Scaling a Defense Robotics Company into Commercial Markets

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Overview

- Founded in September, 2009
- Acquired by ARA in April 2017
- Focus of software development, basic and applied research, and advanced development of unmanned vehicle-related technologies
- ~50 employees - Strong mix of Ph.D. and MS

Neya Main - Pittsburgh, PA

ISO 9001 CERTIFIED

Neya Remote – Framingham, MA

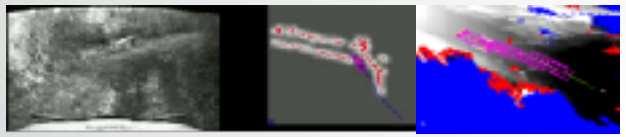
What We Do

Off-Road Autonomy Platform

Off-Road Autonomy

- GPS-denied
- Platform Agnostic
- Rough Terrain
- Multi-Sensor Fusion





Multi-Robot Collaboration Platform

Multi-Robot Collaboration:

- Task Planning
- Task Allocation
- Mission Monitoring
- Mission Execution

DoD Product Lines


UxAB for AEODRS Increment I

Low Rate Production

Open Architecture / Open Business Model

- UCS Architecture Development
- UxSDK for implementing UCS

SAE INTERNATIONAL

AS-4 JAUS Standards

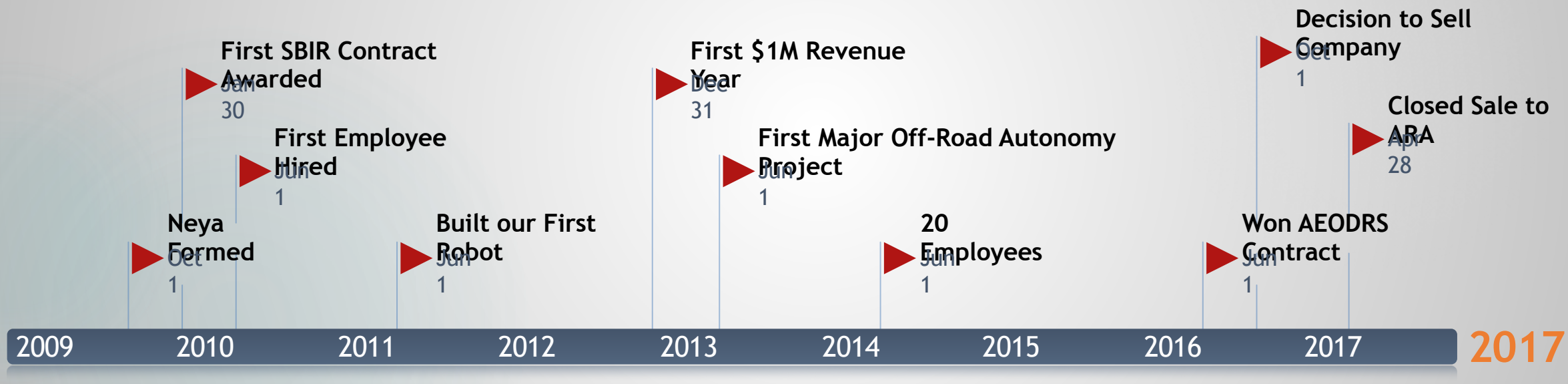
PM FP IOP

AEODRS

ROS military

JAUS ToolSet

Neya


Neya Formed
Oct 1
First SBIR Contract Awarded
Jun 30
First Employee Hired
Jun 1
Built our First Robot
Jun 1
First $1M Revenue Year
Dec 31
First Major Off-Road Autonomy Project
Jun 1
20 Employees
Jun 1
Won AEODRS Contract
Jun 1
Decision to Sell Company
Oct 1
Closed Sale to ARA
Apr 28
2009
2010
2011
2012
2013
2014
2015
2016
2017
2017

