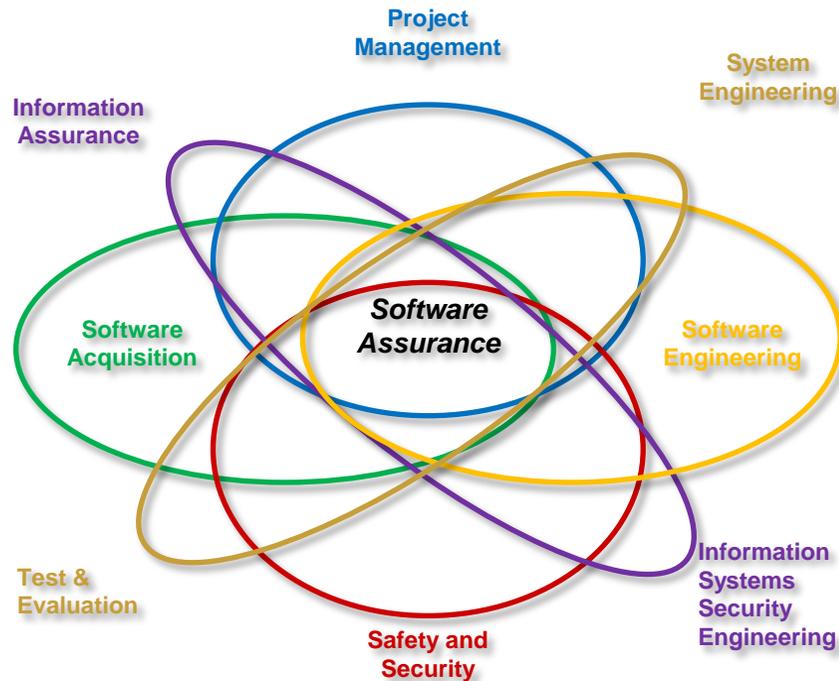




Benchmarking Software Assurance Implementation

Nadya Bartol
Michele Moss
December, 2010

SwA requires multi-disciplinary collaboration

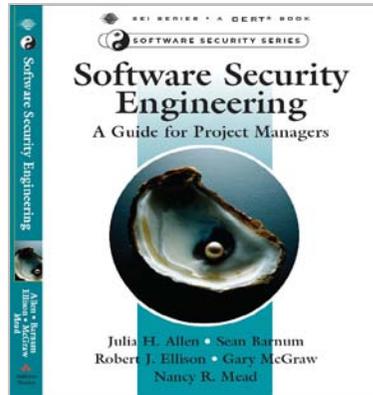
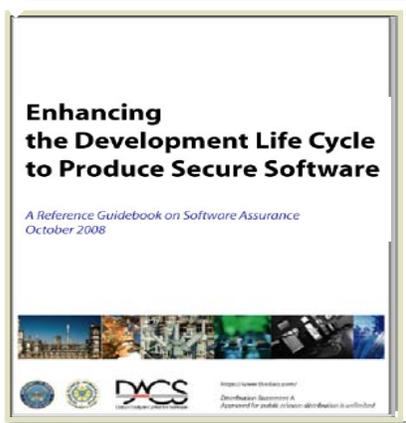


Communication Challenges	
▶ Vocabulary	▶ Experience
▶ Reserved Words	▶ Objectives
▶ Priorities	▶ Drivers
▶ Perspective	▶ Risks

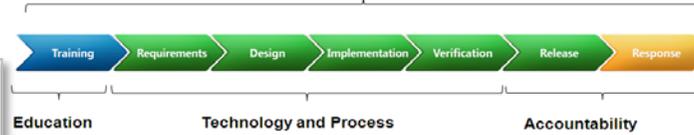
Source: <https://buildsecurityin.us-cert.gov/swa/procesrc.html>

Without a common language we cannot communicate across disciplines

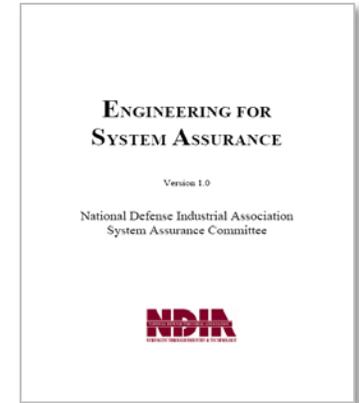
Until recently, SwA communication tools focused on developer-centric audiences



