



PNNL Technologies: Making a Difference

January 8, 2020

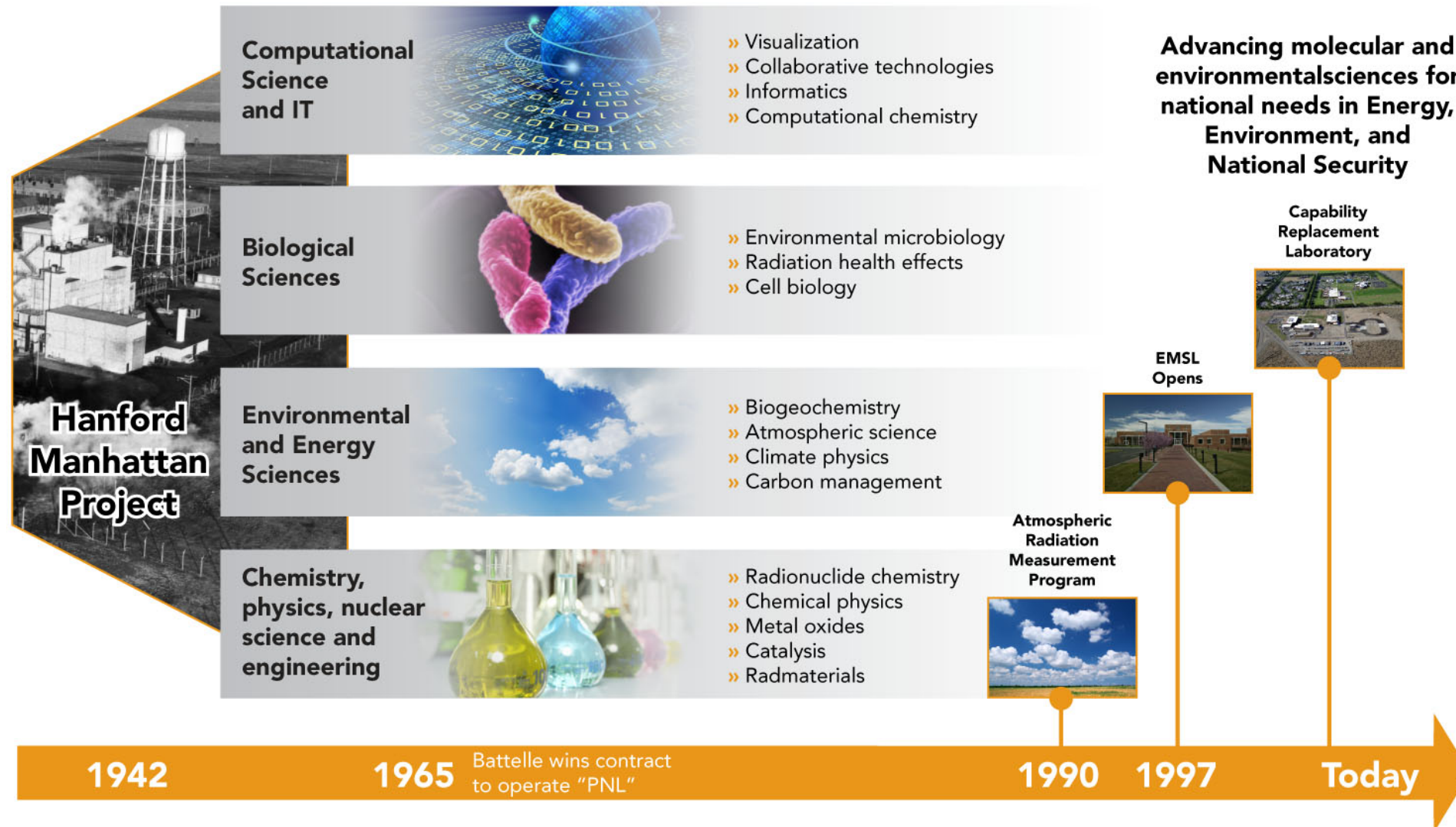
Kannan Krishnaswami, Ph.D.
Technology Commercialization Manager



