

Michigan Automated and Connected Vehicle Working Group Meeting Packet

January 28, 2013

- 1. Agenda**
- 2. Meeting Notes**
- 3. Attendance List**
- 4. Presentations**

MICHIGAN AUTOMATED AND CONNECTED VEHICLE WORKING GROUP

Monday, January 28, 2013

Macomb-Oakland University INCubator
6633 18 Mile Road
Sterling Heights, MI 48314

MEETING AGENDA

1:00 PM Welcome and Introductions

1:15 PM Overview of the Macomb-OU INCubator, Julie Gustafson, Executive Director, Macomb-OU INCubator

1:30 PM Robotic and Automated Vehicle Research and Programs at TARDEC, Alex Kade, Deputy Associate Director, U.S. Army TARDEC

2:00 PM AUVSI and the Intelligent Ground Vehicle Competition, Jerry Lane, SAIC and AUVSI

2:25 PM Networking Break

2:45 PM Connected and Automated Vehicle Programs within the Square One Education Network, Karl Klimek, Executive Orchestrator, Square One Education Network

3:15 PM MDOT ITS Program Office Update, Matt Smith, Statewide ITS Coordinator, MDOT

- Connected Vehicle Safety Pilot Model Deployment
- Automated Vehicle Testing and Development
- Other

3:45 PM 2014 ITS World Congress Tech Demos Update, Steve Kuciemba, PB

4:00 PM Adjourn

MICHIGAN AUTOMATED AND CONNECTED VEHICLE WORKING GROUP

The July 2012 meeting of the Michigan Connected Vehicle Working Group was held at the Macomb-Oakland University INCubator (MAC-OU INC) in Sterling Heights, Michigan on January 28, 2013.

MEETING NOTES

Richard Wallace of the Center for Automotive Research (CAR) gave a brief welcome and proposed that the working group revise its name and mission to include a focus on automated vehicles in addition to connected vehicles. This met with agreement from the attendees. Richard also mentioned recent, related events (such as CES and TRB) and federal solicitations that very likely are of interest to attendees. Greg Krueger announced that TRB's Joint Subcommittee on the Challenges and Opportunities for Road Vehicle Automation Systems would host a 2013 mid-year meeting from July 16-19th at Stanford University in Palo Alto, CA.

Following introductions, Julie Gustafson, Executive Director of MAC-OU INC, gave an overview of the facility, including a description of its current clients and services it offers (which include classes, thematic lunches, networking events, presentations, and access to capital). The incubator is a partnership between the city of Sterling Heights, Macomb County, and Oakland University. It has been designated as one of the 15 SmartZone incubators in Michigan.

Representatives from the United States Army Tank Automotive Research, Development and Engineering Center (TARDEC), gave two presentations on military robot research. Alex Kade presented on robots currently being used by the military, as well as robots still being researched. He mentioned that most funding has been geared towards some of the most difficult applications involving hostile human intent, but that larger return on investment could involve robots designed for situations with benign human intent. Alex also mentioned other TARDEC initiatives, including:

- Increased Mobility and Operational Performance through Autonomous Technologies (IMOPAT)
- Safe Ops of Unmanned Systems for Reconnaissance in Complex Environments (SOURCE)
- Autonomous Mobility Appliqué System (AMAS)
- Applied Robotics for Installation & Base Operations (ARIBO)

Alex was followed by Daniel Barts of Booz Allen who presented on TARDEC work involving automated trucking systems and discussed the creation of an automated vehicle forum that would bring together stakeholders and help facilitate pilot projects.

Jerry Lane of the Association for Unmanned Vehicle Systems International (AUVSI) presented on recent past and future AUVSI events. AUVSI represents more than 7,000 members, and its mission is to advance unmanned systems through education, advocacy, and leadership. Jerry's presentation focused on AUVSI's Intelligent Ground Vehicle Competition, in which college students build unmanned robots to compete in a series of competitions. This year's competition will be held June 7-10th in Rochester, MI, on the grounds of Oakland U.

After a networking break, Karl Klimek of Square One Education Network discussed various programs that Square One has in place to provide teachers and students with learning-enhancing experiences. These programs include activities such as designing and racing vehicles, including automated and underwater vehicles. Karl announced a recent partnership with DENSO that will

enable Square One to include DSRC units in vehicles to add a connected vehicle component to competitions.

Matt Smith of the Michigan Department of Transportation (MDOT) gave a brief update on the Ann Arbor connected vehicle safety pilot. Matt indicated that only 170 in-vehicle units are left to be installed out of roughly 2,900. More information will be available in August and September when the data collected from the vehicles is analyzed. Matt also discussed other MDOT initiatives, such as the I-94 truck parking pilot project, Data Use Analysis and Processing (DUAP), test bed upgrades (USDOT and Road Commission for Oakland County), and weather Integrated Mobile Observations (IMO).

The meeting closed with an update from Steve Kuciemba of Parsons Brinckerhoff on plans for the tech demos at the 2014 ITS World Congress. This event will be held from September 7-11, 2014 at Cobo. The focus is to make technology demonstrations relevant and provide an immersive experience. Planning is done at a high level, with industry and partners providing the specific ideas for demonstrations. Steve asked for business cards of those who are interested in being involved with the ITS World Congress.

MICHIGAN AUTOMATED AND CONNECTED VEHICLE WORKING GROUP

ATTENDANCE LIST

First	Last	Organization	Email
Qing	Ai	WSU - Wayne State University	fc2263@wayne.edu
Oliver	Baer	Clean Emission Fluids	abaer@cleanemissionfluids.com
Bill	Ball	Merriweather Advisors	bill.ball@comcast.net
Jim	Barbaresso	HNTB	jbarbaresso@hntb.com
Daniel	Bartz	BoozAllen/TARDEC	daniel.j.bartz.ctr@mail.mil
Dick	Beaubien	Beaubien Engineering	rfbeaubienpe@gmail.com
Jeff	Blackburn	Tass International	jeff.blackburn@tassinternational.com
Collin	Castle	MDOT	castlec@michigan.gov
Yu	Chen	WSU - Wayne State University	yuchan.wayne@gmail.com
Corey	Clothier	Comet LLC / TARDEC	coreyclothier@gmail.com
Mike	Coletta	Autotalks	mike.coletta@auto-talks.com
Samantha	Cook	Macomb County Department of Roads	scook@rcmcweb.org
Steve	Crain	Integral Blue/Motor City Electric	stevecrain@integral-blue.com
Joshua	Cregger	CAR	jcregger@cargroup.org
Brian	Daugherty	Visteon	bdaughe1@visteon.com
Eric Paul	Dennis	CAR	epdennis@cargroup.org
Jeremy	Eckhous	Compuware	jeremy.eckhous@compuware.com
Paul	Eichbrecht	VIIC	peichbrecht@yahoo.com
Julie	Gustafson	MAC-OU INC	gustafso@oakland.edu
Morrie	Hoevel	FHWA - Michigan Division	morris.hoevel@dot.gov
Qiang	Hong	CAR	qhong@cargroup.org
Faroog	Ibrahim	Savari Networks	farooq@savarinetworks.com
Alex	Kade	TARDEC	alex.kade.civ@mail.mil
Kevin	Kelly	Automotive Events	kkelly@automotive-events.com
Karl	Klimek	Square One Education	karl@squareonenetwork.org
Dan	Krechmer	Cambridge Systematics	dkrechmer@camsys.com
Greg	Krueger	SAIC	gregory.d.krueger@saic.com
Steve	Kuciemba	Parsons Brinckerhoff	kuciemba@pbworld.com
Jerry	Lane	GLS&T/AUVSI/IGVC	glane@comcast.net
Chuan	Li	WSU - Wayne State University	chuan@wayne.edu
Jack	Maddox	Valeo	jack.maddox@valeo.com
Heinz	Mattern	Valeo	heinz.mattern@valeo.com
Ryan	Michael	MEDC	michaelr2@michigan.org
Michael	Mozola	Integral Blue/Motor City Electric	mikemozola@integral-blue.com
David	Pollock	Compuware	david.pollock@compuware.com
Mohammad	Poorsartep	CVPC (UM Dearborn)	mpoorsar@umd.umich.edu
Vicky	Rad	Macomb County	vicky.rad@macombgov.org
Kurt	Ruecke	Connected Marketing Strategies	kirt.ruecke@gmail.com
Stephanie	Schliffski	Valeo	stephanie.schliffski@valeo.com

First	Last	Organization	Email
Scott	Shogan	Parsons Brinckerhoff	shogan@pbworld.com
Bill	Shreck	MDOT	shreckw@michigan.gov
Matt	Smith	MDOT	smithm81@michigan.gov
Bill	Tansil	MDOT	tansilw@michigan.gov
Steve	Underwood	CVPC (UM Dearborn)	underw@umich.edu
Jeff	VanWashenova	NXP	jeff.vanwashenova@nxp.com
Richard	Wallace	CAR	rwallace@cargroup.org
Yuehua	Wang	WSU - Wayne State University	yuehua.research@gmail.com
Rick	Warner	ParkingCarma	rwarner@parkingcarma.com
Kyle	Williams	Robert Bosch LLC	kyle.williams@us.bosch.com
Hongwei	Zhang	WSU - Wayne State University	hongwei@wayne.edu

**MICHIGAN AUTOMATED AND CONNECTED VEHICLE WORKING GROUP
PRESENTATIONS**

Michigan Automated and Connected Vehicle Working Group

Macomb-Oakland University INCubator

Sterling Heights, MI

January 28, 2013

Agenda for This Afternoon

- 1:00 PM Welcome and Introductions
- 1:15 PM Overview of the Macomb-OU INCubator, Julie Gustafson, Executive Director, Macomb-OU INCubator
- 1:30 PM Robotic and Automated Vehicle Research and Programs at TARDEC, Alex Kade, Deputy Associate Director, U.S. Army TARDEC
- 2:00 PM AUVSI and the Intelligent Ground Vehicle Competition, Jerry Lane, SAIC and AUVSI
- 2:25 PM Networking Break
- 2:45 PM Connected and Automated Vehicle Programs within the Square One Education Network, Karl Klimek, Executive Orchestrator, Square One Education Network
- 3:15 PM MDOT ITS Program Office Update, Matt Smith, Statewide ITS Coordinator, MDOT
 - Connected Vehicle Safety Pilot Model Deployment
 - Automated Vehicle Testing and Development
 - Other
- 3:45 PM 2014 ITS World Congress Tech Demos Update, Steve Kuciemba, PB
- 4:00 PM Adjourn

Working Group Mission

- Cooperatively pursue projects and other activities that are best accomplished through partnerships between multiple agencies, companies, universities, and other organizations and that ultimately advance Michigan's leadership position in **automated and** connected vehicle research, deployment, and operations.
 - Benefit our state and our industry (automotive and more)
 - Enhance safety and mobility in Michigan and beyond

Upcoming Automated and Connected Vehicle Events of Note

- ITS America Annual Meeting
 - April 22-24, 2013, Nashville, TN
- NEXT MEETING OF THIS WORKING GROUP
 - Planned for April 2013, location TBD (volunteer hosts welcome)
- Telematics Detroit
 - June 5-6, 2013, Novi, MI
- AUVSI Driverless Car Summit
 - June 11-12, 2013, Detroit
- TRB Summer Automated Highway Meeting
 - July 2013, Stanford, CA
- CAR Management Briefing Seminars
 - August 5-8, 2013, Acme, MI

Other Business for the Group

- CES 2013
 - Many automated driving products unveiled, including from Audi, Lexus, and others
- TRB 2013
 - Also had a strong focus on automated and connected
- Governor Snyder's State of the State
 - “[One] piece of legislation I am also asking for is automated vehicle registration. In terms of saying they are coming up with autonomous vehicles today, Google and other places now, in long term, are going to have vehicles that may not even have people in them. I am not suggesting that now, so don't get nervous, but California, Florida and Nevada have already passed legislation on autonomous vehicles. They're ahead of us and aren't we the automotive capitol of the world? So, I think we should be stepping it up here and make sure we are on the forefront of advances and vehicles and opportunity, so I encourage that legislation.”

Federal Opportunities and News

- Updated USDOT ITS Strategic Research Plan
 - <http://www.its.dot.gov/strategicplan/index.htm>
- Solicitations
 - USDOT SBIR
 - https://www.fbo.gov/?s=opportunity&mode=form&id=0e81ee70f8bf0aa03f179688be0c6ad2&tab=core&_cview=1
 - Proposals due March 4, 2013
 - USDOT RITA Commercial Remote Sensing & Spatial Information Technologies Program
 - A university must be the lead
 - https://www.fbo.gov/?s=opportunity&mode=form&id=5a0486d0729b811a7a6da70d3113f46a&tab=core&_cview=1
 - FHWA Exploratory Advanced Research Program
 - https://www.fbo.gov/?s=opportunity&mode=form&id=0e81ee70f8bf0aa03f179688be0c6ad2&tab=core&_cview=1
 - Proposals due March 14, 2013

FHWA Exploratory Advanced Research Topic Areas

- Topic 1A: High Performance Vehicle Streams
- Topic 1B: Human-Machine Interactions for Systems with Partial Autonomy
- Topic 1C: New Approaches for Testing Connected Highway and Vehicle Systems
- Topic 1D: Innovative Applications for Emerging Real-Time Data
- Topic 1E: Partial Automation for Truck Platooning
- Topic 2: Automation of Video Feature Extraction for Road Safety
 - Also broken into A and B sub-topics