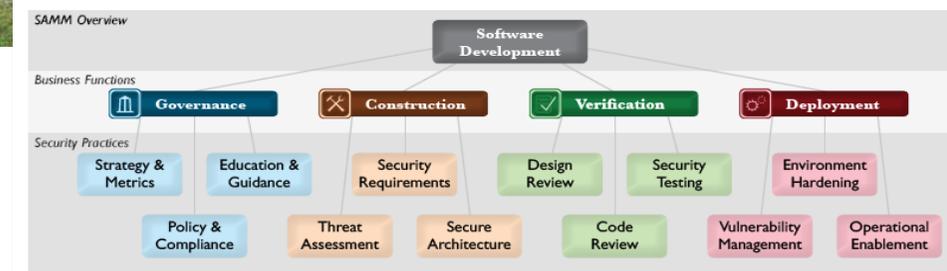
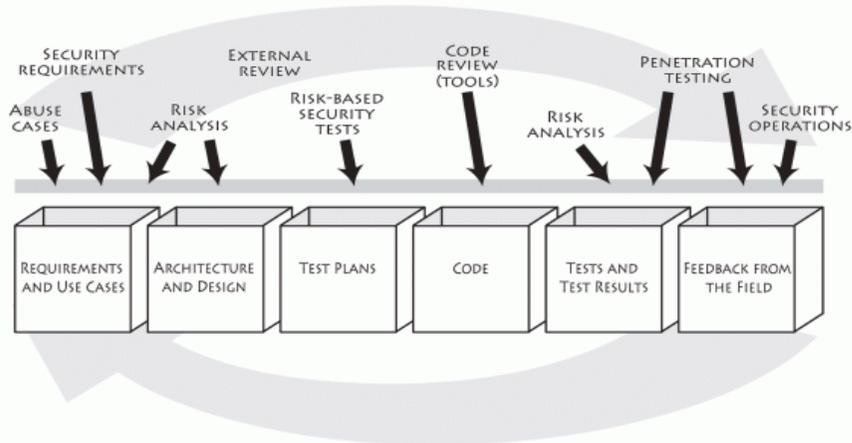
Executive commitment → SDL a mandatory policy at Microsoft since 2004



<http://www.microsoft.com/sdl>



Assurance for CMMI®



Different types of benchmarks exist – process and product

▶ *The chicken.... (a.k.a. Process Focused Assessment)*

- *Management Systems (ISO 9001, ISO 27001, ISO 2000)*
- *Capability Maturity Models (CMMI, Assurance PRM, RMM, Assurance for CMMI)*
- *Lifecycle Processes (ISO/IEEE 15288, ISO/IEEE 12207)*
- *COBIT, ITIL, MS SDL, OSAMM, BSIMM*

