

Opportunities in the Defense and Security Robotics Sector

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www.spawar.navy.mil/robots/

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SSC Pacific

- Space and Naval Warfare Systems Center Pacific
- A Navy R&D laboratory for C4ISR
- Located in San Diego, CA

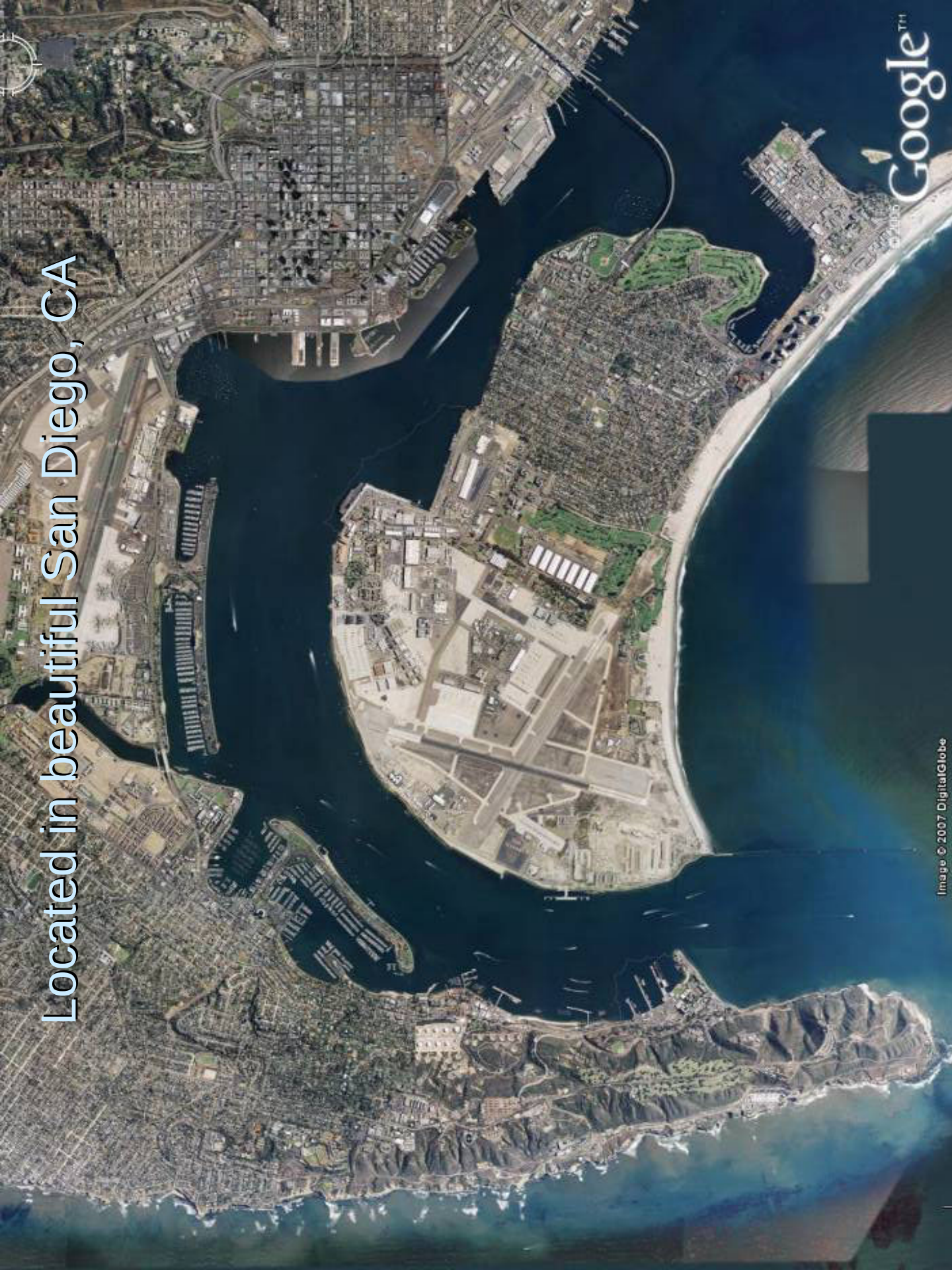
Deliver FORCEnet by investing, acquiring, developing, delivering and supporting integrated and interoperable C4ISR, Business IT and Space Capabilities in the interest of national defense

