



Updates on IT and Software Management Sept. 16 2016

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Initial Thoughts

Please spend 2 minutes capturing your gut reactions to the top two questions on the handout.



IT and Software Management

Discussion Objectives

- **Enterprise Environment/Stakeholders**
(Congress, OSD, Service/Agency, The Market)
- **Functional Contributions to IT and Software Development**
 - Requirements management
 - Life Cycle Management
 - Risk and Opportunity Management
 - Development methodologies that can improve agility
 - Performance management
- **On line resources**



Congress: Clinger Cohen Act (CCA)

[Full details in Table 9 and Encl 11 in DODI 5000.02, Jan 2015]

1. Supports core, priority functions of DoD
2. Has **outcome-based performance measures** linked to strategic goals
3. Processes the system supports re-engineered to improve effectiveness, costs and maximize the use of commercial off-the-shelf technology
4. Determine no private sector or gov't source can better support the function
5. Conduct an **analysis of alternatives**
6. Conduct economic analysis, incl. calculation of **ROI** [for non-AIS, do an LCC estimate]
7. Clearly established **measures and accountability for program progress**
8. Consistent w/ DoD Information **Enterprise policies, architecture, relevant standards**
9. Has a **Cybersecurity Strategy** consistent w/DoD policies, standards, architectures
10. To max extent practicable use 1) modular contracting 2) deliver in phased increments with measurable benefit independent of future increments
11. **Register** Mission-Critical & Mission-Essential systems [in DITPR, run by DOD CIO]



OSD-level Policies & Initiatives

- **Policies & guidance:**

- USD(AT&L): Jun 13 Open System Architecture-Contracting Guidebook
- DOD CIO: Information Assurance: now Cybersecurity
 - DODI 8510.01, Mar 14, Risk Management Framework
 - DOT&E Aug 2014 policy memo on Cybersecurity OT&E Procedures
- Guidebook for Integrating the Cybersecurity Risk Management Framework (RMF) into the System Acquisition Lifecycle
<https://acc.dau.mil/CommunityBrowser.aspx?id=721696>

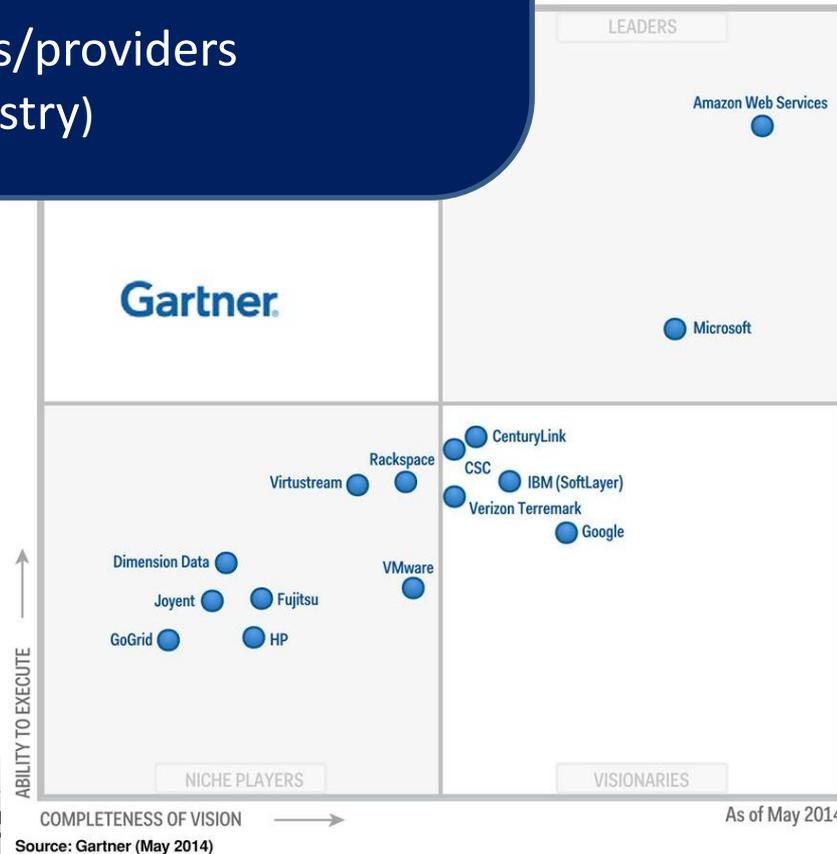
- **Initiatives:**

- CIO: Streamlined process to approve use of Cloud Services
- Joint Information Environment: network normalization, common identity management, access control, enterprise datacenter consolidation



What's different about the marketplace for software intensive or IT programs?

