

SMART
AMERICA 



S E R S

Smart Emergency Response System

SMART
AMERICA

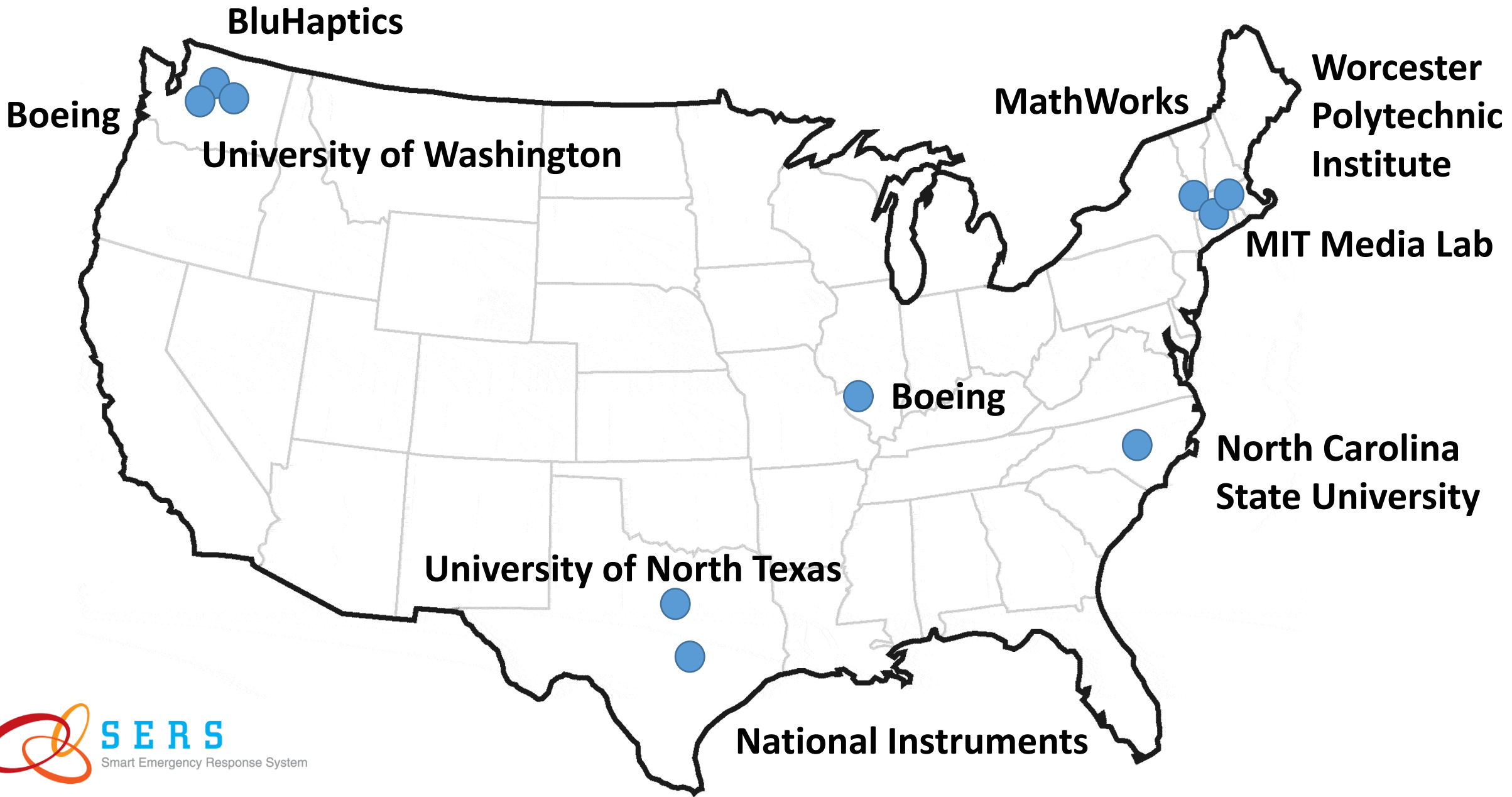


S E R S

Smart Emergency Response System

Potential Applications







SERS

Smart Emergency Response System

BluHaptics
Boeing
Massachusetts Institute of Technology
MathWorks
National Instruments
North Carolina State University
University of North Texas
University of Washington
Worcester Polytechnic Institute



