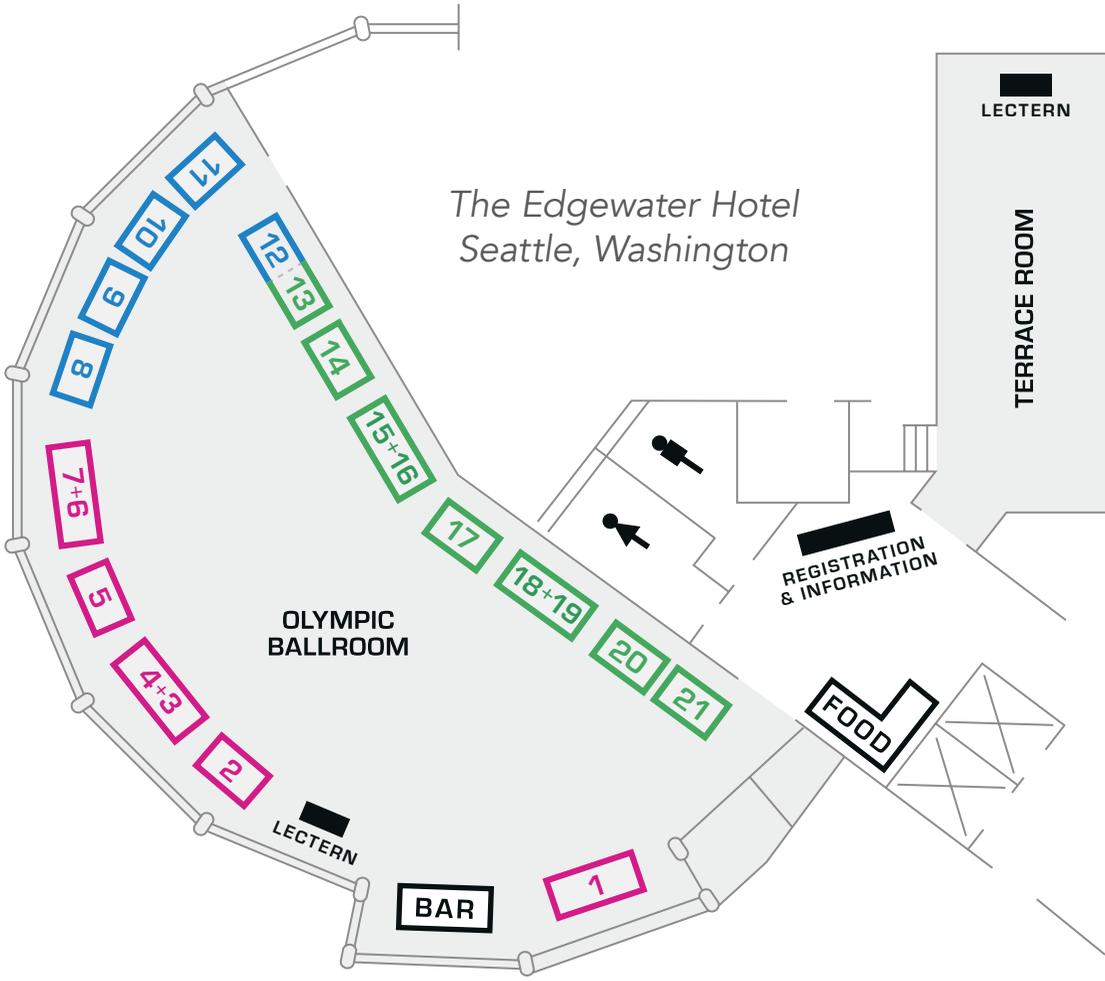
Jon M. Oatley
Washington State University

Genetic engineering of animals will influence society on an unprecedented scale over the next decade by curing genetic diseases, improving agricultural production, and revolutionizing the models available for biomedical and life sciences research. Through WSU's Functional Genomics Initiative, WSU aims to use gene editing to generate traits in livestock that will improve public health worldwide by controlling disease, reducing the use of antibiotics, and helping feed a projected global population of 9.5 billion by 2050.