- Pace of change (technology and products)
- Commercial market forces often drive innovation (vs. defense market forces)
- More rapidly changing players/providers (compared with defense industry)





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Requirements Governance

What are the key questions?

From CMMI-ACQ: *Acquisition Requirements Development has 2 contexts:*

- 1) amalgamation and coordination of stakeholder reqmts into a set of customer reqmts that defines the scope and direction of the acquisition*
- 2) the refining and elaboration of the customer requirements into contractual requirements that become the basis of the product requirements*

- **Functional (User) Reqmts**—required system functions & features
- **Non-functional Reqmts** —requirements the solution must meet to be suitable, secure, operable, survivable (e.g., standards, cybersec, s/w quality)
- **SOW/PWS/CDRL/Contract Terms:** other factors that must be part of contract to ensure product and support approach are appropriate

Ref: MIL-HDBK-520a, **SRD Guidance:** <https://acc.dau.mil/CommunityBrowser.aspx?id=640084>
and CMMI for Acquisition: http://cmmiinstitute.com/sites/default/files/documents/CMMI-ACQ_Quick_Ref-2014.pdf



Product Support Planning and SE

Questions for Program Planning

- What software/IT support considerations will impact planning?
 - Expected evolution/pace of enhancements [threat? Interface changes?]
 - Expected cybersecurity environment/change volume
 - IT and S/W obsolescence mitigation
 - Competition environment/uncertainties [IT marketplace realities?]
- How to tune System and Software Architectures to these factors ?
 - MOSA? Services-oriented architecture? Standards?
 - Intellectual property considerations?
 - Required Integrated Architecture products (DOD Architecture Framework)*

*NOTE: For a GREAT discussion of importance of architecture planning, watch this video: <https://www.youtube.com/watch?v=Sw3VILxNrzo&feature=youtu.be>

- What metrics will provide early insight into supportability issues?
- Other questions?



TABLE DISCUSSION/OUTBRIEF

Software Risk Awareness

Discuss for 5 minutes--pick someone to provide debrief to the class:

Two Front Tables: *“What are some software-related risks in your functional area that can arise during development phases (TMRR, EMD)?”*

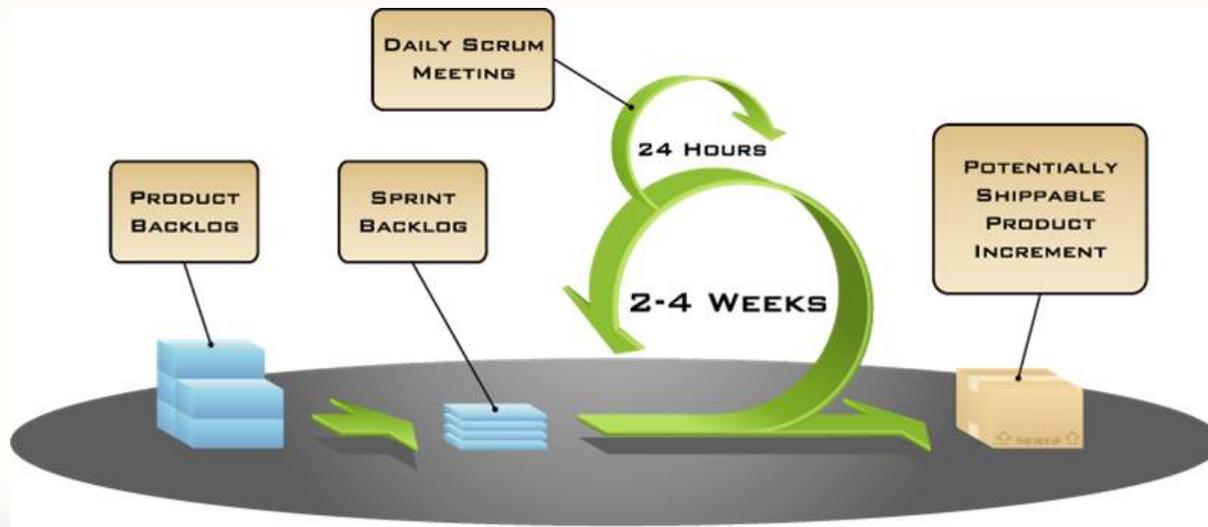
Two Back Tables: *“What are some software-related risks in your functional area that must be managed once the software is fielded (in sustainment phase)?”*

Extra-credit: Discuss how to mitigate these risks.

