DEVOPS AT HARRIS – A CONTRACTOR CASE STUDY

JORGE RELEA-GONZALEZ

Senior Director, Software Engineering

Harris Corporation, Space and Intelligence Systems

The Need for Speed
Delivering Software Faster at Harris

HARRIS®

"Certainly, as you deploy tools like **DevOps**, it's going to help you develop products which have significant **software content faster**. The concept is basically to be able to **continuously integrate and test** software builds so that you always have a software feature that you can field and market, and that is something that we have not developed. A lot of the defense companies have not, and that is going to compress the cycle time for software pretty substantially. We've seen that in multiple cases where we deployed **DevOps**. As we go out the next 2 to 3 years, by fiscal '21, we think **85%** or **90%** of our new starts will be on **DevOps**. I think it's going to be a key thing, the **compressing overall cycle time** and developing and launching new products."

William M. Brown, Chairman, President & CEO Harris Corporation

Q4 2018 Harris Corp Earnings Call / July 31, 2018

DevOps is driven from the highest executive levels at Harris

Software Factory Examples

- **>50%** Reduction in build & release time
- **>50%** Decrease in cycle time
- **>90%** Increase in release frequency
- **>50%** Efficiency improvement

Program Examples

- **33%** Reduction in onboarding time
- **58%** Reduction in project defects
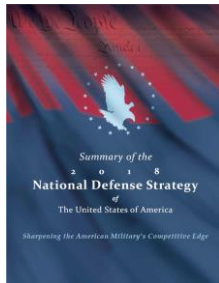- **30%** Decreased I&T effort
- **70%** Defect rework reduction

The defense software industry is changing rapidly

DoD is changing how it acquires…

National Defense Strategy

"…streamline rapid, iterative approaches from development to fielding."

Defense Science Board (DSB) Task Force on the Design and Acquisition of Software for Defense Systems

Defense Innovation Board Software Acquisition and Practices Study

https://www.acq.osd.mil/dsb/reports/2010s/DSB_SWA_Report_FINALdelivered2-21-2018.pdf

https://innovation.defense.gov/software/
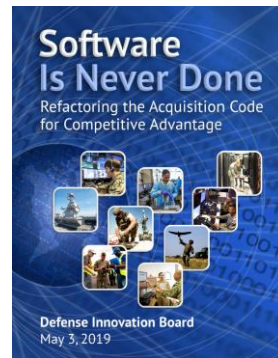
… industry is changing how we work

• Industry recommendations for implementing DSB findings

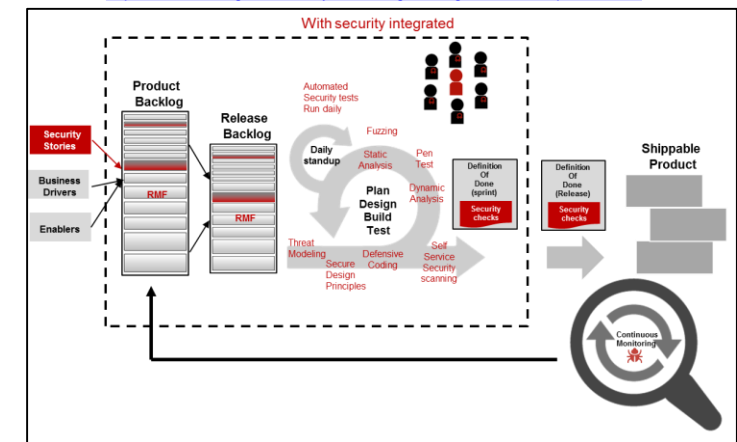http://www.ndia.org/divisions/systems-engineering/studies-and-publications

Metrics

Cost, cycle time, defects, rework, …

Business improvement that affects the bottom line
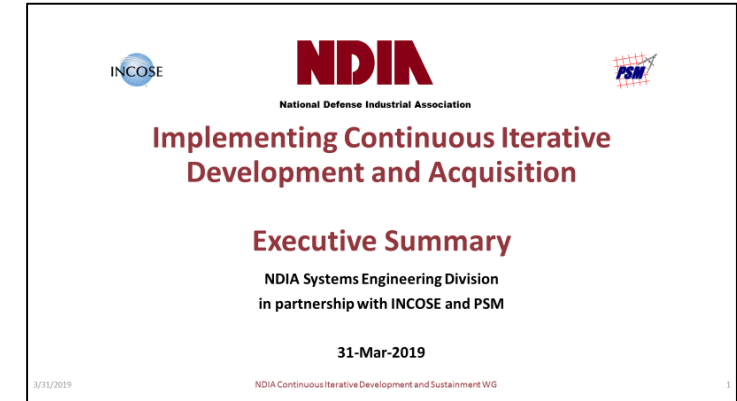
Both DoD and industry see a similar future – and it is DevOps