SSC Pacific

Unmanned Systems Branch

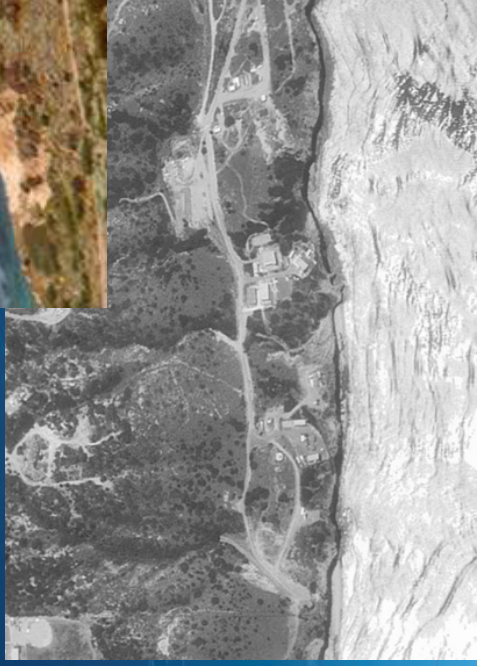
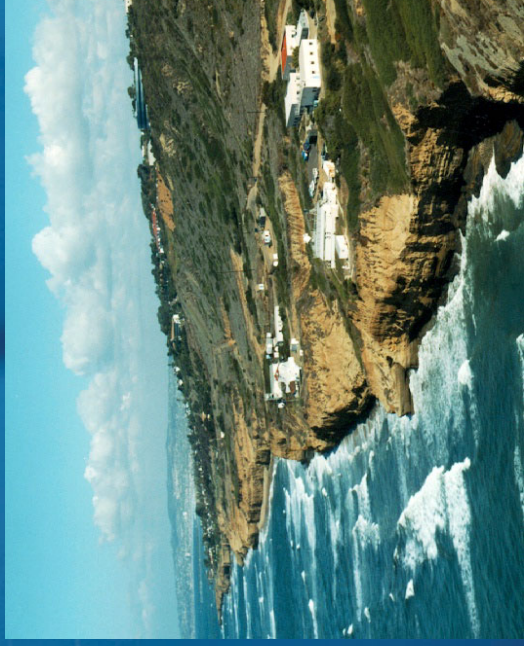
- Over 70 in-house personnel
- 45 government scientists and engineers
- Unmanned Systems Naval Reserve Unit
- 25 years in unmanned ground vehicles
- Over 20 active robotics research and development projects
- Infrastructure for UGV, UAV, USV, UUV RDT&E
- Funding from:
 - OSD JGRE, RS-JPO, NAVSEA, Army PM-FPS, FCS, MANSCEN, CECOM NVESD, ARL, DARPA, DTRA, ONR, NSWG, SOCOM, and others

Located in beautiful San Diego, CA



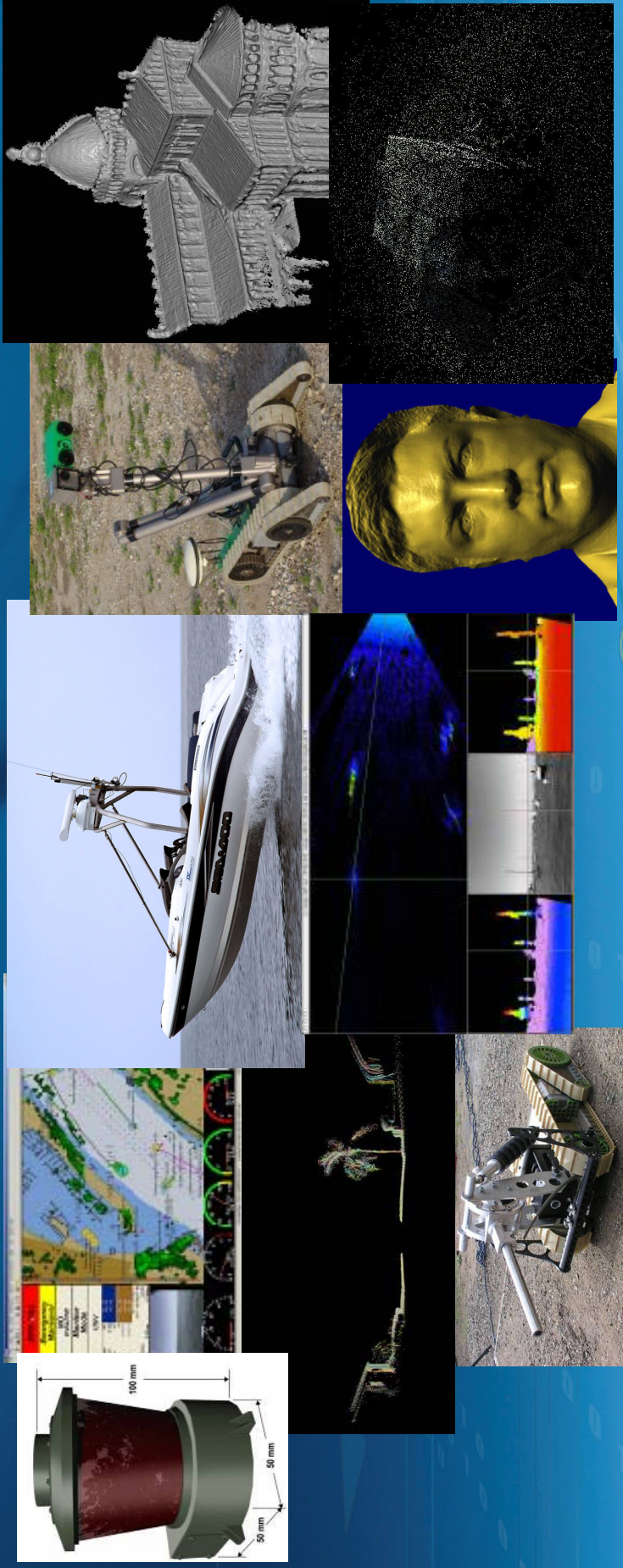
Robotics Test Range

- Paved & unpaved roads
- Off-road terrain
- Bunkers & tunnels
- VTOL UAV flight range
- Ocean access



