

# Improving Processes the NSA Way

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# Who is NSA?

- The National Security Agency was established by the Secretary of Defense on November 4, 1952.
- NSA is part of the US Department of Defense
  - The Director of NSA (DIRNSA) is always a general officer of grade O-9 (occasionally higher) from any military service.
  - The Deputy Director of NSA (D-DIR) is always a DoD civilian employee.





# What does NSA do?

- NSA's core missions are to protect U.S. national security systems and to produce foreign signals intelligence information:
  - Information Assurance
  - Signals Intelligence
  - Network Warfare





# Information Assurance Mission

The information assurance mission confronts the formidable challenge of preventing foreign adversaries from gaining access to sensitive or classified national security information.





# Signals Intelligence

The signals intelligence mission collects, processes, and disseminates intelligence information from foreign signals for intelligence and counterintelligence purposes and to support military operations.





# Network Warfare

NSA enables Network Warfare operations to defeat terrorists and their organizations at home and abroad.





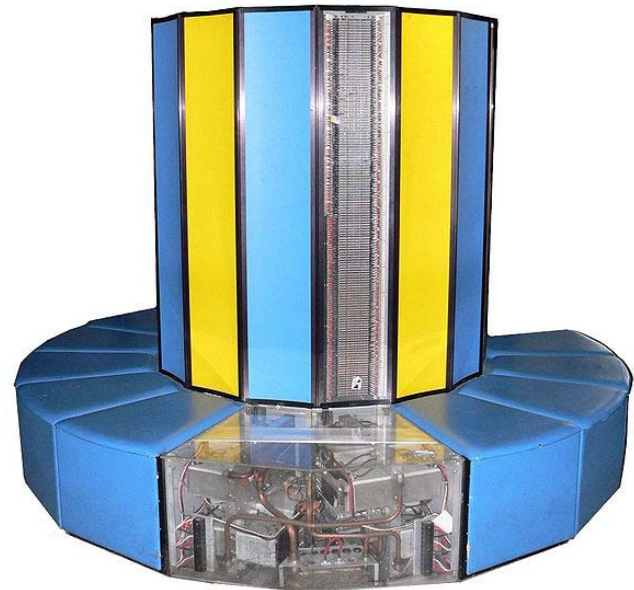
# NSA's Mission and Systems Development

- The Information Assurance, Signals Intelligence, and Network Warfare missions are highly technical.
  - Systems development and integration – particularly software-intensive systems – are a key enabler in fulfilling these missions.
- NSA has many people working on many software development projects.
- Facilitating timely software development that delivers quality sufficient to fulfill the mission are of great interest to NSA.



# NSA Process Improvement History

- Early 1990's – early 2000's:
  - JACKPOT and Software Engineering Knowledge Base Center
- 2003 – 2008:
  - LIONSHARE
    - One (small) organization achieves CMMI ML 2
- 2008 – Present:
  - NSA Way







# What is “NSA Way”?

- It is *not* the name of NSA’s entrance road.
  - That would be Canine Road.
- It is *not* the name of the most popular candy bar at NSA.
  - That would be *Milky Way*.
- It is *not* how all developers at NSA currently do their jobs.
  - Although we wish it were...And more developers are on board every day!
- The NSA Way is:
  - “...a unified framework for building large, complex, primarily software systems that meet the diverse needs of NSA missions. It is lightweight, intuitive, and independent of project size and development methodology.”