S E R S

Smart Emergency Response System

Rich Rovner
Vice President of Marketing
at MathWorks

Government

9 million STEM jobs
by 2022

Industry

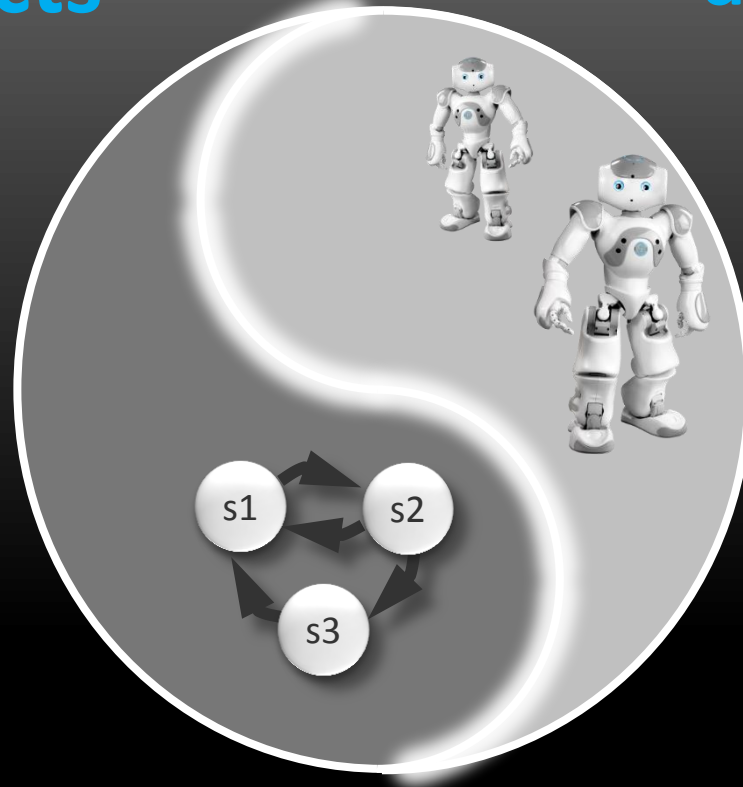
Academia

**Cyber
aspects**

**Physical
aspects**

Open
design

Trusted
platform



Deployment

Systems
collaboration

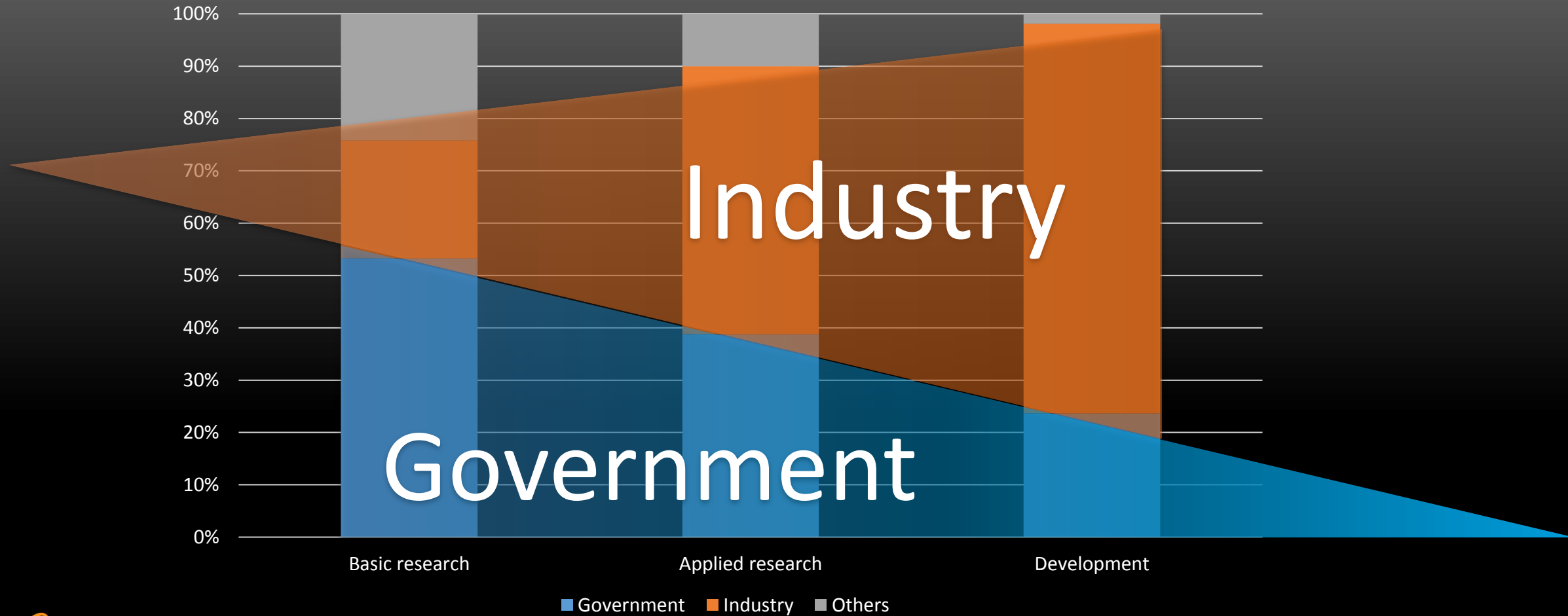
Human in the Loop

Annual firefighting expenses:
\$329 billion

This constitutes **2.1%**
of the U.S. GDP



Research and Development Funding in the USA in 2011 (report of Fiscal Year 2014)