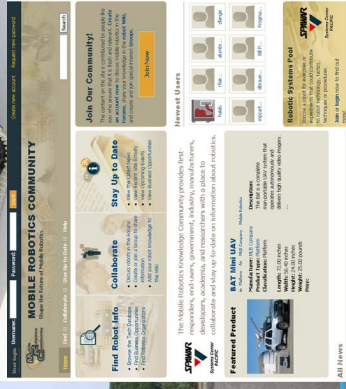
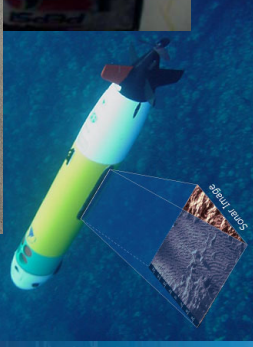
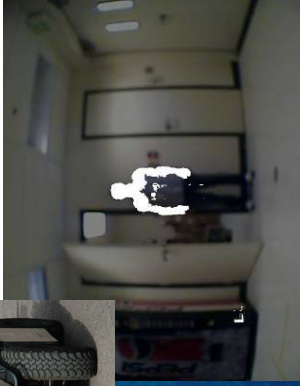
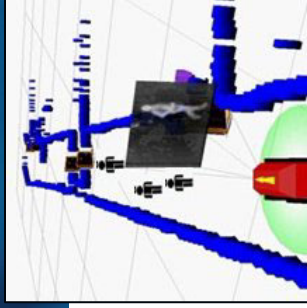
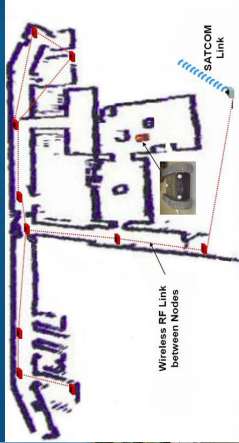
My Specific Projects

Unmanned Surface Vehicles, Urban Modeling, 3D Visualization, Small UGV Autonomous Navigation, EOD Program Support, Operator Interface Software



Other SSC-Pacific Unmanned Systems Projects

Autonomous Force Protection, Communications
Improvements, Mapping and Exploration, Human
Presence Detection, ISR Robots, UAV/UGV
Collaborative Operations/MRKB



The DoD Robotics Mission

- Our job is to make the warfighter more effective
- Provide tools not replacements

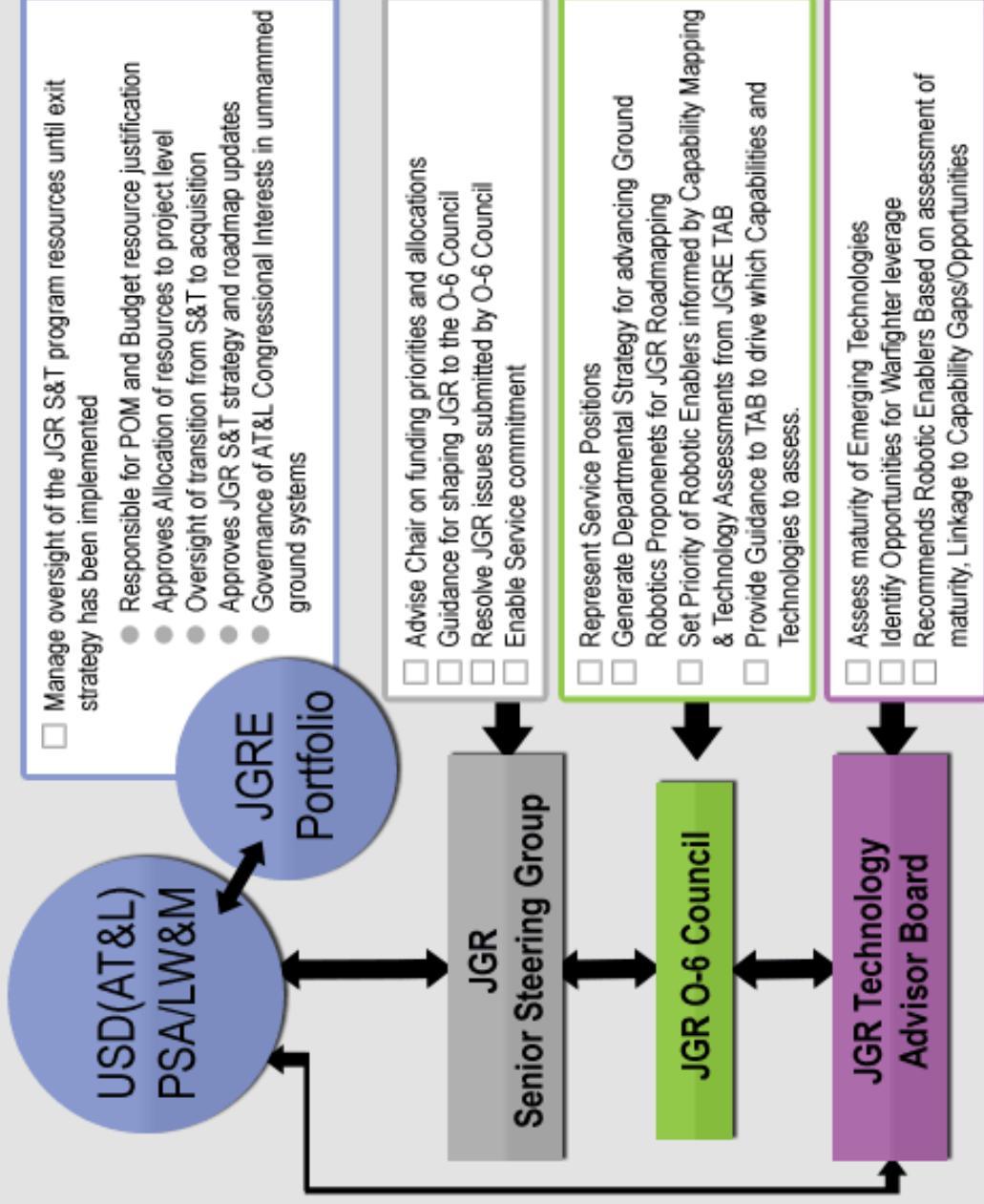


Joint Ground Robotics Enterprise

- Established in 1989 by Congress to consolidate all DoD robotic programs to provide uniform direction, prevent duplication and ensure technology is shared among the services.
- Funds S&T efforts to mature technology so that they can be transitioned into acquisition programs.
- Focused on ground vehicle related technologies and projects only