The Edgewater Hotel
Seattle, Washington

OLYMPIC BALLROOM

TERRACE ROOM

LECTERN

REGISTRATION & INFORMATION

FOOD

LECTERN

BAR

Booths:
- 11, 10, 9, 8 — Biotechnology
- 12, 13 — Clean Energy
- 14
- 15+16
- 17
- 18+19
- 20
- 21
- 7+6, 5, 4+3, 2 — Cyber/Data Analytics
- 1 — Cyber/Data Analytics

Legend:
- ● = Cyber/Data Analytics
- ● = Biotechnology
- ● = Clean Energy

CYBER/DATA ANALYTICS

BIO TECH

CLEAN ENERGY

CYBER/DATA ANALYTICS

PNNL 1

SerialTap for Protecting Physical Control Systems
Low-Cost Device Improves Situational Awareness, Detects Potential Threats

Computer-driven control systems such as those for power systems and manufacturing must run efficiently. Organizations need better ways to find threats before problems occur. SerialTap, a low-cost, small device, connects to both a control system and the computer network without interrupting system operations. SerialTap "translates" the data from the control system so that the network cybersecurity software can analyze it. Control system vendors and integrators who design systems are particularly interested in this patent-pending technology for situational awareness and trouble-shooting. At SciTech Northwest, you'll see how SerialTap triggers alarms from the simulated control system of a water tank.

PNNL 2

Hydra Software
Statistical Design for More Accurate Predictions

Hydra is a statistical design process that identifies how to best combine multiple streams of varying information to improve predictive accuracy. It is applicable to the energy, financial, and other sectors where personnel must make accurate, cost-effective decisions based on forecasts or predictions. One example is to predict short and long-term energy needs in the power grid. Hydra works by iteratively tuning, augmenting, and then combining the strengths from an ensemble of competing methods to generate a single aggregate forecasting model that is more accurate and reliable than any ensemble constituent. At SciTech Northwest, you will see how researchers have used distributive, real-time data to make immediate, accurate decisions.

PNNL 3

Ant-Based Cyber Defense
Protects Large-Scale Networks & Internet-of-Things Devices

Ant-Based Cyber Defense (ABCD), also known as Digital Ants, can protect large-scale networks, up to millions or even billions of devices—think the Internet of Things—without compromising proprietary information between shared networks. This copyrighted software mimics ant colony behavior, but instead of laying down scent patterns to alert other ants, it uses sensor "ants" to roam around all the computer-operated devices in the network, looking for differences in system operations that could indicate an attack. ABCD is lightweight (computationally negligible), nimble, costs only pennies per device, and doesn't pick up or share network data. *Scientific American* named it "one of 10 world-changing ideas" because it is more scalable and flexible than centralized security programs. ABCD could be a game changer for companies with large networks to protect and anyone with Internet-connected products. At SciTechNorthwest, you will see how ABCD finds anomalies.

PNNL 4

MLSTONES
Applying Bio-Sequencing Approaches to Detect Malware

Organizations need to be able to quickly identify malware in computer networks to minimize information theft and operational disruption. But existing cybersecurity tools have been notoriously inadequate at finding real threats vs. innocuous false alarms. That's because malware is constantly mutating and evolving, and traditional antivirus software has a hard time keeping up. PNNL is developing a new generation of biology-inspired cybersecurity based on the way health researchers compare proteins associated with early-stage disease. At SciTech Northwest you will see how MLSTONES uses bio-inspired approaches to classify, characterize, and detect malware. We will demonstration our malware "detector" that will identify current and zero-day (evolving) malware.

WSU 5

High-Throughput Sensing in Agriculture
Allows for More Informed Decision-Making

Currently, farmers and plant breeders have to walk through acres of fields to manually inspect and monitor crop health. WSU researchers combine the power of high-tech sensors and camera systems with mechanized platforms to detect plant health characteristics more quickly and accurately than the human eye. Dr. Sindhuja Sankaran and her team are in the early development of this technology which harnesses data to identify water stress in grapes, signs of disease in crops, and which plants are producing the most desirable fruits. Having that information will help farmers make decisions about when to treat crops, which plants are best for propagation, when to use less water, and so on. Dr. Sankaran has tested the technology in vineyards and wheat fields using a range of platforms from tractors to unmanned aerial systems.