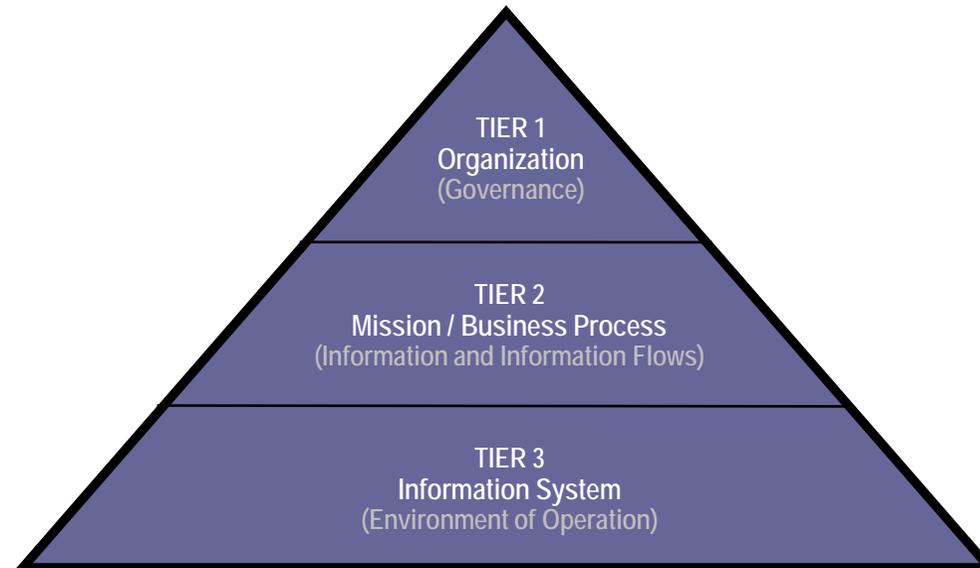


▶ *The egg ... (a.k.a Product Focused Assessments)*

- *SCAP - NIST-SCAP*
- *ISO/OMG W3C – KDM, BPMN, RIF, XMI, RDF*
- *OWASP Top 10*
- *SANS TOP 25*
- *Secure Code Check Lists*
- *Static Code Analysis*
- *Pen Test Results*



To effectively produce better code, SwA needs to translate to organizational and mission/ business-focused stakeholders



Source: NIST 800-37 Guide for Applying the Risk Management Framework to Federal Information Systems A Security Life Cycle Approach

- ✓ **Applicable in diverse contexts – e.g., Defense, National Security, Finance, Health care, Aviations, Telecommunications**
- ✓ **Become a source of market differentiator rather than a source of liability or misunderstanding in acquisition decisions**

Executives want to understand the benefits to their organization

Executive Vocabulary

- ▶ Contributions to the bottom line
- ▶ Alignment with business strategy/plan
- ▶ Financial return for investing

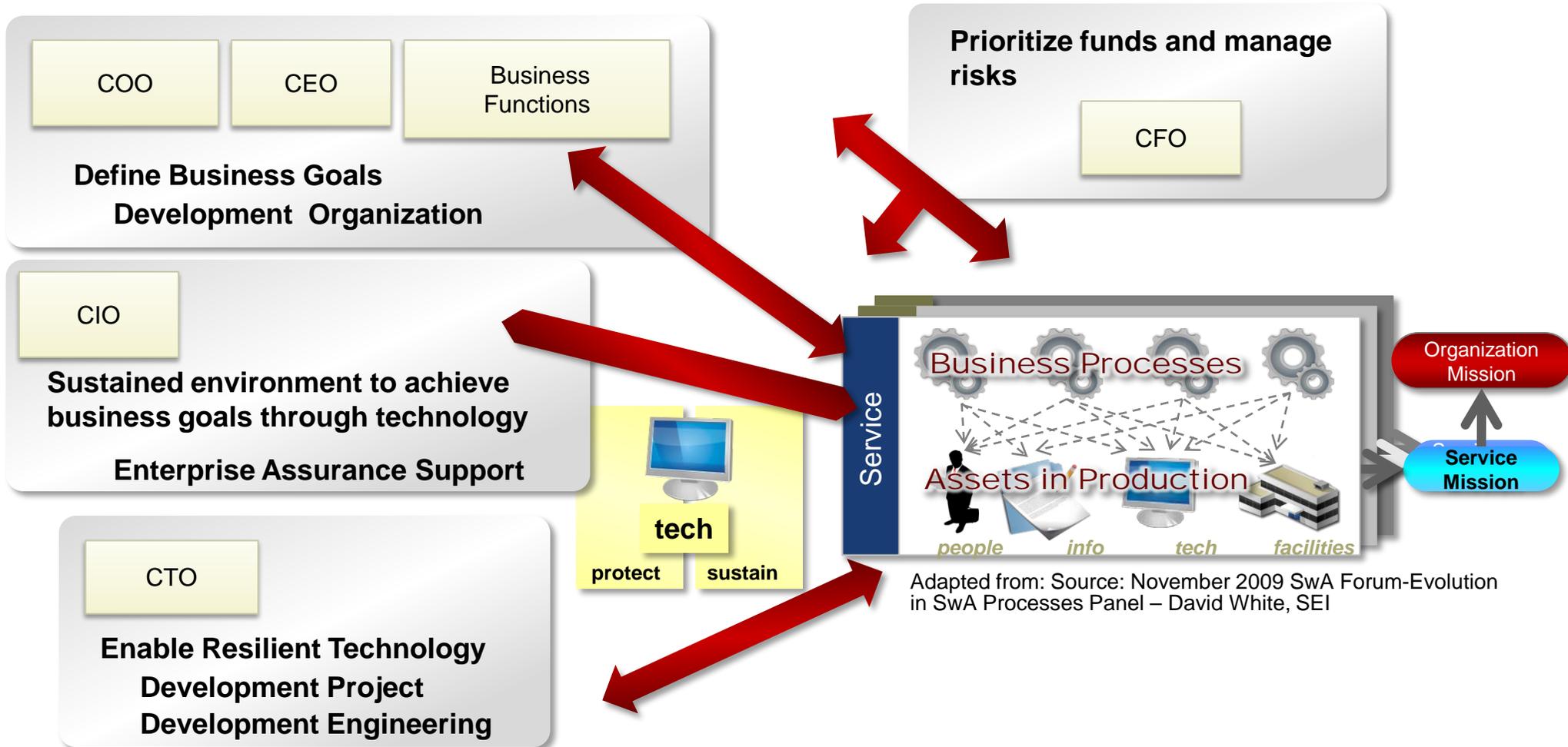
Payback Period
Net Present Value
Benefit/Cost Ratio
Return on Investment