**Macomb-OU INCubator
at Velocity Collaboration Center
6633 Eighteen Mile Road
Sterling Heights, MI 48314**

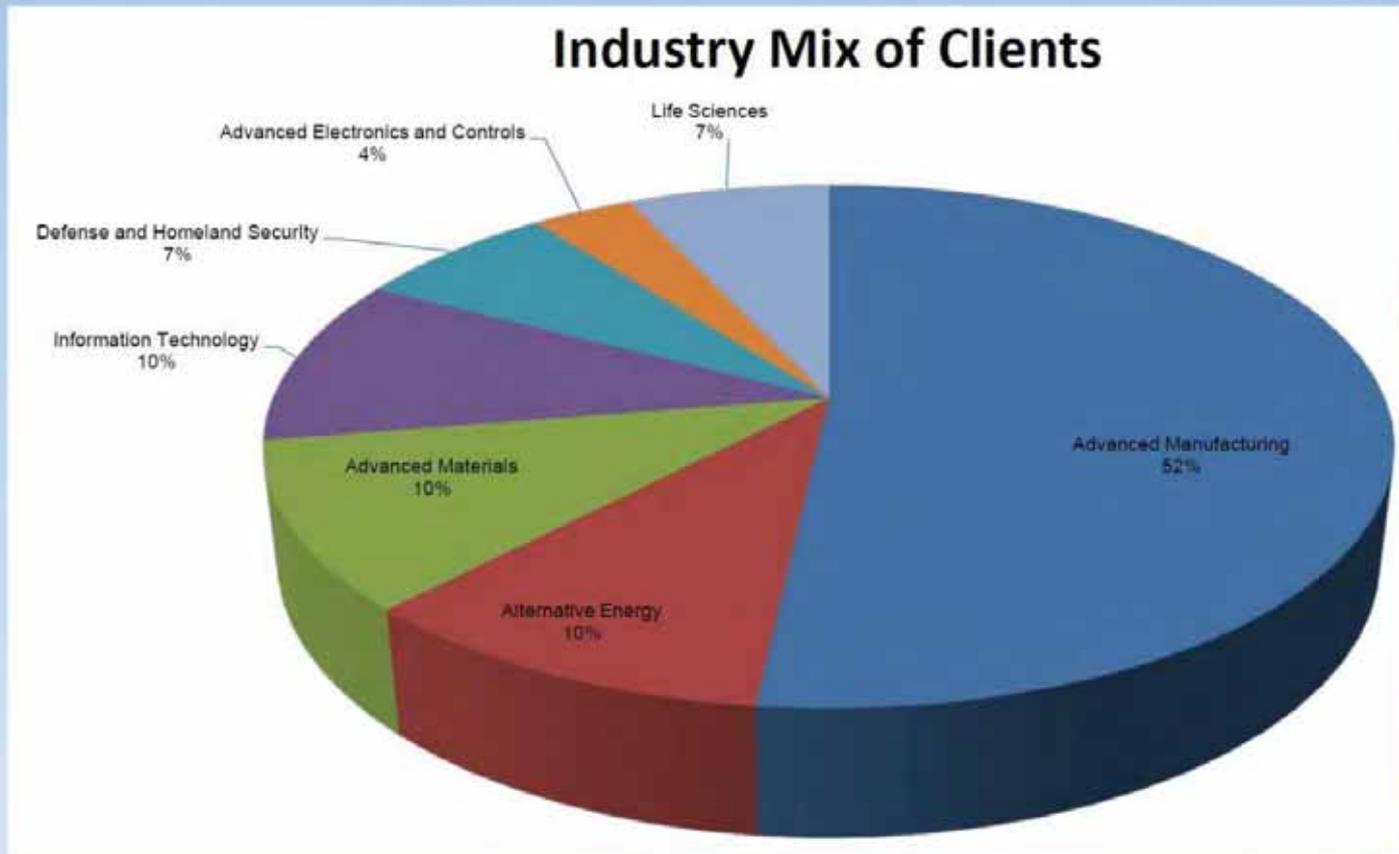
Collaboration Between:



Mac-OU INC provides entrepreneurial resources,
business solutions and proactive support to
businesses at every stage.

Target: Defense, Homeland Security, Advanced
Manufacturing, Energy, Technology

Industries Served in 2012





Square Feet: 35,400

Offices: 21

Cost: \$185-1,200/month

I-Hub: \$95/month

- Conference rooms (free use)
- Collaboration Center (2 days of free use per year)
- Innovation Lab (2 days of free use per year)

- Copier (per use charge)
- Free Wireless Internet
- Mail address

- Ample parking
- On-site caterer
- Client recognition board
- Optional phone line (per line charge)



Services:

- Professional knowledge
- Trainings/seminars/events
- Oakland University connections
- Access to capital

Professional Knowledge

- Incubator staff
- Business Advisory Board
- Corporate partners
- Pawley Lean Institute
- CRUIS
- City of Sterling Heights
- Macomb County
- SBTDC
- Michigan Defense Center
- Executives in Residence

Training and Events

- Lean Diversification
- Lunch & Launch
- Fireside Growth Story
- Capital Raise Meetups
- Panels
- Partner events
- Networking





Fireside Growth Story



Boeing Partnership Forum



MEDC Bus Tour



Defense Center Ribbon Cutting



Lunch and Launch

Access to Capital

- Onsite capital advisor
- State programs
- Capital Raise Meetups
- Private funding: venture capital, angels, alternative financing, banks



Oakland University Connections

- Access to university faculty
- Access to research labs
- Access to student interns



Statistics:

Current:

Onsite clients: 6

Anchor tenants: 6

Accelerator clients: 24

Executives in Residence: 4

2012:

- 128 companies served
- 19 jobs created
- 19 jobs retained
- 6 new companies created
- \$3.3 million raised in capital for clients
- 5,000+ clients attended trainings/networking

ainings/re

Helping a Biz: Terra-Telesis



MAComb-OU

INCubator



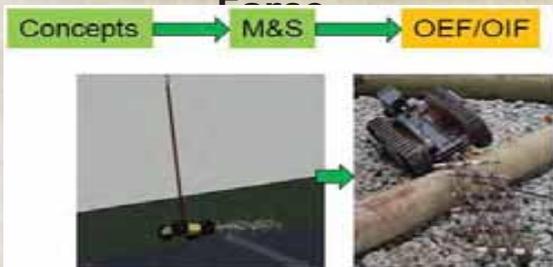
TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

TARDEC Ground Vehicle Robotics Overview

28 Jan 2013



Supporting the Current



- Pointman-Alpha**
Mini Ripsaw
- Pointman-Charlie**
Secway RMP
- Pointman-Bravo**
HDT Platform with Flail
- TARDEC Countermine Roller**

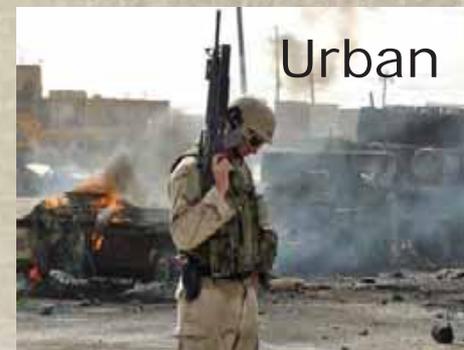


Local ISA
Aerial ISA
Interface

Enabling the Future Fight



- Robotics benefits...
 - Robots can extend the reach of the soldier
 - Robots can reduce the load of the soldier
 - Robots can go into some dangerous places
 - Robots are better at doing some tasks
- The current realities of **'fielded'** mobile ground robotics...
 - Robots are mostly remotely controlled or tele-operated
 - Robots are difficult to control
 - Robots work best in benign, structured environments
 - Robots are slow and can't keep up with the operation tempo
 - Robots are expensive
 - Robots break down frequently
 - Robots that are 'intelligent' aren't fielded because we can't guarantee their behavior under all conditions
 - **Some soldiers think robots will take their jobs**



Sustain:

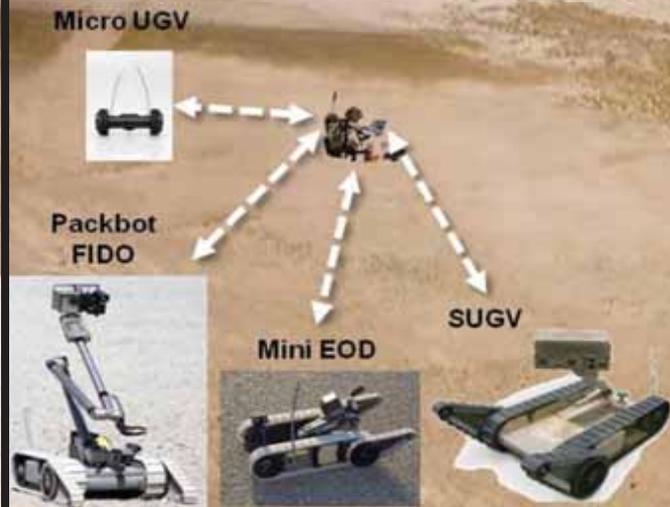
- + Trust and Confidence
- + Reduced Operator Workload
- + Expanded Missions

Improve:

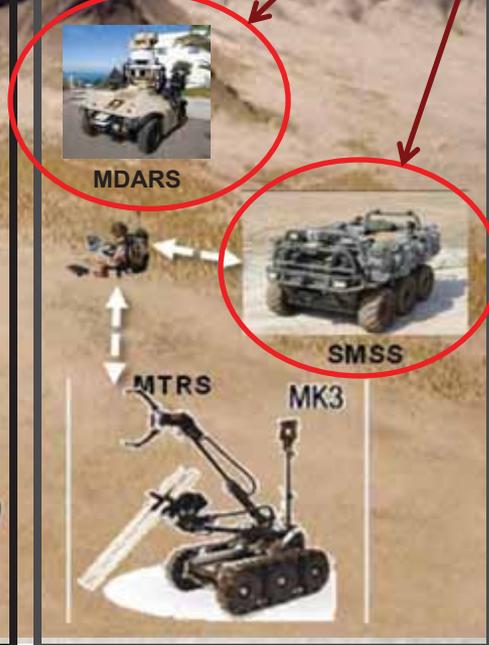
- Modularity
- Reliability
- Interoperability
- Collaboration
- Autonomy

*beyond
tele-op*

Man-Transportable



Vehicle-Transportable



Self-Transportable & Appliqué



EOD Robots in the sweet spot of 3 key platform parameters;

- Communications** (line-of-site)
- Power/Energy** (duration of mission)
- Mobility** (benign terrain)

Communications

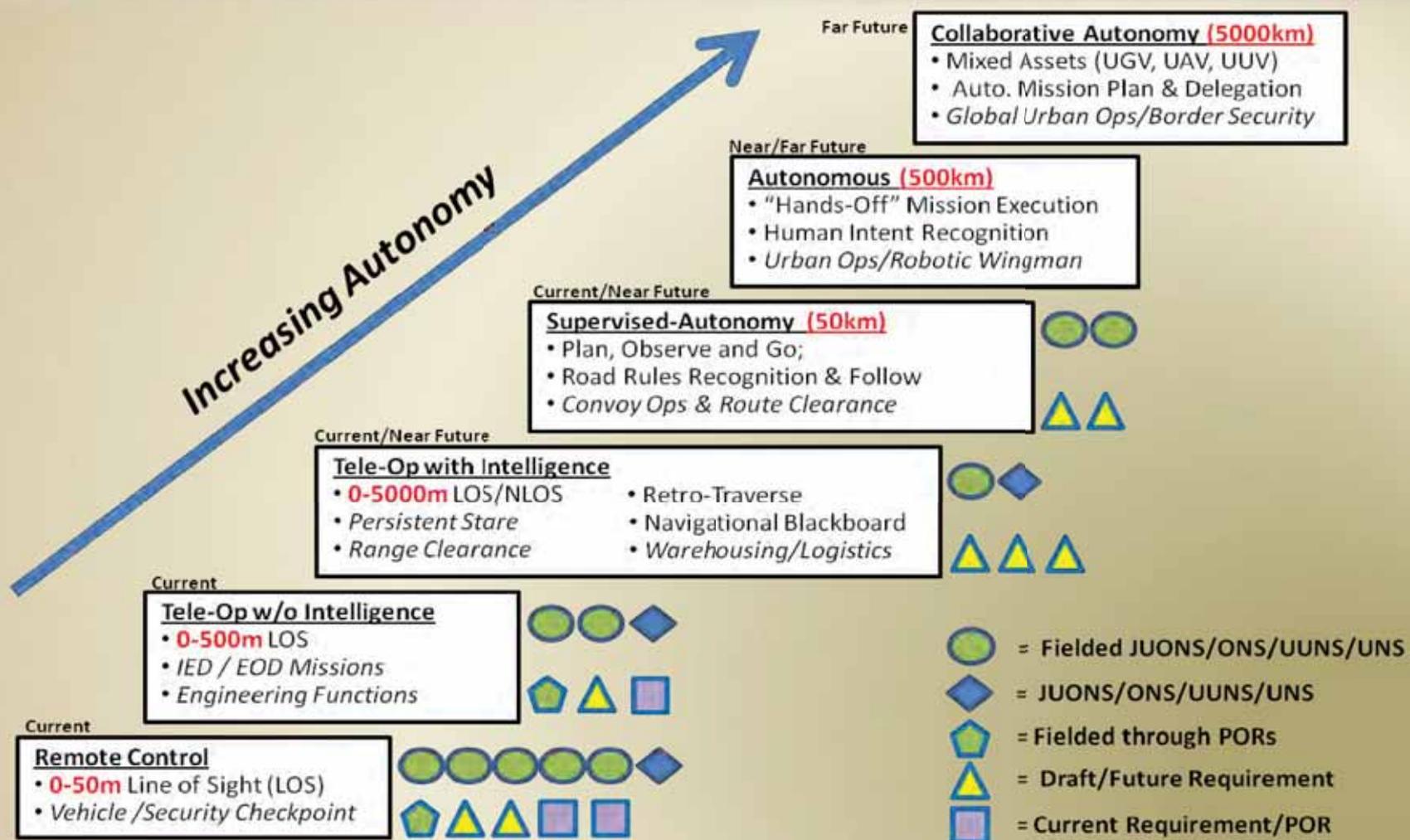
Mobility



"Ease of integration into the bomb squad"

Minimum Impact on the DOTMLPF of the Squad

Expanding the Soldier Reach: Separation



Increased Mobility and Operational Performance through Autonomous Technologies (IMOPAT)



Provide visual local situational awareness (LSA) thru electro-optic indirect vision (EOIV) technologies during manned and unmanned platform operations



Safe Ops of Unmanned Systems for Reconnaissance in Complex Environments (SOURCE)



Autonomous Mobility Appliqué System (AMAS) - JCTD



X-by-wire kit

Autonomy kit

Electronic Architecture

Driving functions only

2 modalities

Human in vehicle

(i.e. shared driving)