Joint Ground Robotics Enterprise

ENTERPRISE GOVERNANCE CHART



Joint Ground Robotics Enterprise

- Unmanned Systems Roadmap
 - Requested by Congress
 - Integrated across the domains and across the services
 - Project a future vision for how unmanned systems will be developed, acquired, and sustained by the DoD
 - www.jointrobotics.com

Joint Ground Robotics Enterprise

■ **Robotics Technology Consortium**

- Provide opportunity for non-government organizations to participate in DoD research planning process
- Allow for better leveraging of IR&D funding through insights gained as a result of this mutual planning process
- Lower the entry barriers for small companies to enter into the government acquisition process

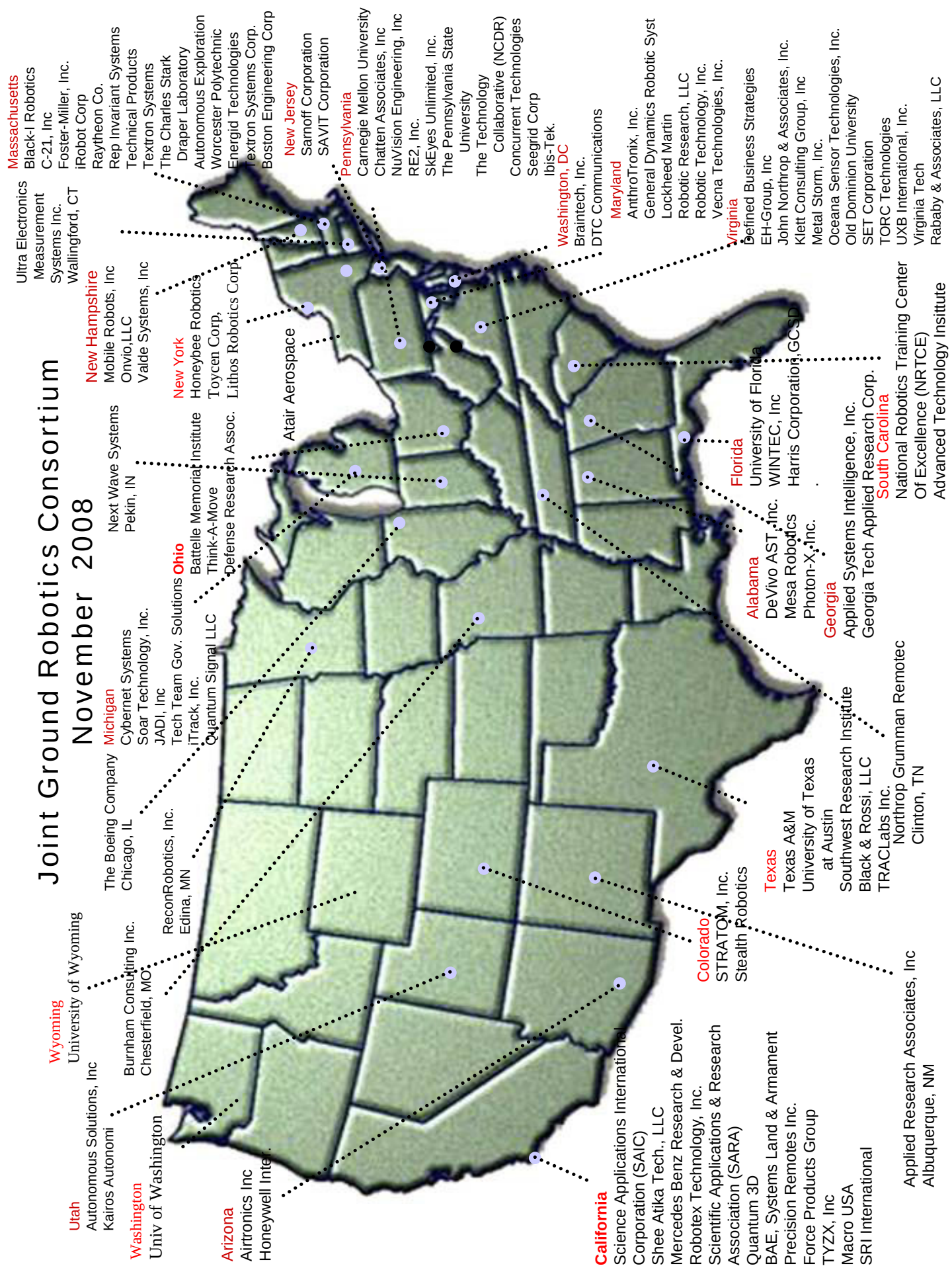
Joint Ground Robotics Enterprise

■ **Robotics Technology Consortium**

- Consortium contract requires participation from non-traditional defense contractors
 - No previous DoD contracts > \$500K
 - Alternatively, a vendor can provide at least 1/3 the cost of the task
- This is an excellent opportunity for robotics companies that typically have not done business with the DoD
- www.roboticstechc.org

