Industry 5.0: Robotics and Automation in Industrial Applications

Cleantech Forum | San Francisco

Industry 5.0 Robotics and Automation in Industrial Applications

Drivers

- Sensor quality
- Falling hardware costs
- Labor shortages
- More data
- Computation (& cloud!)

Challenges

- Productivity decline
- Public perception
- Capital costs
- Chinese competition

Ecosystem

Innovators

BEAR FLAG ROBOTICS
HDS
GreyOrange
云迹科技 YUNJI TECHNOLOGY

Corporates & Incumbents

ABB
SIEMENS
BOSCH
FANUC
KUKA
YASKAWA

Entrepreneur Support Organizations (ESO)

HAX
b.next
TOYOTA RESEARCH INSTITUTE
svb

What are we covering today?

- Emerging robotic service models
- Adoption in new verticals
- The changing funding landscape

Digital Water - Software & Solutions: Innovator examples

Kando: Developer of sensor and software solutions to track industrial wastewater output

Contact: Ari Goldfarb, CEO
Investment: Sept 2018: Series A from Israel-Colorado Innovation Fund. Seeking further investment for scale-up.

Projects:

- Working with Jerusalem-based utility as a paying customer, and other Israeli cities as beta testers.
- Australia and Europe current pilots, regulatory similarities, and invest in infrastructure as part of pilot/tests.

Insights & Outlook:

- Monitor industrial wastewater to ensure regulatory compliance. Utility clients shows close relationship of industrial and municipal water sectors.
- Installation of IoT sensors required, so cost of deployment must be mitigated. SaaS-based platform monitoring for utilities, and ensuring companies treat waste properly – promise of an opex return on expenditure.
- In process of setting up a US pilot and trial, looking to focus on this market in future.

Plutoshift (fka Pluto AI): Developer of AI & IoT technology for water resource management

Contact: Prateek Joshi - Founder
Investment: March 2017: $2.1M seed round from 500 Startups and 3 other VCs.

Projects:

- Solutions deployed at several water treatment plants
- E.g. leveraging SCADA and sensor data at Tennessee-based plant to help operators look at real-time insights for plant monitoring and efficiency improvements.

Insights & Outlook:

- Oct 2018: shift to a cloud-based asset performance management (APM) system
- Sept 2016: The California Open and Transparent Water Data Act requires the state to develop an open-platform online data repository that is available to all water suppliers and users. Plutoshift can utilize this data to feed into its ML algorithms.
- Acquisition of rival Fracta by Kurita in June 2018 suggests that large industrial water suppliers will look at Plutoshift's technology to acquire similar capabilities.

Wings ICT: Developer of a cloud-based platform for monitoring of water treatment & sanitation

Contact: Kostas Tsagkaris, Managing Director
Investment: Funding from XPV Capital and Silver Lake, originally spun out from Global Water Resources, which maintains a minority share.

Projects:

- Successful trials in Paris (Sense-City), Portugal (SMAS, Almada), and Greece (Xanthi local authority) to integrate sensors for leakage and contamination.

Insights & Outlook:

- Developing software for many sectors: (water, energy, smart cities, transport etc.) this creates synergies and knowledge which can integrate into smart-city applications.
- Broad customer range across industrial and municipal water: network providers, treatment companies, engineering companies and domestic users.
- The company quotes the global water control monitoring solutions market as a $30B dollar market by 2021 (from $22.8B in 2017), but broad product offering could inhibit specialism.

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ROBOTICS

A PROBLEM WORTH SOLVING

The US is facing a severe farm labor crisis

THE AGRICULTURAL WORKFORCE IS:

— aging out

— moving to higher-paying industries with less demanding work environments

— leaving the country

— rising in cost year after year

A PROBLEM WORTH SOLVING

By the year 2050 growers must increase Food production by 70% to meet global demand for food.

Growers and the agricultural industry at large are in need of solutions that immediately reduce operational expenses and take the human error and inefficiency out of manual farming.

