Leading Arms Race 2.0

Systems & Software Technology Conference (SSTC)

Architecture: Track 1

April 25, 2012 1:15 PM - 2:00 PM

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Introduction

- Speaker: David Paul Taylor
  - Process & quality improvement consultant for TSA IT modernization programs within the Office of Intelligence and Analysis (OIA)
  - Provider of IT services
  - ***Consumer of IT services***
- Audience
  - IT service providers *& consumers*
- Presentation objectives are to provide the audience with an understanding of
  - The significance of Arms Race 2.0
  - The path to the Arms Race 2.0 lead

Arms Race 1.0

- The *objective* of Arms Race 1.0 was to achieve military superiority by stockpiling brute-force weapons
- The *race* was to produce greater numbers of brute-force weapons faster than the enemy
- The United States lead Arms Race 1.0 because
  - *World's largest economy* created a spending gap
  - The spending gap enabled a production gap
  - The production gap delivered the missile gap
- The US lead because we had the resources and a universal commitment to *mass spending*

Arms Race 2.0

- The *objective* is to achieve defense superiority through Information Technology (IT)
  - IT is the central nervous system of defense capabilities

China Cyber Capability Puts U.S. Forces at Risk:
Analysis by Northrop Grumman Corp released on March 08, 2012 by the U.S.-China Economic and Security Review Commission.

  - Of Near-Perfect Quality: *life & death quality standards*
  - Delivered As Soon As Possible: *the right time*
  - For the Least Cost Possible: *the best price*
- The standard applies to all Defense IT projects

Arms Race 2.0 Progress Report

- Bad news: In the United States, IT struggles are legendary
  - Delivering insufficient innovation late and over budget
  - In many cases, we still claim victory
    - Rebaseline the project until the final delivery is on time and within the budget of the current rebaselined plan
    - Artificial success: the capabilities **were not** delivered *as soon as possible* or for the *least cost possible*
    - Unable to *determine how to improve* on the next project
- *Good news*: Arms Race 2.0 is a dead heat
  - Public and private sectors of every nation struggle to deliver IT innovation on time and within budget
- The race is to overcome IT's legendary struggles

Leadership Is Critical To Success

- Enterprise Architects are the front-line leaders
  - They lead the transformations that deliver IT innovation
- Enterprise Architects should possess leadership abilities comparable to traditional architects
  - Frank Lloyd Wright (Guggenheim Museum)
  - I. M. Pei (Louvre Pyramid)
  - Thomas Jefferson (Declaration of Independence, Monticello, University of Virginia)
  - Gen. Dwight David Eisenhower (Operation Overlord)
  - Arthur Wellesley & *Napoleon Bonaparte* (Waterloo)
- IT culture has not developed front-line leaders capable of achieving the Arms Race 2.0 lead

Enterprise Architecture (EA)

- Enterprise Architecture must deliver the IT innovation required to lead Arms Race 2.0

According to the Gartner Group:
Enterprise architecture is the process of translating business vision and strategy into effective enterprise change by creating, communicating and improving the key requirements, principles and models that describe the enterprise's future state and enable its evolution.

- Enterprise Architecture is a *transition process*
  - Translates business vision and strategy into *effective enterprise change*

Effective Enterprise Change

"Making no mistakes is what establishes the certainty of victory".

Sun Tzu, "The Art of War" (450 BC)

- To deliver innovation without making mistakes, we must understand the *physics of IT innovation*