Joint Ground Robotics Consortium

November 2008



Joint Ground Robotics Enterprise

■ **Robotics Technology Consortium**

- Current topics out for proposals
 - Non-Line-Of-Sight Tele-operation
 - Improved Depth Perception to aid Tele-Operation
 - Architecture for Rapid Structure Characterization*
 - Unmanned Sniper Detection
 - Force and Tactile Sensing based Manipulation
 - Mapping in Complex Urban Terrains*
- Proposals due in early December?
- New topics likely to come out in February

Other DoD Mechanisms for Developing and Transitioning Technology

- SBIRs
- BAAs (DARPA, Services, Labs)
- OSD Technology Transfer programs
 - TTI
 - DAC
 - FCT
 - Mentor-Protégé

Other DoD Mechanisms for Developing and Transitioning Technology

■ SBIRs

- Federal agencies required to set aside a portion of funding to fund small business
- Administered through each service, OSD, DOE and NASA
- Up to \$850K for early-stage R&D funding for small technology companies
- A wide variety of topics
- New topics come out about every 4 months
- www.dodsbir.net , www.science.doe.gov/sbir/ , sbir.nasa.gov

Other DoD Mechanisms for Developing and Transitioning Technology

■ BAAs

- Broad Agency Announcements
- Typically requests for white papers that may lead to requests for full proposals
- Often used by the major DoD R&D organizations such as DARPA, ONR, ARL, AFRL, etc.
- Announcements made on the FedBizOpps at www.fbo.gov

Other DoD Mechanisms for Developing and Transitioning Technology

- **Technology Transition Initiative**
 - Intended to accelerate the introduction of new technologies into operational capabilities for the armed services
 - Technology must be relatively mature and must have previously been funded by DoD S&T funding
 - www.acq.osd.mil/ott/tti

Other DoD Mechanisms for Developing and Transitioning Technology

■ **Defense Acquisition Challenge Program**

- The DAC Program provides opportunities for the introduction of innovative and cost-saving technologies into DoD acquisition programs. Provides an “on-ramp” to DoD acquisition system for small and medium vendors.
- DAC provides oversight and funds for the Test and Evaluation of technologies that have potential to improve current acquisition programs at component, subsystem, or system level
- TRL 6-9
- www.acq.osd.mil/cto

Other DoD Mechanisms for Developing and Transitioning Technology

■ Foreign Comparative Test program

- Funding to test and evaluate technologies from our foreign allies and friends to determine if they meet the requirements for the U.S. military
- Technology must be mature
- The technology must fill a current DoD acquisition requirement

Other DoD Mechanisms for Developing and Transitioning Technology

■ **Mentor-Protégé**

- The DoD Mentor-Protégé Program assists small businesses (Protégés) to successfully compete for prime contract and subcontract awards by partnering with large companies (Mentors) under individual, project-based Agreements.
- www.acq.osd.mil/osbp/mentor_protege

CCAT

- **Center for Commercialization of Advanced Technology**
 - Accelerate the time to market for technologies residing in government laboratories, universities, and private companies
 - CCAT San Diego has partnered with SPAWAR Systems Center Pacific to focus on specific robotic related technologies
 - www.ccatsandiego.org

Contracting with the Government

- Fair and Responsible use of the taxpayer's money
- Does not require but often leads to a long and bureaucratic process

Working with Program Managers

- One user does not constitute “the user”
- Talk to the PMs before building your solution to their problem

Other DoD UGV Programs

- Future Combat Systems
- Man-Transportable Robotic System
- Advanced EOD Robotic System
- Mobile Detection Assessment Response System

Other DoD UGV Programs



- **Future Combat Systems**

- SUGV
 - 30lb tele-operated ground vehicle
 - Part of spin out 1 (2011)
- XM156 Class I UAV
 - 50lbs including OCU and support equipment
 - Part of spin out 1 (2011)



- MULE
 - Multifunction Utility/Logistics Equipment Vehicle
 - 6x6 articulated suspension, in-hub motors
 - Climb a 1m step, cross a 1m gap
 - 2015 deployment



Other DoD UGV Programs

- **Man-Transportable Robotic System (MTRS)**

- Current EOD UGVs in operation in Iraq and Afghanistan (~1400)
 - MK1 – iRobot EOD Packbot



MK1 MOD 0 ROBOT EXPLOSIVE ORDNANCE DISPOSAL



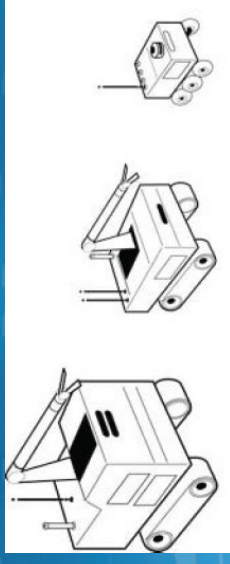
MK2 MOD 0 ROBOT EXPLOSIVE ORDNANCE DISPOSAL

- MK2 – Foster-Miller EOD Talon
- Continuous Improved Program
 - Update current systems with additional capability
 - Services choose and rank the improvements

Other DoD UGV Programs

■ **Advanced EOD Robotic System**

- Developing the next generation of EOD UGVs to replace the MTRS systems
- Possibly a family of three systems (30lb, 160lb, >160lb)
- Striving for commonality between systems
- Planning on an open architecture with modular payloads
- Significant autonomy
- 2013 deployment schedule