Agile Software Management

Terms and Processes

- Release/Product: 1 – 6 months
 - Comprises multiple sprints – Complete capability to ship to users
- Sprints/Iterations: 2 – 4 weeks
 - Deliver interim capability – Fully integrated and tested
- Scrum: Daily
 - Members of small team review and plan development activities



Terms and Timelines
Vary By Agile Approach

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[Source: MITRE Handbook for Implementing Agile in DoD IT Acquisition, Dec 2010](#)



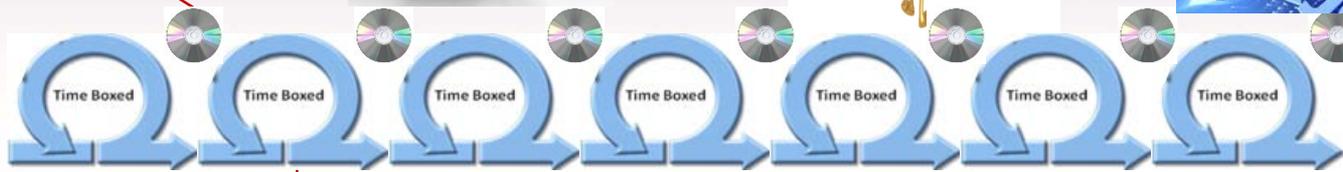
Consider Benefits of Agile Tenets to Your Program(s)

Deliver usable capabilities every 6-12 months

Active user involvement to prioritize requirements and provide responsive feedback during development

A different approach to project management - Small, dynamic, and empowered teams

Roadmaps and architectures align increments into larger capabilities



Small scoped releases **responsive to changes** in operations, tech, budget. . .



Integrated test & evaluation, certifications during development—**“fail fast”**
Leverage common test infrastructure, automated tools

Streamlined contracting processes leveraging existing contract vehicles for rapid Task/Delivery Order execution

Leveraging **common infrastructure platforms**, standards, and interfaces

Learn. Perform. Succeed.



Software T&E Considerations

- Testing environments: *must be planned for with sufficient lead time.*
- Iterative integration and testing: *usually requires **test automation** to reduce cycle time [automated tests run 24/7] and save on staff/resources*
- Cybersecurity testing: *DOT&E Aug 2014 memo*
[http://www.dote.osd.mil/pub/policies/2014/8-1-14_Procs_for_OTE_of_Cybersec_in_Acq_Progs\(7994\).pdf](http://www.dote.osd.mil/pub/policies/2014/8-1-14_Procs_for_OTE_of_Cybersec_in_Acq_Progs(7994).pdf)



Project Level IT Governance

What is Your Role in Information-driven Decision-making?

- **Select metrics to provide insight—change them over the life cycle**
 - Technical metrics: perf. vs. spec; **s/w complexity vs benchmarks**; defects vs benchmarks
 - Progress: performance vs plan [similar to h/w centric programs]
 - Schedule, Cost: **government tasks too**, esp when adapting COTS—blueprinting, BPR, hosting
 - Consumption of margin (money and time)
 - Efficiency/Productivity: output cost vs. plan; actual vs planned output per developer vs time—source lines of code AND **functions** completed vs plan
- **Select battle rhythm—don't let infrequent metrics slow you**
 - Seek insight into **contractor's metrics/indicators** (in Source Selection and after award)
 - Ensure a process for **“out of cycle”** data [vs. waiting a month for next PMR]
- **Resource Management -- track project resource usage vs. plan**
 - Can adjustments to **structure and skill mix** of your functional team improve results?
 - Use **peer reviews & outside experts** as advisors; consider IV&V based on criticality

Common Success Factors for IT Acquisitions

1. Program officials actively engaged with stakeholders
2. Program staff had necessary knowledge and skills
3. Senior department/agency executives supported the program
4. End users stakeholders involved in development of requirements
5. End users participated in testing of system functionality prior to formal end user acceptance testing
6. Government and contractor staff were stable and consistent
7. Program staff prioritized requirements
8. Program officials maintained regular communication with the prime contractor
9. Programs received sufficient funding

Source: FY 12 GAO Report 12-7: Information Technology: Critical Factors Underlying Successful Major Acquisitions
[Successful programs each had seven or more of these factors in common]

Questions/Comments?