The Physics Of IT Innovation

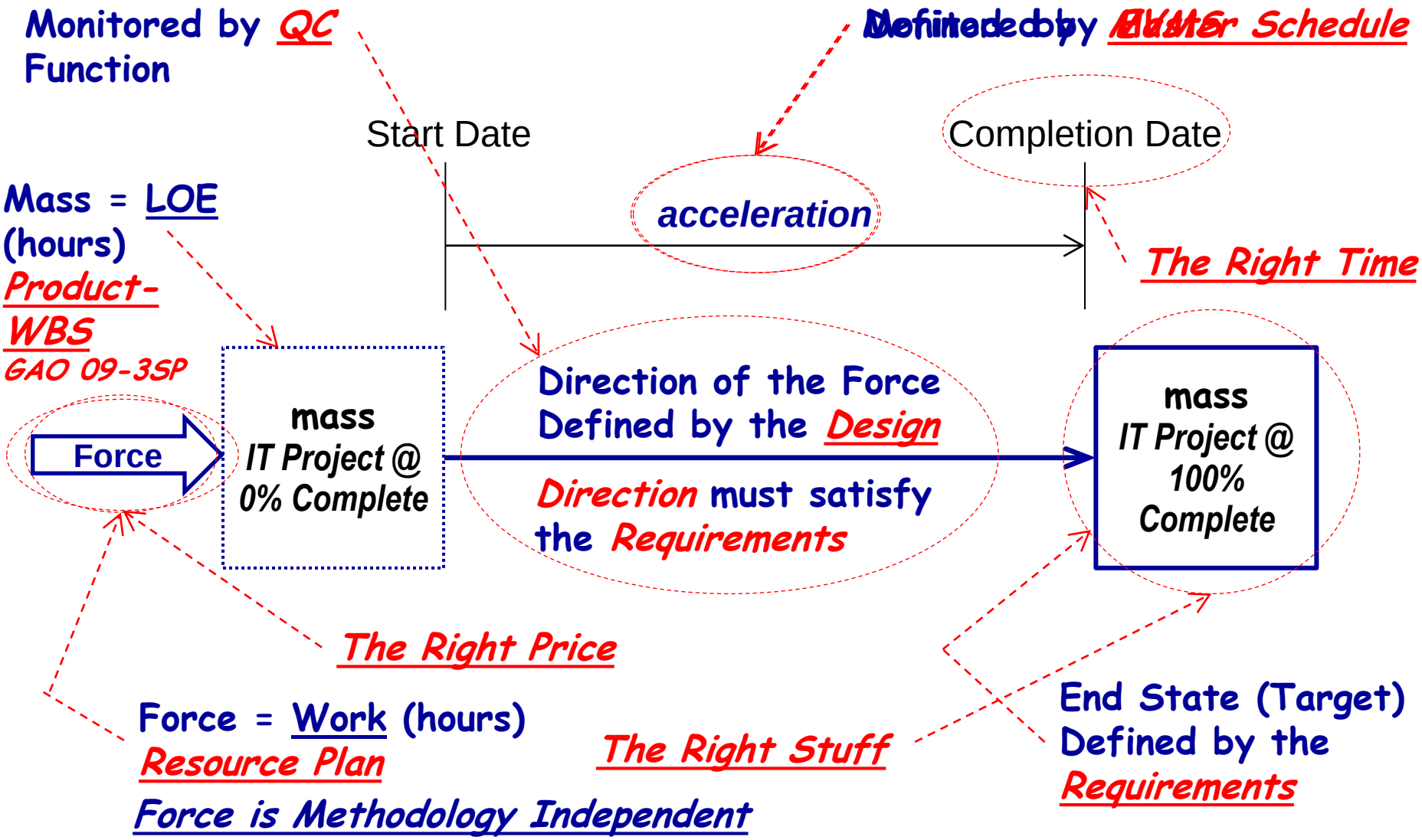
Conventional IT wisdom holds that IT is abstract, however;

- IT capabilities (innovation) delivered are real
- Delivery dates are real
- Costs are real
- Users are real