PNNL 6

Clique: Online Threat Detection
Detects and Analyzes Threats in Real-Time

Clique is an advanced data-intensive visual analytic software package that combines visual identification and investigative discovery—enabling detection and analysis of cyber threats in near-real-time. Network defenders now have a mechanism to move seamlessly from high-level views of behaviors down to detailed representations. At SciTech Northwest you will see two views of Clique: 1) Cadence, with a graphical user interface that gives users the ability to see deviations from expected activity, and 2) Trace, which gives analysts a flexible and scalable two-dimensional scatter plot, revealing patterns in large volumes of network data.

PNNL 7

Scalable Reasoning System
Analytic Framwork for Web-Based Visualization

Scalable Reasoning System is an analytic framework for developing web-based visualization applications. Using a growing library of both visual and analytic components, custom applications can be created for any domain, from any data source. Its modular architecture helps connect data to analytics and visualizations—helping users make sense of data. This technology has been used to create solutions for a wide range of domains including health care and cyber security, incorporating either large or streaming data sets. At SciTech Northwest, you will see how this tool has been used for cyber security, biosurveillance, and patent analysis.

BIO TECH

UW 8

No More Rolling Stones
Innovations in Non-Invasive Kidney Stone Treatment

Each year, more than three million Americans see a physician for kidney stones and over 700,000 procedures are performed to break large kidney stones. A UW research team developed ultrasound to reposition kidney stones to alleviate pain and facilitate passage of stones. Operated with a handheld probe that sends only sound waves through the skin, the machine images, accurately measures, fragments, and repositions kidney stones. With patients awake, kidney stones can be managed in an office or clinic, while avoiding the radiation issues and cost of X-rays. One clinical trial has been conducted and additional human trials are planned. A new company, SonoMotion, Inc. has licensed the technology. At SciTech Northwest, participants will be able to image fragments and reposition stones inside a mannequin just as a doctor would, seeing the stones breaking and moving in real time.

WSU 9

Accelerating Vaccine Development with Software Tool

A major challenge facing vaccine development for cattle worldwide is targeting the strains of bacteria that cause disease. Pathogens often have a large variety of strains that are dispersed globally. A quick way to track the presence of the pathogen and also look at strain distribution requires advanced capabilities for analysis of short DNA sequences called repeats. Researchers currently analyze and manually keep track of repeats – a time consuming and error-prone endeavor. Researchers Assefaw Gebremedhin and Kelly Brayton developed a software, RepeatAnalyzer, to improve that process. RepeatAnalyzer tracks, manages, analyzes and catalogues short, repeating sequences of bacterial DNA. The interdisciplinary team has developed a database that can analyze *A. marginale*, a tick-borne bacterium that affects cattle. The software can be extended to any other species with similar repeats. Attendees will be able to see demonstrations of the analysis and management capabilities offered by RepeatAnalyzer.

UW 10

FoldIt Protein Structures

Foldit is a revolutionary computer game enabling you to contribute to important scientific research. We're collecting data to find out if humans' pattern-recognition and puzzle-solving abilities make them more efficient than existing computer programs at pattern-folding tasks. If this turns out to be true, we can then teach human strategies to computers and fold proteins faster than ever! Foldit attempts to predict the structure of a protein by taking advantage of humans' puzzle-solving intuitions and having people play competitively to fold the best proteins. SciTech participants will be able to interact with a live demo of Foldit to experience tutorials used by real-world players.