IT Management *Learning Resources*

- DAU on line courseware and Defense Acquisition Portal resources
 - Defense Acquisition Guidebook Chapter 7 -Acquiring IT: <https://acc.dau.mil/CommunityBrowser.aspx?id=511590>
 - CLE-060 Practical S/W Systems Measurement: http://icatalog.dau.mil/onlinecatalog/courses.aspx?crs_id=1725
 - CLB-023 Software Cost Estimating: http://icatalog.dau.mil/onlinecatalog/courses.aspx?crs_id=434
 - DoD Open Systems Architecture Contract Guidebook: <https://acc.dau.mil/osaguidebook>
 - Risk Management Framework implementation guidebook: <https://acc.dau.mil/CommunityBrowser.aspx?id=721696>
- Additional Sources on IT and Software Management
 - Apr 2014 DCMO policy memo implements 2012 NDAA: DepSecDef approval of IT investments >/= \$1M http://dcmo.defense.gov/governance/Guidance%20for%20DBS%20Funds%20Certification_Signed%202014-04-28.pdf
 - Software Engineering Institute : <http://www.sei.cmu.edu/acquisition/>
 - DTIC: Software Program Best Practices: https://www.thecliac.com/spruce/resources/ref_documents/monitoring-software-intensive-system-acquisition-sisa-engineering-programs-spr
- Agile Software Management--A brief intro: <http://www.agile-process.org/>
 - GAO: Agile in DoD—Effective Practices and Challenges: <http://gao.gov/products/GAO-12-681>
 - Resource: Agile Acquisition Guide, Mar 2014, The MITRE Corp Technical Paper <http://www.mitre.org/publications/technical-papers/defense-agile-acquisition-guide-tailoring-dod-it-acquisition-program>



Metrics for IT and Software-Intensive Programs

Learning Resources

- Practical Software and Systems Measurement approach:
<https://sw.thecsiac.com/databases/url/key/4902>
- Web site on practical measurement: <http://www.psmisc.com/PSMI.asp>
- SEI book: <http://www.sei.cmu.edu/library/abstracts/books/0201604442.cfm>
- Technical metrics for early insight into software development issues
 - Data & Analysis Center “Gold Practices” Web Site—look up “the core metrics” :
<https://sw.thecsiac.com/databases/url/key/5929>
 - Software Engineering Institute—a dated (1996) but useful guidebook:
<http://www.sei.cmu.edu/library/abstracts/reports/96hb002.cfm?DCSext.abstractsource=SearchResults>



Back-up Charts



On the Horizon

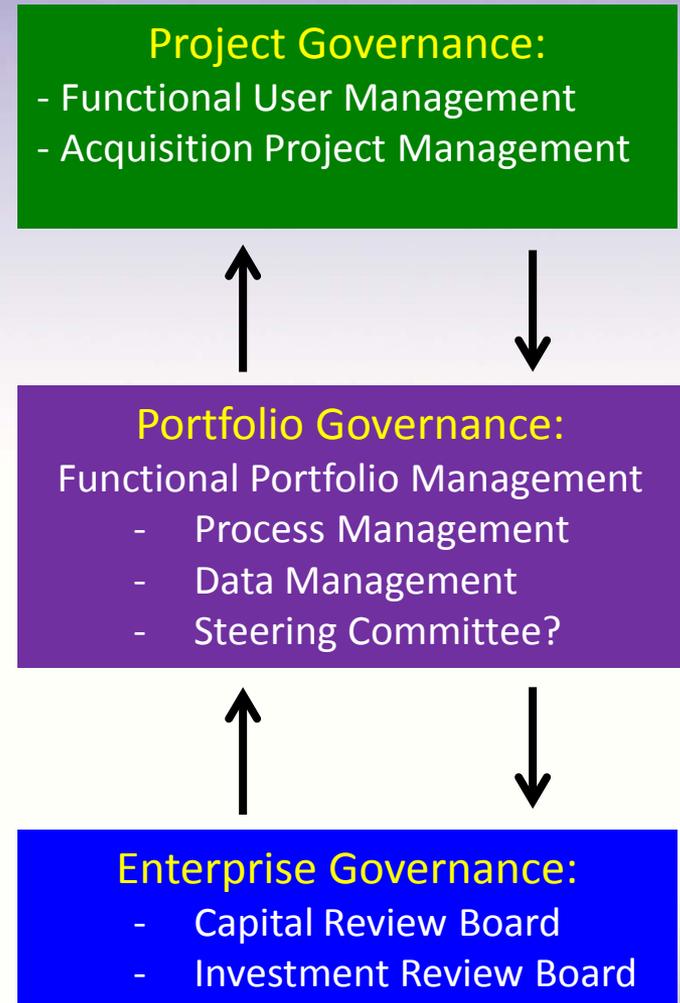
- Fed IT Acq Reform Act (Dec 14) implementation
- FITARA included several provisions:
 - Chief Information Officer (CIO) Authority Enhancements
 - Enhanced Transparency and Improved Risk Management in IT Investments
 - Portfolio Review
 - Expansion of Training and Use of IT Cadres
 - Federal Data Center Consolidation Initiative
 - Maximizing the Benefit of the Federal Strategic Sourcing Initiative
 - Government-wide Software Purchasing Program
- OPM Implementing guidance yet to be promulgate by DoD

Governance Perspectives

- **Project Level** :
 - Who is functional owner/user(s)?
 - How will we transition from existing systems?
 - Can we leverage similar/related programs?