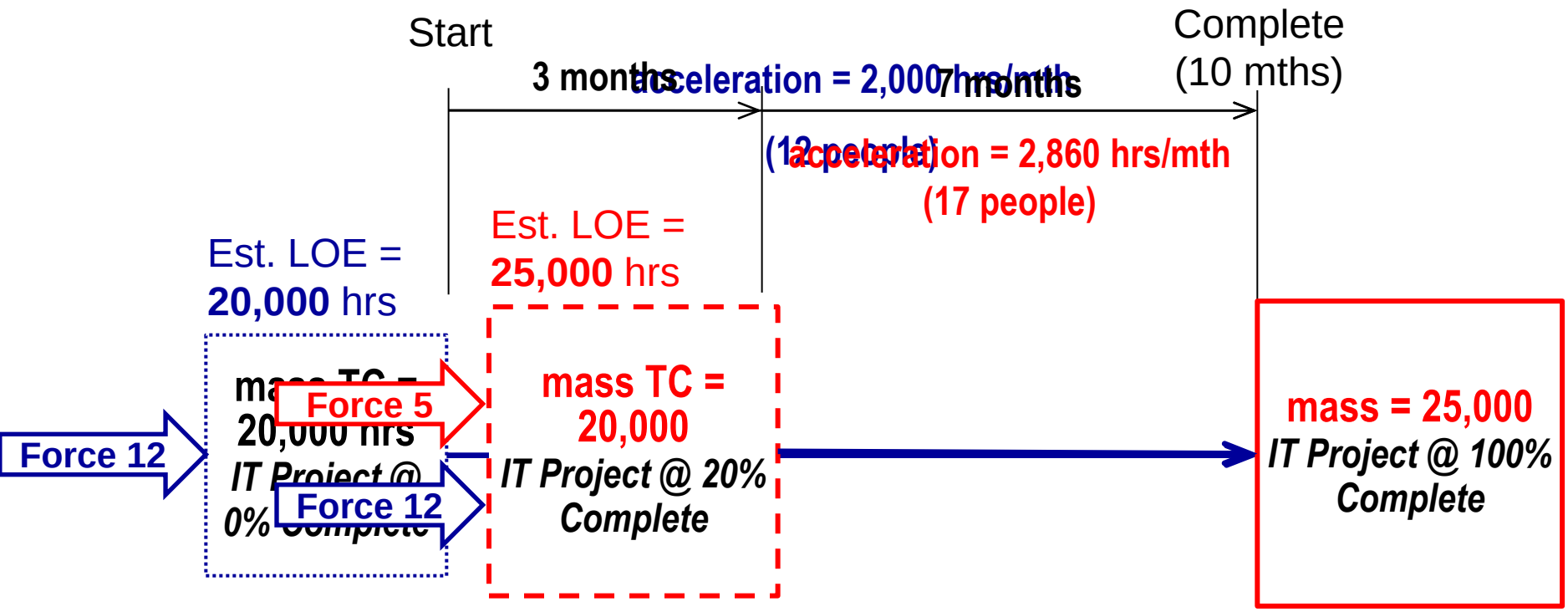
It is a mistake to regard IT as abstract

***direction of the straight line in which the force acts*.**

Innovation Physics Applied To IT Projects



The Physics Of Underestimation



"Adding manpower to a late software project makes it later."

Frederick P. Brooks – Mythical Man-Month (1975)