WSU 11

Expanding Capabilities of Personal Glucose Monitors

Personal glucose monitors are accurate, portable, affordable devices that have helped diabetic patients keep track of their blood glucose levels for over 30 years. WSU researchers Annie Du and Yuehe Lin, who has a joint appointment with PNNL, developed a technology that could expand the capabilities of these devices to monitor a nearly infinite number of environmental and health factors. The device allows an antibody paired to a molecule of interest to become the indicator on a standard glucose test strip. Using this method, any molecule that can be attached to an antibody can be tested in the field or office without the use of expensive or complicated laboratory equipment. The technology can be applied to existing strips and meters. Attendees can see the device and prototype test strips. Drs. Du and Lin are looking for industrial partners to commercialize this technology. Their technology will be presented by Yang Song, a graduate student in Dr. Lin's lab.

PNNL 12

Bio-Based Products
Renewable Commercial Commodities from Biological Materials

Companies are increasingly looking into transforming biomass—such as agricultural waste and even sewage—into biofuel and other valuable products. PNNL is a leader in renewables research and technologies, including catalyst development, conversions of sugars to chemicals, thermochemical conversions, bio-oil upgrading, fermentation, and algal biotechnology. These fuels and products are significantly valuable to the airline and chemical industries for adding bio-based product lines and re-using waste from various sources. At SciTech Northwest you will see "before" and "after" samples of biomass to biofuel. You'll also learn how to partner with PNNL to develop and use these capabilities.

CLEAN ENERGY

PNNL 13

Sensor Suitcase for Building Energy Diagnosis
Efficiency Recommendations Can Save up to 9% of Energy Costs

If you own one or more small-sized commercial buildings, you probably do not have the budget for retro-commissioning investments. The Sensor Suitcase offers a turnkey solution that can be used by building owners to automatically generate recommendations to improve building energy efficiency, reduce operating costs, and improve occupant comfort at low/no cost. It is designed for small businesses—up to 50,000 square-feet—and can save building owners up to 9% in their annual energy costs. You place the sensors and collect the data; then analysis software tells you where specific operational changes can save money. At SciTech Northwest, you will be able to handle the sensors, see how easy they are to install, and interact with the software.

WSU 14

Making Liquid Hydrogen a Viable Alternative Fuel Source

The very low value of electricity in our region creates problems for new renewable energy projects and rural energy utilities. Converting this surplus curtailed energy into storable hydrogen fuel can increase the value of the energy up to 40x. The Hydrogen Properties for Energy Research (HYPER) laboratory at WSU recently founded Protium Innovations, LLC to commercialize small-scale hydrogen liquefaction technologies to address this need, while simultaneously fueling the coming fleet of fuel cell electric vehicles. They have already worked with local company Insitu on a liquid hydrogen-fueled drone, and are developing more collaborations with industry. Attendees will see demonstrations of the Heisenberg Vortex technology at the heart of the liquefier, in addition to liquid hydrogen storage technologies.

PNNL 15

Organic Redox Flow Battery For Energy Storage
Improves Grid Operations and Expands Renewable Energy Use

This is a new water-soluble, organic electrolyte for redox flow batteries, which are used for large, grid-scale applications and to support the integration of renewable energy sources. An organic electrolyte is more eco-friendly and cost effective compared with conventional alternatives. Flow batteries help stabilize the grid, make renewables dispatchable, and enable companies or utilities to pre-purchase power at non-peak prices. At SciTech Northwest you will see a cutaway of an actual battery stack that makes the technology possible and see how flow batteries make grid storage possible.

PNNL 16

Advanced Battery Facility
Testing New Battery Chemistries at Commercially Relevant Scales

Researchers from industry and universities can use the Advanced Battery Facility at PNNL in Richland, Wash., to develop and test new battery chemistry and materials at commercially relevant scales. There, users work with PNNL to test chemistries such as lithium-metal, sulfur, sodium, and magnesium, to make batteries last longer and store more energy. The facility contains a complete process line to prepare, fabricate, and validate experimental batteries known as pouch cells. Battery manufacturers gain confidence that the new chemistries are viable, and companies can license the technologies. At SciTech Northwest, you will see a pouch cell and learn more about using the facility or having your materials tested there.