Other DoD UGV Programs

■ Mobile Detection Assessment and Response System

- Developed by the Army Force Protection Systems office (PM-FPS)
- Fully autonomous security patrol of CONUS army bases
- Passed milestone C
- Platform built by GDRS
- SSC Pacific is the technical lead and developed the user interface



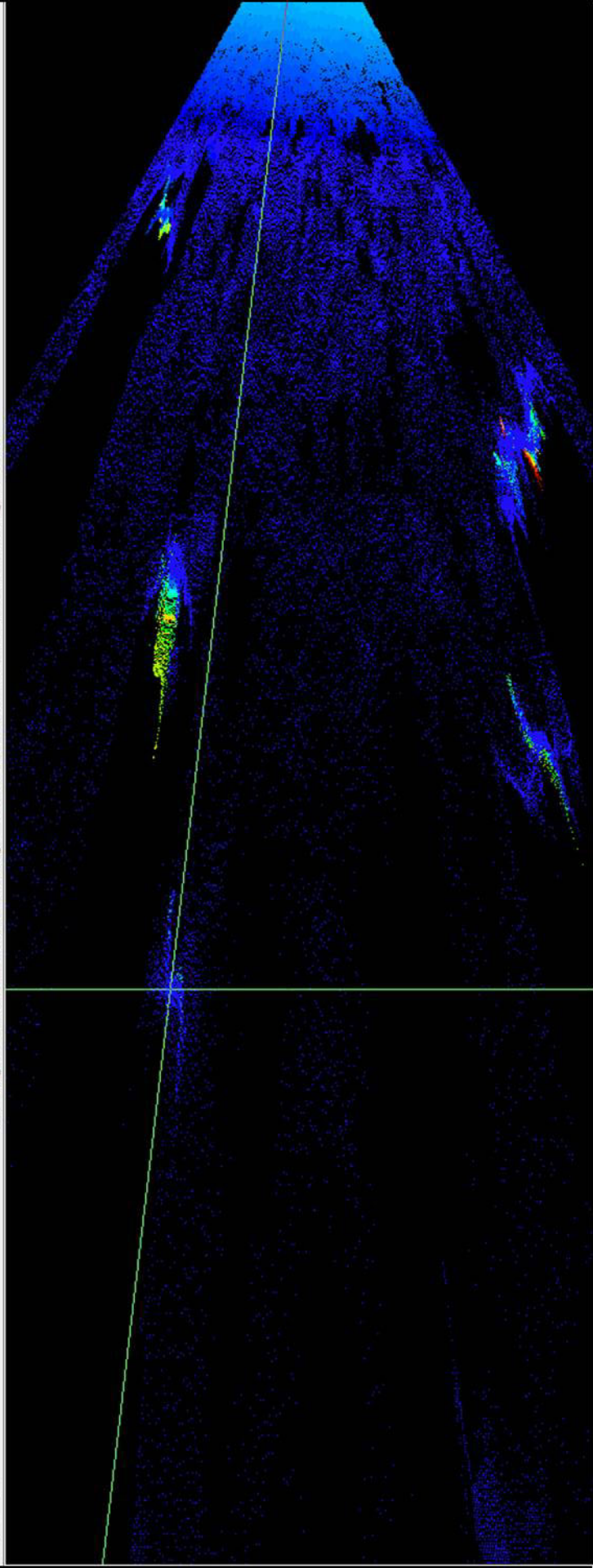
Civilian First Responder Applications

- First Responders are looking for robotic systems that they can afford
 - < 50 Packbots and Talons sold to First Responders
- The requirements aren't that much different than the military requirements



Questions?