BENEFIT SOF AUTOMATION

Maximize Output

Bear Flag Robotics' tractors are designed to be deployed as a fleet and controlled by a single supervisor.

One supervisor to many machines, operating day or night means more productivity and more output for critical and time-sensitive operations.

OUR MISSION IS:

To reduce the cost of growing food,
while increasing global food production
through automation technology.


BEAR FLAG
ROBOTICS

IQT®

IN·Q·TEL

January 29, 2019

Why In-Q-Tel?

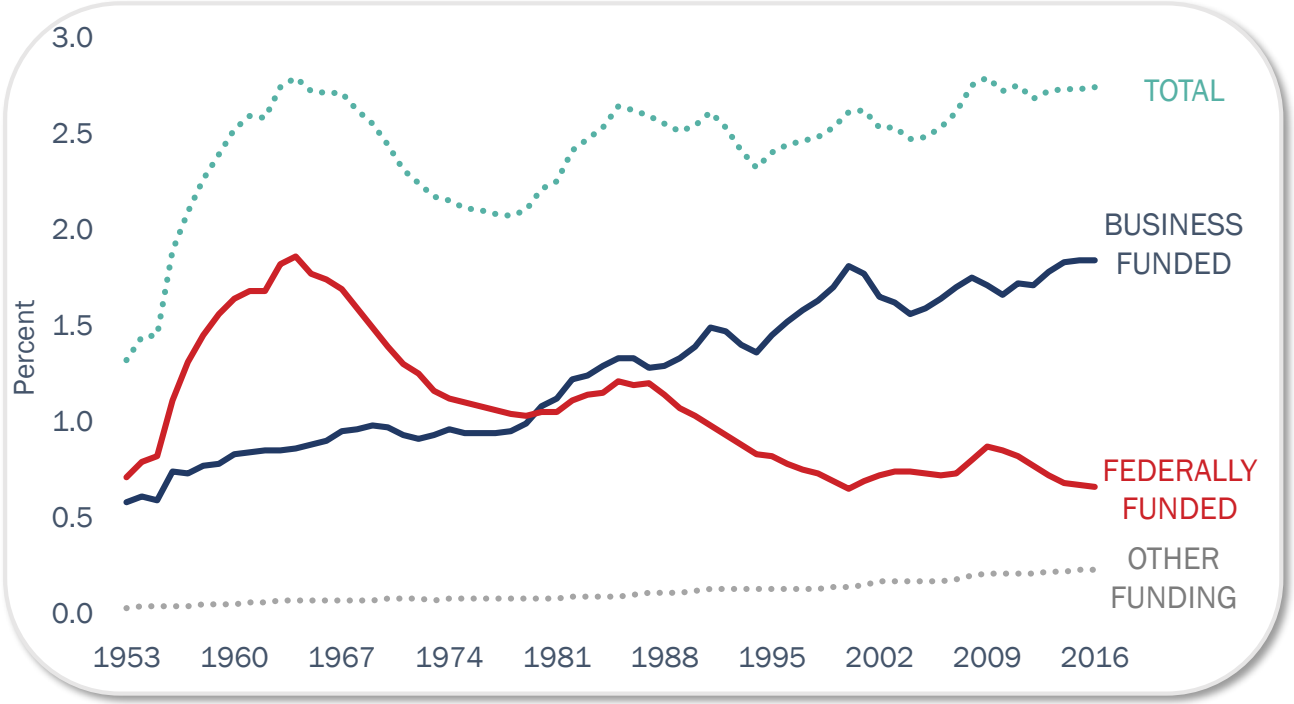
THE CHALLENGE

DECLINING
R&D budgets

INCREASED
private sector spending & developments

DIMINISHED
visibility and access to technology explosion

Increasing Portion of R&D from Business Sector



Ratio of U.S. R&D to gross domestic product, by source of business, federal, and nonfederal funding for R&D. Source: National Science Foundation, National Center for Science and Engineering Statistics, National Patterns of R&D Research. Dec. 2017.