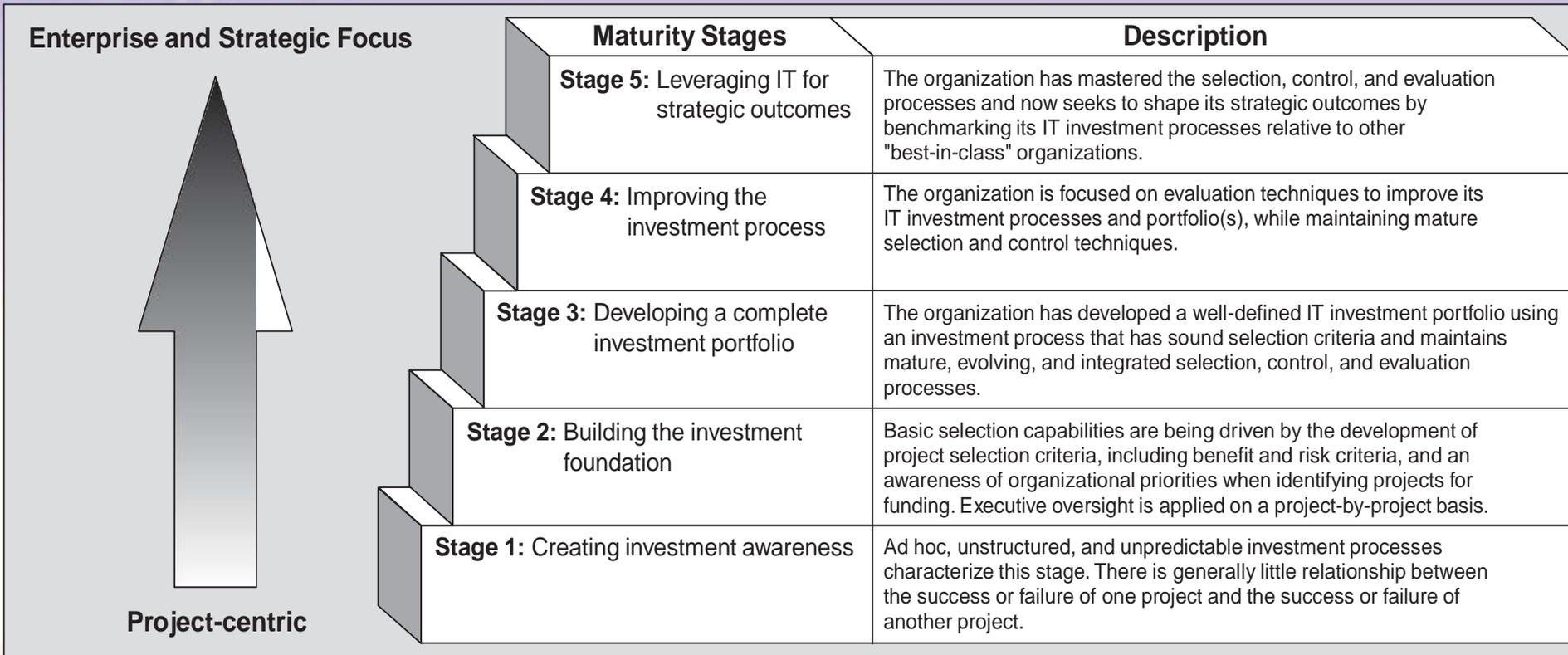
- **Functional Portfolio Level**:
 - What is the system of systems architecture ? What arch. changes could optimize security, cost?
 - Execution across portfolio—issues? redundancy?
 - Best use of resources (infrastructure, key skills)

- **Enterprise Level—the entire portfolio** :
 - Investment management: how much can we afford overall? Which problems deserve \$, manpower?
 - What are key cost drivers we can affect?
 - Take a CEO’s Perspective