PNNL is operated by Battelle for the U.S. Department of Energy

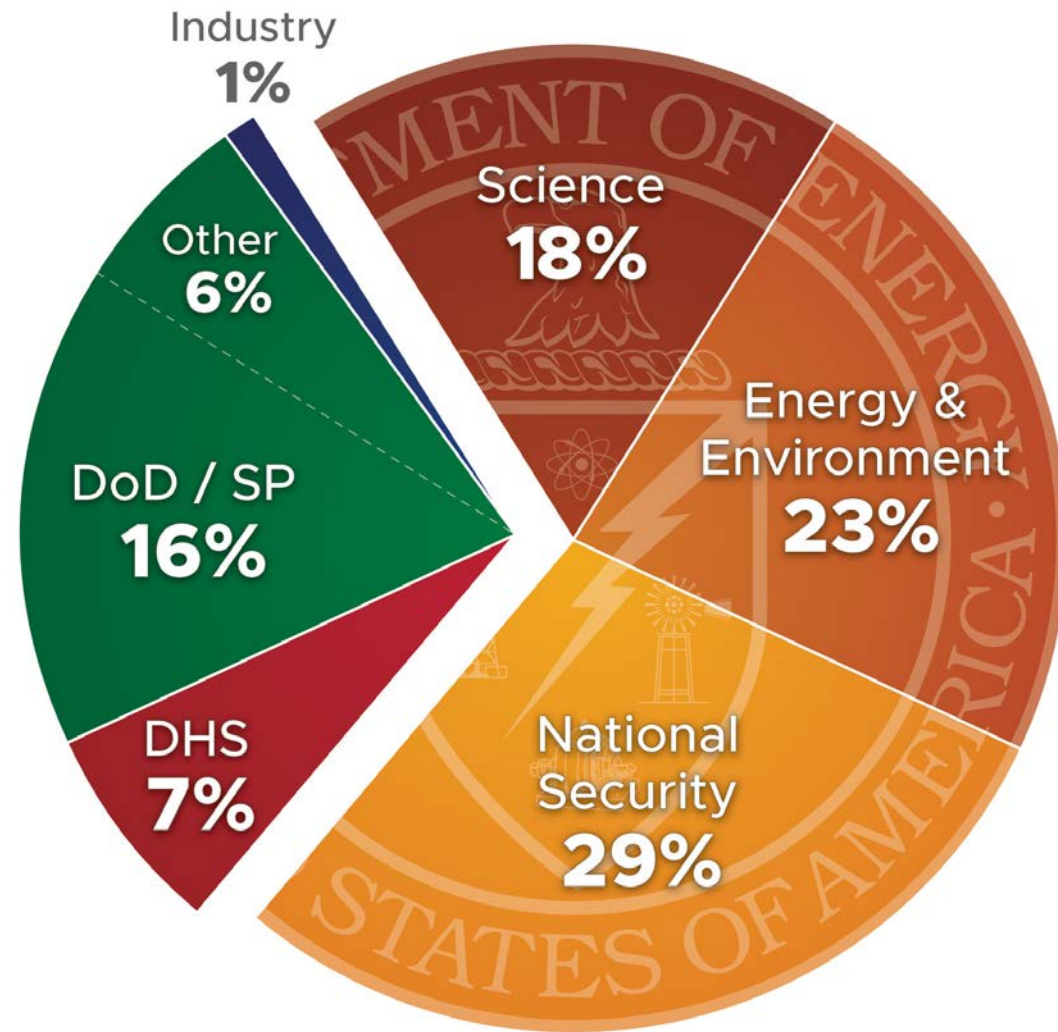


From its Manhattan Project origins to advancing science and solving national problems

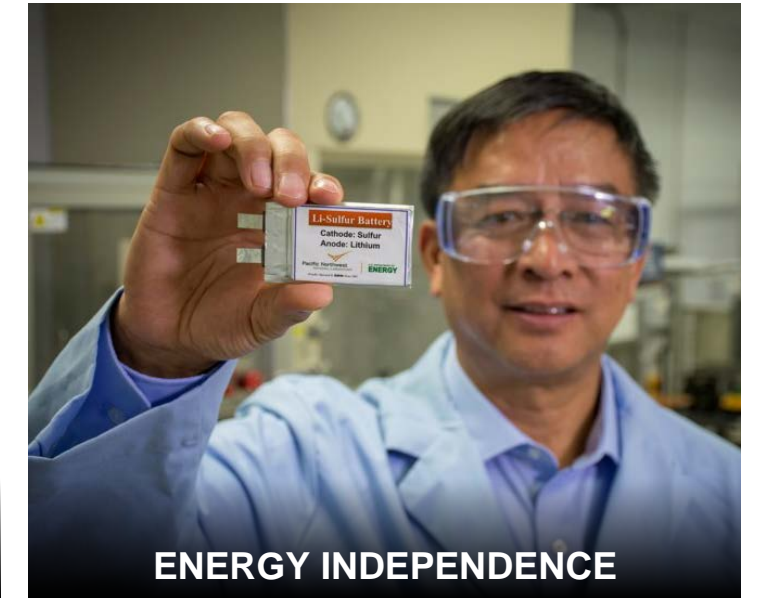


- General Electric (GE) took over Hanford operations in 1946
- Hanford Laboratory formed in 1953
- Separation of R&D from site operations in 1965
 - Pacific Northwest Laboratory created
 - Battelle was chosen to operate the Lab
- Renamed Pacific Northwest National Laboratory (or PNNL) in 1995