Videos

The Fundamental Dichotomy

Government will pay for R&D

Businesses want to buy products

Businesses don't want to buy your Gov't R&D

2009 - Limited commercial market for off-road autonomy

The Good…

Funding	Non-Dilutive	Priorities change	Company Culture
• 2018 - $140B federal R&D • VC Funding $80-100B	• Bootstrap Friendly • No Cap Table	• New Threats • New Administrations	• Billable Hours • Accounting Rules • Total Time Accounting

The Gov't is *great* at paying for R&D

The Challenges…

It's Not Fast

- 6-12 months from proposal to award
- OTAs improving that

Voice of the Customer

- Hard to talk to end-customer
- Grab opportunities to work with end users

IP Rights

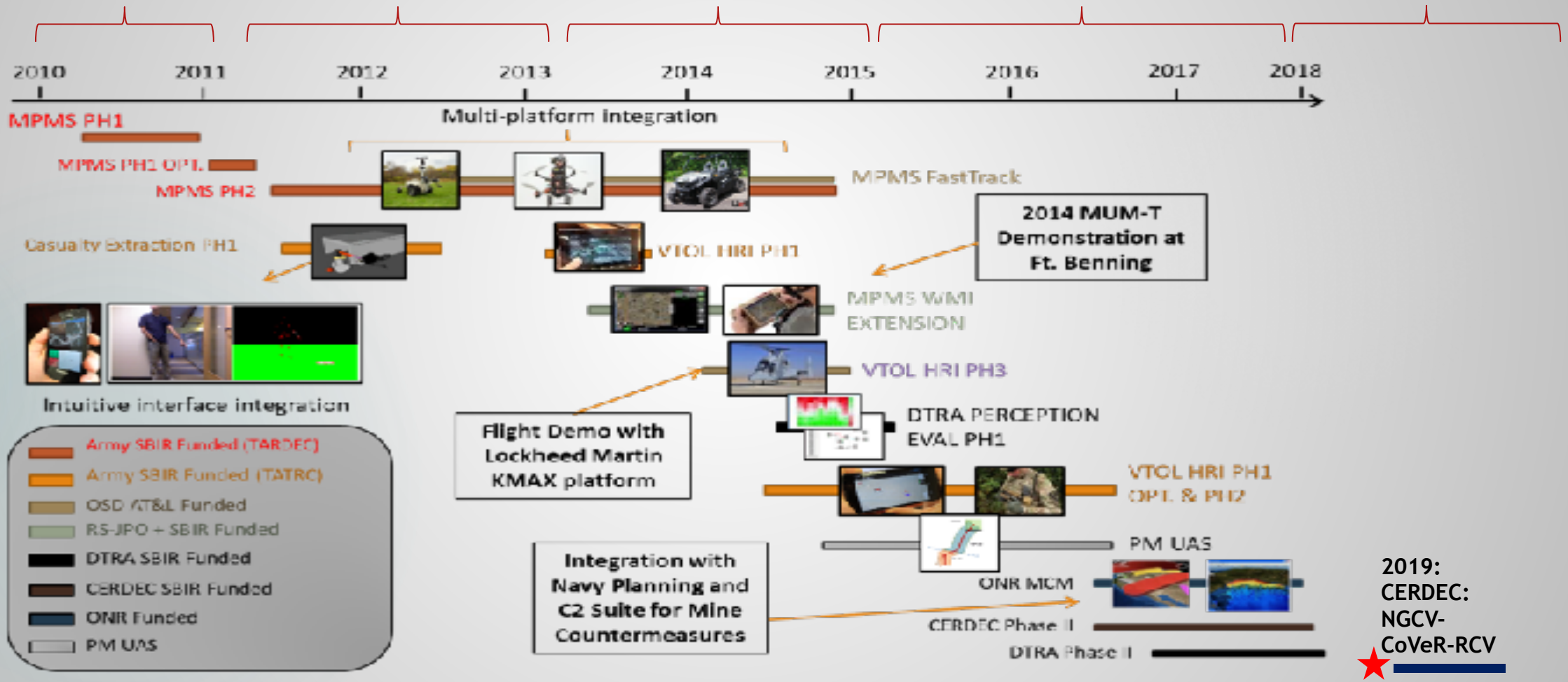
- SBIR
- Government Purpose
- Government Unrestricted

Product Development

- Long, slow process from R&D to product

It's *hard* to sell robotics products to the Gov't

Neya Mission Planning Development Threads



Why Change?