Together
For humanitarian cause
To live better and smarter

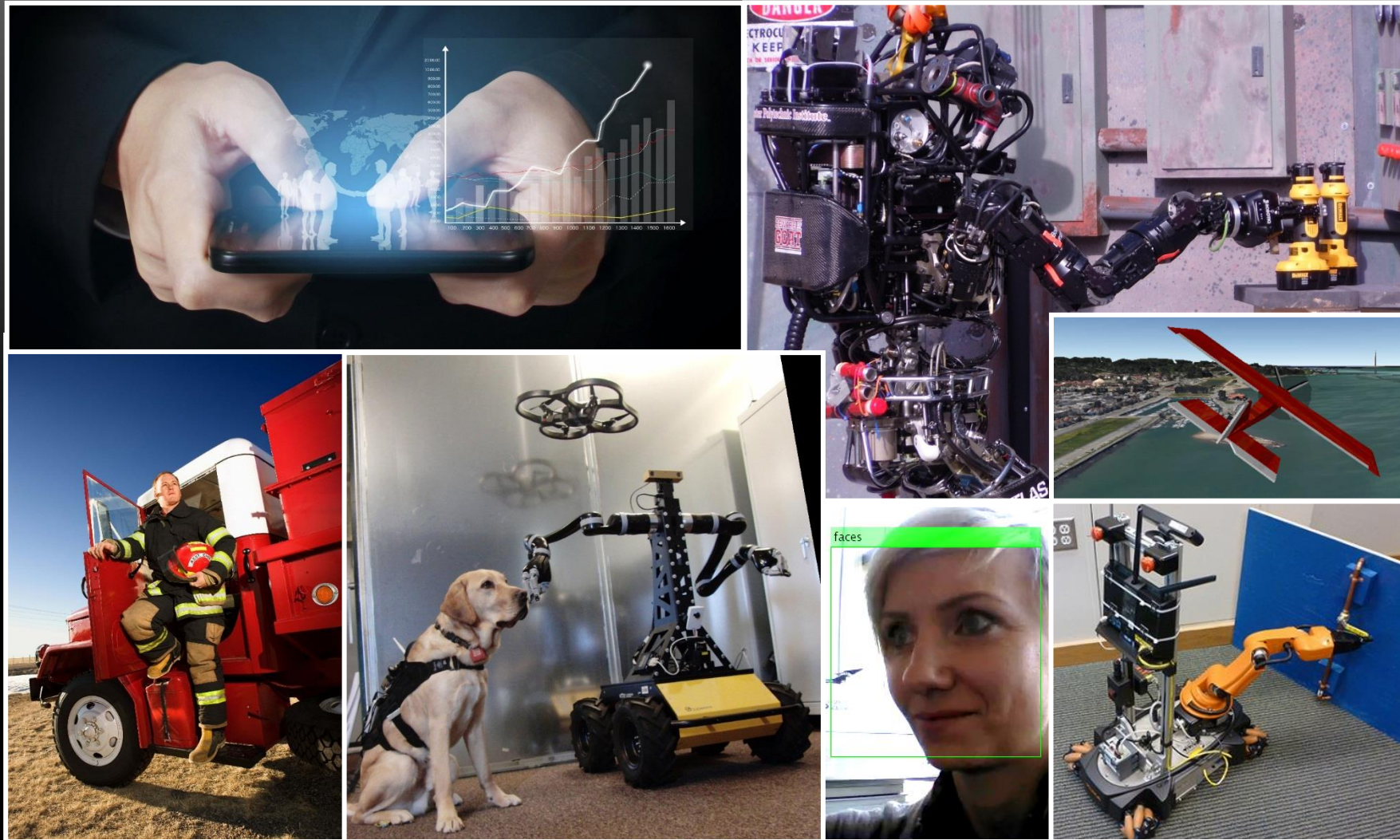


S E R S

Smart Emergency Response System

James L. Paunicka
Technical Fellow
at Boeing

Supporting a More Prepared, Safer, and Smarter America



The SERS Concept

MathWorks

Mission Control Dispatches Drones



The SERS Concept

Mission Control Dispatches Drones

Drones Set Up Life-Saving Network
Connectivity and Provide Vital Situational
Awareness Imagery



