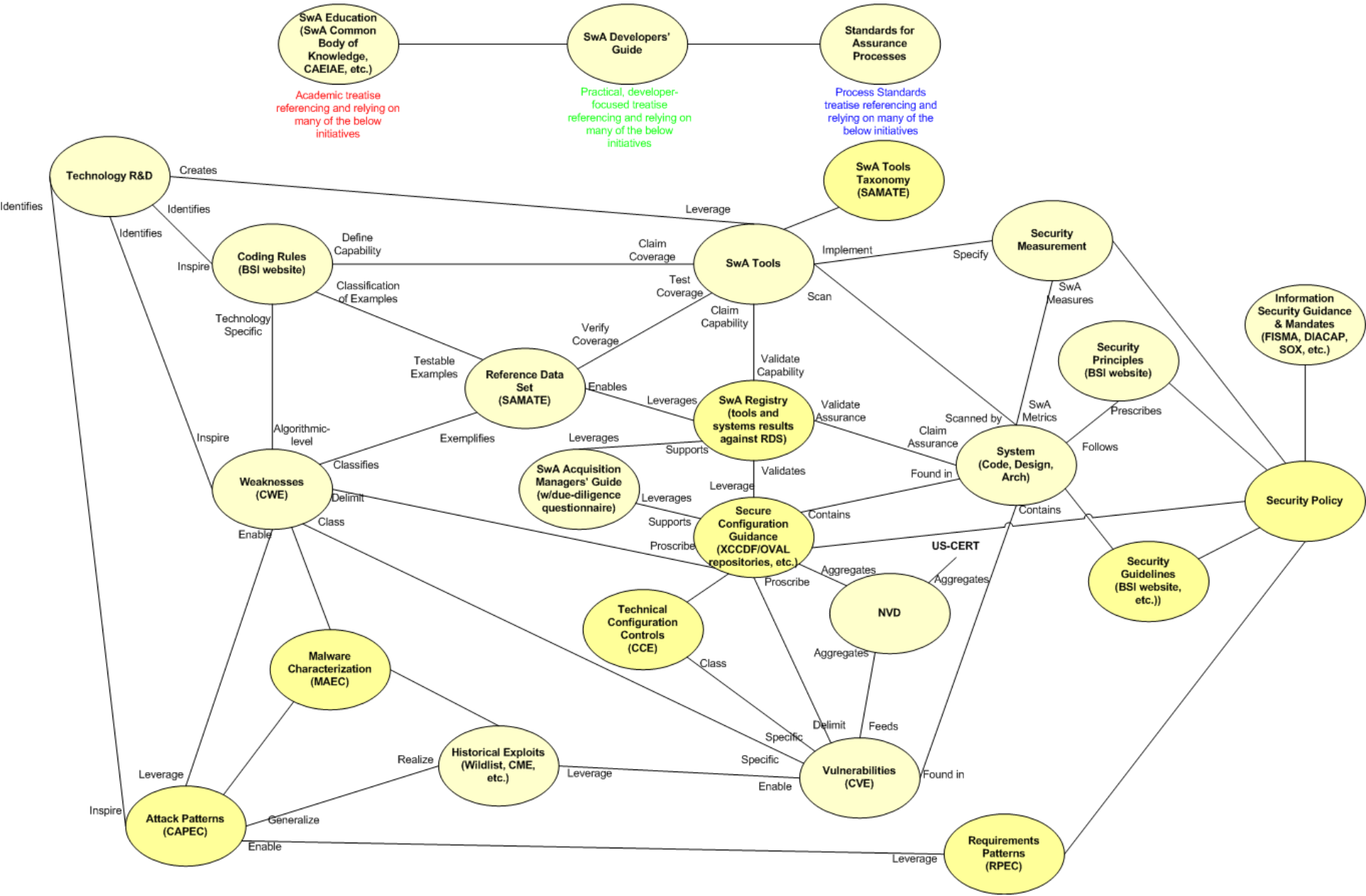
Software Assurance Ecosystem Knowledge Architecture



What Do The Building Blocks for Measuring Assurance Look Like?