The Physics Of Misdirected Projects

Case Study: FBI's Sentinel Program

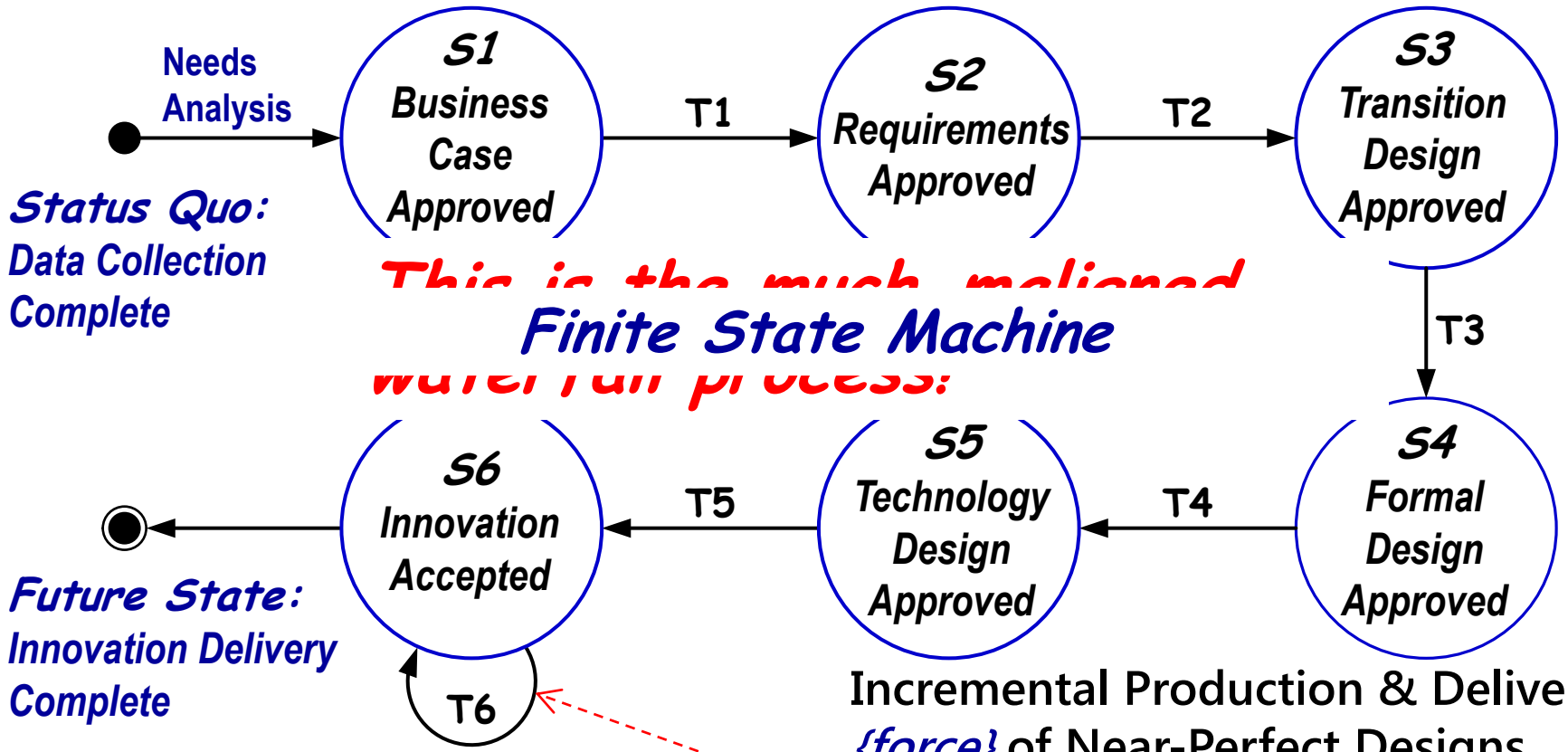
In a Dec. 19, 2011 letter to the Inspector General, FBI CIO characterized the *8-month slip* in Sentinel's schedule as a "*modest extension*". "As of early December, 2011, *88% of Sentinel's required functionality* had been completed."

The legacy of the Sentinel program:

- 2001: Commissioned as *Trilogy* expecting 2004 completion
- 2004: Trilogy, incomplete, canceled due to overages, delays
- 2005: Repackaged as "Sentinel" ($390m, 3 years, 4 phases)
- 2007: Sentinel required $60 million in additional funds
- 2010: FBI brings project in house *before phase 2 completes*
- 2011: FBI's *modest extension*: is an 8 month slip in ~1 year