Portfolio Governance

IT Investment Management (ITIM) Framework*

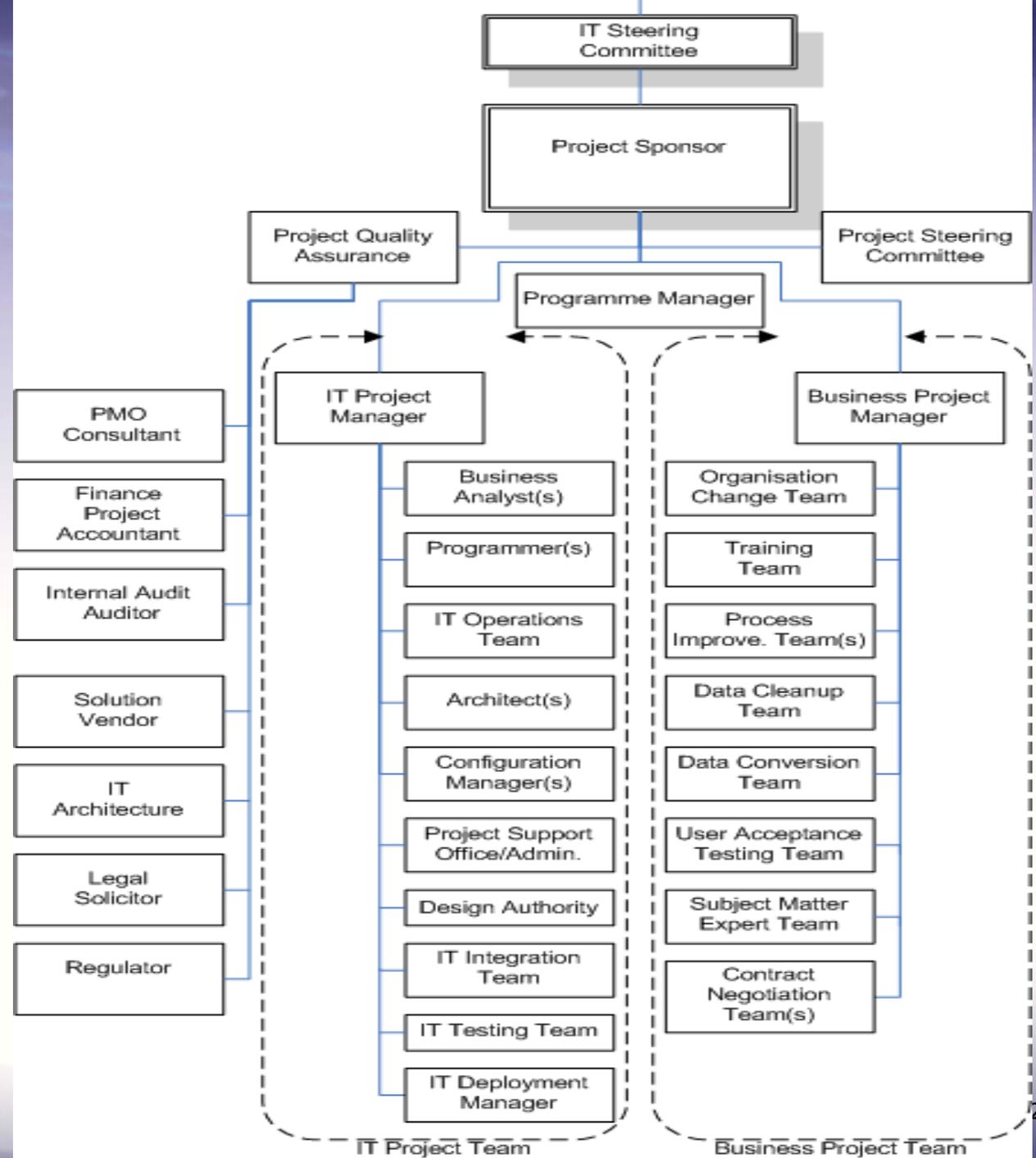


Source: GAO.

*GAO report, March 2004: <http://www.gao.gov/new.items/d04394g.pdf>



IT Project Governance Functions



- **Software and IT cost estimating caveat:**
 - Estimators rely on engineers and IT experts to define effort required
 - Proper extrapolation from history, and market research are key factors
- **Budgeting:**
 - Schedule estimate + cost estimate (w/risk profile) drive budget phasing
 - PROTECTION of risk funding can seem at odds with annual appropriations