UW 17

Self-Cleaning Solar Panels

Dust accumulation on solar panels reduces their efficiency. Traditional surface modifications such as coatings and textured patterning have showed promise but have fallen short. UW's patented Aquapel technology creates an active, self-cleaning surface on solar panels by dislodging surface contaminants using water droplets and vibration. On solar panel cover glass, a microfabrication process creates hydrophilic (water-loving) patterns on a hydrophobic (water-repellant) background. When water is sprayed on the panel, or when it rains, water droplets are systematically guided along this patterned surface using independent vibration, cleaning away contaminants. The result: Cleaning labor and water usage costs are reduced, and customers' investments in solar electricity are maximized. SciTech participants will see a video of the technology in action, as well as a live demo with instrument setup.

PNNL 18

GridOPTICS Software for the Power Grid
Actionable Information for Operational and Policy Decisions

GridOptics provides markets-to-exchange decision-making information for today's grid and data networks, transmission and distribution networks, and operations and planning systems. It includes the following software tools:

VOLTTRON - Distributed control and sensing platform that allows appliances and other devices to communicate with each other to prioritize power needs and deliver electricity.

GridPACK - Software framework that harnesses high-performance computing for grid modeling.

GridOPTICS Software System (GOSS) - Facilitates data exchange and enables interoperability to develop new applications for the future grid.

Framework for Network Co-Simulation (FNCS) - Federated co-simulation platform that merges communication simulators with distribution and transmission simulators.

Shared Perspectives - Allows simultaneous and selective sharing of information between two different entities such as electric utilities. At SciTech Northwest you will be able to participate in a demonstration that shows how two utilities can see the same information when one has a fire that affects transmission and distribution infrastructure.

PNNL *19*

Friction Stir Welding
Enables Lightweight Vehicle Parts

PNNL has developed and demonstrated a friction stir welding process for the expanded use of lightweight aluminum in cars and trucks at the speed, scale, quality, and consistency required by the auto industry. The process reduces production time and costs while yielding strong and lightweight parts. A car door can be 62% lighter and 25% cheaper than that produced with today's manufacturing methods. This solid-state welding technology enables joining of aluminum sheets without melting the material, which ultimately enables the stamping of high-quality car components made of varying thicknesses of aluminum alloy. The process is ten times faster than current friction-stir welding techniques, meeting high-volume assembly requirements. Attendees will see a car door made with friction-stir welding and samples of dissimilar materials joined with friction stir scribe technology. PNNL is seeking industry collaborators to customize the process for their needs and licensees to take this technology to market.

UW *20*

Battery Informatics, Inc.

Battery Informatics, Inc. (Bii), a spin-off from UW, is developing the next generation of battery management systems. Bii's solution is targeted at the electric vehicle and the energy storage markets. These rapidly growing markets are converging on Li-ion chemistry as the preferred battery solution, but Li-ion batteries have complex behavior, resulting in conservative operations. Bii provides improved control of the operating constraints to reduce battery degradation, which results in the batteries lasting longer. Bii's solution will provide a 20% improvement by a combination of longer battery life and improved economic benefits. The product will run as a real-time control system as part of a battery management system. The target customers are battery manufacturers; automotive OEM suppliers; and integrators who sell energy storage solutions to commercial buildings and electric power utility companies. SciTech participants will see Li-ion batteries and associated control devices, and simulation results.

PNNL *21*

Fish-Friendly Technologies
Reveal Fish Behavior and Impacts for Water Power Design

Sensor Fish is a small sensor device that analyzes the physical conditions fish experience as they pass through dams. This synthetic "fish," a small, instrumented tube, is helping hydro facilities become more fish-friendly. The data from Sensor Fish can improve the environmental performance of hydropower. The demo will show the Sensor Fish and associated data. A separate but related technology, the Juvenile Salmon Acoustic Telemetry System (JSATS), implants acoustic transmitters into fish to remotely track them with sub-meter accuracy. It monitors the survival rate of juvenile salmonoids during migration and monitors how fish respond to waterpower structures and ferry terminals. The demo will show how the swimming motion from the fish is the energy source to power the transmitter. SciTech Northwest attendees can wave a transmitter "fish" around and see the data generated by the movement.

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