- Defense budgets move up and down
- Hard to scale as a contract R&D house
- *Strong growth in commercial acceptance and demand for unmanned systems*

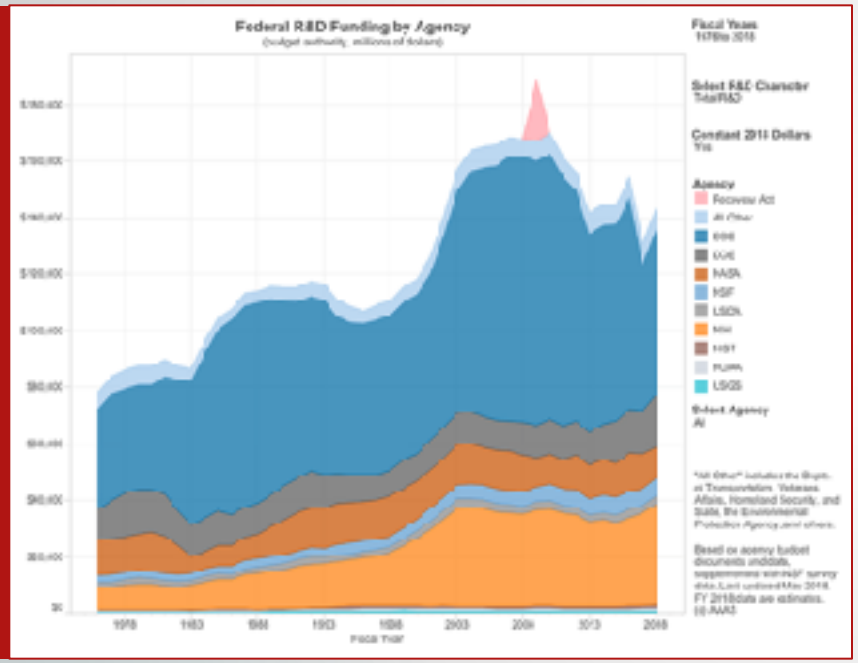
Macroscopically, it's not even close

DoD Contract Statistics (top 100 DoD Contractors)