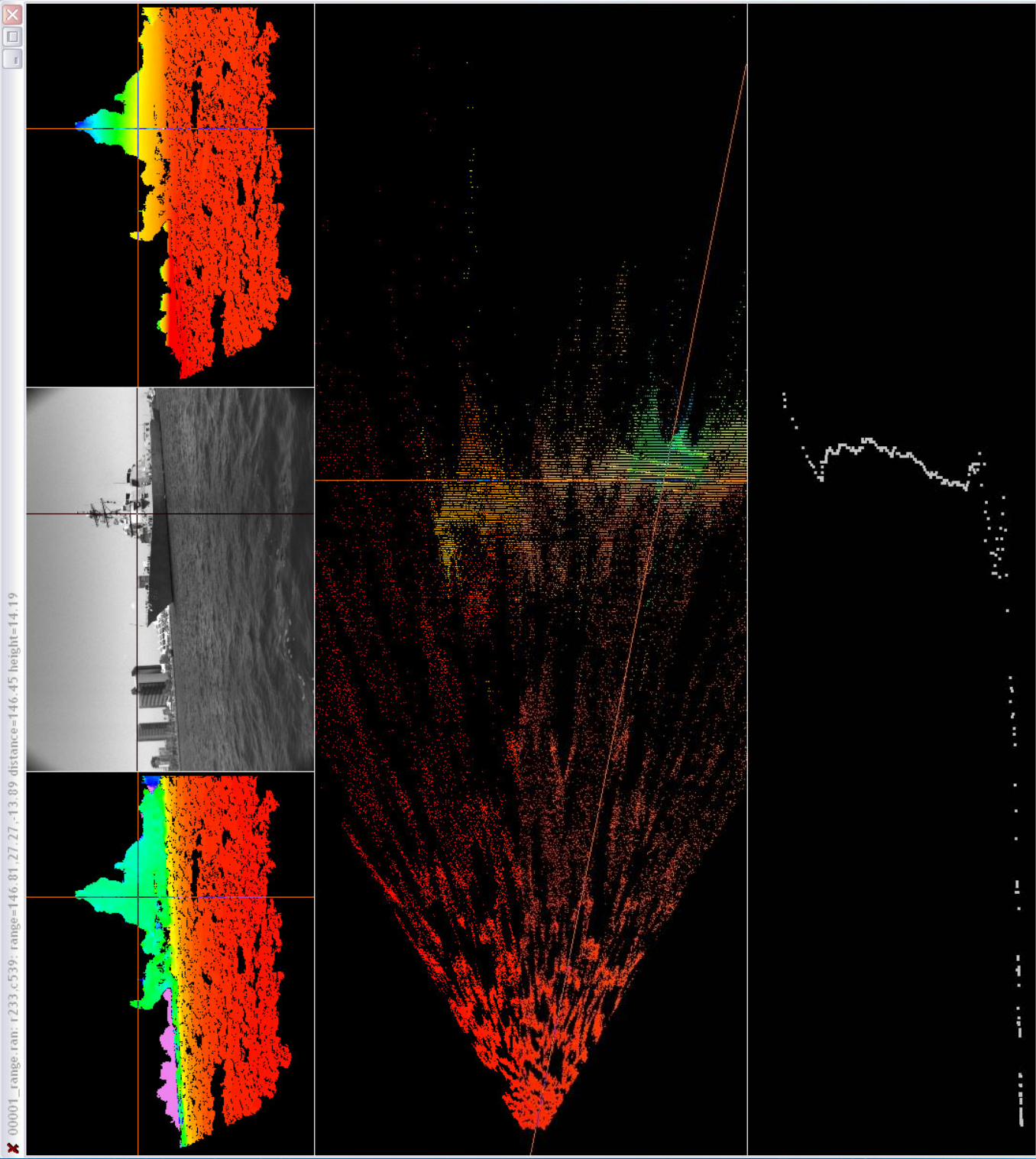
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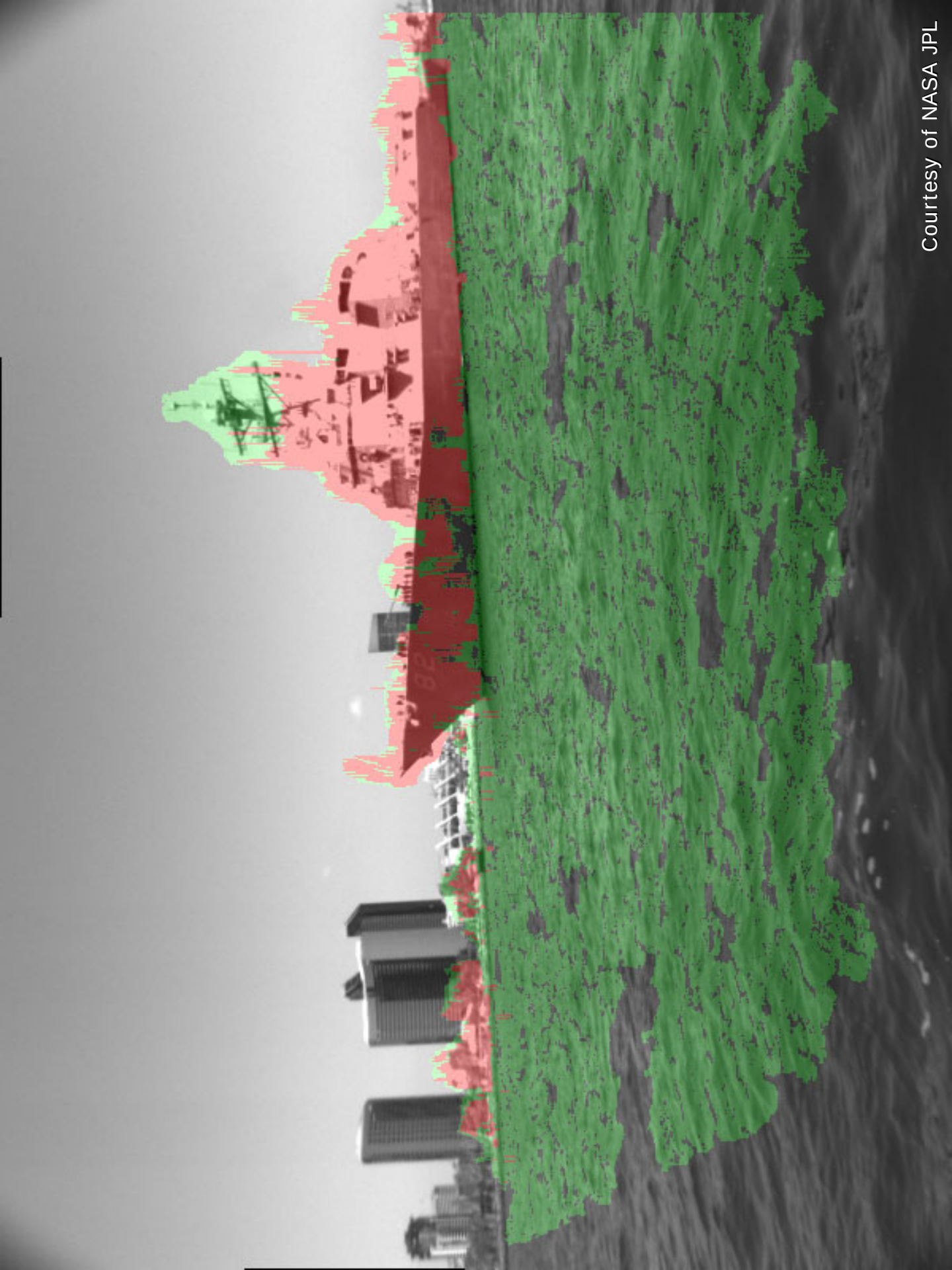


