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# Automated Cyber Hardening of Mission Management Systems


## Raytheon IIS

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# Overview

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- This talk represents a 2+ year investment in developing automated strategies and approaches  for cyber hardening infrastructure of mission management systems.
- Topics we will cover include:
  - Mission Management System Commonalities
  - But Security and STIGs are Hard!
  - Why Automate?
  - Multiple Programs – Multiple Solutions
  - Our Solution – STIGLER
  - Equal Press - Other Solutions
  - Recommendations

# Mission Management System Commonalities

Merges sophisticated cutting-edge mission planning software

To specialized, long-life (and often ancient) command hardware

## Hardening Requirements

- 7x24 uptime,
- stable technologies & environments
- Cross Platform (Windows & Linux)
- Continual Patching
- Short Maintenance Windows
- Enterprise Scale (100s – 1,000s of hosts)

**Mission Management Systems have Specialized Security Requirements**

# But Security and STIGs are Hard!

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- **So many products go into our Systems!**
  - Everyone loves Commercial Off the Shelf (e.g. Oracle, RedHat, Microsoft)
  - Open Source is equally prevalent (Linux, Apache, MySQL and others)
- **So many rules!**
  - DISA now has over 400 STIGS or SRGs, with thousands of settings
- **So many roles!**
  - RMF calls for Role Based Access Control, meaning an Operator workstation has a different posture than network administrator workstation, even though the same products are installed.
- **So many baselines!**
  - Software patches & upgrades mean one or more baseline per machine role
  - Baseline-specific exceptions, exemptions, and risk profiles
  - With quarterly updates, and continuous integration the job is never done
- And then there's the Cloud
  - How do you deploy to hundreds of servers on AWS or Azure?

# Why did Raytheon Automate Hardening?

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- **Speed**
  - Machines are faster than people
  - Support short maintenance windows for patches and updates.
  - Reduce build and checkout times for Complex environments from weeks to days
- **Cost**
  - Allows us to leverage senior Systems Administrators for multiple systems
  - Let machines do the simple stuff. Save the people for more challenging tasks.
- **Consistency**
  - **Human involvement** = human error
  - **Test as you build** – Adopt SW “Unit Test” approach to test a STIG setting in the same way that you set it

# Our Approach

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- Test on environments of hundreds or machines
  - Mix of Windows, Linux, COTS and Open Source (FOSS)
  - Mix of real and virtualized assets/Mix of Servers and Workstations
  - Hundreds of different Apps
- Demonstrate STIG Compliance
  - A “typical” baseline includes > 50 STIGS/SRGs and > 2,500 separate STIG Checks
  - Assume use of ACAS/Nessus for STIG verification (DoD standard)
  - Scripts can be used for “check out” of configuration
- Flex Multiple Deployment Scenarios
  - Periodic Patch Windows, Full Rebuild of environments, Point Rebuilds
- Automate the Humans
  - Develop detailed documentation so everyone knows what to do

**Through Automation, we reduced deployment/checkout times from 3 weeks to 4 hours!!**

# Our Approach (2) – The details

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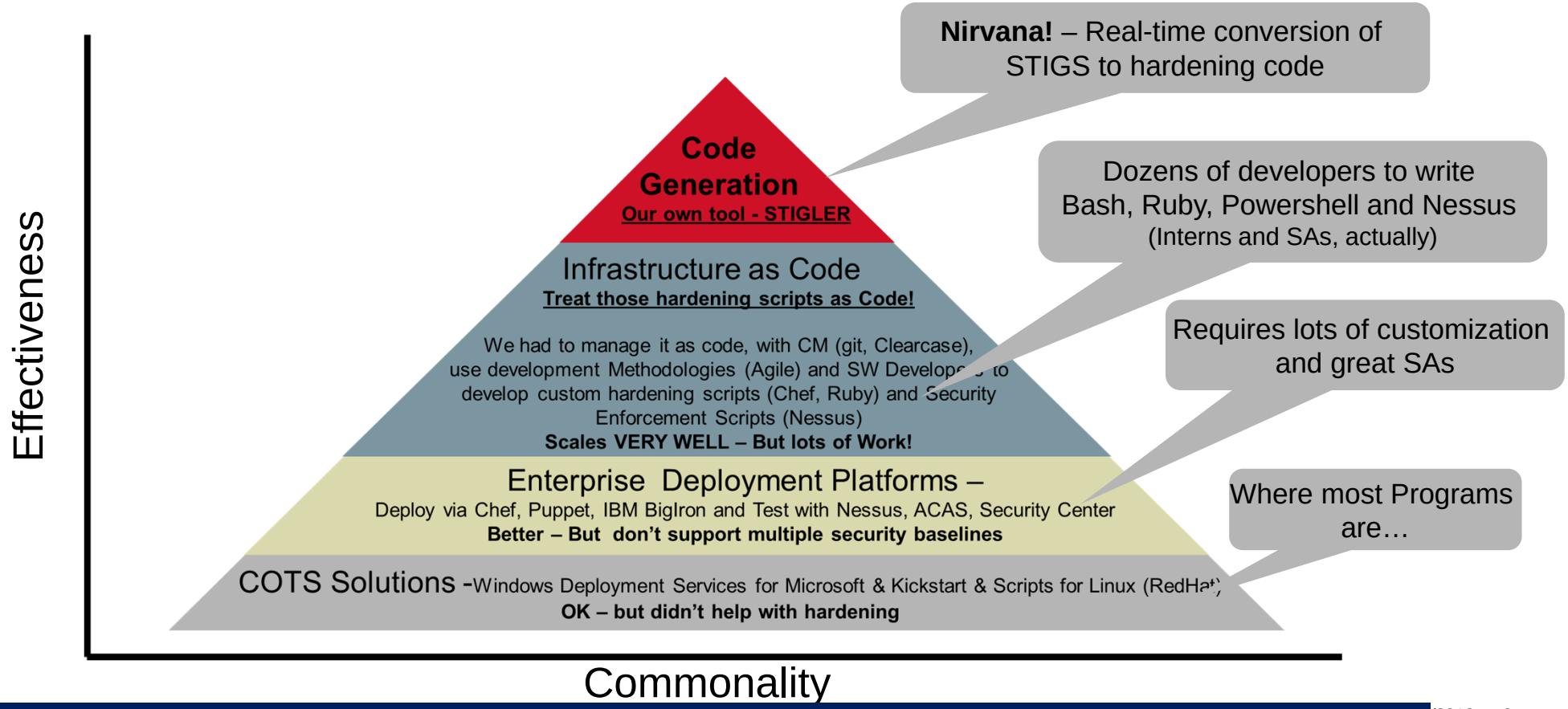
- Collect Scripts from programs
  - Every SA has a “home grown” solution
- Trade Studies
  - Evaluated dozens of deployment, cyber and enforcement platforms
- Wrote Lots of Scripts
  - Learned that college interns excel at this!
  - Focused on DevOps
  - Learned how to manage Infrastructure Deployment scripts as Code
    - Lots of testing, peer reviews
    - CM managing and versioning these scripts
- Tested
  - Took advantage of DevOps and Cloud to deploy, test and repeat