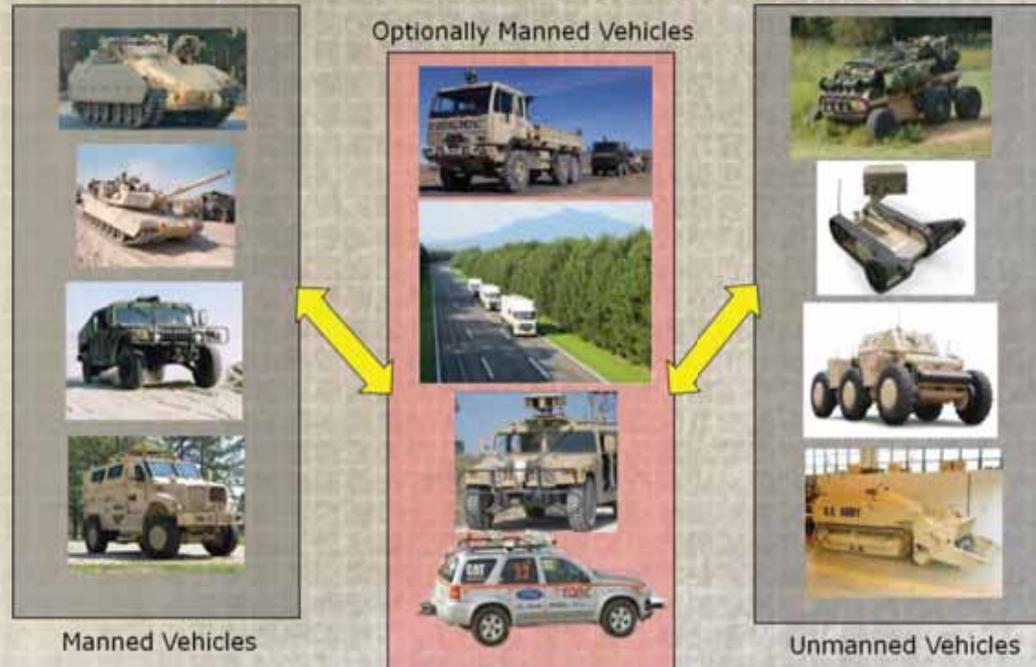
Human NOT in vehicle

(i.e. remotely operated)

invariant across all missions for OMV

Mission Payloads

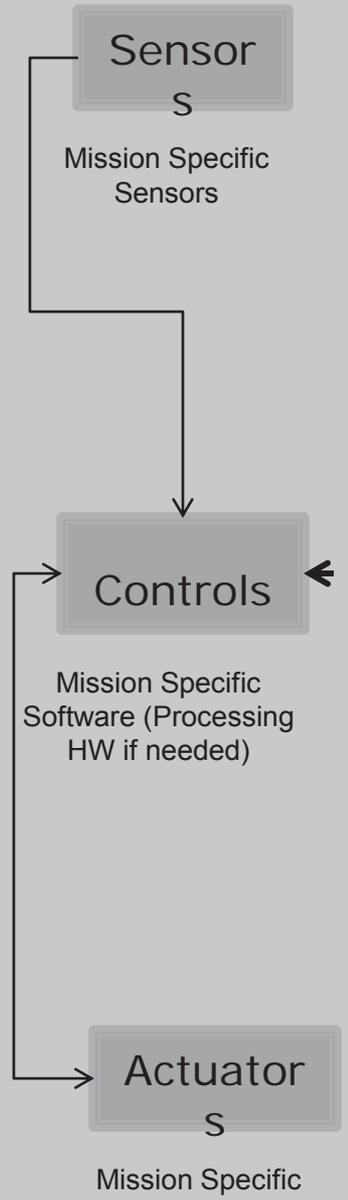
OMV can be driven by a soldier;
OMV can drive a soldier;
OMV can be remotely operated;
OMV can be autonomous



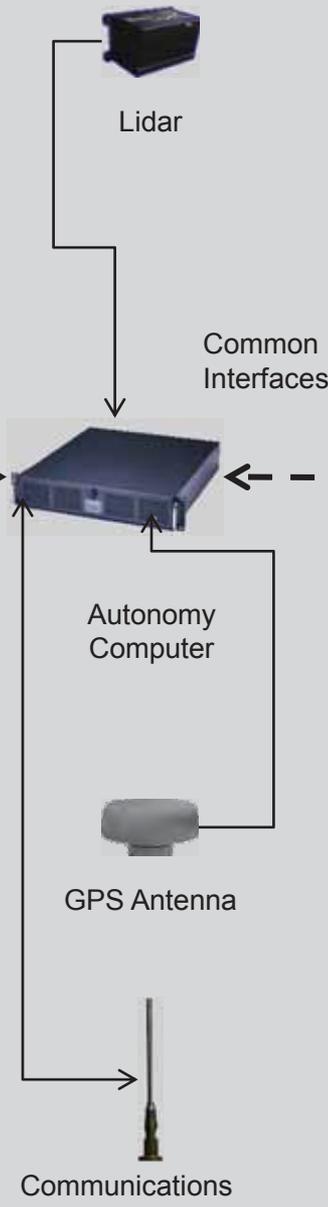
- Major accidents due to driver error
 - Very long convoy missions—10 to 14 hours
 - Difficult, unpaved, rugged terrain
 - Inexperienced drivers—age 18 & 19 years
 - Collision(Front & Rear), Rollover, Roadway Departure, etc.
- Susceptibility to attack by adversary
 - Asymmetric warfare
 - Improvised explosive devices (IEDs)
 - Coordinated threat attack



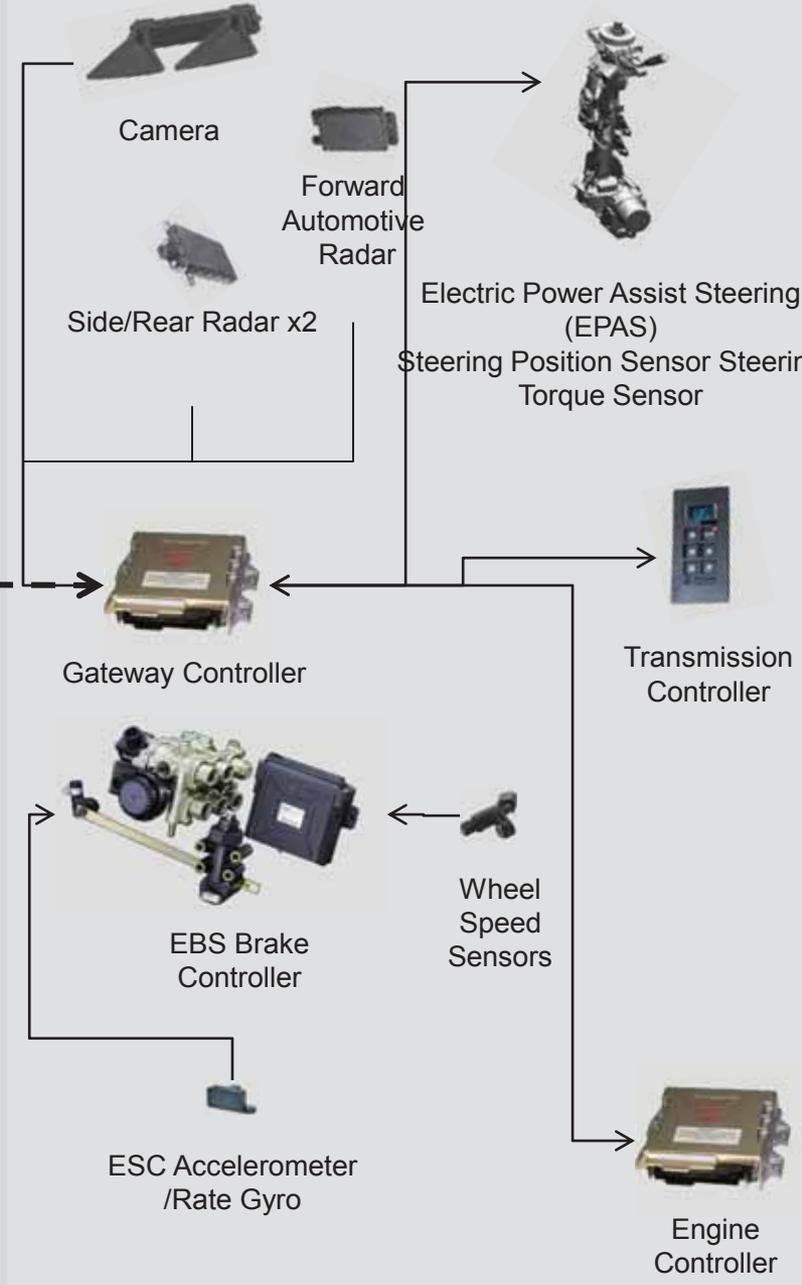
Mission Payload Kit



General Autonomy/Leader-Follower Kit



By-Wire/Active Safety Kit



UNCLASSIFIED

Capability	Description	Man-Vehicle Tasks				Comments
			Info	Cntr	Rsp	
System Off	Current fleet, no intelligence or additional external sensors	M	x	x	x	All manned vehicles
		V				
Driver Warning	Additional sensors being added to monitor activity immediately around Vehicle. Info Task is shared		Info	Cntr	Rsp	Blind-side detectors, collision warning, roll-over warning, V2I and V2V
		M	x	x	x	
		V	x			
Driver Safety	By-wire hardware being added w/ additional sensing. Info task shared and Control task occasionally taken by Vehicle for safety reasons		Info	Cntr	Rsp	At this point, by-wire kit (brake, throttle, gear and steer) is integrated into the vehicle
		M	x	x	x	
		V	x	x		
Optionally Operated (Auto-Pilot)	Human still in vehicle but can 'willingly' give up control so that he/she can perform other tasks (autonomy kit first needed)		Info	Cntr	Rsp	Under certain conditions, 'distracted driving' is the preferred mode of operation
		M	x	x	x	
		V	x	x		
Optionally Manned	All of the previous capabilities plus the additional feature of the vehicle being operated w/o a driver present and a OCU (e.g. convoying, perimeter security)... AMAS-JCTD		Info	Cntr	Rsp	Includes emergency modes; Chauffer and Ambulance where I, C and R are Vehicle tasks
		M	x	x	x	
		V	x	x	x	

RG31 with Driver Warning



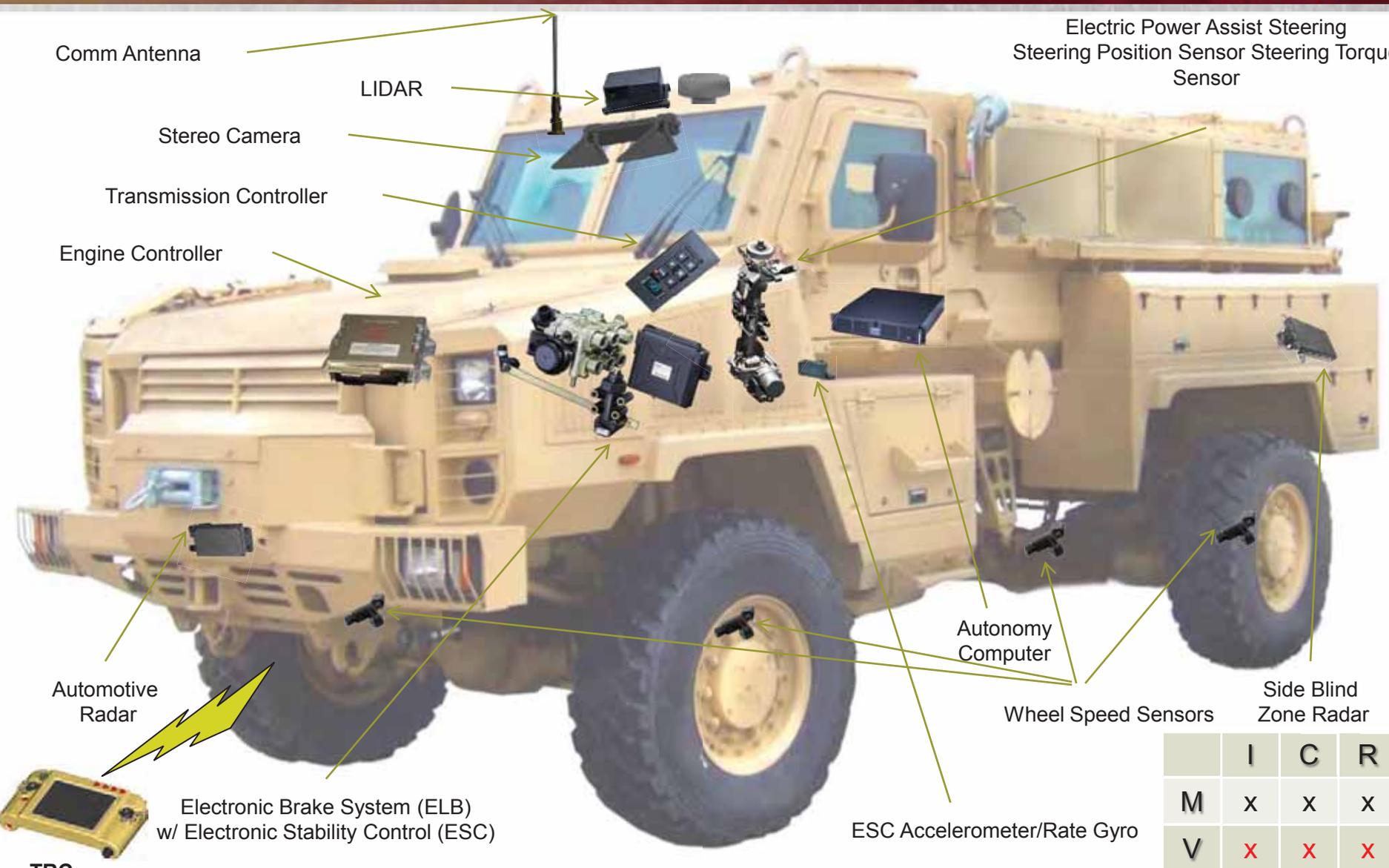
Automotive Radar

Stereo Camera

Side Blind Zone Radar

	I	C	R
M	x	x	x
V	x		

RG31 – Optionally Manned



	I	C	R
M	x	x	x
V	x	x	x

UNCLASSIFIED

- ENVIRONMENT...

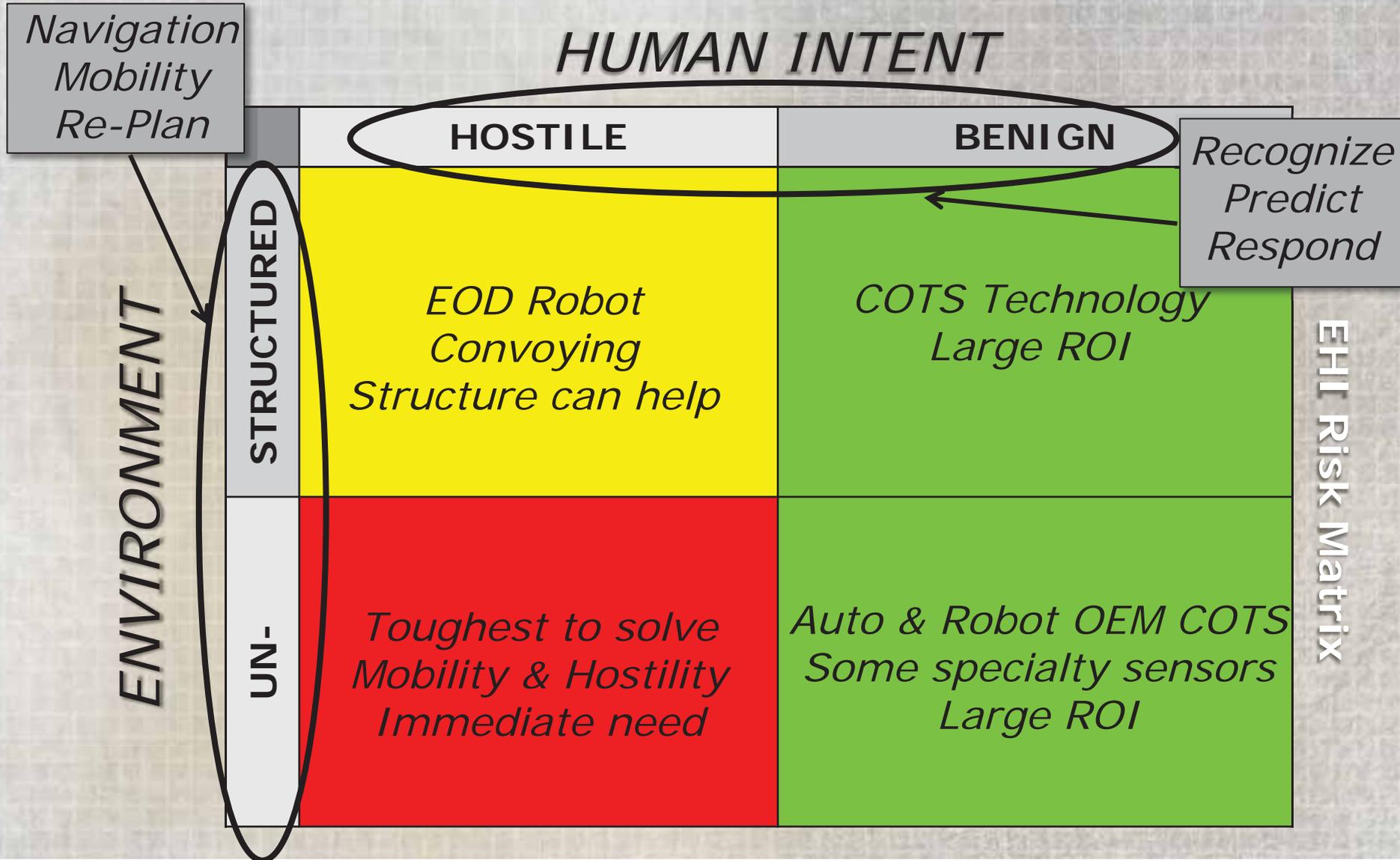
- **Structured** vs. **Un-Structured**
- Structured includes road-ways, upright buildings, military bases
- Un-structured includes x-country, rubble, dense forest/jungle, snow, rain, fog,...
- In general, no roads/hallways = un-structured
- Radiation, deep ocean, deep space, etc...