Expected capabilities: 8 years late, $625m over budget

Physics-Compliant Transition Process

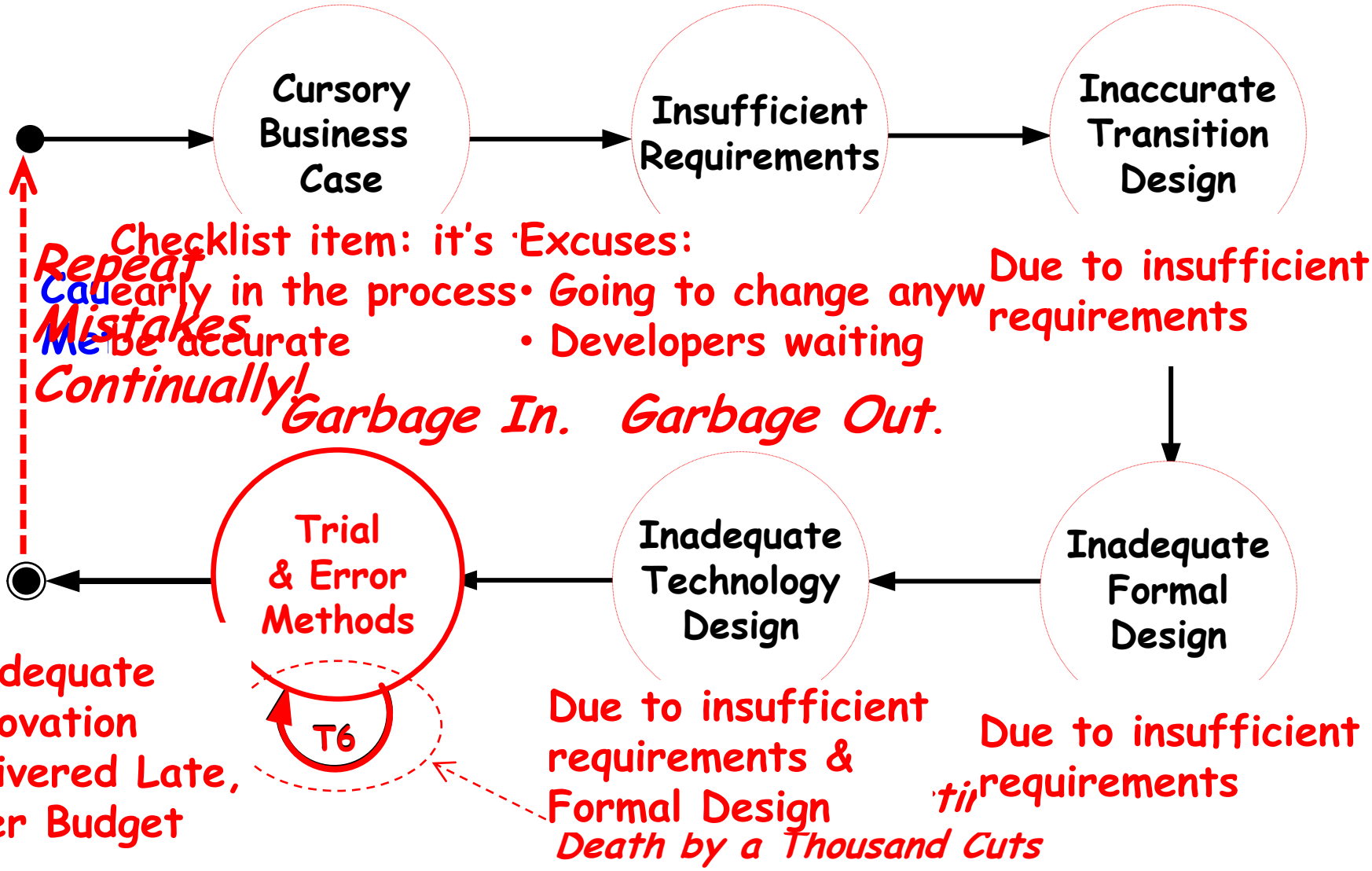


Incremental Production & Delivery *{force}* of Near-Perfect Designs *{direction toward requirements}* produces innovation that is *right the first time*