- Standard ways for **enumerating** "things we care about"
- **Languages/Formats** for encoding/carrying high fidelity content about the "things we care about"
- **Repositories** of this content for use in communities or individual organizations

Making Security Measurable™

The Building Blocks Are:

- Enumerations
  - **Catalog the fundamental entities in Software Assurance**
    - **Vulnerabilities (CVE), configuration issues (CCE), software packages (CPE), attack patterns (CAPEC), weaknesses in code/design/architecture (CWE)**
- Languages/Formats
  - **Support the creation of machine-readable state assertions, assessment results, and messages**
    - **Configuration/vulnerability/patch/asset patterns (XCCDF & OVAL), software security patterns (SBVR), event patterns (CEE), malware patterns (MAEC), risk of a vulnerability (CVSS), config risk (CCSS), weakness risk (CWSS), information messages (CAIF & *DEF)**
- Knowledge Repositories
  - **Packages of assertions supporting a specific application**
    - **Vulnerability advisories & alerts, (US-CERT Advisories/IAVAs), configuration assessment (NIST Checklists, CIS Benchmarks, NSA Configuration Guides, DISA STIGS), asset inventory (NIST/DHS NVD), code assessment & certification (NIST SAMATE, DoD DIACAP & eMASS)**

Common Weakness Enumeration (CWE)

- Weaknesses are characteristics of software that may lead to vulnerability
- Existence of weaknesses in software can be objectively measured through the use of various techniques and tools
- Software assurance is determined by the absence of weaknesses identified as relevant for a given context and assurance level

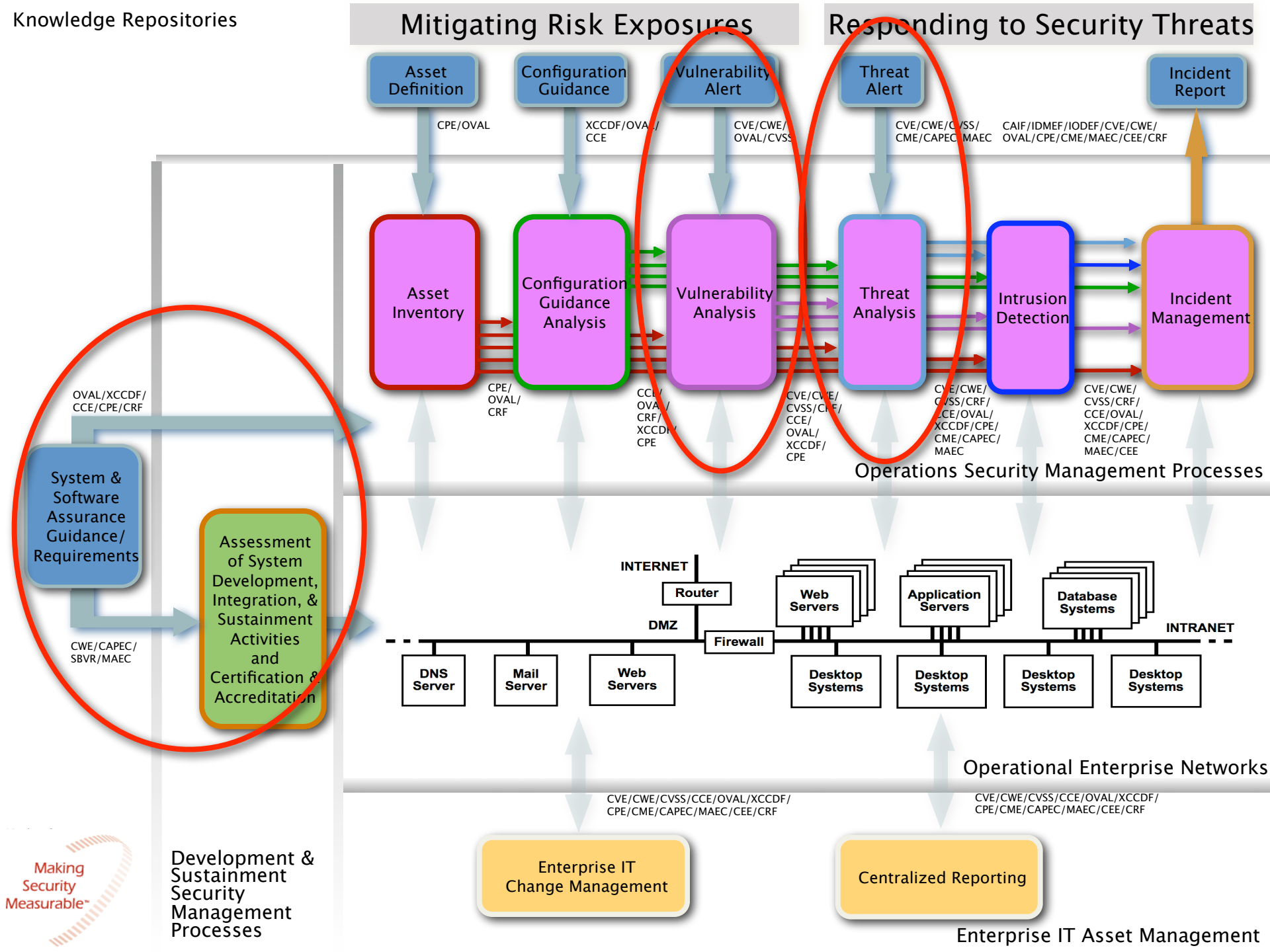
- CWE is an effort targeted at standardizing the capture and description of weaknesses and providing a useful collection to be leveraged by the community
- Community effort developed from dozens of sources
- CWE version 1.1 was released December 2008
- Already being used in education, tools, software risk assessment, policy, etc.