- HUMAN INTENT...

- **Benign** vs. **Hostile**
- Benign; Humans generally don't mean to do intentional harm
- Generally follow the 'rules of the road'
- Stupid behavior
- Hostile; Humans intend to inflict mayhem
- Humans don't generally follow the 'rules of the road'
- Legacy or Live engagements
- *Identify/Recognize/Response hierarchy*





Commercial

Military

Understanding the Environment

- Structured Environment
- Potential for V-to-V and V-to-I assistance
- Benign, Permissive

- Unstructured Environment
- Minimal C2 Infrastructure
- Adversarial

Human/
Unmanned System
Interaction &
Collaboration

- Consumer acceptance/trust
- Affordability
- Accepted operator interface
- Structured Environment

- Soldier trust
- Affordability
- Current interface is obstacle to normal conduct of operations
- Dynamic, Unstructured Environment

Scalable Teaming

- Primarily individual vehicle systems or adjudication of multiple systems operating independently

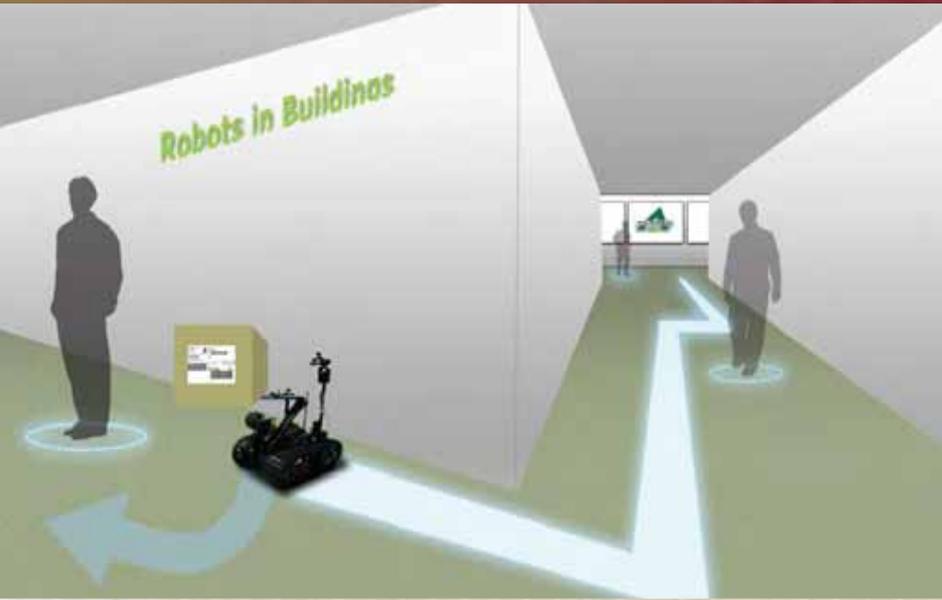
- Small unit teams including heterogeneous systems

Flexible,
Adaptable
Systems that
Learn

- Necessity for reliability and uniformity of response in structured environment limits requirement for learning

- Unknown and dynamic conditions creates necessity for learning

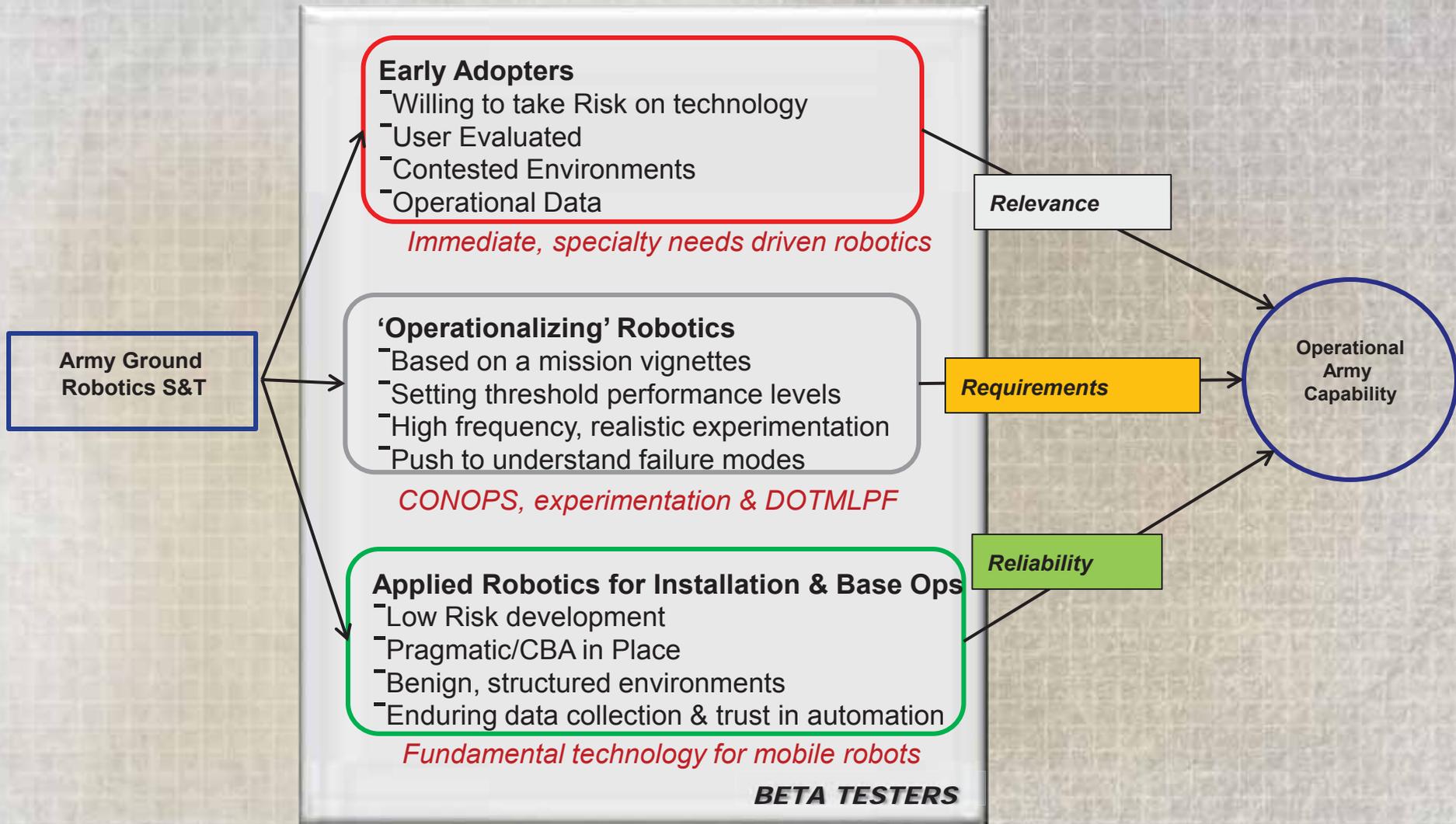
Commercial: large numbers, structured environment; very high reliability
Military: smaller numbers, dynamic & high OPTEMPO; mission requires risk



ARIBO

Autonomous Robotics for Installation & Base Operations

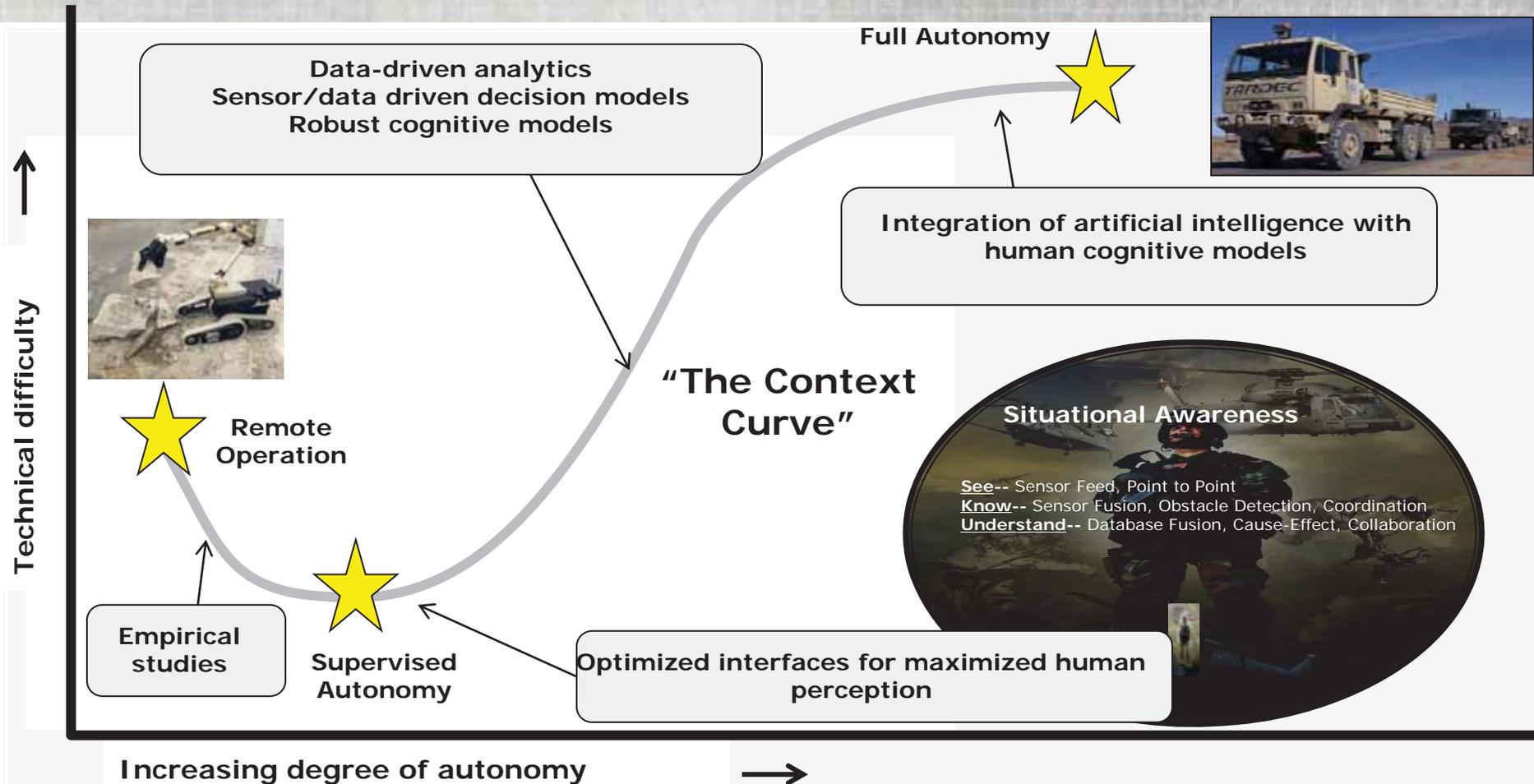
- Transportation
- Protection
- Logistics





Feed the Roadmap





> 1



< 1

Data drives functionality (e.g. Army UAV – 1,000,000 hours of flight time 2001-2010)



Automotive Safety Sensors

Automotive Industry



Wireless V-to-X communications



Automatic Platooning Systems

Computer Industry



New Sensor Designs



High Performance GPUs



New Players in Autonomy

Leverage current robotic systems and technologies to allow for evolutionary approaches to technology



- Continue Technology Development
- Tighter coupling between S&T and Requirements generation
- Transition Paths
 - Early Adopters
 - Operationalization
 - Benign Application
- Experimentation and Data Collection/Analysis
- Leveraging operation "pull-out" assets
 - Experimental Prototypes
 - TALON, HMDS, Packbot, etc.
 - Manned/Unmanned Vehicles
- Consistent Strategic Priorities



Questions?