Application Security Gaps

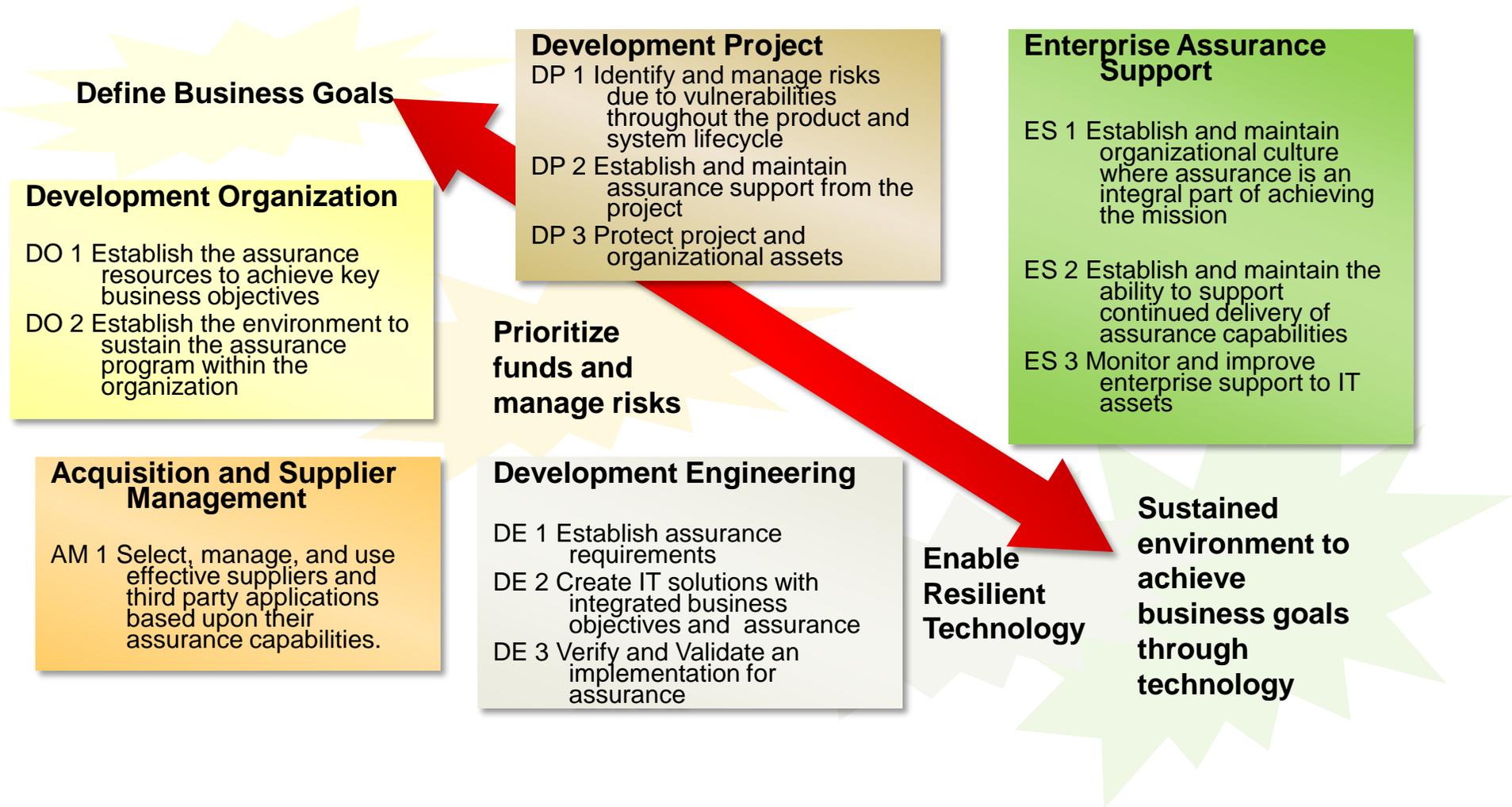
- ▶ Explicitly connect with business strategy and mission
- ▶ Address accomplishments
- ▶ Connect the dots at the enterprise level