1.7M Contracts

$133K Mean

$228B Total

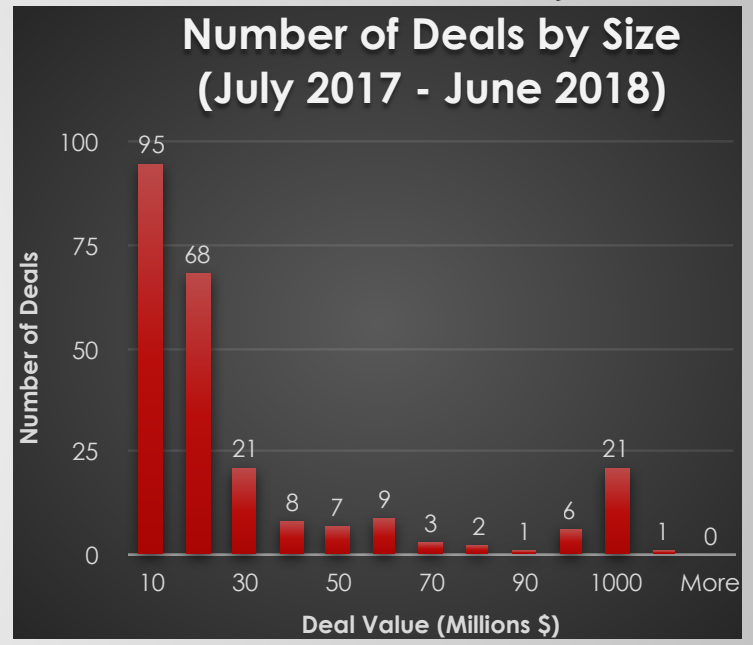


VC Deals in Robotics and Unmanned Systems

242 Deals

$15M Median

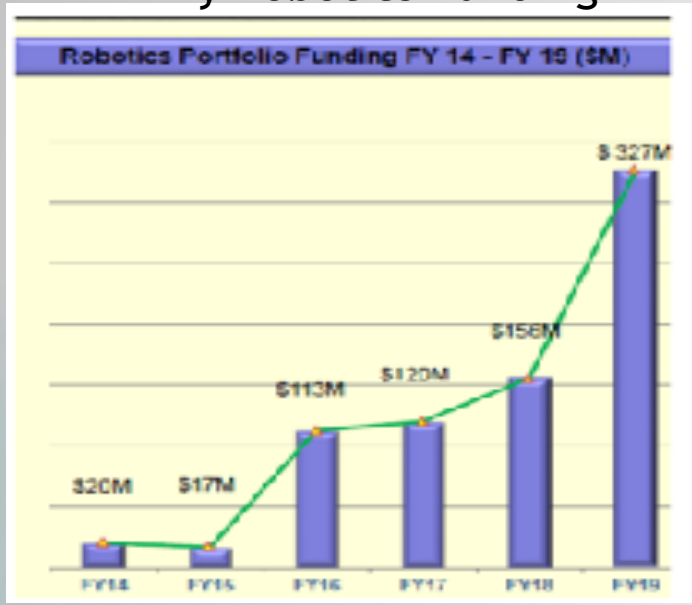
$12.3B Total



Collated from www.therobotreport.com monthly funding summaries

But when you segment the market a bit…

Army Robotics Funding



VS

Mining

- ~$5B
- Focusing mainly on open-pit mines
- Automated Haul Systems

Agriculture

- ~$4B
- Full life cycle automation
- Greenhouses

Construction

- $200M
- Focusing on demolition
- Growth in construction operations

Core Challenges

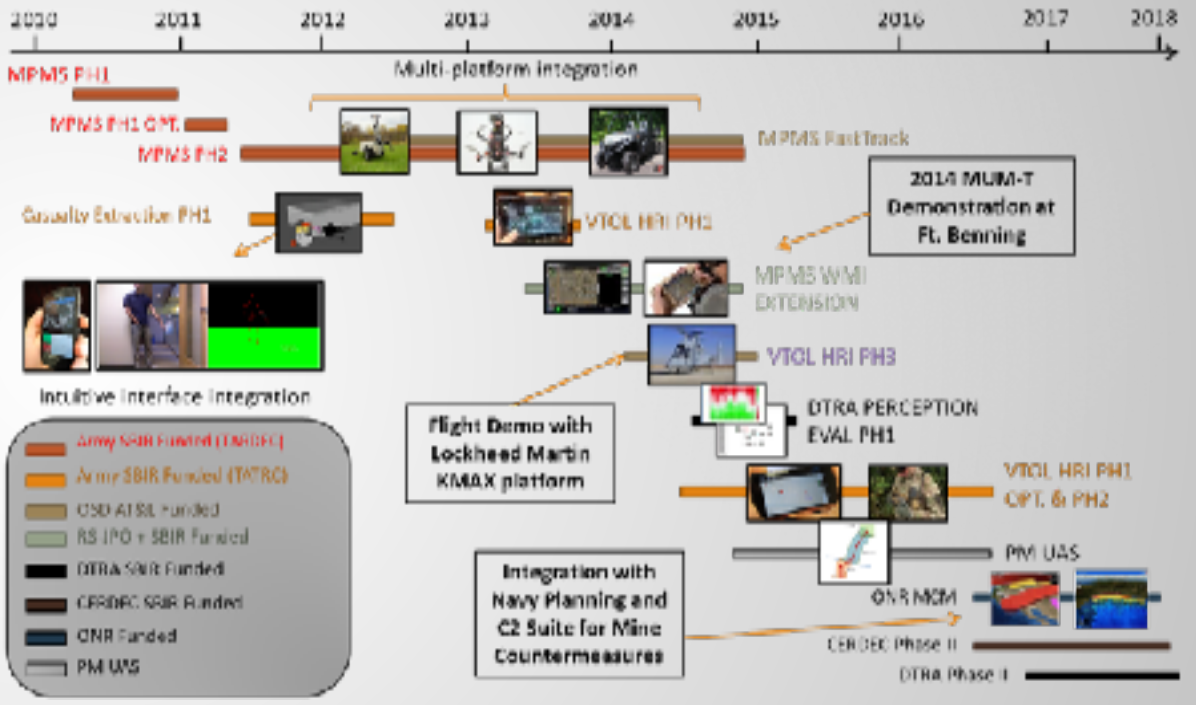
- Technical
- Business Model
- Marketing
- Cultural