PNNL tackles **critical scientific challenges** for multiple sponsors



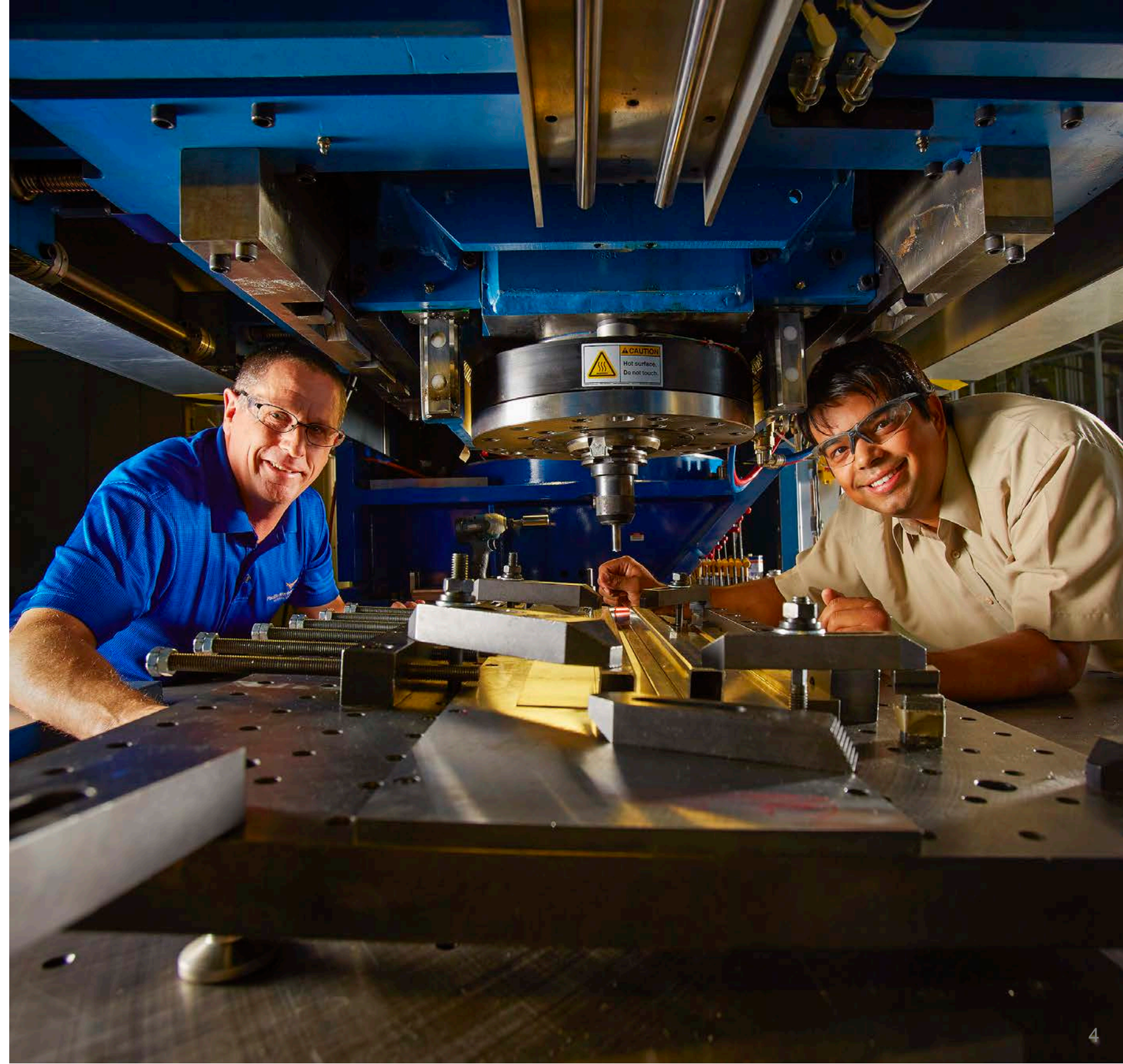
FY19 Budget



Another critical mission of the Laboratory is:

To move innovations from laboratory to industry, which results in:

- Solutions addressing national challenges
- Improved quality of life
- Economic growth and stability





We **engage industry** to maximize the scientific and economic impact of PNNL-developed technologies



4,414

Employees



\$960M

Annual Spending



\$456M

Total Payroll



208

Invention Disclosures



99

U.S. and Foreign Patents



45

Licenses



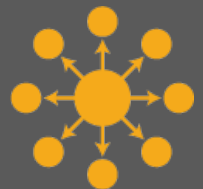
3

Total: 88
FLC Awards



7

Total: 109
R&D100 Awards

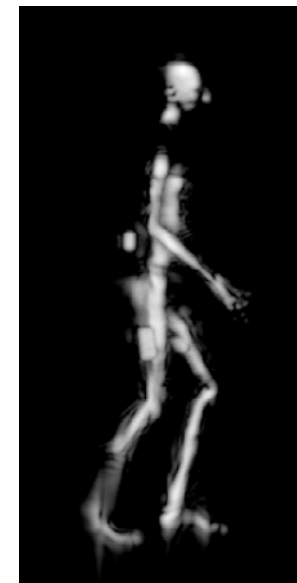
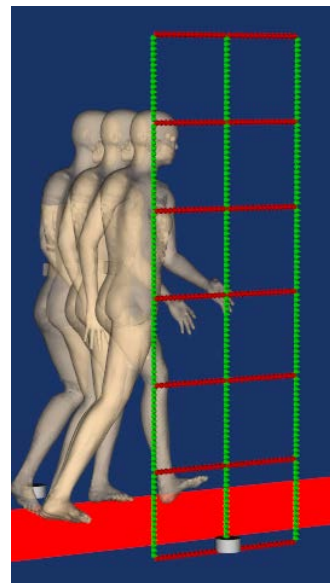


193

Companies
with PNNL Roots

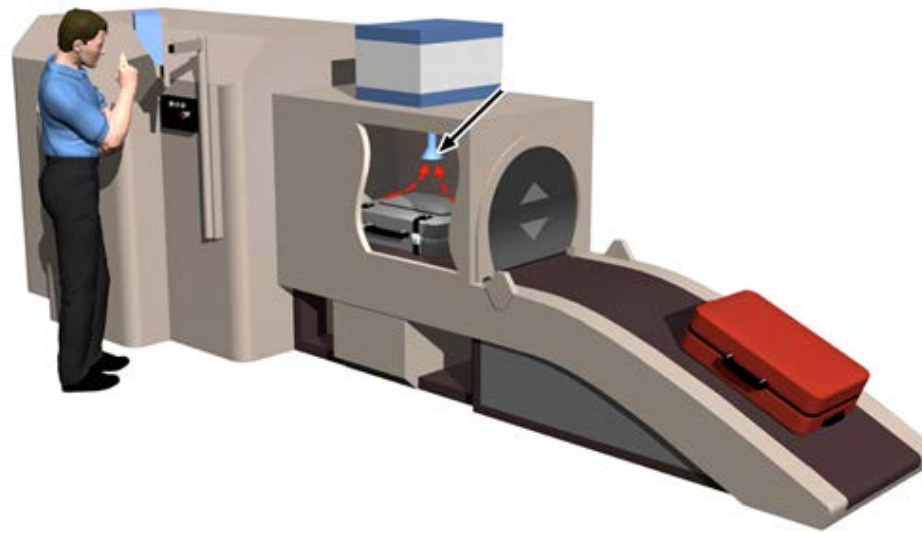
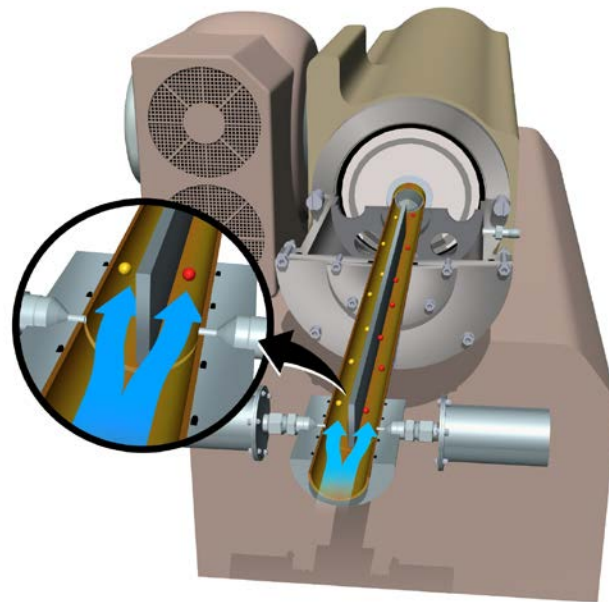
**FY18 data*