Harris Business Context for DevOps

Communication Systems

Tactical and airborne radios, night vision technology, and defense and public safety networks

Space and Intelligence Systems

Complete solutions encompassing advanced sensors and payloads, processing systems, and analytics for global situational awareness, space superiority missions, and Earth insights

Electronic Systems

Electronic warfare, avionics, robotics, advanced communications and maritime systems for the defense industry, as well as air traffic management solutions for the civil aviation industry

Diverse domains, business segments and products

Geographically distributed

Engineering Demographics - By Discipline

SE · EE · ME · SW
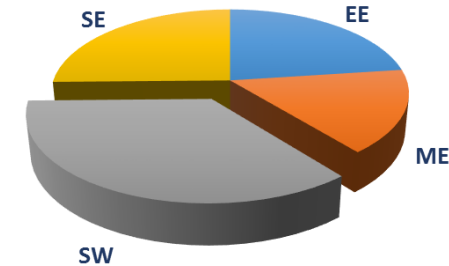
Rapid growth in SW demand
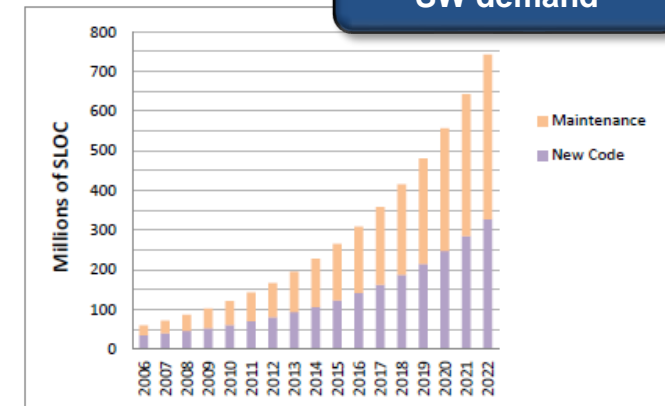
Figure 1. Forecast of DoD Software Demand

Software Productivity Trends and Issues. David Tate, Institute for Defense Analyses. March 2017.
https://www.ida.org/idamedia/Corporate/Files/Publications/IDA_Documents/CARD/2017/D-8367.pdf

Harris business is increasingly dependent on software across diverse domains – with a motivation for improvement driven by both internal and external factors

Challenges

Changing the culture
- Legacy to DevOps
- Automation (speed, speed, speed)
- Skill mix, support disciplines
- Industry and government, engagement

Enterprise metrics in DevOps era
- Productivity, quality, estimate accuracy, …
- Building new historical DBs for estimates

Acquisition and contracting
- Streamlining policies, constraints
- Source code availability vs. IP