Boeing
University of North Texas



The SERS Concept

Mission Control Dispatches Drones



Drones Set Up Life-Saving Network Connectivity and Provide Vital Situational Awareness Imagery



Victims and First-Responders Leverage Network in the Disaster Area



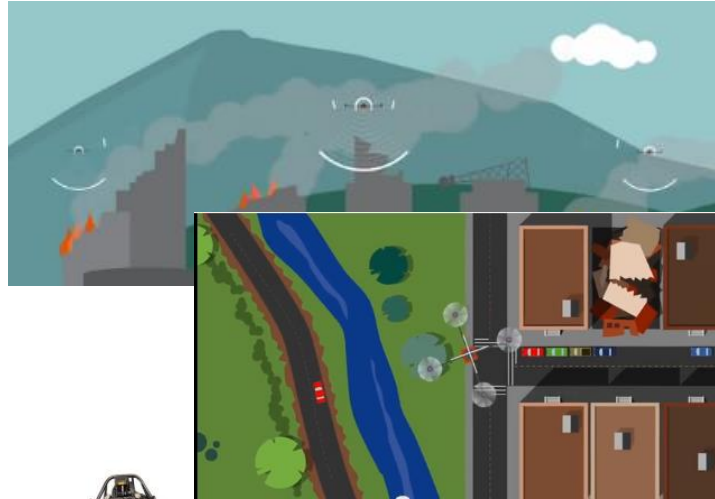
MIT Media Lab

The SERS Concept

Mission Control Dispatches Drones



Drones Set Up Life-Saving Network Connectivity and Provide Vital Situational Awareness Imagery



Victims and First-Responders Leverage Network in the Disaster Area



Mobile Ground Assets (Robots and Rescue Dogs) Dispatched



BluHaptics

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North Carolina State University

University of Washington

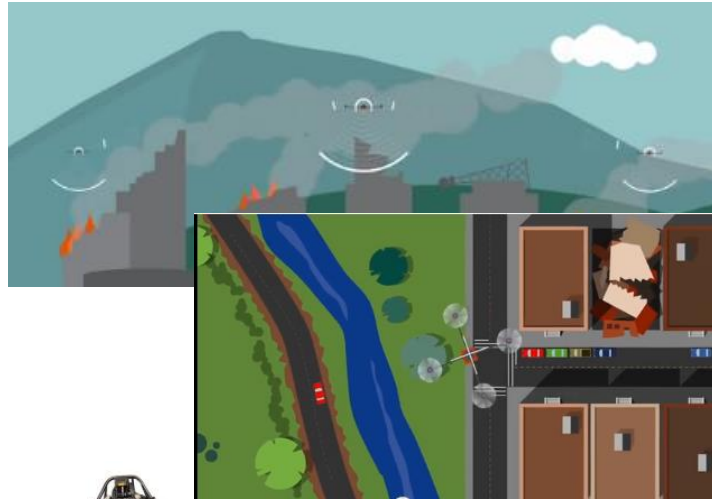
Worcester Polytechnic Institute

The SERS Concept

Mission Control Dispatches Drones



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Victims and First-Responders Leverage Network in the Disaster Area



Mobile Ground Assets (Robots and Rescue Dogs) Dispatched



Mission Control

- Optimizes Mission Plans and Displays Sensor Data from All Mobile Assets (Ground and Air)
- Allows for tele-operation and supervised control of robots and dogs