The Challenge: Connecting Three Very Different Worlds

GOVERNMENT PARTNERS

VENTURE CAPITAL

1,600+

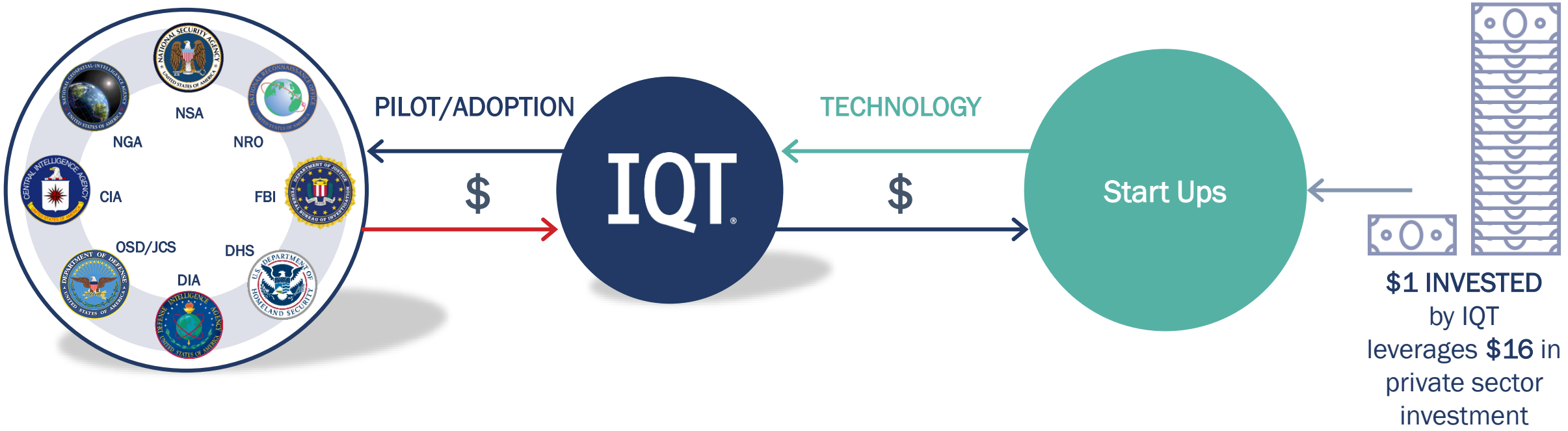
co-investors

STARTUPS

18,000+

company engagements

Our Model: Not-for-profit Focused on Mission



- Fund visionary startups and provide market insights and engineering expertise
- Identify and adapt commercially-focused products that can be modified, tested, and delivered for use within 6 to 36 months
- Identify interested government partners
- Success measured by pilot and adoption of technology

IQT Investment Focus

- Stage agnostic
- Equity & development funding
- Flexible model (equity, debt, warrants) and Board Observer
- Co-invest with VCs

Investment Types

Work Program + Strategic Investment

Up to $3M

Defined Customer Engagement

"Seed" Investment

~$250K

Developing Customer Engagement

 |

Measuring Our Success: Delivering Mission Capabilities

400+
INVESTMENTS

700
PILOTS
evaluated by USG, funded by IQT

150+
MULTI-AGENCY DEALS

~225
COMPANIES
currently in IQT's Portfolio

100+
ACTIVE WORK PROGRAMS
per year

Robotics Market Trends… a “Cambrian Explosion”

	ESTABLISHED	EMERGING	DEVELOPING
MARKETS	Industrial manufacturing Consumer niches	Logistics & warehouses Collaborative manufacturing Drones… delivery, inspection Automotive… driver assist	Autonomous transport… cars, trucks, off-road, indoor, marine Healthcare… surgery, rehab, elder care Commercial… retail, food prep, mining, ag, construction
MODELS	Full-stack hardware… walled gardens	Horizontal plays… open source	Robots-as-a-Service

Robotics:
AI in the Real World

What's Happening in Frontier Tech Today?