It is a long term management process that may take time to demonstrate measurable results

Resiliency Management Model provides a framework for presenting our problem in executive terms

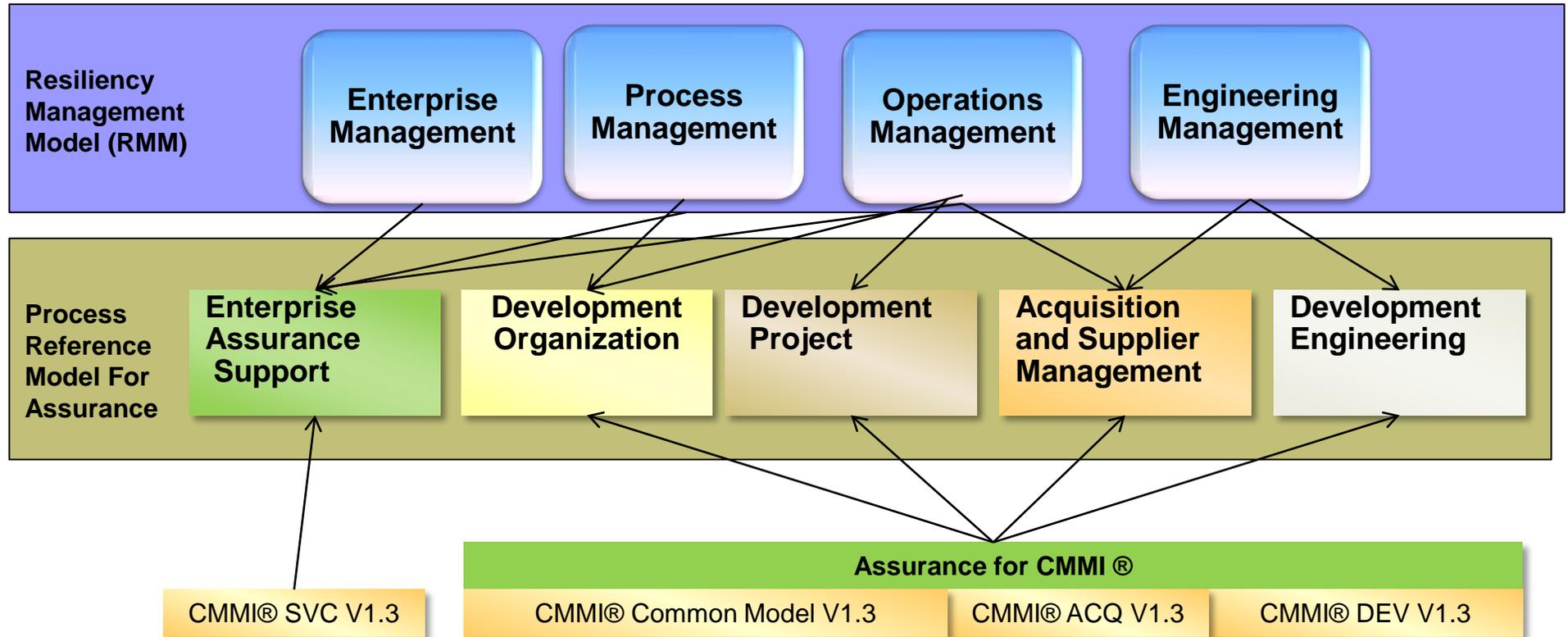


Assurance PRM provides a “vertical slice” that addresses assurance from executive to developer