mm-Wave Security Scanner



- High resolution imaging, extended to include footwear
- Next generation portals would allow walk-through screening
- Ongoing technology transfer discussions with several companies and entrepreneurs
- Other applications: sports and concert arenas, mass transit, shopping malls, apparel fitting, medical imaging, etc.

VaporID – “Sniffing” Explosives and Drugs



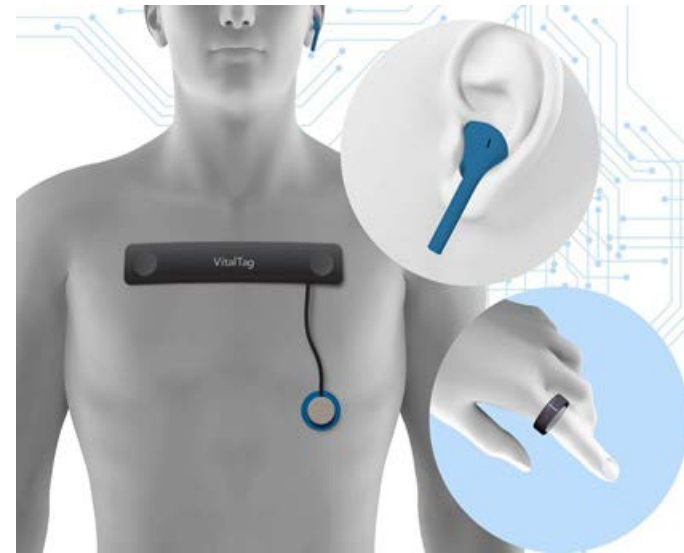
- Traditionally performed by dogs; approximately \$250K per year, per dog
- Dogs function for short periods of time with a trained handler
- New technology can “sniff” explosives and drugs with high a degree of accuracy
- 24 x 7 operations
- Potentially achieve 100% baggage screening

Acoustic Gunshot Detector



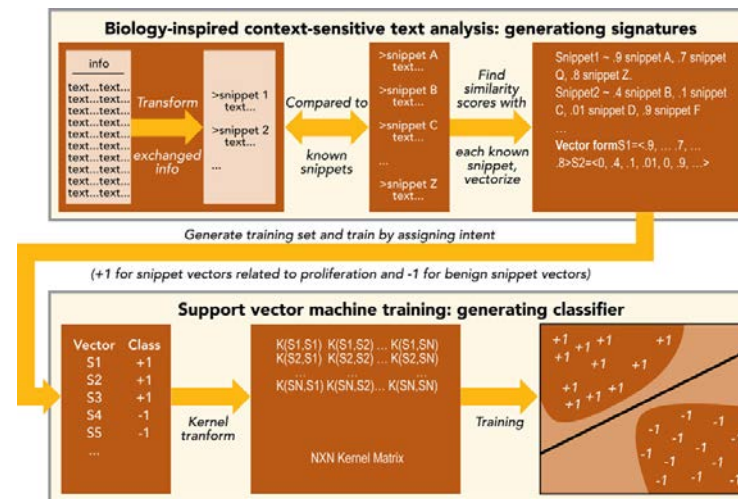
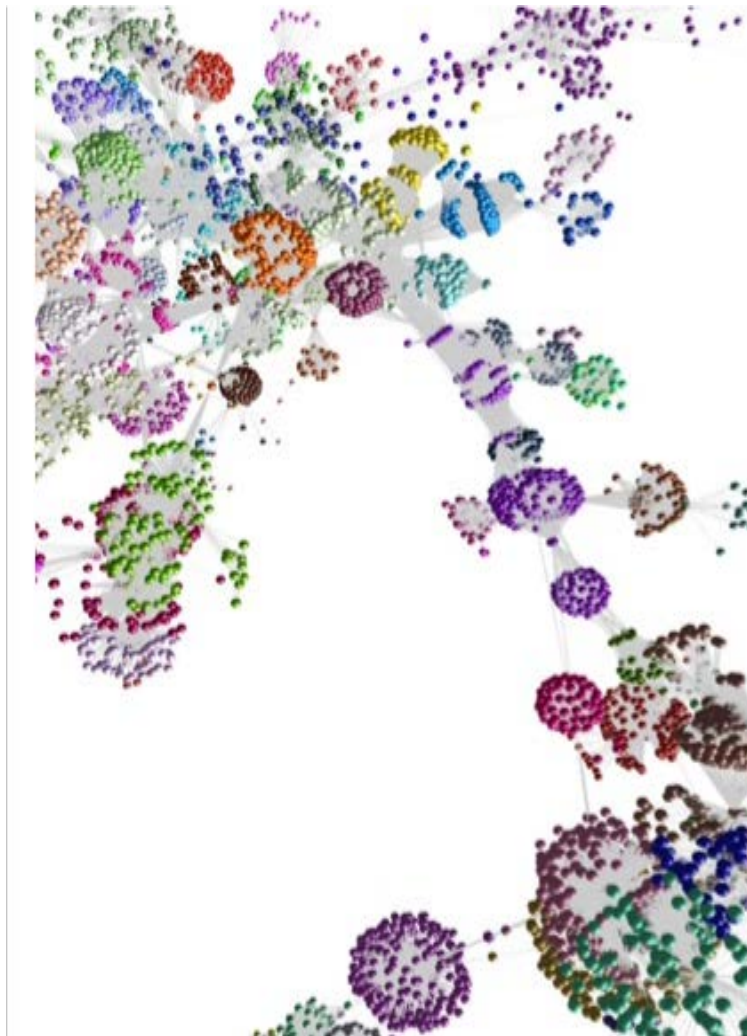
- Low cost acoustic sensor
- Differentiates between gunshot and other similar sounds with high accuracy
- Capable of identifying the caliber of weapon fired
- First responders informed instantaneously without need for human action
- Licensed to four companies to develop and provide solutions.
- Next generation technology currently in development