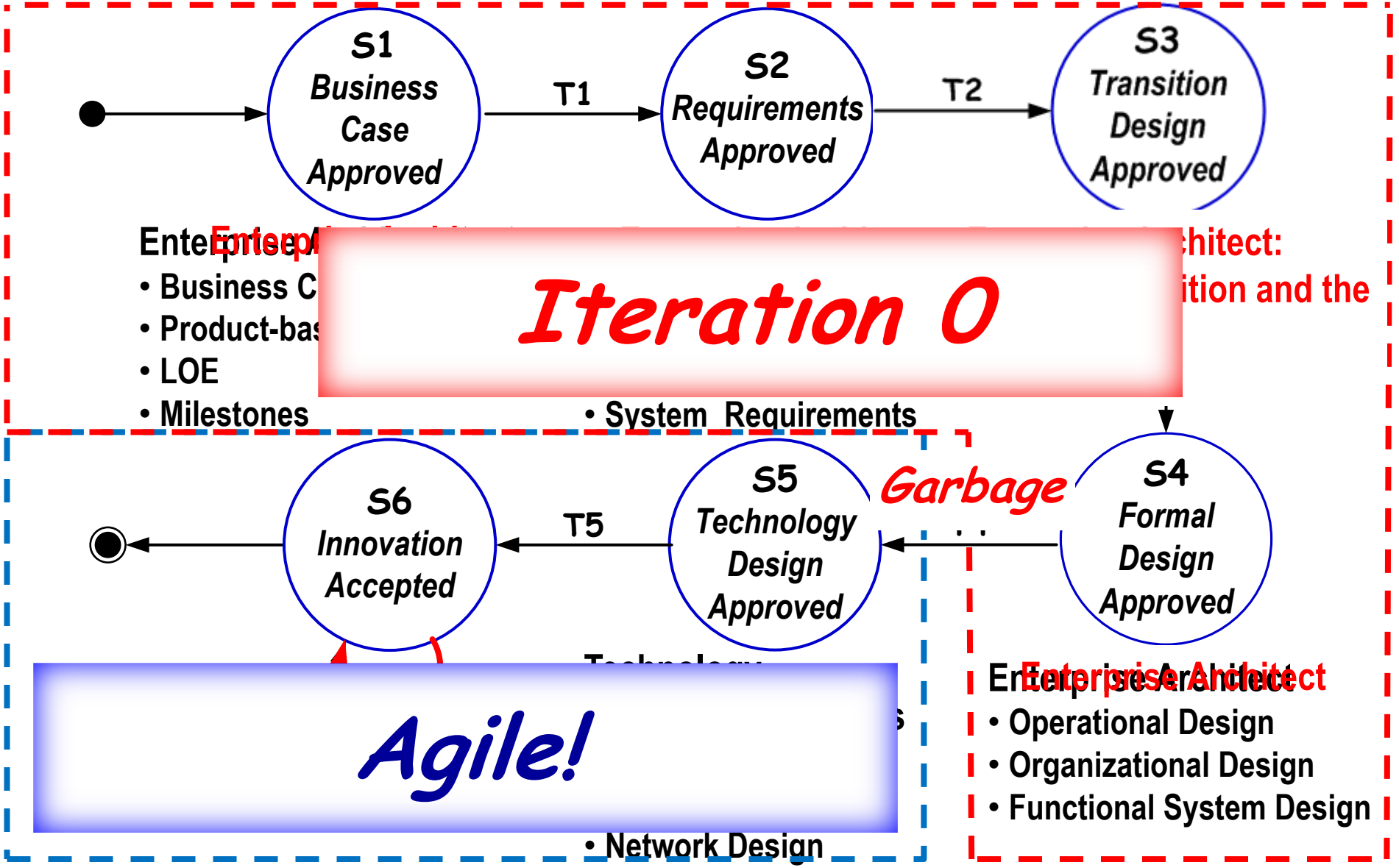
Arms Race 2.0 Victory!

- Appropriate innovation of
- Near-Perfect Quality
- As Soon As Possible
- For the Least Cost Possible

~~*Waterfall*~~ Issues Are Due To Execution



The Leadership Void



Case Study: TSA Secure Flight Program

Nothing New Under the Sun…

TSA's Secure Flight Today

- Office of Intelligence & Analysis (OIA) system
  - Pre-screens air travelers for security threats
  - Processes 2.5 million boarding passes daily
  - Constantly evolving to address new threats and leverage new technology
- Results recognized by Government Computing News (GCN) for IT program excellence in 2011
  - Reduced rework (mistakes) from 35% to 15%
  - Increased development production level 110% with a 25% increase in staff size
  - Shortened release lifecycle from 9 months to 5 months
- Results that produce the lead in Arms Race 2.0

Secure Flight Improvements Background

- Guiding principles (formalized in 2009)
  - *Optimize the ability to improve the program* based on new threats and new technology
  - *Minimize the cost* of the improvements
- Improvement objectives
  - Prevent mistakes during delivery: *right the first time*
  - *Avoid GIGO*: incremental delivery of near-perfect designs based on accurate physics & requirements
  - Use scope, quality, cost (hours) and timeliness to measure innovation efficiency: *effective change*
  - Use lifecycle *artifact quality* measures to predict the outcomes of capabilities deliveries
  - Never rebaseline a release: *prohibits lessons learned*