https://buildsecurityin.us-cert.gov/swa/proself_assm.html

Assurance PRM holistically connects executive-focused RMM and more detailed CMMI frameworks



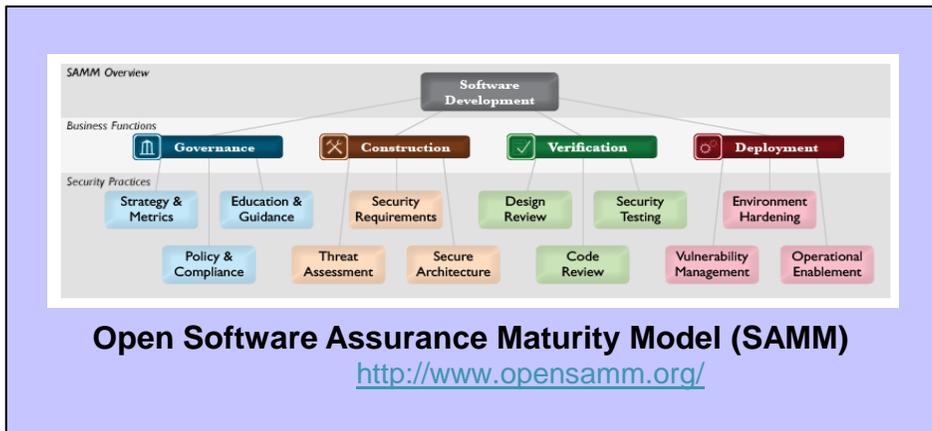
https://buildsecurityin.us-cert.gov/swa/proself_assm.html