VitalTag – First Response During Mass Casualty



- First responder need for patient triaging during mass casualty events
- Low-cost and disposable suite of sensors to measure:
 - Systolic blood pressure
 - Heart rate
 - Single lead electrocardiogram
 - Pulse oximetry
 - Respiration rate
- Applications: medical emergency centers, post operative care, in-home monitoring, telemedicine, extreme sports

Nature Inspired Cybersecurity



- “Exact match” malware detection is ubiquitous
- Minor code change creates new malware strings that can bypass detection
- We developed “non-exact matching” by deconstructing malware to its genetic sequence – like a protein
- Machine learning applications enable classification and quarantining of malware
- Licensed to a venture backed startup

Beyond Security Applications

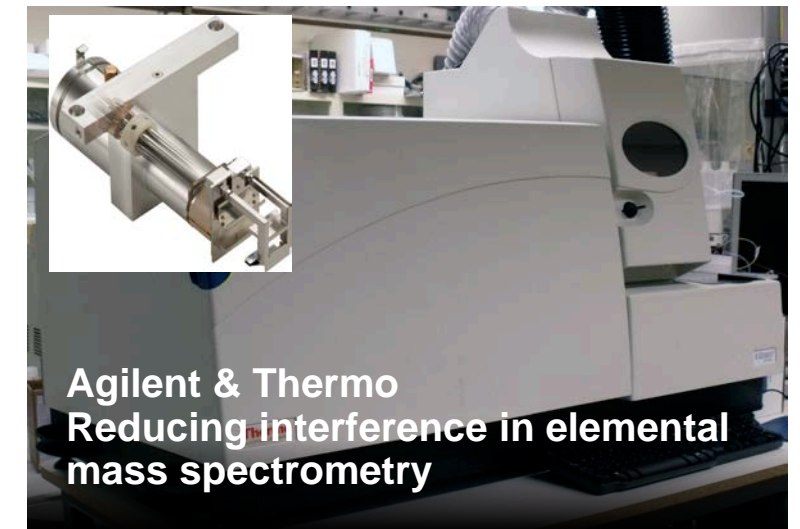
ENVIRONMENT



ENERGY STORAGE



SCIENTIFIC INSTRUMENTS



Pacific Northwest National Laboratory aspires to:



- Deliver high-impact science and solutions to address the most important challenges facing our nation
- Be viewed as a regional and national asset
- Partner with regional universities to advance science and innovation
- Partner with industry to ensure R&D makes it to the commercial market place

Thank you