Building a Marketplace for Intelligent and Autonomous Vehicles: An introduction to the Automated Vehicle Forum

▶ Daniel Bartz

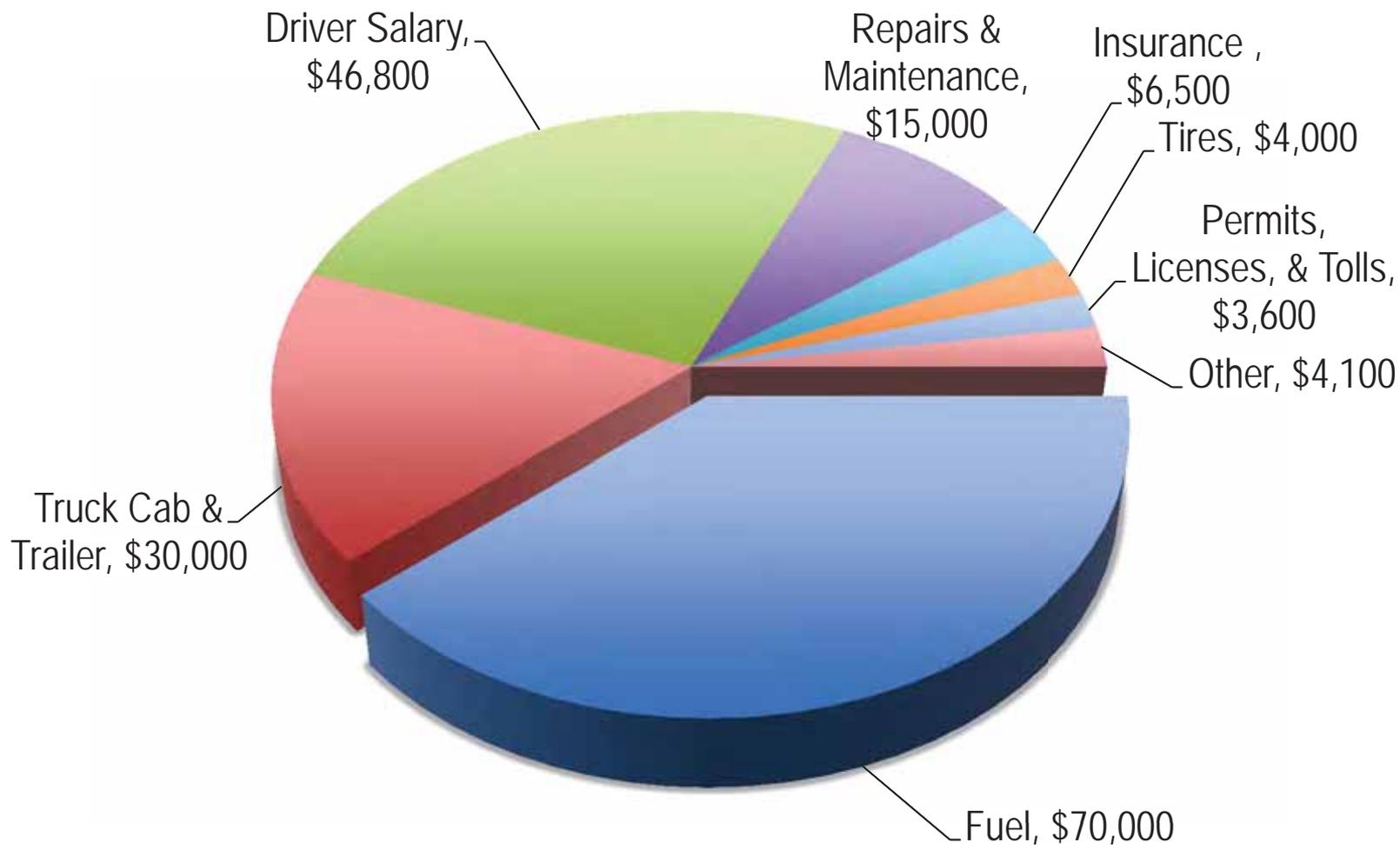
– Booz Allen Hamilton



Booz | Allen | Hamilton

UNCLASSIFIED: Distribution Statement A. Approved for public release.

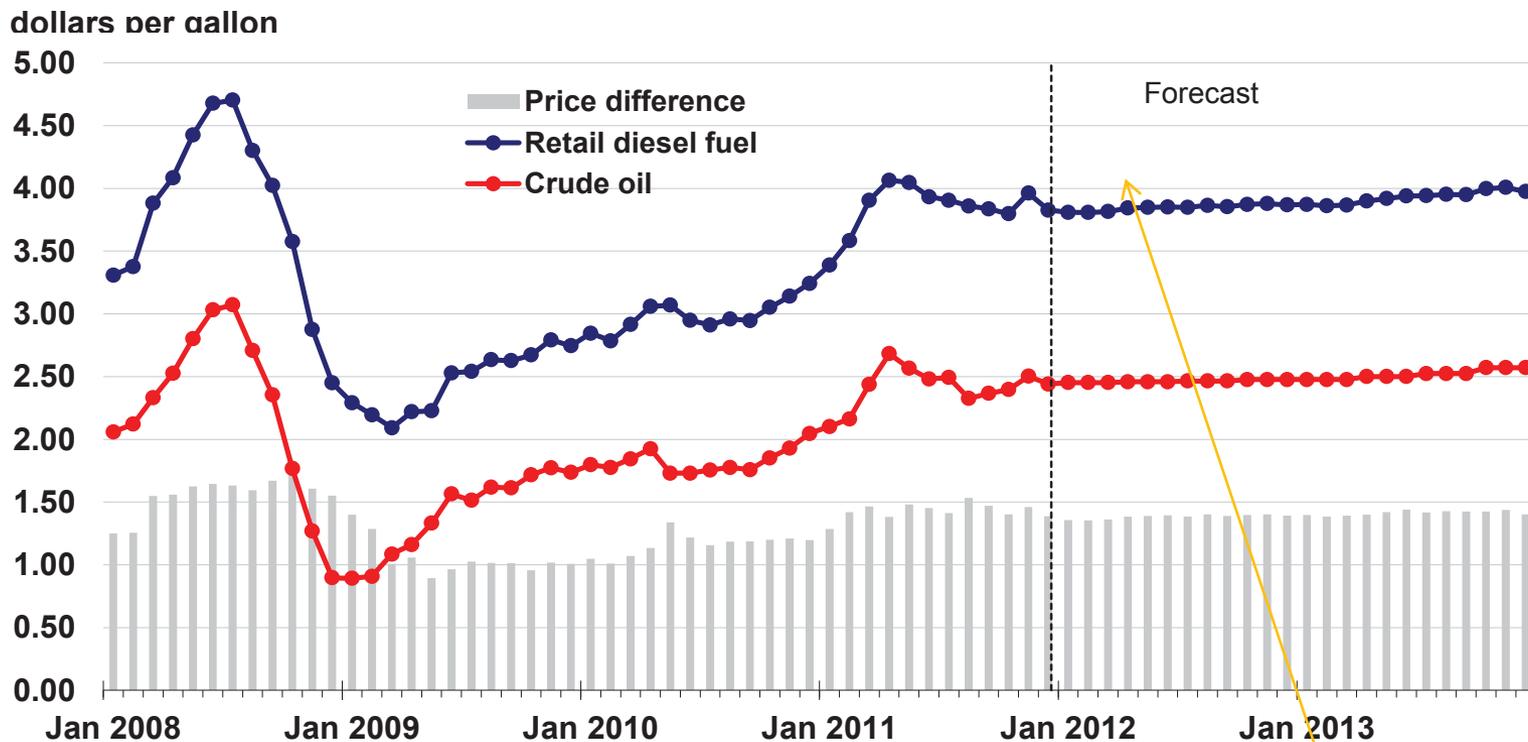
Fuel is the Leading Cost of Trucking



Annual cost per truck. From www.thetruckersreport.com April 2012

The Department of Energy Projects Fuel Price: 2012 [\$3.91/Gal.] and 2013 [\$3.99/Gal.]

U.S. Diesel Fuel and Crude Oil Prices



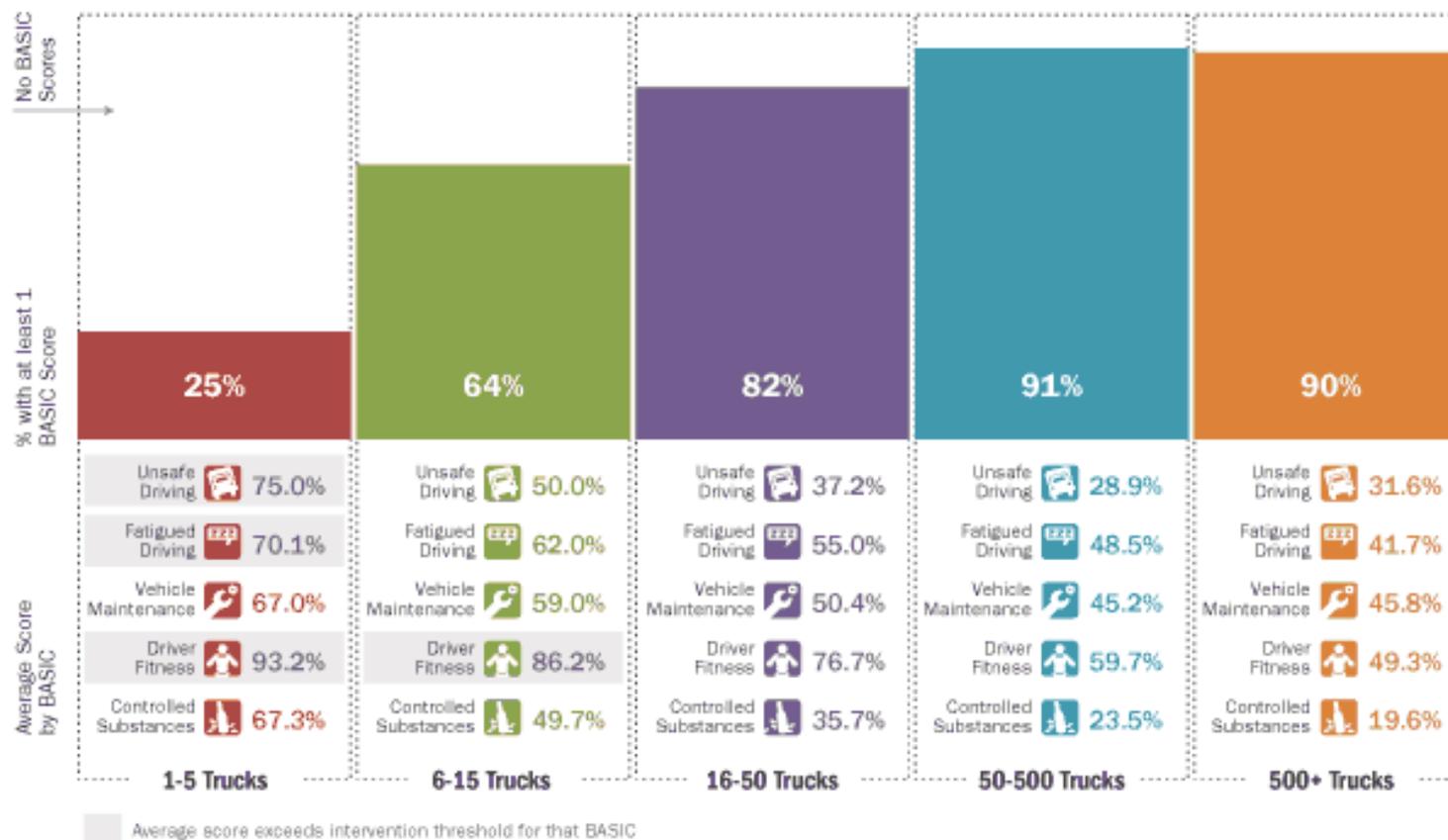
Crude oil price is average refiner acquisition cost. Retail prices include State and Federal taxes.

Source: Short-Term Energy Outlook, January 2012

DOE Index Midwest Diesel 9/3/12 - \$4.072, up \$0.22 YOY

CSA Impact

Average Scores by Fleet Size, Freight Carriers



Nearly 3/4 of carriers acknowledged that CSA has made it more difficult to hire new drivers, due to the increased scrutiny that is now required.

Driver Shortage Worsening

With 8.2% unemployment, why does nobody want 200,000 trucking jobs?

By CNN's Jack Cafferty:

Trucker jobs go unfilled, leading to delayed deliveries

By Paul Davidson, USA TODAY

Truck driver shortage could hurt consumers

By Greta Kreuz

Tons of trucking jobs ... that nobody wants

By Aaron Smith @CNNMoney

Truck driver shortage causes economic speed bump

by Kyndel Lee-Bates

Commentary: Truck Driver Shortage a Perpetual Problem
William B. Cassidy, Senior Editor
The Journal of Commerce Magazine -
Commentary

Loads Significantly Outstripping Capacity

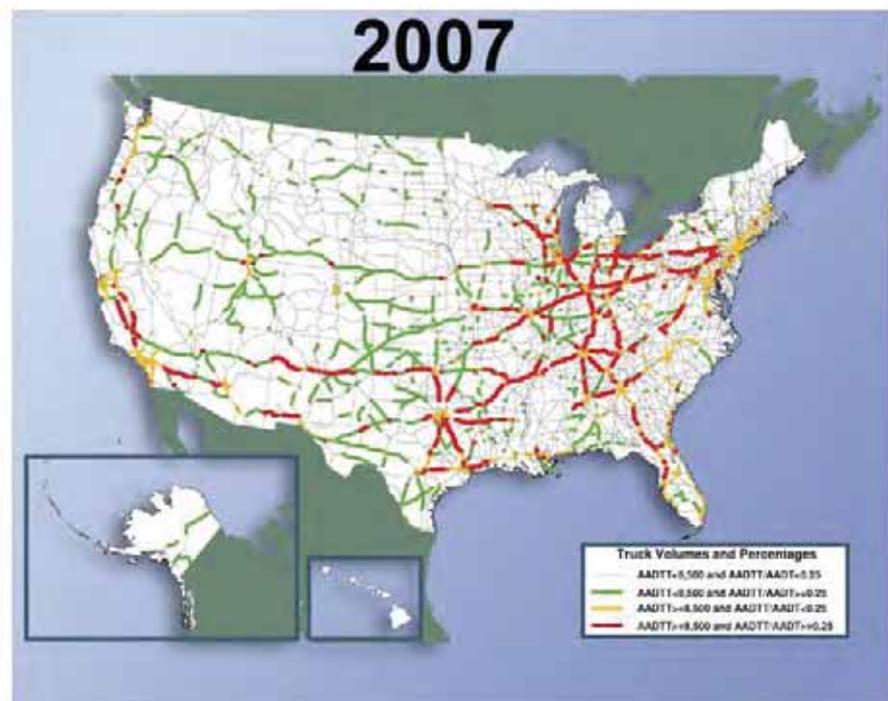


YOY, tonnage up 7%

Source: Transource DAT – 09/10/12

Problem - Impacts of Congestion on Productivity

- ▶ Just-In-Time Delivery is significantly impacted by travel time reliability for trucks
- ▶ FHWA estimates freight volumes in the U.S. will more than double by 2040

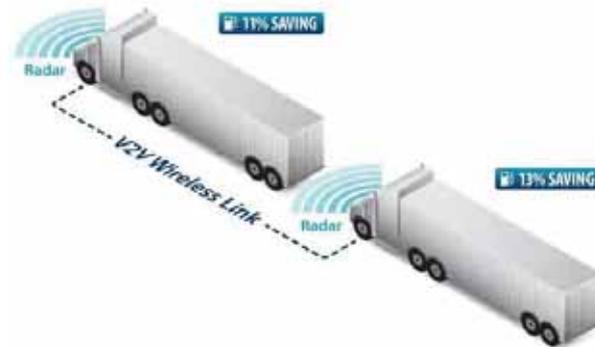


Congestion Getting Dramatically Worse on Truck Routes (Freight Facts and Figures 2011)