Integrating cybersecurity into SW factory processes and toolchain
- DevSecOps

How did we get here?
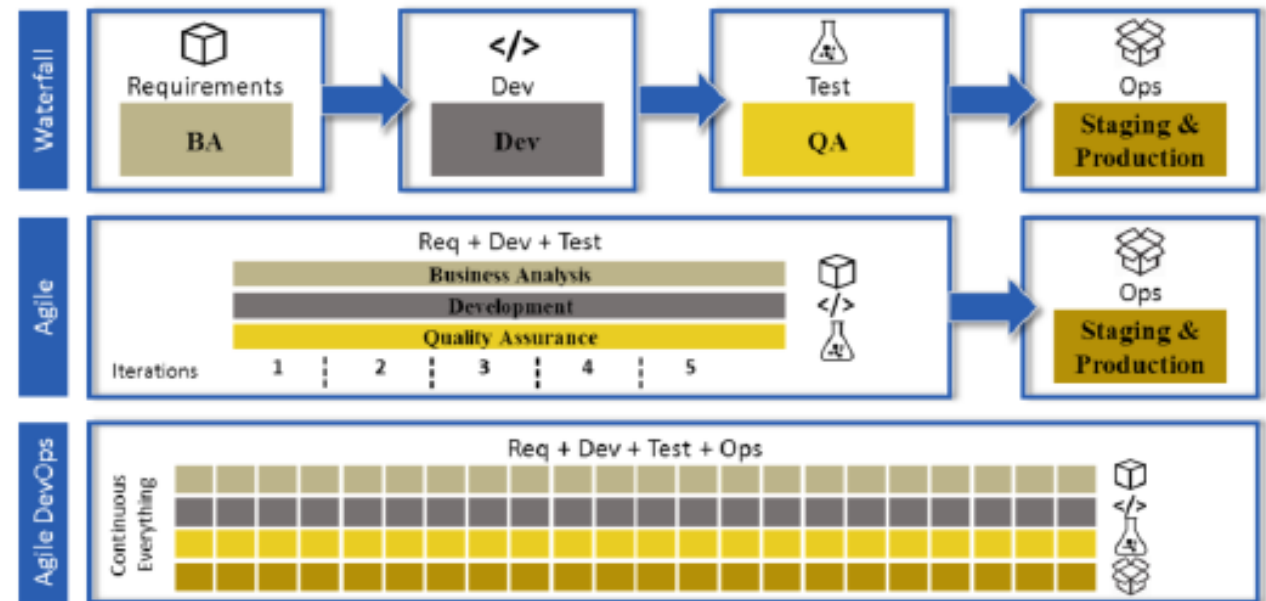Shift from Waterfall to Agile, from Silos to Collaboration

Figure 3. Theories of Software Development[4]

Defense Science Board (DSB) Task Force on the Design and Acquisition of Software for Defense Systems
https://www.acq.osd.mil/dsb/reports/2010s/DSB_SWA_Report_FINALdelivered2-21-2018.pdf

Breaking past traditions to do business differently

DevOps Program Transition Strategy

	People	Process	Tools	Training

| Assessment | Infrastructure | Transition | Continuous Integration | Continuous Delivery/ Deployment | Internal Ops |

Continuous Enterprise Improvement

Communities of Practice	Transition status, Training, Mentoring	Measure Results	Build on Success; Rewards and Recognition

COI DIRECTORY — ONLINE HARRIS COMMUNITIES

DevOps | COI Portal

Program	I	T	CI	CD
A	FY19 Q1	FY19 Q1	FY19 Q3	FY20 Q1
B	FY19 Q1	FY19 Q1	FY19 Q3	FY20 Q2
C	FY19 Q2	FY19 Q3	FY19 Q4	FY20 Q3
D	FY19 Q1	FY19 Q2	FY20 Q1	FY20 Q3
E	FY19 Q1	FY19 Q3	FY19 Q4	FY20 Q3

HBX — Harris Business Excellence

Support programs with their DevOps transition - Success breeds more success

Managing the DevOps Pipeline
Integrated processes, capabilities, and tools

Continuous Integration
- Code Development
- Automated SW Build
- Automated Unit Test
- Automated Quality Check

Tools: git, make, Maven, Gradle, CppUnit, googletest, JUnit, sonarqube, klocwork

Infrastructure
- Project Management
- CI/CD Conductor
- Version Control / CM
- Security

Tools: JIRA, Bamboo, Jenkins, splunk>, CHEF

Continuous Delivery/Deployment
- Package & Archive
- Automated Deployment
- Integration & Test
- Labs & Environments

Tools: JFrog Artifactory, Nexus, ANSIBLE, puppet, TestComplete, ZEPHYR, SoapUI, Nagios

- Operations
- Maintenance
- Field Support

**Processes are supported by tools, not built around them -
plan tool chains for adaptability to change, program needs, and future capabilities**

Executive Role in DevOps Transition

HARRIS®

Success Factors

- **Establish vision, strategy and objectives**
- **Visible commitment and engaged sponsorship**
- **Investment in infrastructure**
- **Enable software factories**
- **Establish goals and measures (KPIs)**
- **Set expectations for results**

Implementation Strategy

DevOps advisory board	• Industry & functional collaboration • Common metrics • Governance
Enterprise DevOps Strategy	• Software factories • Remove silos • Standard process & objectives
Program Execution	• Strengthen product quality • Quickly meet customer demands • Shift execution risk left

Success starts from the top – at Harris, or at any enterprise

Contact Information

Jorge Relea-Gonzalez

Senior Director – Software Engineering

Harris Corporation, Space and Intelligence Systems

Melbourne FL

jorge.relea-gonzalez@harris.com

http://www.harris.com/