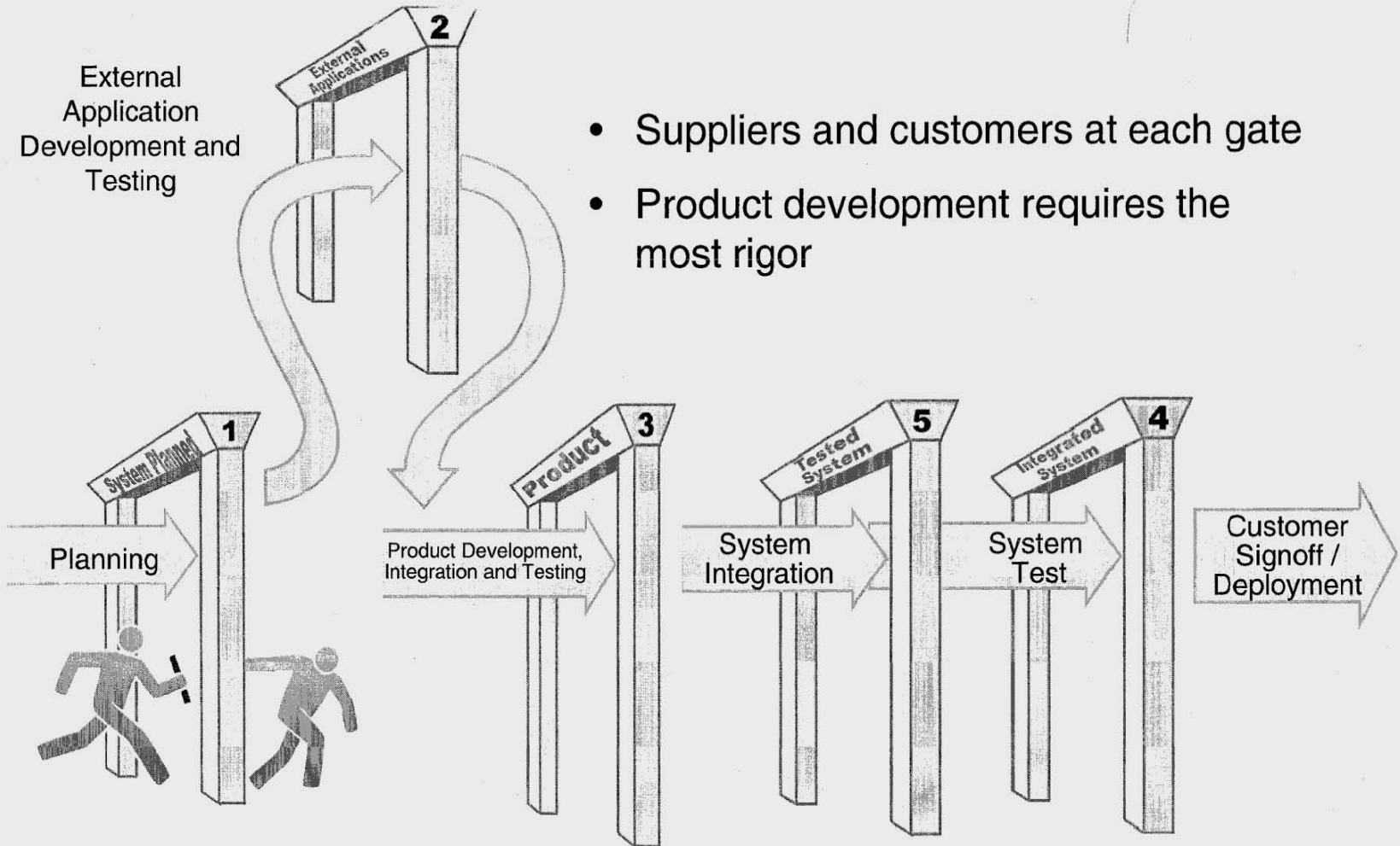


# How does NSA Way Fit in NSA?

- NSA Way is an initiative sponsored by the chief of the Technology Directorate.
- The initiative is managed from the Enterprise Systems Engineering and Architecture Associate Directorate.
- NSA Way defines core expectations for how systems and software development are done in the Technology Directorate.
- NSA Way deploys 'coaches' into NSA systems and software development organizations to provide implementation guidance and to assess progress.
- NSA Way is implemented through:
  - Life cycle milestone control 'gates'
  - Processes
  - Metrics



# NSA Way Gates





# NSA Way Required Activities

- 'Establish and maintain' coding standards
- 'Establish and maintain' configuration management processes
- 'Establish and maintain' internal and external interface specifications
- Regularly review and improve development and test methodologies
- 'Establish and maintain' verification processes
  - Conduct code inspections
  - Implement software unit testing
- 'Establish and maintain' a defect tracking and reporting system