Multiple tools exist for measuring the implementation of SwA practices

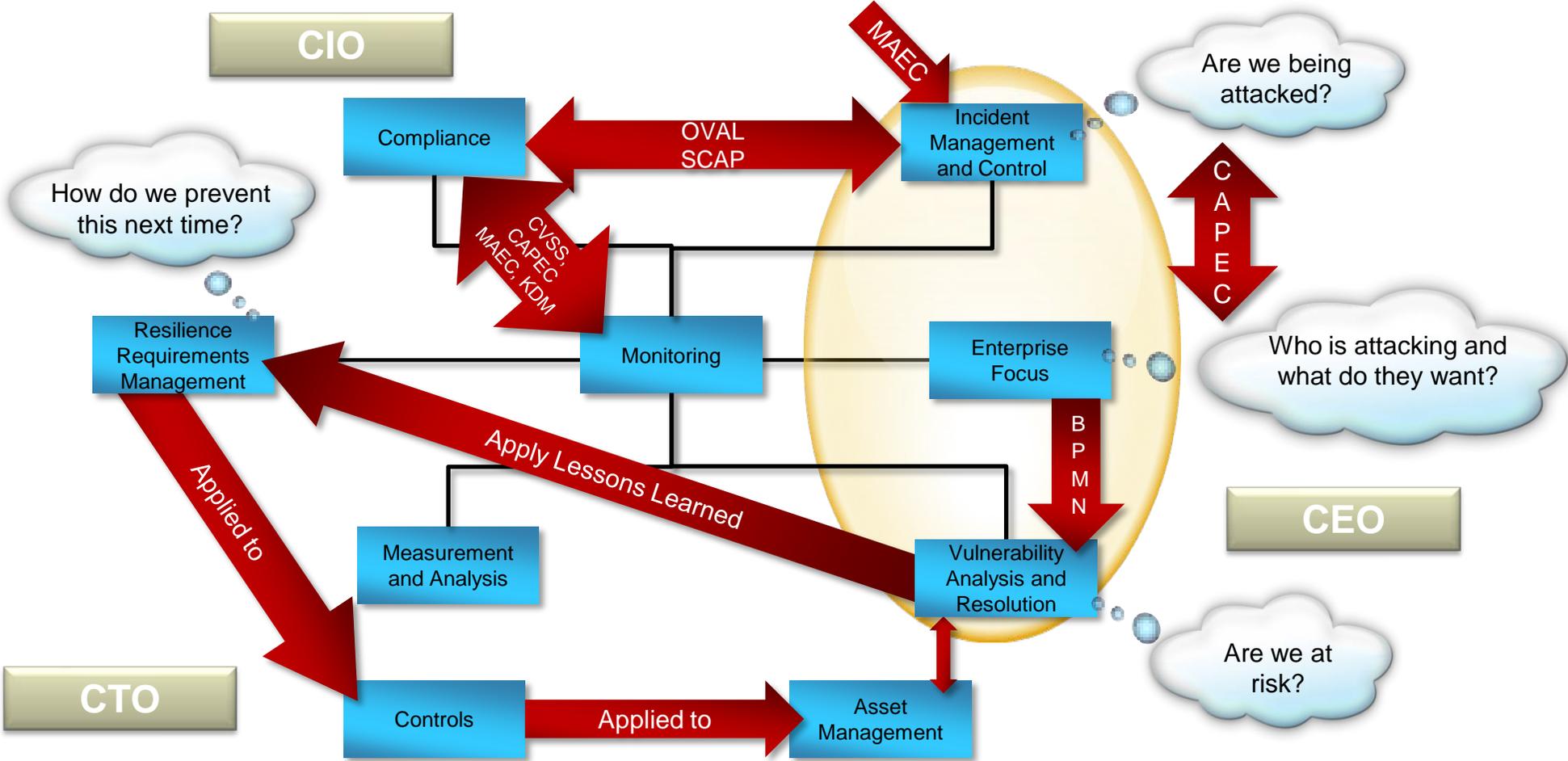
Assessment Tool	Overview	Perspective
Capability Maturity Model Integration (CMMI)	Defines the “What” for systems and software development, services, and acquisition	Development, services, acquisition, and associated organizational elements
Resiliency Management Model (RMM)	Defines the “What” for converging security, business continuity, and IT operations in support of operational risk management	Enterprise Operations
Assurance Process Reference Model (PRM)	Defines the “What”-level practices for addressing assurance in the context of software/system, development, operations, and enterprise	Development and associated organizational and enterprise elements
Assurance for CMMI	Defines the “What”-level practices for addressing assurance in the context of software/system, development,	Development /integration in the context of CMMI
Microsoft Secure Development Lifecycle (SDL)	Detailed example of “How” for implementation of engineering efforts	Development
Open Software Assurance Maturity Model (SAMM)	Example of “How” from the context of software assurance with many examples portable to security architecture	Development, operations, and enterprise
Build Security In Maturity Model (BSIMM)	Example of “How” from the context of real world examples primarily from large product vendors and financial services organizations	Development, operations, and enterprise
SwA Checklist for Software Supply Chain Risk Management	Provided a consolidated view of the models addressing the “How” of assurance goals and practices	Development, operations, and enterprise

The SwA Checklist for software supply chain risk management identifies common elements