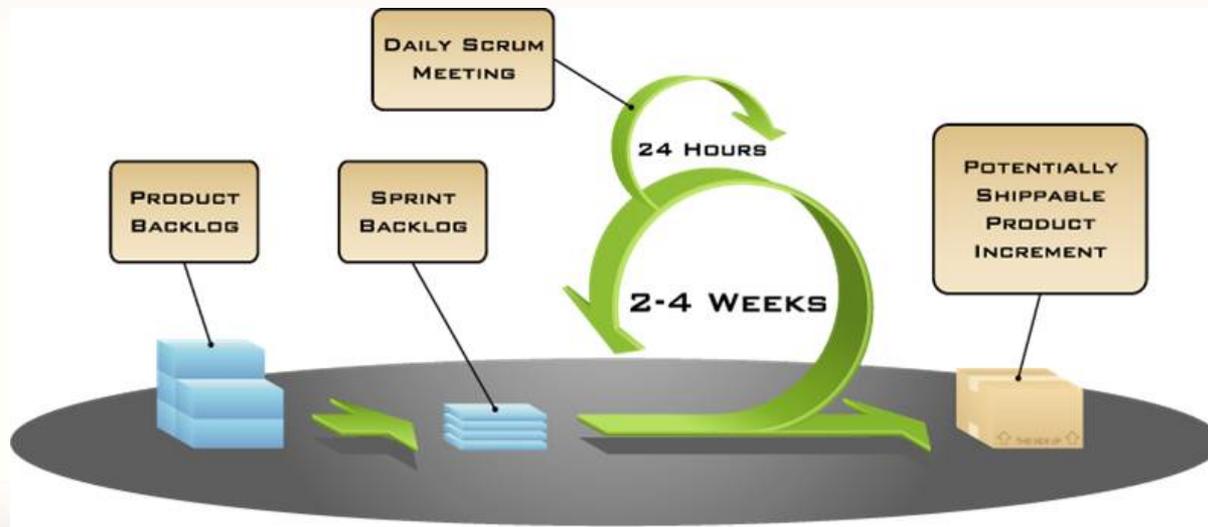
Funding execution – pressures to spend vs. risk buffer

- *If risk \$ not used this year, are they available for unfunded requirements?*
- *Do you try to carry forward, or release to PEO and seek re-phasing?*

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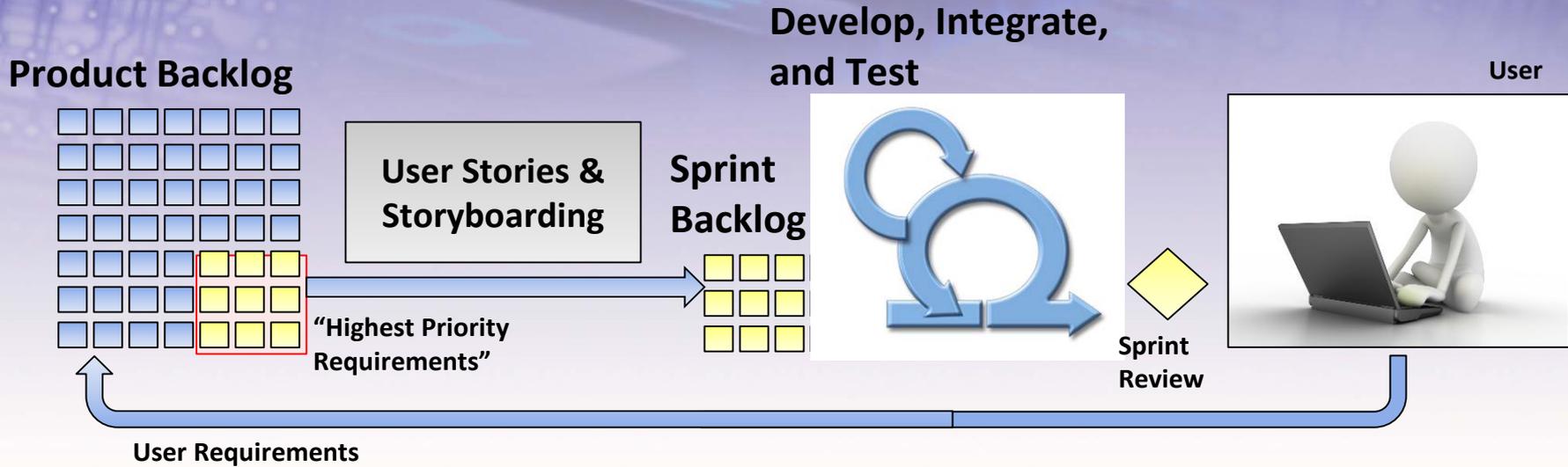
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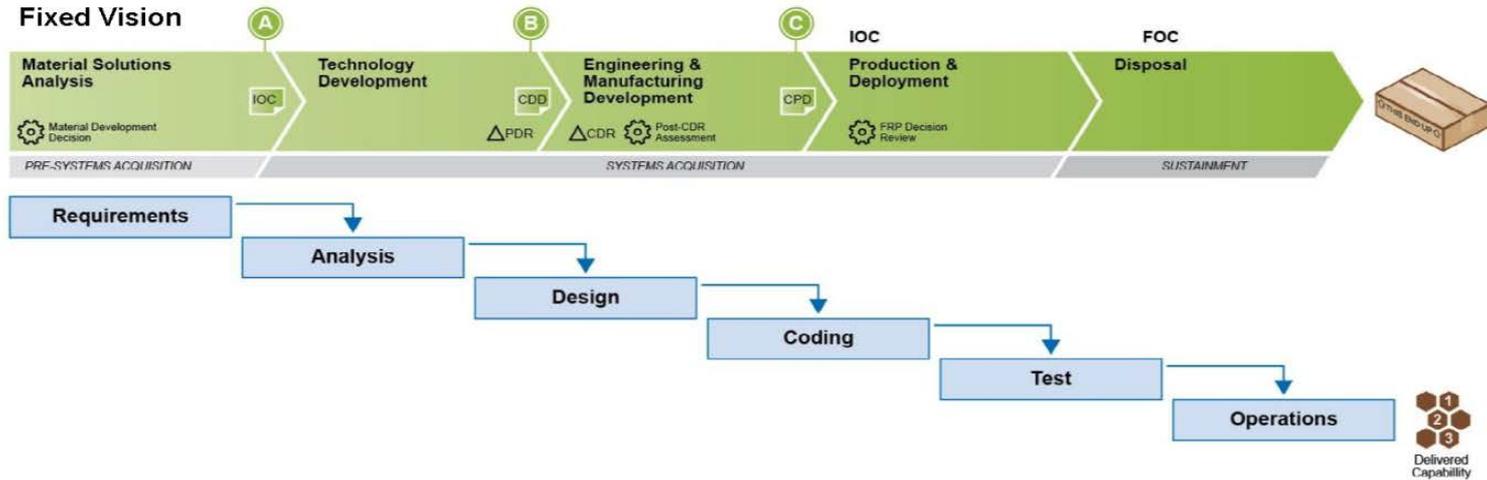
Agile Requirements/Stories