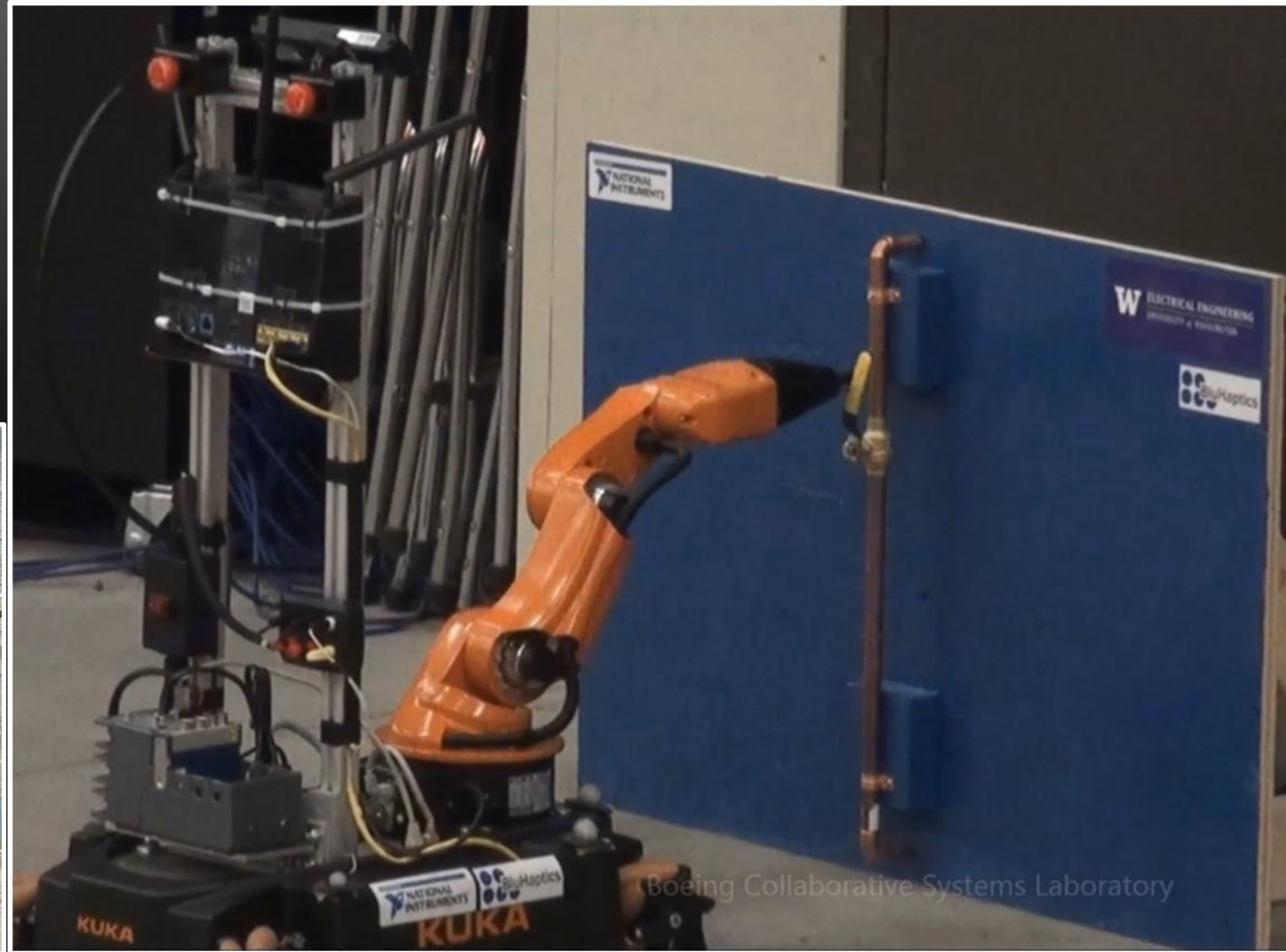
Utility of Instrumented Canines



- Leverages excellent search and rescue capability
- GPS in harness provides geolocation of dog and survivors
- Camera in harness provides remote dog handler with situational awareness of what / whom the dog has found
- Vibrating actuators in harness allows for teleoperation of dog movements
- Integrated inertial measurement units (IMUs) in vest provide remote behavioral monitoring
- Other equipment mounted in harness to sense for dangerous conditions (e.g., natural gas leak)
- Future harness capabilities will allow physiological monitoring of the dog