Vehicle automation has the potential to mitigate some of these problems



California PATH Truck Platooning



Peloton Truck Platooning

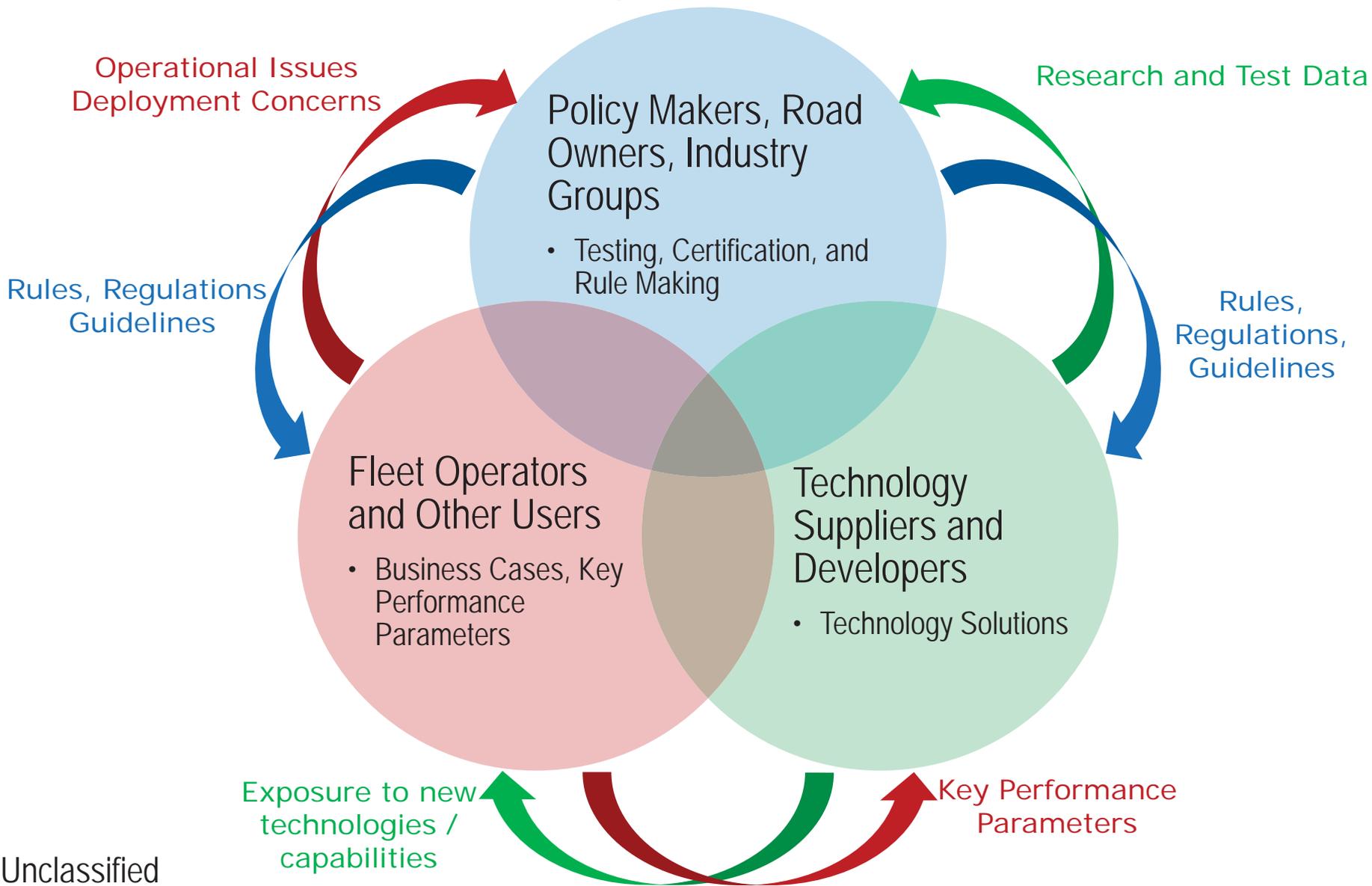


Continental Automated Vehicle

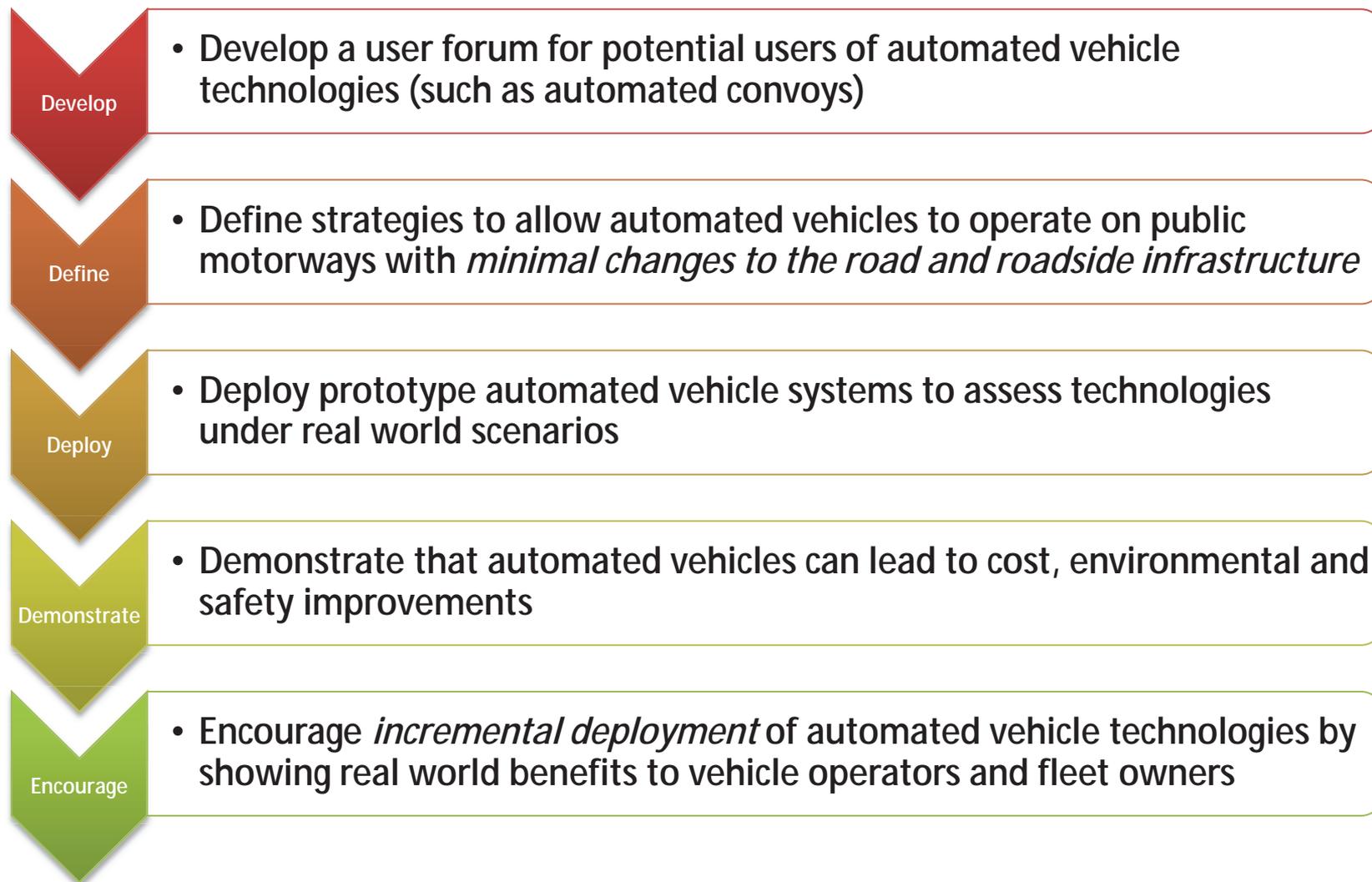


TARDEC CAST/AMAS

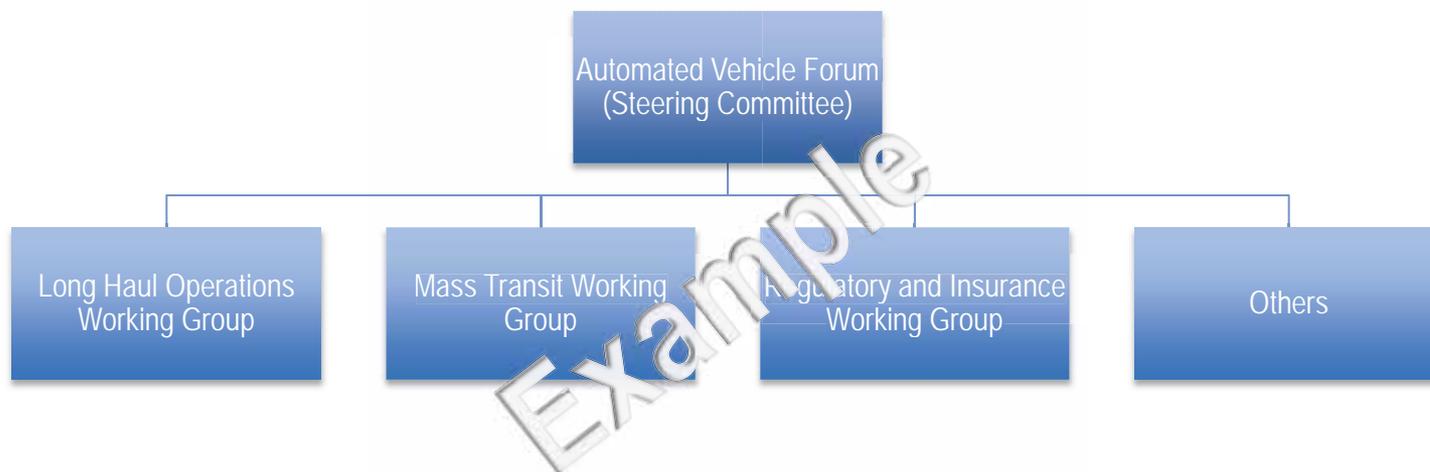
The Automated Vehicle Forum concept



Objectives for the Automated Vehicle Forum



Automated Vehicle Forum Conceptual Structure



Who are some of the people we are talking to

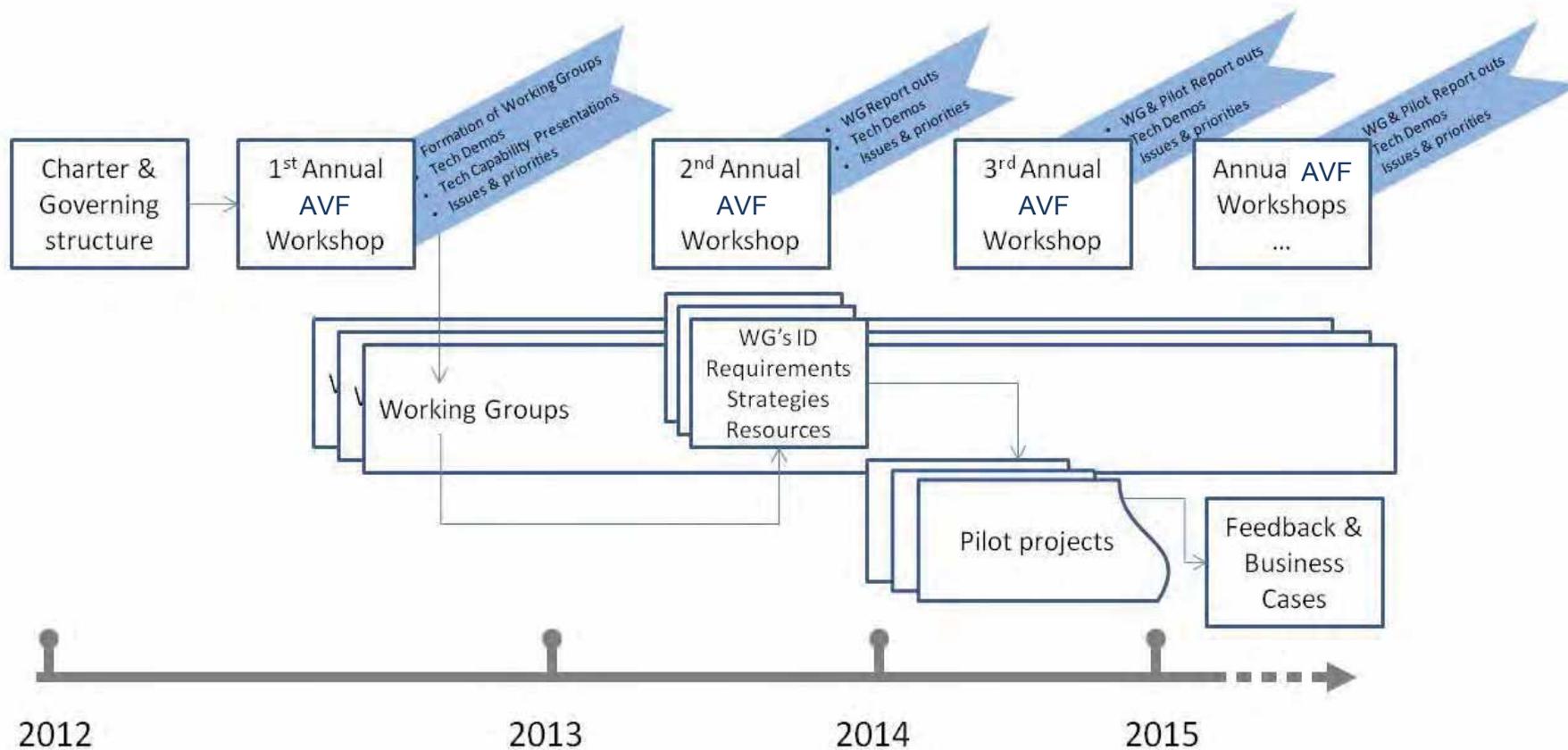


Booz | Allen | Hamilton



Example: Key Performance Parameter HTUF Utility Working Group

Key Performance Requirement	Additional Description
Payload loss	<i>500 lbs (max)</i>
Top speed	<i>65 mph</i>
Reliability and durability	<i>meet or exceed baseline</i>
Acceleration	<i>rate of loaded unit</i>
Exceed fuel economy of baseline	<i>50% increase in fuel economy</i>
Startability	<i>15% @ 20 mph</i>
Gradeability	<i>3.5% @ 55 mph</i>
Different rpm settings for different applications	
Body and Boom	<i>same as currently used on baseline trucks</i>
Engine-off power or idling	<i>2-3 h of work site operations</i>
Exportable power	<i>3.5 kW single phase and meets the standards</i>
Fuel Preference for units	<i>Diesel</i>
Towing ability	<i><1,000 lbs</i>
Engine-off creep mode (up to)	<i>20 mph</i>





Chapter President: Jerry Lane

glane@comcast.net

586-980-1142

www.AUVSI.org

www.IGVC.org

AUVSI

The Association for Unmanned Vehicle Systems International

CONNECTING THE
UNMANNED SYSTEMS COMMUNITY
ACROSS THE GLOBE



About AUVSI

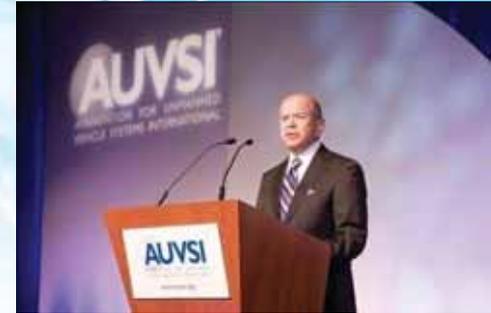
AUVSI's mission is to advance the unmanned systems and robotics community through education, advocacy and leadership.