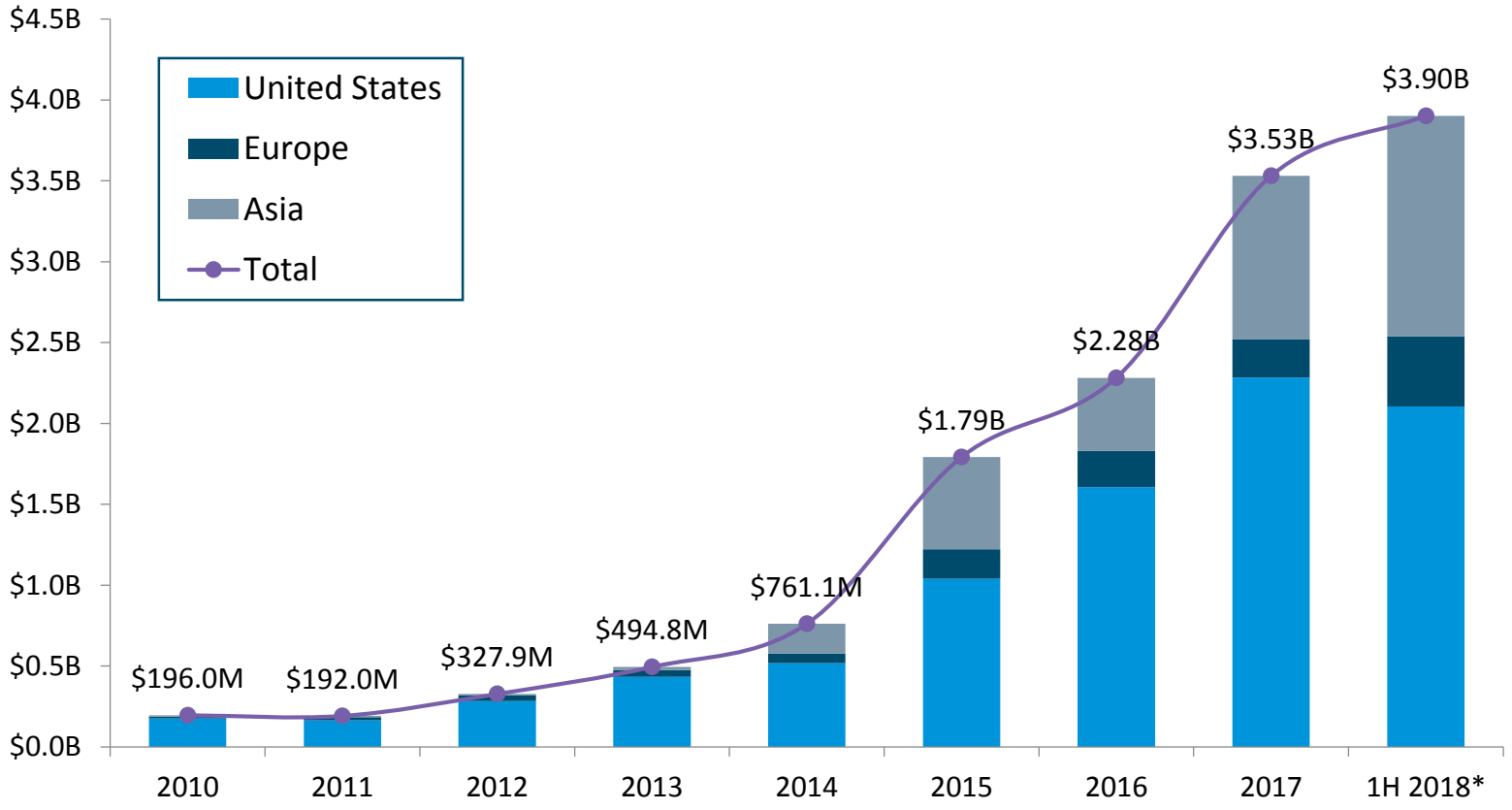
Adoption of hardware solutions is increasing as advances in sensor technology, data storage & processing continually progress.