- http://cwe.mitre.org

What is the Common Attack Pattern

- Effort targeted at:
  - Standardizing the capture and description of attack patterns
  - Collecting known attack patterns into an integrated enumeration that can be consistently and effectively leveraged by the community
  - Classifying attack patterns such that users can easily identify the subset of the entire enumeration that is appropriate for their context

- http://capec.mitre.org
- Sponsored by DHS
- Led by Cigital


Knowledge Repositories
Mitigating Risk Exposures
Responding to Security Threats
Asset Definition
Configuration Guidance
Vulnerability Alert
Threat Alert
Incident Report
CPE/OVAL
XCCDF/OVAL/ CCE
CVE/CWE/ OVAL/CVSS
CVE/CWE/CVSS/ CME/CAPEC/MAEC
CAIF/IDMEF/IODEF/CVE/CWE/ OVAL/CPE/CME/MAEC/CEE/CRF
Asset Inventory
Configuration Guidance Analysis
Vulnerability Analysis
Threat Analysis
Intrusion Detection
Incident Management
CPE/ OVAL/ CRF
CCE/ OVAL/ CRF/ XCCDF/ CPE
CVE/CWE/ CVSS/CRF/ CCE/ OVAL/ XCCDF/ CPE
CVE/CWE/ CVSS/CRF/ CCE/OVAL/ XCCDF/CPE/ CME/CAPEC/ MAEC
CVE/CWE/ CVSS/CRF/ CCE/OVAL/ XCCDF/CPE/ CME/CAPEC/ MAEC/CEE
Operations Security Management Processes
OVAL/XCCDF/ CCE/CPE/CRF
System & Software Assurance Guidance/ Requirements
CWE/CAPEC/ SBVR/MAEC
Assessment of System Development, Integration, & Sustainment Activities and Certification & Accreditation
INTERNET
Router
DMZ
Firewall
Web Servers
Application Servers
Database Systems
INTRANET
DNS Server
Mail Server
Web Servers
Desktop Systems
Desktop Systems
Desktop Systems
Desktop Systems
Operational Enterprise Networks
CVE/CWE/CVSS/CCE/OVAL/XCCDF/ CPE/CME/CAPEC/MAEC/CEE/CRF
CVE/CWE/CVSS/CCE/OVAL/XCCDF/ CPE/CME/CAPEC/MAEC/CEE/CRF
Making Security Measurable™
Development & Sustainment Security Management Processes
Enterprise IT Change Management
Centralized Reporting
Enterprise IT Asset Management

Making Security Measurable™

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Making Security Measurable™

A Collection of Information Security Community Standardization Activities and Initiatives

MITRE, in collaboration with government, industry, and academic stakeholders, is improving the measurability of security through **enumerating** baseline security data, providing standardized **languages** as means for accurately communicating the information, and encouraging the sharing of the information with users by developing **repositories**.

The other activities and initiatives listed here have similar concepts or compatible approaches to MITRE's. Together all of these efforts are helping to make security more measurable by defining the concepts that need to be measured, providing for high fidelity communications about the measurements, and providing for sharing of the measurements and the definitions of what to measure.

Home | Current Collection | Feedback Requested

Measurable security pertains at a minimum to the following areas:

- Vulnerability Management
- Intrusion Detection
- Asset Security Assessment
- Asset Management
- Configuration Guidance
- Patch Management
- Malware Response
- Incident Management
- Threat Analysis

Enumerations

Common Vulnerabilities and Exposures (CVE®) - common vulnerability identifiers

Common Weakness Enumeration (CWE™) - list of software weakness types

Common Attack Pattern Enumeration and Classification (CAPEC™) - list of common attack patterns

Common Malware Enumeration (CME™) - common identifiers for viruses, worms, and other malicious code

Common Configuration Enumeration (CCE™) - common security configuration identifiers

Common Platform Enumeration (CPE™) - common platform identifiers

SANS Top Twenty - SANS/FBI consensus list of the Twenty Most Critical Internet Security Vulnerabilities that uses CVE-IDs to identify the issues

OWASP Top Ten - ten most critical Web application security flaws

WASC Web Security Threat Classification - list of Web security threats

Languages

Open Vulnerability and Assessment Language (OVAL®) - standard for determining vulnerability and configuration issues

Common Result Format (CRF™) - standardized assessment result format for conveying findings based on common names and naming schemes

Common Event Expression (CEE™) - standardizes the way computer events are described, logged, and exchanged

OVAL Interpreter - free tool for collecting information for testing, carrying out OVAL Definitions, and presenting results of the tests