AUVSI's vision is to improve humanity by enabling the global use of robotic technology in everyday lives.

- In its 40th year, AUVSI is the ***world's largest non-profit association*** devoted exclusively to unmanned systems and robotics
 - Air, Ground and Maritime
 - Defense, Civil and Commercial
- AUVSI represents more than ***7,500 members***, including ***more than 590 corporate members*** from more than ***60 allied countries***
 - We add a new corporate member every 3.2 days
- ***Diverse membership*** from industry, government and academia

AUVSI Events

- AUVSI's Unmanned Systems North America Symposium and Exhibition (**Las Vegas, 6-9 August 2012**)
 - The World's Largest Unmanned Systems Event
 - More than 7,400 Delegates and 571 Exhibitors from more than 40 Countries
 - **Michael Huerta**, Acting Administrator, FAA; **Leslie Cary**, Secretary, UAS Study Group, ICAO; **Lt. Cmdr Rorke Denver**, Navy Seal; **Vice Adm William Burke**, Deputy Chief of Naval Operations Warfare Systems, U.S. Navy; **Lt. Gen. Mary Legere**, Deputy Chief of Staff, U.S. Army delivered keynotes
 - 100+ "other" presentations, panels, workshops and posters
- AUVSI's Unmanned Systems Program Review
 - Military and Civilian Government Agency Updates on Unmanned Systems Programs
- Global Reach and Participation in Events in Australia, Canada, Europe, Asia, South America, the Middle East and the United States
- Webinars, Roundtables, Workshops and more



AUVSI Products and Services

■ Advocacy

- AUVSI advocates for the interests of the entire unmanned systems community (air, ground and maritime) with lawmakers, regulators and decision makers
- In the US, AUVSI works closely with a number of Congressional Committees and Subcommittees, the House Unmanned Systems Caucus and the newly formed Senate Unmanned Aerial Systems Caucus.
- AUVSI has submitted testimony and questions for several US Congressional hearings related to UAS integration
- AUVSI works with the FAA and other US federal agencies (DHS, DOJ, DOD) to facilitate communication between industry and government
- AUVSI created a coalition of aviation-related associations in the US to work together on UAS integration issues and challenges (AOPA, ALPA, NATCA, AIA and more)
- AUVSI serves on the NextGen Institute's Management Council (part of the JPDO) to provide information and guidance to the FAA on NextGen implementation

AUVSI Products and Services

■ Advocacy

- AUVSI serves on a working group of the FAA's Aviation Rulemaking Committee (ARC)
- AUVSI is a member of both ASTM F-38 and RTCA SC203
- AUVSI meets with a variety of civil liberties groups to discuss the challenges with UAS and privacy
- AUVSI serves as an observer on the ICAO UAS Study Group and holds a position on EUROCAE's WG-73
- AUVSI participates in developing the defense robotics section for the national robotics roadmap
- AUVSI continues working with all relevant stakeholders involved with vehicle automation by bringing the industry together, exchanging ideas and disseminating information, providing a greater understanding by delving into the issues and policy through an open forum
- AUVSI will host a one day conference in 2013 to address Export Controls and the President's Export Reform Initiative, which will be released in 2013

AUVSI Products and Services

■ Publications

- Unmanned Systems Magazine – readership of 18,000
- Mission Critical – more than 250,000 individual page views
- eBrief – distributed to more than 36,000 individuals

■ Communications

- Media Outreach
- Public Awareness and Education Campaign
- Social Media
 - LinkedIn Group – more than 6,500 members
 - Twitter – more than 2,500 followers
 - Facebook – more than 1,400 followers

■ Knowledge Resources

- Knowledge Vault
- Market Reports
 - US Jobs Report
 - Economic Analysis
 - Home Healthcare, Agriculture and First Responder Market Reports
- Vehicle Database

DRIVERLESS CAR SUMMIT



SECTION
ORC

SECTION
110

21st Annual
Intelligent Ground Vehicle Competition

IGVC

*for University and College
Mobile Robotics Student Teams*

Oakland University

7-10 June 2013

www.IGVC.org

founded 1992

IGVC Purpose



What is Intelligent Ground Vehicle Competition?

The IGVC is the premiere university level unmanned ground vehicle competition in the world. It challenges students to think creatively as a team about the evolving technologies of vehicle electronics, controls, sensors, computer science, robotics, and systems integration throughout the design, fabrication and field testing of autonomous intelligent mobile robots.

IGVC – Autonomous Robotics for University and College Student Teams

- Develops the next generation of Robotics Researchers, Scientists and Entrepreneurs
- Students Learn & Resume Bullets:
 - Advanced robotics controls
 - Machine vision
 - Computer Engineering
 - Vehicle Systems Engineering
 - Team Collaboration
 - Report & Presentation Skills
 - Follow the rules www.IGVC.org
 - On-Time
 - Field Experience



Student Challenges



- Design: Report required Presentation & Vehicle review
- Autonomous Driving & Navigation:
 - Basic
 - Advanced
- Computer Architecture:
 - SAE & DoD Joint Architecture for Unmanned Systems

How far we've come...

19 Years, 79 Schools, 463 Teams



Celebrate 20 Years!



1993
Recognize them?



1996
I know that guy...



1999
On the spot design innovations.



2003



2011



2012!
What's in store?

Prepared for battle.

45 2012 Teams

- American University of Sharjah
- Bluefield State College
- Bob Jones University
- California State University-Northridge
- California State University-Northridge
- Delhi Technological University
- École de Technologie Supérieure
- Georgia Institute of Technology
- German Jordanian University
- Glendale Community College
- Hosei University
- Indian Inst. of Technology Bombay
- Indian Inst. Of Technology Kharagpur
- Instituto Tecnologico de Monterrey
- Johns Hopkins University
- Kettering University
- Lawrence Technological University
- M. S. Ramaiah Institute of Technology
- Michigan Technological University
- Milwaukee School of Engineering
- Missouri University of Science & Technology
- Oakland University
- Rochester Institute of Technology
- Rosa-Hulman Institute of Technology
- Rose-Hulman Institute of Technology
- Rutgers University
- Sathyabama University
- Stony Brook University
- Tennessee Technological University
- The Citadel
- Trinity College
- U. S. Naval Academy
- University at Buffalo
- University of Calgary
- University of Central Florida
- University of Cincinnati
- University of Colorado Denver
- University of Detroit Mercy
- University of Illinois at Chicago
- University of Illinois, Urbana/Champaign
- University of Massachusetts Lowell
- University of Wisconsin-Madison
- Virginia Tech
- Worcester Polytechnic Institute
- York College of Pennsylvania

Make 2012 unforgettable!

And of course, have fun!

Share your stories!

High tech equipment.



2011 1st Place: California State Univ., Northridge

2011 Design Competition:

1st Place Prize: University of Waterloo - Indrik Lescoe Cup

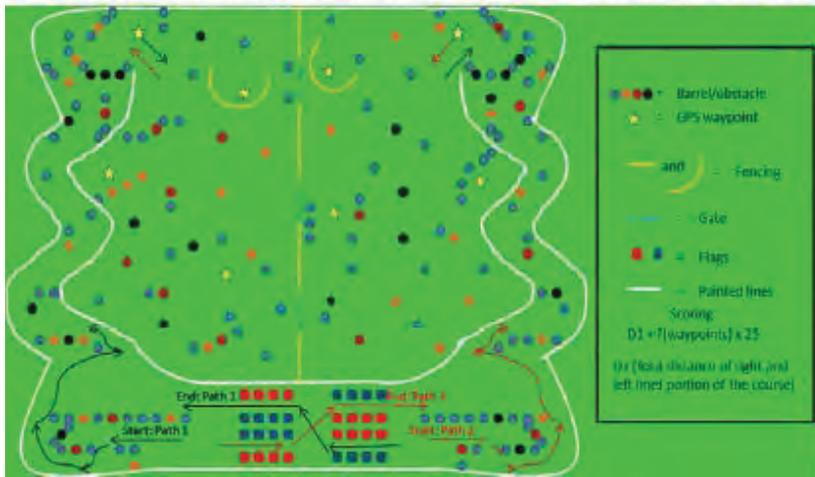


2011 Navigation Challenge: University of Delaware



2011 teams hard at work.

ALL NEW for Our 20th Anniversary: The Auto-Nav Course!



Special Thanks to Our Sponsors for Making it Possible!





2012 Registered IGVC teams

American University of Sharjah
Bluefield State College
Bob Jones University
California State University-Northridge
California State University-Northridge
Delhi Technological University
École de Technologie Supérieure
Georgia Institute of Technology
German Jordanian University
Glendale Community College
Hosei University
Indian Inst. of Technology Bombay
Indian Inst. Of Technology Kharagpur
Instituto Tecnológico de Monterrey
Johns Hopkins University
Kettering University
Lawrence Technological University
M. S. Ramaiah Institute of Technology
Michigan Technological University
Milwaukee School of Engineering
Missouri University of Science & Technology

Oakland University
Rochester Institute of Technology
Rose-Hulman Institute of Technology
Rose-Hulman Institute of Technology
Rutgers University
Sathyabama University
Stony Brook University
Tennessee Technological University
The Citadel
Trinity College
U. S. Naval Academy
University at Buffalo
University of Calgary
University of Central Florida
University of Cincinnati
University of Colorado Denver
University of Detroit Mercy
University of Illinois at Chicago
University of Illinois, Urbana/Champaign
University of Massachusetts Lowell
University of Wisconsin-Madison
Virginia Tech
Worcester Polytechnic Institute
York College of Pennsylvania

2012 IGVC Awards

	AutoNav	Design	J AUS	Rookie	Total
Northridge-RR	3000	750			3750
Naval Academy	2000				2000
Hosei - Tokyo	1000		3000		4000
ERAU-RV	750	500			1250
Lawrence Tech	500		1000		1500
Georgia Tech	250				250
Oakland U		3000	2000		5000
Rutgers		500			500
Northridge- L		400			400
Wisc Madison		250			250
Univ Detroit M			4000		4000
ERAU-M			300		300
Michigan Tech			1000		1000
ITT Bombay				1000	1000
Total	7500	5400	11300	1000	25200



The 21ST Annual Intelligent Ground Vehicle Competition (IGVC)

June 7TH - 10TH, 2013
Oakland University
Rochester, Michigan

In memory of Paul Lescoe

Notes
AutoNav Basic Course
added
Width adjusted to 4ft in

Design Judges inspecting novel Robotic mobility system with LADARS



Cal State Northridge





Cal State Northridge Design Presentation

Vehicle Inspection by Design Judges



Inspection Questions & Answers





Embry Riddle
Aeronautical
University
preparing
to run
AutoNav

Cal State Northridge on the AutoNav Course



University of Detroit Mercy on the AutoNav Course





spartan

UNIVERSITY
OF DETROIT
MERCY

spartan

OmniSTAR

glt

NEWELL

Robots need shade too!