# Raytheon's Hierarchy of Cyber Maturity




**Reduced Deployment/Checkout times from 3 weeks to 4 hours**

# Our Solution – STIGLER

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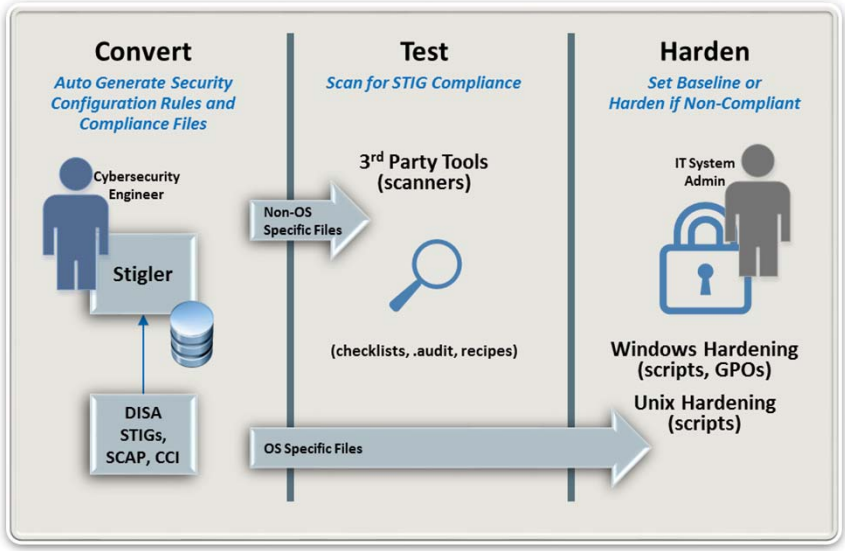
"To STIG" (v): the process of automatically deploying STIGs to the Enterprise and make System Administrator's lives easier

STIGLER

- Ingest STIG Data from DISA
  - No manual input
- Export to Enterprise Tools
  - Powershell, Group Policy, Bash, Ruby (Chef), Nessus (Proprietary)
- Automated correlation of STIG rules with SCAP/OVAL data
  - Know the setting and desired value for each rule right away.
- Per-rule management
  - Modify or exclude rules quickly.
- Baselines Management
  - Exemptions and exclusions applied to a system role, not the whole system.



# Equal Press - Other Solutions

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- **The OpenSCAP Project** – a collection of Open Source Security Policies, tools and Standards


- **SIMP** – an open source fully automated framework, built on Puppet – released by the NSA

- **Chef Compliance** – assess an enterprise's adherence to compliance requirements


- **SteelCloud – "Config OS"** – COTS product that Automates STIG deployment

SteelCloud®
*Simplifying Information Assurance*

# Conclusion

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- Through use of automation, we were able to reduce rebuilds from weeks down to hours
  - We leveraged automation to improve deployment products (Chef/Puppet) and STIG verification (ACAS)
  - Adopted DevOps principles to deploy continuously to learn how to do it fast and repeatable
  - Complemented automation with Build Orchestration Books (“BOBs”) to make human actions repeatable
  - Created scripts to harden COTS and FOSS Operating Systems, Application Platforms and Applications

- Buy all the STIGLERs. They make great stocking stuffers.

# Thank You!!

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