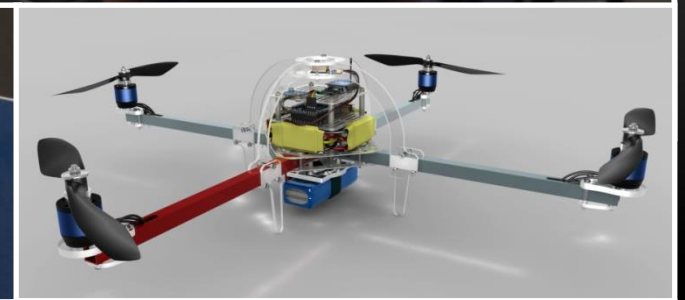
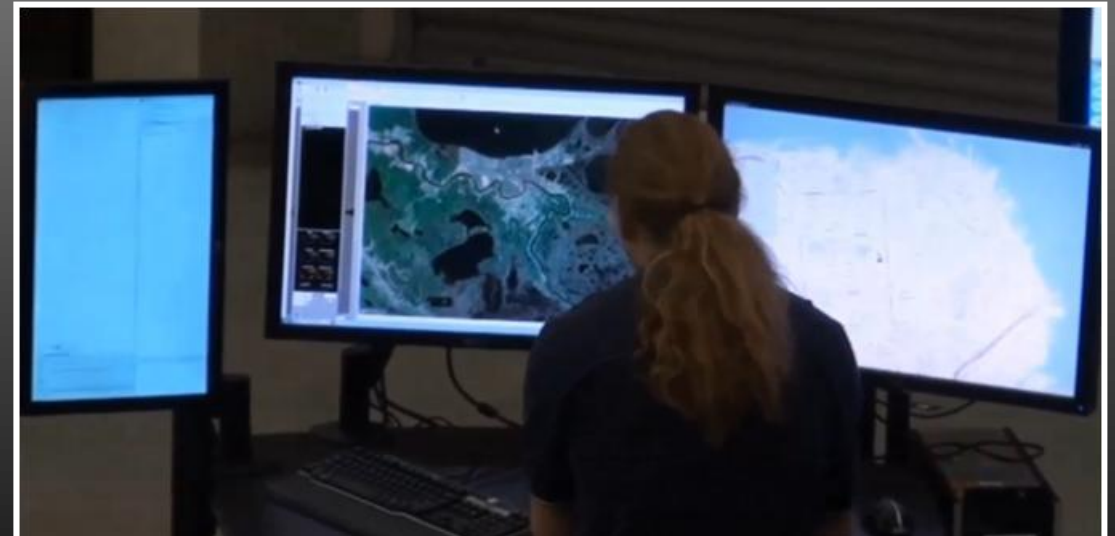
Utility of Tele-Operated Ground Robots

- Can perform operations in locations too dangerous for humans
- Tele-operation and supervised control allows for precise control by a human from a safe location



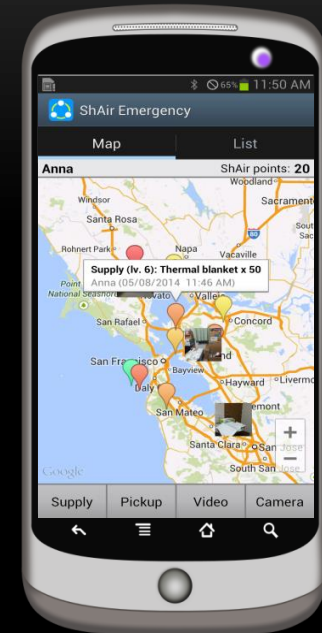
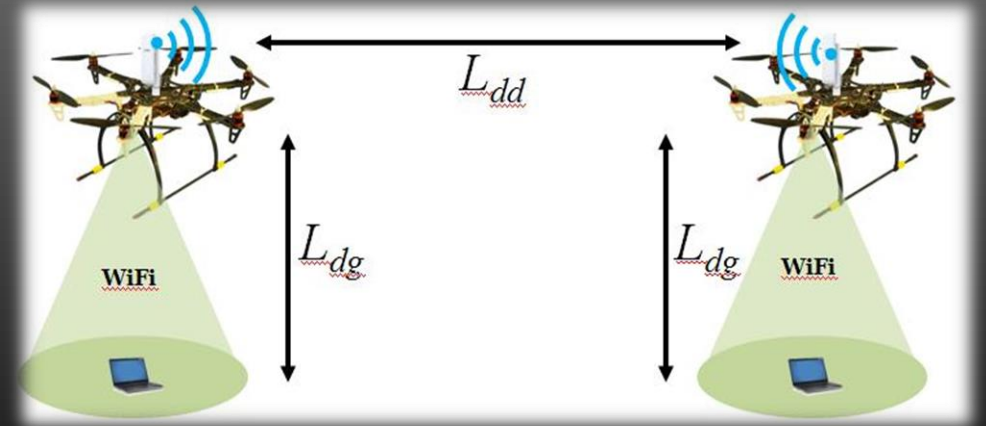
Mission Control is Critical

- Can plan missions (routes to travel and activities to perform) in near-optimal ways
 - Leveraging powerful computation capabilities and advanced algorithmic techniques
- Provides situational awareness to mission commanders and tele-operators of ground robots, dogs, and drones
 - Up-to-date locations of robots, dogs, and drones on a map
 - Live image feeds from cameras on robots, dogs, and drones



It All Works When People and Machines are Networked

- Rapidly standing up networks with drones
 - Replacing destroyed infrastructure
 - Standing up a network in places which did not have connectivity before
- Support for allowing common handheld communication devices to be part of the network
 - Connectivity with First-Responders
 - A Lifeline for Victims
 - Submit relief / help requests
 - Share their situations using messages and pictures (of surroundings / wounds)