Robot looking
for a Navigation
Waypoint in
AutoNav

Hosei University in No-Mans Land







LTU robot in the AutoNav serpentine



Cal State Northridge #1 Team



Robot running under the Meadowbrook sign







Naval
Academy
Midshipman
and new
officers
prepare their
robot for
AutoNav



Lawrence Tech Robot finding the Gate in the Fence



Naval Academy in the final leg of AutoNav



Oakland University team wins #1 in the 2012 Design Competition



Oakland University Team Awards





Hosei University Tokyo and multiple awards



Cal State Northridge #1



2012 IGVC Volunteers

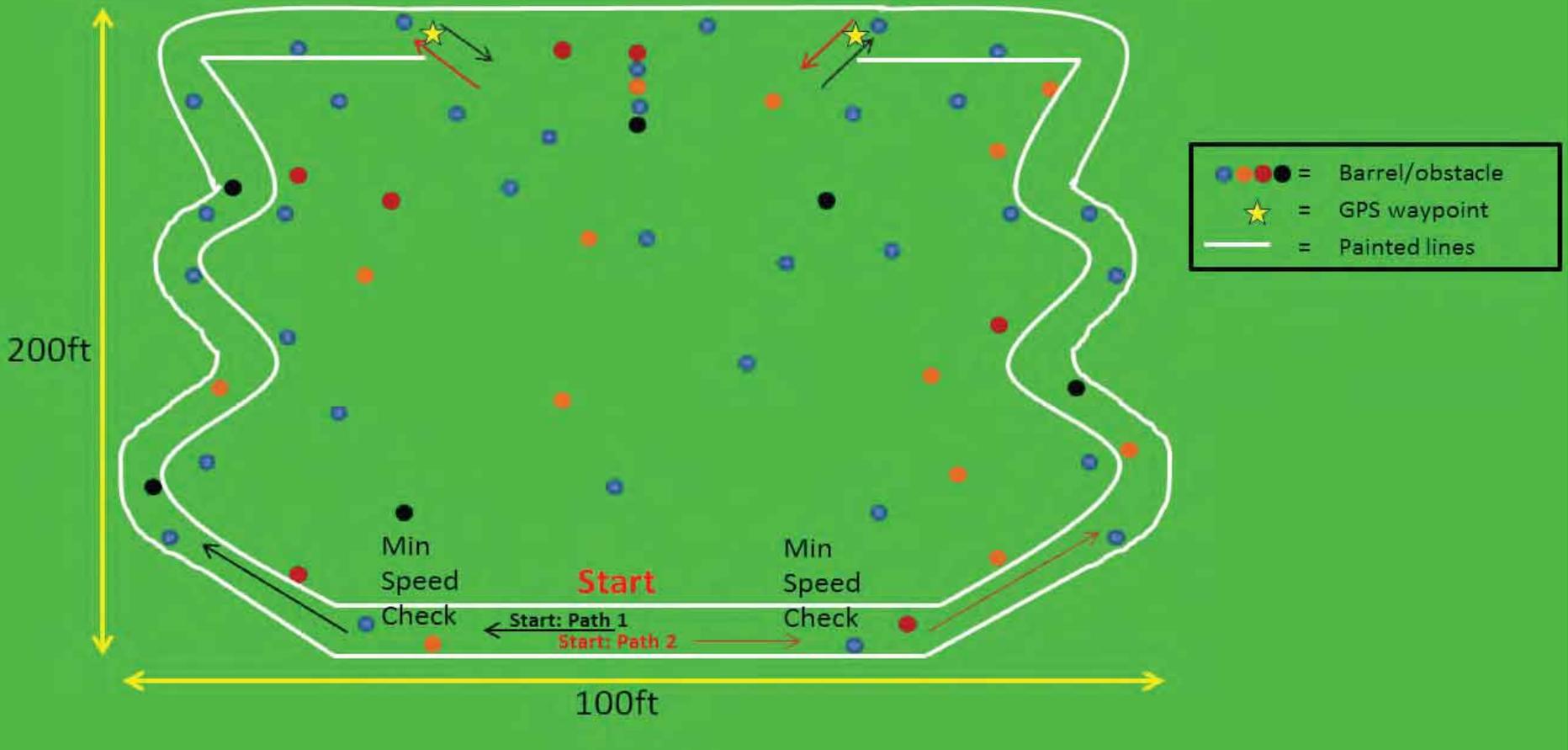


2013 AutoNav Courses

- Basic Course added for New schools and new teams

Basic AutoNav

IGVC 2013 Basic Auto-Nav Course



Advanced AutoNav



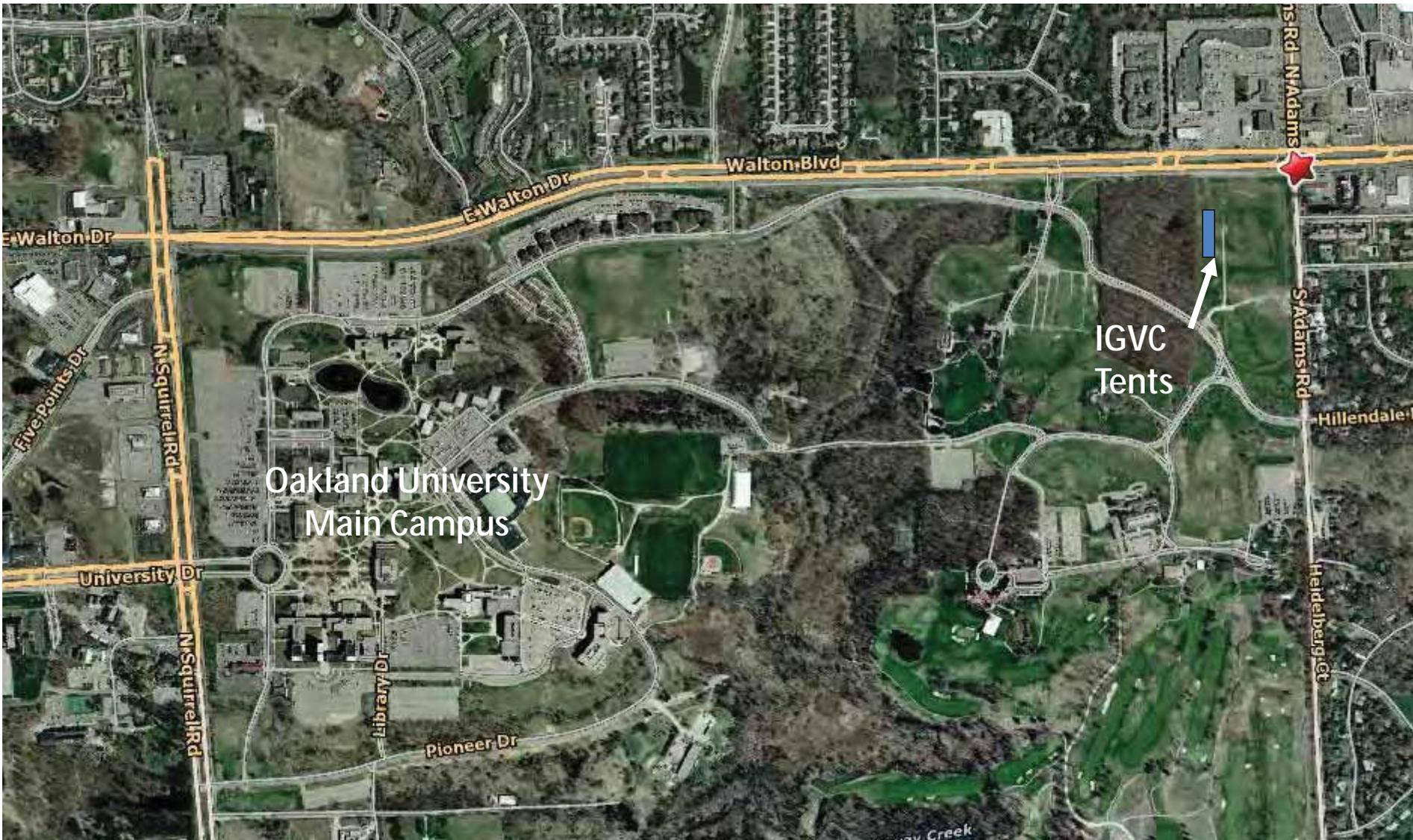
CONTRIBUTION	PRIVILEGES
<p style="text-align: center;">\$15,000 Platinum Sponsor</p>	<ul style="list-style-type: none"> • Logo and web link on Competition website • Logo on all printed material • Logo on Competition tee-shirt • Banner hung at the Competition • Company banner hung on tent. • Table for exhibit at the Competition • Sponsorship plaque, 4 shirts and 4 hats • Access to Competition Student Resumes • Competition Judge • Competition Keynote Speaker
<p style="text-align: center;">\$10,000 Elite Sponsor</p>	<ul style="list-style-type: none"> • Logo and web link on Competition website • Logo on all printed material • Logo on Competition tee-shirt • Banner hung at the Competition • Company banner hung on tent. • Table for exhibit at the Competition • Sponsorship plaque, 3 shirts and 3 hats • Access to Competition Student Resumes • Competition Judge
<p style="text-align: center;">\$5,000 Sponsor</p>	<ul style="list-style-type: none"> • Logo and web link on Competition website • Logo on all printed material • Logo on Competition tee-shirt • Banner hung at the Competition • Company banner hung on tent. • Table for exhibit at the Competition • Sponsorship plaque, 2 shirts and 2 hats • Access to Competition Student Resumes
<p style="text-align: center;">\$2,000 Supporter</p>	<ul style="list-style-type: none"> • Logo and web link on Competition website • Logo on all printed material • Logo on Competition tee-shirt • Banner hung at the Competition • Company banner hung on tent. • Table for exhibit at the Competition • Sponsorship plaque, shirt and hat

IGVC

Sponsorship

www.IGVC.org

IGVC Opening Ceremony Monday 10 June 8 AM



Jerry Lane Cell 586-275-9664; E-Mail gerald.r.lane@saic.com

IGVC Committee

IGVC Co-Chairs:

Ka C Cheok	Oakland University	cheok@oakland.edu
Jerry Lane	SAIC	gerald.r.lane@saic.com
Bernard Theisen	U.S. Army TARDEC	bernard.l.theisen.civ@mail.mil

Auto-Nav Challenge Lead Judges:

Jerry Lane	SAIC	gerald.r.lane@saic.com
Ka C Cheok	Oakland University	cheok@oakland.edu
Jeff Jaczkowski	PEO GCS RS JPO	jeffrey.j.jaczkowski.civ@mail.mil
Chris Mocnik	U.S. Army TARDEC	christopher.t.mocnik.civ@mail.mil

Design Competition Lead Judge:

Steve Gadzinski	Ford Motor Company (retired)	sgadzinski@gmail.com
-----------------	------------------------------	----------------------

JAUS Challenge Lead Judges:

Mark Mazzara	PEO GCS RS JPO	mark.a.mazzara.civ@mail.mil
Matt Skalny	TARDEC Robotics	matthew.Skalny.civ@mail.mil

Administrative:

Markhanna McBurrows	Oakland University	mcburrow@oakland.edu
---------------------	--------------------	----------------------

Director of Operations:

Andrew Kosinski	U.S. Army TARDEC	andrew.d.kosinski.civ@mail.mil
-----------------	------------------	--------------------------------



The 21ST Annual Intelligent Ground Vehicle Competition (IGVC)

June 7TH - 10TH, 2013
Oakland University
Rochester, Michigan

In memory of Paul Lescoe

Notes
AutoNav Basic Course
added
Width adjusted to 4ft in

“The Future Starts with Us!”

www.squareonenetwork.org

Karl Klimek
Executive Director

The Square One Education Network is a 501 c 3 charitable organization



Mission:

What is our unique reason for being?

Create and fund powerful, relevant experiences for K-12 teachers and students that creatively *integrate* science, technology, engineering and mathematics (STEM) using best practice supported instruction through unique project designs



CREATIVE

CURRENT

EXCITING

HELPFUL

ACTION

SUPPORTIVE

INVENTIVE

PASSIONATE

RESOURCEFUL

ENGAGING

TECHNOLOGY

ADMIRE

DIGITAL

INNOVATIVE

EXPANSIVE

IGNITING

KNOWLEDGEABLE

PERSONABLE

SCHOOLS

THRIFTY

LEADING EDGE

YOUTH

BRIGHT

BENEFICIAL

FUTURISTIC IMAGINATIVE

TRANSFORMATIONAL

PREMIER

EDUCATIONAL

GEAR

LEADING

SPIRITED

DYNAMIC

CONNECTED

ENERGY

GENEROUS

PROJECTS

SUCCESS

VERTICAL

CREATIVE

DYNAMIC

INTELLIGENT

NIMBLE

SMART

REFORMERS

INSPIRING/INSPIRATIONAL

The Square One Process

- Identify and leverage highly enthusiastic teachers
- Co-create a STEM*-based, meaningful project
- Target creative-innovative pursuits
- Commit to continuing service and support
- Stay poised to locate a corporate, university or community partner

*STEM: **S**cience, **T**echnology, **E**ngineering, **M**athematics

Square One is *Different!*

- Methodology reflects “home-grown” value and importance
- Emphasizes teacher training...building capacity
- Highly engaging, affordable engineering projects
- Personalized service
- Educational support aligned with research on learning



Michigan Born...

Michigan Based...

Michigan Grown.

Our “Customers”



- K-12 students and teachers
- Great Lakes Region for now!
- Teachers have also been trained from:
Nevada, Alaska, New York, Louisiana,
Pennsylvania, Washington DC, and also
some from Canada.
- All projects and offerings are expandable

Develop Innovative Thinkers
Develop Technology Leaders
Cultivate Dynamic and Relevant Learning Environments
Employ entrepreneurial Practices
Ignite the creative potential of youth in exploration of STEM



Our "Products"



Established: 2005



Established: 2005



Established: 2007



Established: 2010



An Ambitious Course...



INNOVATIVE VEHICLE DESIGN



BE CONNECTED. BE SAFE. BE GREEN.

Connected

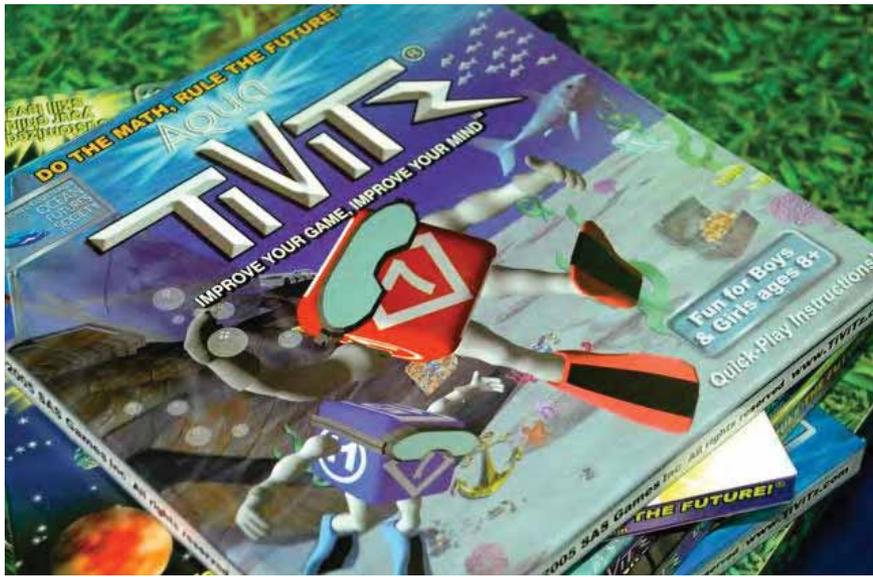
Established: 2012!





The First
in the
World!

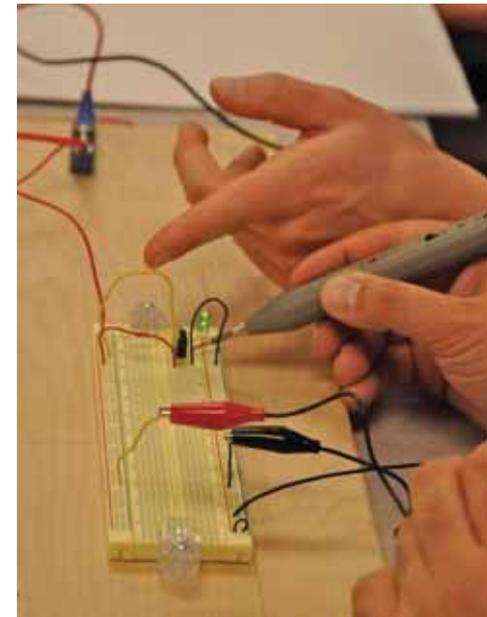














Path to Palau Remotely Operated Vehicles and Partners





Entrepreneurial -- Incubator

Karl Klimek

Executive Orchestrator

313.590.4000

Generative -- Relevant -- Organic karl@squareoneeducationnetwork.org

W

Now in 3D!

i.e. Science of Cell Phones & Wireless Communications

--Established 2006--



Connected

- Battery Technology Expertise
- Micro Controller Technology
- Partners in Innovative Engineering
- Technical Support/Specialists
- Potential investors in our unique and effective programming
- Professional Connected Vehicle Partner(s)
- Sponsors!
- New industry/business partners that want SQ1 can deliver on their behalf

Bring Value to Partners...

Bring Value to the Next Workforce!



the future starts with us!

Karl Klimek

karl@squareonenetwork.org

313-590-4000

www.squareonenetwork.org

Facebook

MDOT Updates

1/28/13

Safety Pilot Update

- < 70 ASD's to be installed
- < 100 Heavy & Medium Duty DAS to be installed
- Integrated vehicles switching over to second driver set
- Freeway RSE IPv6 addresses
- All other RSE's installed and operational
- Data being collected

Automated Vehicle Testing and Development

- Called for in State of the State
- Legislation being prepared
 - Cross-industry
 - Minimal burden (industry and state)
- Coordination with USDOT
- Driverless Car Summit
 - June 11-12, 2013
 - Motor City Casino, Detroit

Initiatives

- I-94 Truck Parking
- Data Use Analysis and Processing
- Test Bed Upgrades (w/ USDOT & RCOC)
- Weather “IMO”