Key Process Improvements

- Implemented a physics-compliant process (FSM)
- Defined quality metrics for each state transition
  - Measured artifact quality to assess transition readiness
- Updated roles and responsibilities by FSM state
  - Enterprise Architect is responsible for the overall success of the release & for artifacts specific to
    - S1: Business Case/Project Charter
    - S2: Requirements & Requirements Analysis
    - S3: Transition Design
    - S4 : Formal Design
  - Technology Architect responsible for S5: Tech Design
  - Project Manager responsible for S6: Delivery

Improvements To Key Artifacts

- Enterprise Architecture improvements
  - Used DoD Architecture Framework to vertically integrate models and technology
  - *Accurately documented the Enterprise Architecture*
- Program transition/change artifact improvements
  - Updated business case/project charter structure
  - Implemented formal change analysis artifacts addressing *innovation requirements*
  - Formalized innovation requirements-to-delivered innovation traceability (per release)
- Quality standards improvements
  - Formalized quality standards for each artifact

Requirements-Specific Improvements

- Business Case (S1) *Defines project physics*
  - Project charter: capabilities (scope: innovation requirements), budgeted hours (cost), milestone dates
- Requirements (S2) *Define the "target"*
  - *Innovation requirements* define changes to baseline operations and system requirements
- Requirements Analysis (S2) *Defines the path*
  - Perform Innovation Requirements Analysis at 3 levels
    - Changes to baseline ops & system requirements (C2R)
    - Changes to baseline design (C2D)
    - Changes to baseline technology (C2T)

Design Artifact Improvements

- Transition Design (S3) *The battle plan*
  - Formalizes the business case based on requirements & requirements analysis (C2R, C2D, C2T)
  - Includes operations and organizational changes (C2R)
  - Finalizes milestone dates
- Formal Design (S4) *Operations direction*
  - Updated operations & system functional architecture based on revised requirements (C2R)
- Technology Design (S5) *Technology direction*
  - Updated technology design based on revised formal design (C2D)
- Quality standards for each state transition (S1-S5) designed to prevent *Garbage Out*

Leading Arms Race 2.0

- To lead Arms Race 2.0, IT's culture must evolve out of it's current mistake-prone state
- To achieve *effective enterprise change* IT must
  - Implement a physics-compliant *innovation/transition process* that prevents mistakes
  - Improve the quality of all IT lifecycle artifacts
  - Refine all IT roles and responsibilities
  - Develop accurate, vertically integrated *EA models*
- *Enterprise Architects* must step up to lead enterprise change
  - We need to develop the Frank Lloyd Wrights and Dwight D. Eisenhowers of Enterprise Architecture

Conclusion

- Prediction: IT's culture will evolve to a more efficient state: *achieve effective enterprise change*
  - Arms Race 2.0 mandates rapid delivery of quality IT innovation without *over spending*
- Prediction: *Enterprise Architects* will lead the evolution
  - Eventually, IT will develop talented superstars with the ability to deliver innovation that is ***right the first time***
- You have inadvertently become catalysts in the cultural evolution of IT in the United States
  - Please share this information with your organizations
  - Prediction: their response will be *"the world is flat"*
- One final thought: *someone will lead* …

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April 25, 2012

David Paul Taylor

Thank You!

Reference Information

- DoDAF Reference
  - DoDAF applied to Operations Architecture & Transition Architecture
- Artifact Lifecycle Description
  - Artifacts mapped to FSM states

DoDAF Reference

David Paul Taylor, AEA
3/20/2012 7:24 AM

Enterprise Architecture Layers (Perspectives/Disciplines)