Software Assurance Checklist for Software Supply Chain Risk Management															
Item #	Strategy & Metrics	Policy & Compliance	Training & Guidance	Threat Assessment	Security Requirements	Secure Design	Architecture Analysis	Code Analysis	Risk Based Security Testing	Penetration Testing	Vulnerability Management	Incident Response	Agreement Requirements	Evaluation & Substantiation	Agreement Management
Goal:	Establish and execute plan for security software across the supply chain	Enforce and track compliance with security plan, policies and other compliance requirements	Partner training and awareness program to ensure staff are properly trained to secure software supply chain	Perform threat modeling and security requirements that will secure a secure software supply chain	Develop and enforce security requirements that will secure a secure software supply chain	Design security into the software design	Review software designs to ensure they meet the documented security requirements	Analyst code to identify bugs before releasing to production	Perform automated testing in part of QA process to identify flaws	Conduct penetration testing to test software from hacker's perspective	Establish robust processes to identify, prioritize, and fix software vulnerabilities	Proactive, reactive, and manual software verification	Manager negotiates and documents regular security requirements	Review and substantiate regulatory, contractual and management controls and processes for each security requirement	Enforce, monitor, measure, and update regular security requirements
Practices:	Establish Security Information Management and Incident Response	Identify and document relevant compliance	Establish security awareness program	Build an effective threat intelligence program	Perform threat modeling and security requirements that will secure a secure software supply chain	Design security into the software design	Review software designs to ensure they meet the documented security requirements	Analyst code to identify bugs before releasing to production	Perform automated testing in part of QA process to identify flaws	Conduct penetration testing to test software from hacker's perspective	Establish robust processes to identify, prioritize, and fix software vulnerabilities	Proactive, reactive, and manual software verification	Manager negotiates and documents regular security requirements	Review and substantiate regulatory, contractual and management controls and processes for each security requirement	Enforce, monitor, measure, and update regular security requirements
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Understanding investment *impact* across the organization requires analysis and interpretation of diverse measures



Adapted from September 2010 SwA Forum, CERT RMM for Assurance , Lisa Young, SEI

To be effective, benchmarks should address all stakeholders and all relevant considerations

Process and Organization

- ▶ Process-based gap analysis or “SCAMPI-like” assessment
- ▶ Capability maturity benchmarks
- ▶ Expectations for repeatable results

Specific Practices

- ▶ Industry defined SwA program implementations
- ▶ Specific implementation paths
- ▶ Explicit milestones for tracking progress

- ▶ Resiliency Management Model (RMM)
- ▶ Assurance Process Reference Model (PRM)
- ▶ Assurance for CMMI
- ▶ Capability Maturity Model Integration (CMMI)

- ▶ Open Software Assurance Maturity Model (SAMM)
- ▶ Microsoft Secure Development Lifecycle (SDL) Optimization Model
- ▶ Build Security In Maturity Model (BSIMM)
- ▶ SwA Checklist for Software Supply Chain Risk Management

We need to use a toolbox to be successful

- ▶ Very little of this is rocket science, however, it may be tedious and not exciting at times
- ▶ Both Process and Product assessments are valuable within specific contexts – we need to explicitly decide on our objectives to use them right
- ▶ There are LOTS of ways to communicate – no single way speaks to all audiences NOR it is effective by itself
- ▶ We are ALL trying to say the same things – we just use different words
- ▶ There is plenty of resources out there on how to develop better code
- ▶ There are also resources out there on how to demonstrate value

Benchmarking is possible today by using the wealth of the available content and applying it to the problem!!!

Nadya Bartol
Senior Associate

Booz | Allen | Hamilton

Booz Allen Hamilton Inc.
One Preserve Parkway
Rockville, MD 20852
Tel (301) 922-9537
bartol_nadya@bah.com

Michele Moss
Lead Associate

Booz | Allen | Hamilton

Booz Allen Hamilton Inc.
8283 Greensboro Dr
McLean, VA 22102
703-377-1254
moss_michele@bah.com

Back-up

https://buildsecurityin.us-cert.gov/swa/proself_assm.html

The DHS SwA Processes and Practices Working Group has synthesized the contributions of leading government and industry experts into a set of high-level goals and supporting practices (an evolution of the SwA community's Assurance Process Reference Model)

The goals and practices are mapped to specific industry resources providing additional detail and real world implementation and supporting practices

- Assurance Focus for CMMI
- Building Security In Maturity Model
- Open Software Assurance Maturity Model
- CERT® Resilience Management Model
- CMMI for Acquisition
- CMMI for Development
- CMMI for Services
- SwA Community's Assurance Process Reference Model –Initial Mappings
- SwA Community's Assurance Process Reference Model - Self Assessment
- SwA Community's Assurance Process Reference Model – Mapping to Assurance Models

Other valuable resources that are in the process of being mapped include

- NIST IR 7622: DRAFT Piloting Supply Chain Risk Management Practices for Federal Information Systems
- NDIA System Assurance Guidebook
- Microsoft Security Development Lifecycle
- SAFECode