These technologies are allowing for the digitization of the physical world, which we believe will significantly impact all sectors.

Venture Financing in Robotics & Advanced Manufacturing Technology

Aggregate Investment by Global Region

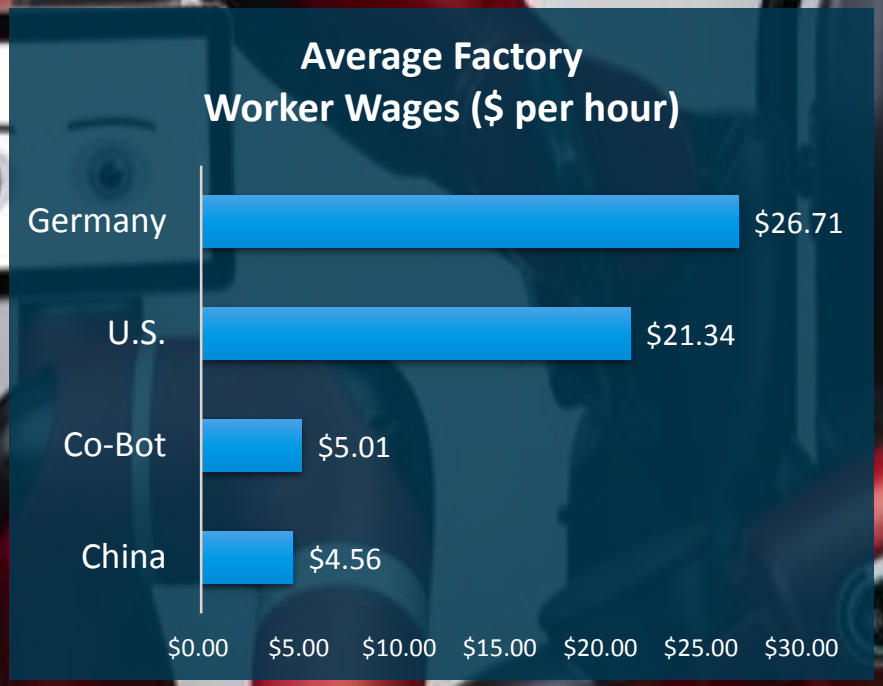
Given the regulatory and technology hurdles facing autonomous transportation the market landscape is uncertain. Companies are using similar AV technology but applying it to robotics and automation. This space has much lower hurdles and we expect near term impacts.



Data through September 4,2018 Source: PitchBook

Human Labor vs. Co-Bots

Robots are increasingly used for repetitive tasks; experts estimate that there are as many as 1.5 million robots globally engaged in tasks that once were performed by humans



The collaborative robotics sector is expected to increase roughly tenfold between 2015-2020, reaching over $1 billion from approximately $95 million in 2014. TechNavio forecasts the global co-bot market to grow at a compounded annual growth rate (CAGR) of 50.88% to 2019

Why Use The HaaS Model?

Equipment Provider's Perspective

(SVB Borrower)

Pros

- Attractive sales model that can lead to shorter sale cycle.
- Budget approvers tend to be at lower levels making them more reachable.
- Converts one-time transactions to long-term relationships.
- Lifetime value doesn't end at the sale, deepens understanding of customer overtime.
- Predictable monthly revenues instead of lumpy unpredictable sales.

Cons

- Significant upfront capital required to build equipment with cost recovery overtime.

Equipment Buyer's Perspective

(Borrower's Account Debtor)

Pros

- Limit risk of buyer's remorse.
- Take assets off the balance sheet – Op ex vs. Cap ex.
- Flexibility for the next generation of technology.
- Solutions built more around actual needs.

Cons

- Potentially higher Total Lifetime Cost.
- Easier for company to cancel.

About Silicon Valley Bank

For more than 35 years, Silicon Valley Bank has helped innovative companies and their investors move bold ideas forward, fast. SVB provides targeted financial services and expertise through its offices in innovation centers around the world. With commercial, international and private banking services, SVB helps address the unique needs of innovators.

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