Transformation T1: Business Design to System Design

Transformation T2: Sys. Design to Tech. Design

Transformation T3: Tech. Design Realization

Operate

			Operations Architecture							Transition Architecture							
			Operations Architecture Products [1]	Org Arch [2]	Operations Governance Model					Transition Architecture Products [9]	Org Arch [10]	Transition Governance Model					
					FEAF PRM [3]	FEAF BRM [4]	FEAF SRM [5]	FEAF DRM [6]	FEAF TRM [7]	Stds. [8]			FEAF PRM [11]	FEAF BRM [12]	FEAF SRM [13]	FEAF DRM [14]	FEAF TRM [15]	Stds. [16]
Operations Design (SOA Specification)	DoDAF Layer 1	Business Context	**1-1** Operations Context (1) Ent. Context Model (2) High-Level Ops Architecture: BPM L0 (3) Stakeholders	1-2	1-3	1-4	1-5	1-6	1-7	1-8	**1-9** (1) Strategic Planning (2) Enterprise CIP (3) Program Definition (4) Business Case Development	1-10	1-11	1-12	1-13	1-14	1-15	1-16
	DoDAF Layer 2	Process Design Ops IP	**2a-1** Operations Component Architectures (KPAs/BPA) (1) Core Mission Processes (2) Mission Support Processes	2a-2	2a-3	2a-4	2a-5	2a-6	2a-7	2a-8	**2a-9** (1) SELC Phase Process Descriptions (2) Governance Activity Definitions/Phase (3) QA Activities	2a-10	2a-11	2a-12	2a-13	2a-14	2a-15	2a-16
		Capabilities Specifications	**2b-1** Ops Detailed Specifications (1) Func. Reqs. (Tech IP) (2) User Exp. Reqs. (TIP) (3) User Guides (Ops. Tool) (4) SOPs (Ops. Tool)	2b-2	2b-3	2b-4	SOA Specs 2b-5	2b-6	2b-7	2b-8	**2b-9** SELC Procedures/Activity (1) Design (2) Specification (3) Engineering (4) Development + (5) Test	2b-10	2b-11	2b-12	2b-13	2b-14	2b-15	2b-16
Logical System Design	DoDAF Layer 3	High-Level System Design	**3a-1** (1) System Context (2) System Func. Design 2.1: Architecture 2.2: DFDs/Event Traces (3) Data Design	3a-2	3a-3	3a-4	3a-5	3a-6	3a-7	3a-8	**3a-9** (1) System Context (2) System Func. Design 2.1: Architecture 2.2: DFDs/Event Traces (3) Data Design	3a-10	3a-11	3a-12	3a-13	3a-14	3a-15	3a-16
		Component-Level Designs	**3b-1** (1) Component Func. Des. 1.1: Arch, 1.2: DFDs (2) Logical Software Design (3) Logical Data Design (4) Logical HW Design	3b-2	3b-3	3b-4	3b-5	3b-6	3b-7	3b-8	**3b-9** (1) Component Func. Des. 1.1: Arch, 1.2: DFDs (2) Logical SW Design (3) Logical Data Design (4) Logical HW Design	3b-10	3b-11	3b-12	3b-13	3b-14	3b-15	3b-16
Technology Design	DoDAF Layer 4	Physical/SOA Design	**4-1** (1) Physical SW Design (2) Physical Data Design (3) Physical HW Design	4-2	4-3	4-4	4-5	4-6	4-7	4-8	**4-9** (1) Physical SW Design (2) Physical Data Design (3) Physical HW Design	4-10	4-11	4-12	4-13	4-14	4-15	4-16
	DoDAF Layer 5	Operational Configuration	**5-1** (1) Device Inventory (2) As-Built Sys. Configurations (3) Monitoring Capabilities (4) Maintenance SOPs	5-2	5-3	5-4	Shared Services	5-6	5-7	5-8	**5-9** (1) Device Inventory (2) As-Built Sys. Configurations (3) Monitoring Capabilities (4) Maintenance SOPs	5-10	5-11	5-12	5-13		5-15	5-16
Technology Operations	DoDAF Layer 6	Operating Devices	**6-1** Devices Enabling Core Mission Functions: (1) Core Mission Systems (2) Monitoring Systems (3) Reporting Systems	6-2	6-3	6-4	6-5	6-6	6-7	6-8	**6-9** Devices Enabling Operational Transitions (1) Development (2) Test (3) Training	6-10	6-11	6-12	6-13	6-14	6-15	6-16

CIP

Transition Governance

EA Artifact Lifecycle