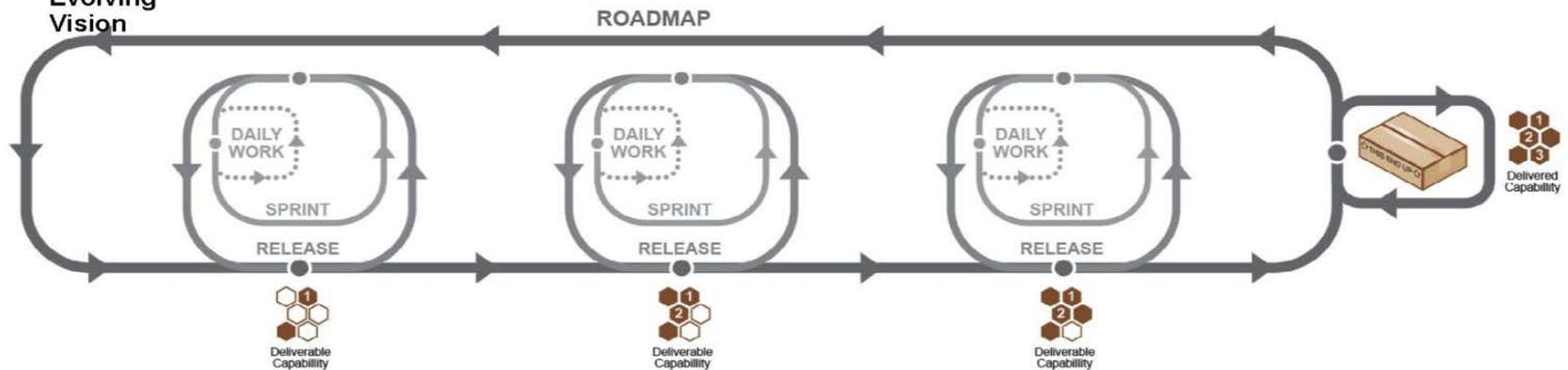
- **Product Backlog**
 - An evolving, prioritized queue of operational and technical requirements
 - Includes requested features, enhancements, and defect corrections
 - Managed as a living document with regular user inputs and reviews
- **Sprint Backlog**
 - The priority subset of requirements to be addressed in the sprint
 - Once development team commits to the work, the scope is locked`

Alternate Worlds

Fixed Vision



Evolving Vision



Traditional vs Agile Practices



Traditional Practices		Agile Practices
Completely defined in detail up-front	Requirements	Iteratively refined during development
Detailed cost estimates and full funding	Risk Reduction	Incremental releases and sprints
Early, large, document-intensive	Reviews	<i>Small, frequent, and often informal</i>
Process and documentation	Emphasis	Knowledgeable, empowered teams
Detailed APB, IMS freezes solution early	Baselines	Adapted to new info in development
At end of an increment (years)	Delivery	At end of a release (months)
EVM measures progress against plan	Measurement	Frequent capability deliveries
Independent following development	Testing	<i>Daily development, integration, test</i>
Acceptance at end of increment	Users	Active for continual review, feedback