# NSA Way Metrics

- Delivery of capabilities
  - Number of features planned versus delivered
  - Number of unplanned features delivered
- Time to market
- Quality
  - Cumulative defects versus time per release
  - Customer satisfaction
  - Root cause analysis of fielded defects
  - System availability in the field
  - Code review results
  - Unit test results
- Efficiency
  - Lessons learned
  - Gate pass/fail results
  - Assessment by NSA Way Coach



# NSA PI Challenges

## (Have You Heard These Before?)

- ‘I produce good software! I don’t need help.’
  - Many developers, including NSA developers, honestly think that they are producing good systems and software – even when the number of defects being fielded indicates otherwise.
  - Internal to NSA, many developers become the sole technical authority in a particular domain.
    - Being the sole technical authority limits a developer’s ability to compare their successes (and failures) with their peers.
- ‘Not invented here.’
  - NSA’s mission leads to compartmentalization – many developers have home-grown development traditions.
- ‘Process gets in the way of mission.’
  - As in many development cultures, success by being a hero is more exciting than success by being a good engineer.



# NSA Way PI Solutions (1)

- Senior Level Support and Visibility
  - NSA Way is sponsored by Chief of the Technology Directorate.
    - Challenges faced by the NSA Way initiative are raised to the Chief of the Technology Directorate and, as warranted, to the Deputy Director of NSA
  - NSA Way is championed by:
    - NSA senior technical leaders,
    - The NSA systems engineering organization, and
    - A member of NSA's Advisory Board (NSAAB)
      - This NSAAB expert provides NSA Way with a champion who has access to all levels of NSA leadership, but is outside of NSA's internal politics.



## NSA Way PI Solutions (2)

- Strong emphasis on the supplier – customer dialogue throughout the development life cycle.
  - This isn't process improvement for process's sake, but focus on improving the ability to deliver systems faster with fewer critical defects against customer needs.





# NSA Way PI Solutions (3)

- De-emphasis on the 'Process-word'!
  - CMMI has a mixed history of success at NSA.
    - To some personnel, this mixed history diminishes CMMI's credibility, even though past improvement challenges were more about change management than CMMI itself.
  - NSA Way reflects CMMI practices – but not explicitly.
    - NSA Way down plays the role of CMMI, focusing instead on mission-oriented concepts:
      - NSA Way supports developing and deploying applications for the Signals Intelligence, Information Assurance, and Network Warfare missions
    - NSA Way does correlate well with CMMI – which is to be expected, since CMMI is fundamentally a collection of best practices and NSA Way is implementing software best practices.



# Contrast Between NSA Way and Past NSA PI Initiatives

	Examples from Past Initiatives	NSA Way
<b>Senior Management Support</b>	Supported by a junior 'senior' leader who could not influence other key stakeholders. No clear champion other than the sponsor	<ul style="list-style-type: none"> <li>Supported at the highest level</li> <li>Championed by senior personnel both within key offices and across the organization.</li> </ul>
<b>Participation by respected technical leaders</b>	Limited or none	Developed and supported by some of the organization's technical leads.
<b>Based on CMMI (or other model)</b>	Explicitly	Implicitly
<b>Appraisals / Assessments</b>	Participating programs went through an initial SCAMPI class A appraisal as an entry condition for participating.	Monthly assessments directly connected to limited areas where technical leads agree there is positive return-on-investment.



# NSA Way Success Stories (1)

- #1 NSA Way development life cycle terminology and expectations are accepted throughout some of NSA's most important programs.
- #2 Other important NSA initiatives are joining NSA Way as a deployment mechanism.
  - Network and software security assurance
  - Compliance with legal and policy regulations



## NSA Way Success Stories (2)

- Gate results: Gate behavior and results are trending in the right direction.
- Process results: 50% of the initial project set are fully compliant with NSA Way required processes.
- Over the past 6 months:
  - 60% increase in the number of NSA Way projects
  - Average process compliance increase from 45% to 61%



# Future NSA Way Directions

- Continue to expand and improve across the Technology Directorate
- Establish a reward structure
- NSA Way 2.0
  - Analyze data on the current framework
  - Research additional best practices
  - Engage the community



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