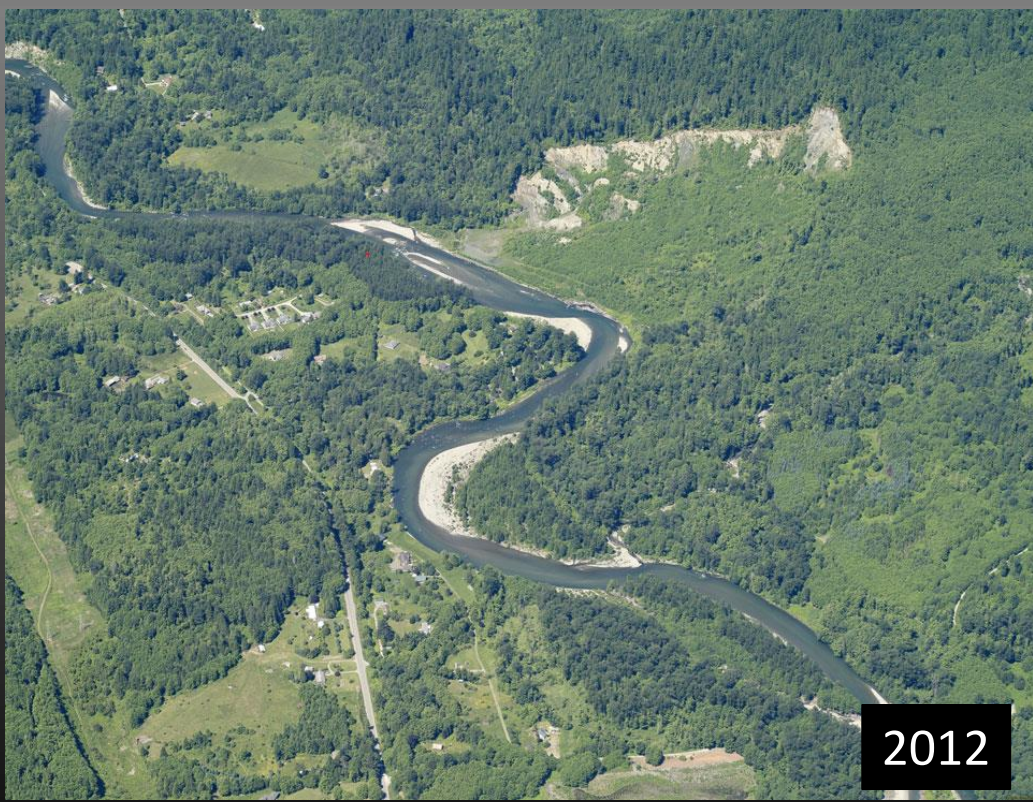


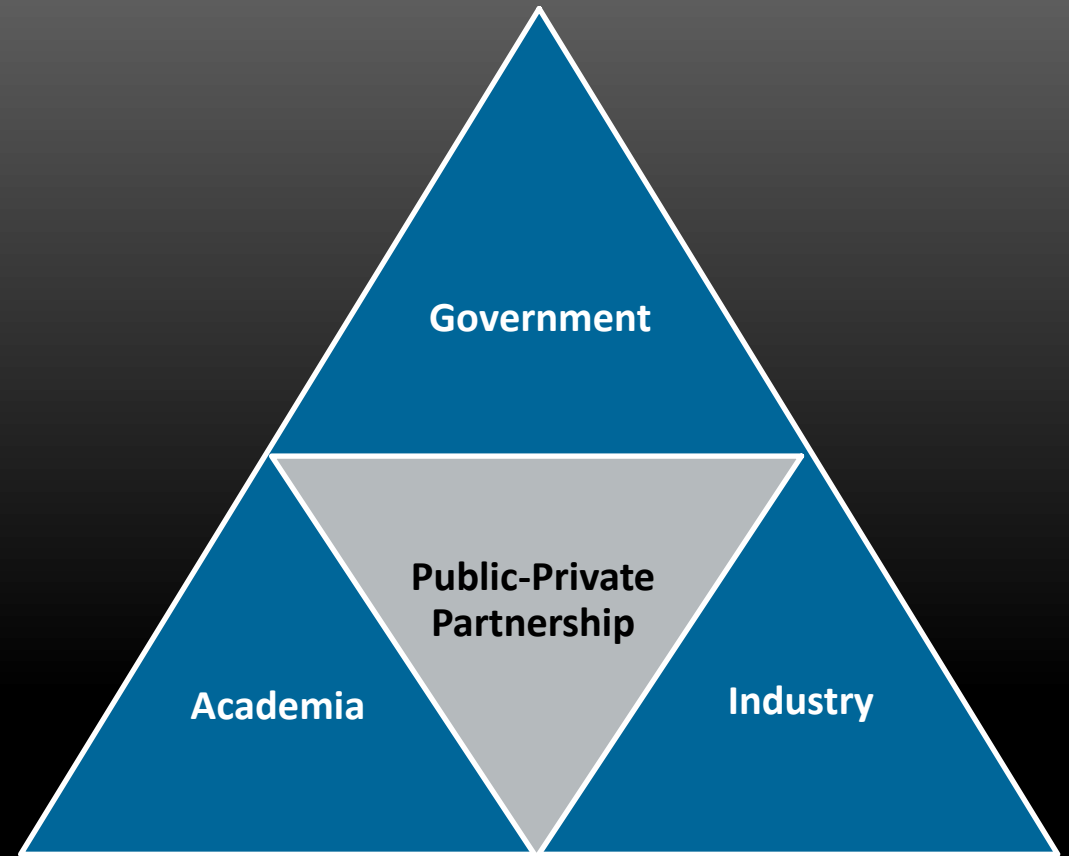
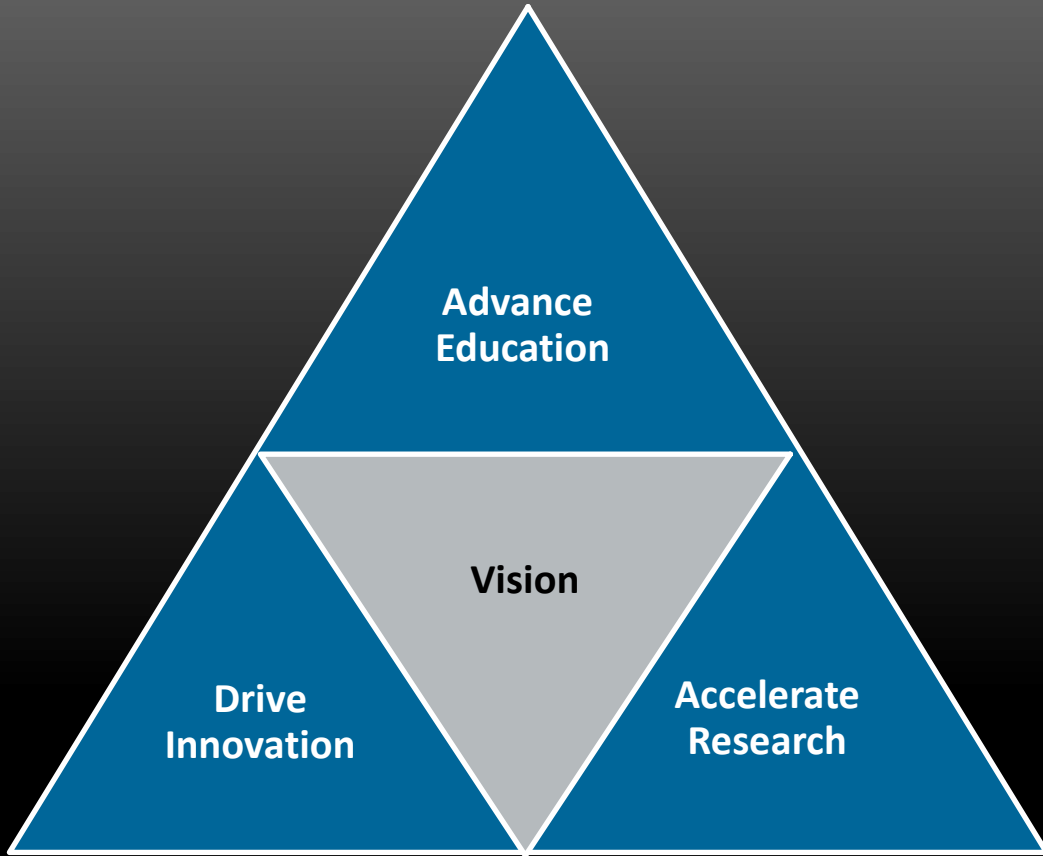


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Ray Almgren
Vice President of Marketing
National Instruments







Advance health informatics



Engineer the tools of scientific discovery



Reverse-engineer the brain



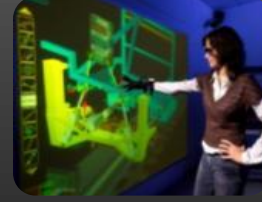
Provide energy from fusion



Engineer better medicines



Provide access to clean water



Enhance virtual reality



Restore and improve urban infrastructure



Develop carbon sequestration methods



Advance personalized learning



Make solar energy economical



Prevent nuclear terror



Secure cyberspace



Manage the nitrogen cycle

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