Elevation Map

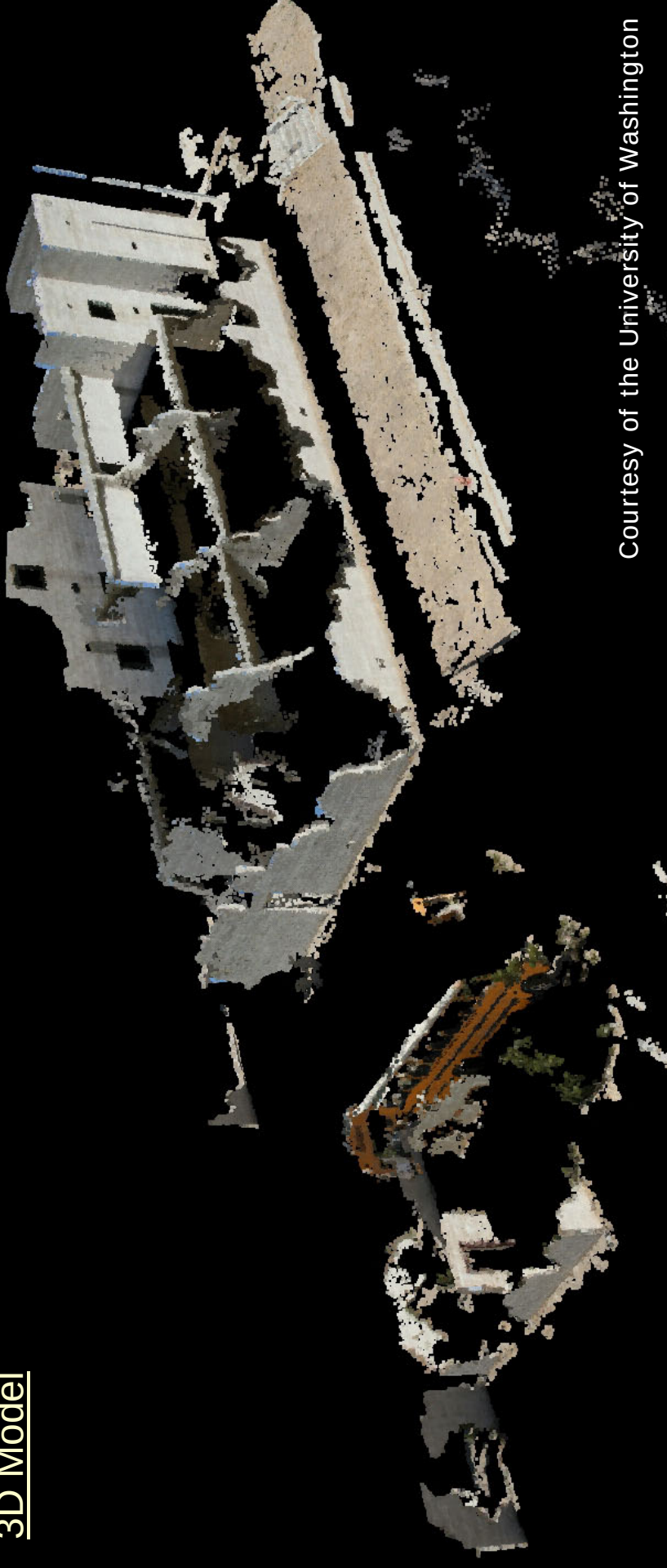
Left Image

Range Map





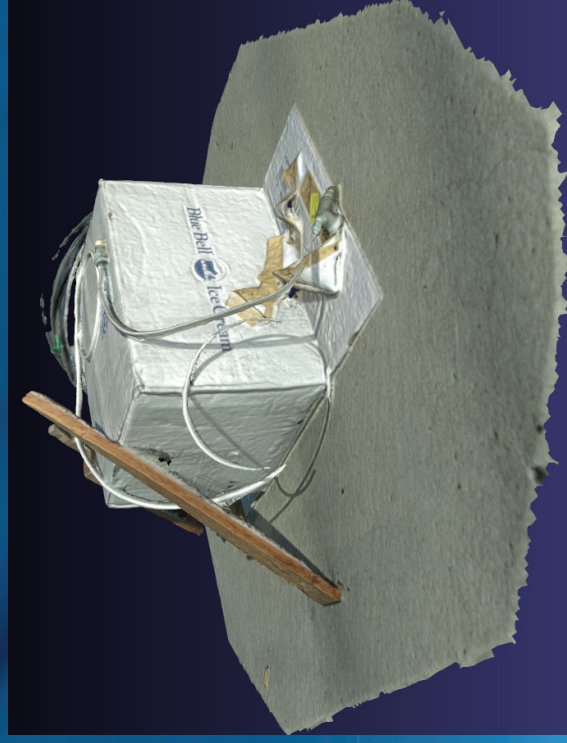
3D Model



Courtesy of the University of Washington



Input Photos





Input Photos

3D Model