Business Model

- Defense R&D Business Model:
  - Sell billable hours
  - Develop low volume, high cost product lines
  - Market nearly exclusively to DoD
  - Primary customer PoC are PIs (Ph.Ds / Researcher)
- What We Changed / are Changing
  - Move to a Platform approach – Sell licenses + integration and customization services
  - Still low volume – but emphasize future manufacturability and overall quality
  - Work to reduce integration time / cost for rapid demonstrations and proofs of concept
  - Hire subject matter experts / BD people for commercial areas we are making a large push into

Technical Challenges

- Code is developed over many years
- Many different developers, with moderate continuity
- It's "R&D" code
- It's been developed for different, sometimes competing, requirements
- It's rarely modular or well architected
  - ROS is helping here



What we Did

- Create a distinct software engineering team, with a dedicated software engineering lead
- Re-evaluate, and truly assess the maturity and re-usability of multiple code bases
- Focus on rapid integration of autonomy capabilities onto new platforms
  - From 6/200 to 1/25
- Completely re-write (in progress), from the ground up our core autonomy software
  - Focus on modularity and ease of integration
  - Safety / BIT hooks
  - Common, consistent coding practices

Marketing / Business Development

- Marketing to the Government means:
  - Getting to know individual Gov't and Prime PMs
  - Responding to lengthy RFPs / BAAs
  - Some trade show / industry association involvement
- Commercial B2B Marketing means:
  - Broader engagement with tradeshows in multiple domains
  - More importance on ancillary marketing (web site, blogs, etc) to attract "walk in" customers

Culture

- Have always had a culture of innovation – common misconception is “respond to RFPs without thinking”
- Strict Gov’t accounting rules affect culture – total time accounting
- Moved from PI-centric organization to a light matrix / functional organization

Case Study – Bossa Nova Robotics

- BLAST
  - Low Bandwidth, High Latency Teleoperation
  - Developed under Army contract for remote operation of squad-based robots and EOD platforms

- Inventory Management
  - Data-as-a-Service
  - Autonomous platform and imaging system deployed to Walmart locations
  - Neya provides back-end emergency long range, low bandwidth teleoperation interface – human in the loop on demand

BLAST PIC

Conclusion

- If you start in defense w/out considering commercial, you could end up structured entirely the wrong way in all major functional areas
- Integrate good software engineering practices from the ground-up – don't code to the project
- Develop a dual business model – sell hours + platform sales / licensing
  - What will be "shrink wrapped"
  - What will require custom integration
- Don't organize around PIs. Create functional lines
- Understand your IP rights

Leaders in Unmanned Systems

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