Benchmark Editor™ - free tool that enhances and simplifies creation and editing of benchmark documents written in XCCDF and OVAL

Extensible Configuration Checklist Description Format (XCCDF) - specification language for uniform expression of security checklists, benchmarks, and other configuration guidance

Common Vulnerability Scoring System (CVSS) - open standard that conveys vulnerability severity and helps determine urgency and priority of response

Common Announcement Interchange Format (CAIF) - XML-based format created to store and exchange security announcements in a normalized way

OMG Semantics of Business Vocabulary and Business Rules (SBVR) - language for interchange of business vocabularies and rules among organizations and software tools

Repositories

OVAL Repository - community-developed OVAL Vulnerability, Compliance, Inventory, and Patch Definitions

National Vulnerability Database (NVD) - U.S. vulnerability database based on CVE that integrates all publicly available vulnerability resources and references

NIST Security Content Automation Protocol (SCAP) - security content for automating technical control compliance activities, vulnerability checking, and security measurement

Red Hat Repository - OVAL Patch Definitions corresponding to Red Hat Errata security advisories

Center for Internet Security (CIS) Benchmarks - best-practice security configurations accepted for compliance with FISMA, the ISO standard, GLB, SOx, HIPAA, and FIRPA, and other regulatory requirements for information security

DISA Security Technical Implementation Guides (STIGS) - U.S. Defense Information Systems Agency's (DISA) STIGS are configuration standards for DOD information assurance and information assurance-enabled devices and systems

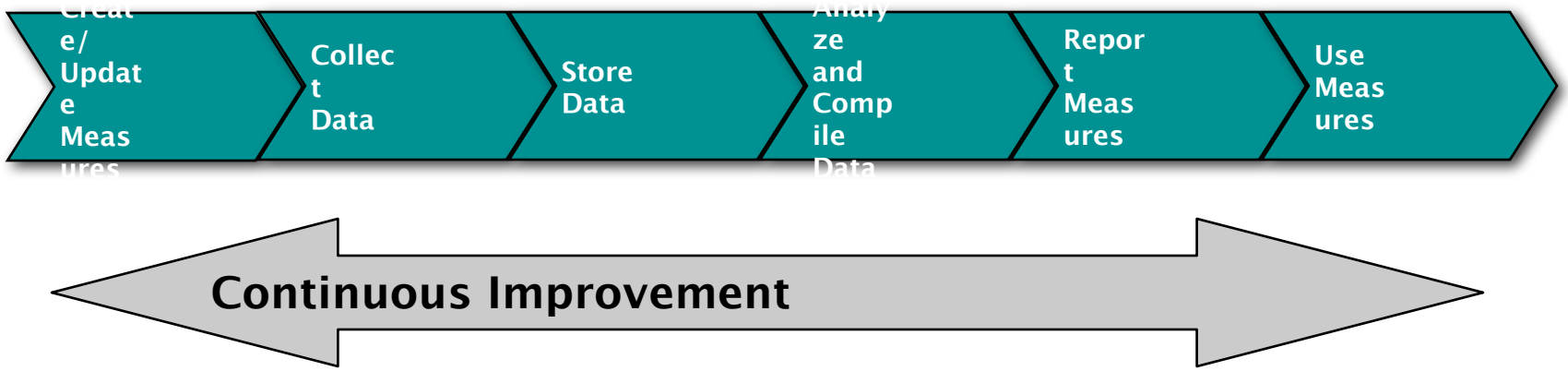
View the current collection of organizations, activities, and initiatives.

Disclaimer

Page Last Updated: January 17, 2008

Practical Measurement Framework

- Harmonized with five prevailing system/software and security measurement approaches
- Provides basic measures development and implementation processes
- Provides general measures examples
- Integrates with existing measurement programs
- Incorporates Making Security Measurable products
- Provides an overarching framework for summarizing SwA measures and communicating them to stakeholders



What Is Measurable Today?

- **Enumerations of Things That We Want to Know About:**
  - Common Weakness Enumeration (CWE)
  - Common Attack Pattern Enumeration and Classification (CAPEC)
  - Common Vulnerabilities and Exposures (CVE)
  - Common Configuration Enumeration (CCE)
- **Ways of Expressing Details About Enumerated Items:**
  - Open Vulnerability and Assessment Language (OVAL)
  - XML Configuration Checklist Data Format (XCCDF)
  - Common Platform Enumeration (CPE)
  - Common Vulnerabilities Scoring System (CVSS)
  - Common Configuration Scoring System (CCSS)
  - Common Weakness Scoring System (CWSS)
- **Repositories of Content with Measurement Criteria**
  - SCAP (Secure Content Automation Protocol)

Other measurable items include quality and project management measures which are well developed and available for use