



An Overview of Sandia National Laboratories

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000. SAND -2005-6648P



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Our Business: National Security



- **Core Purpose:** to help our nation secure a peaceful and free world through technology.
- **Highest Goal:** to become the laboratory that the United States turns to first for technology solutions to the most challenging problems that threaten peace and freedom for our nation and the globe.





Mission-Driven Laboratory



We serve many agencies of the US Government with:

- **Design and development: nonnuclear portions of US nuclear weapons**
- **Production: advanced components**
- **Safety, security, use control**
- **Treaty verification, nonproliferation, counter-proliferation**
- **Advanced military technologies**
- **Energy and environment**
- **Homeland security, countering weapons of mass destruction**



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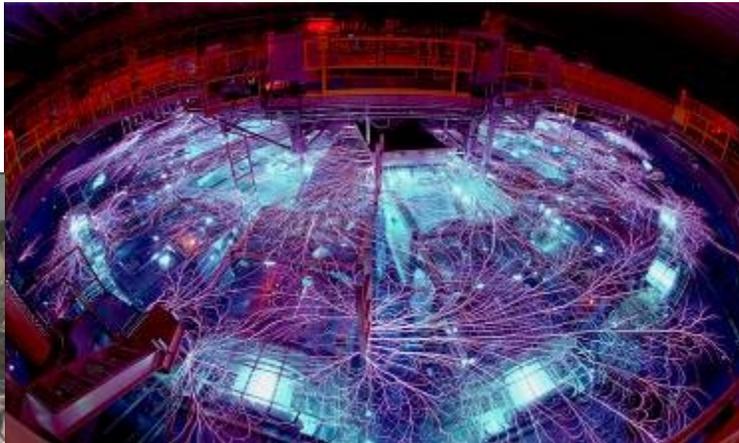
Sandia's Science and Engineering Advances

We are a leader in high-technology innovation

Weapons and energy testing



Engineering sciences



Microelectronics and photonics



Materials and processes

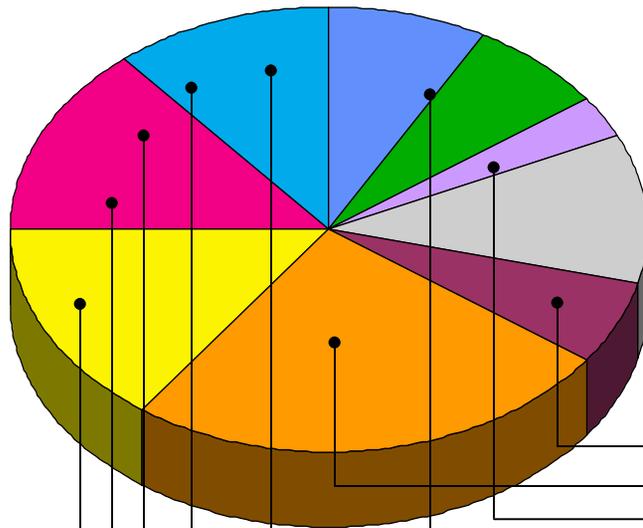


Robotics and intelligent machines



Highly Skilled Workforce

- More than 8,600 full-time employees
- More than 1,500 PhDs and 2,700 MS/MAs
- 2,200 on-site contractors
- \$2.33 billion FY06 total budget



- Mechanical Engineering - 16%
- Electrical Engineering - 22%
- Other Engineering - 15%
- Other Science - 6 %
- Physics - 6%
- Chemistry - 6%
- Math - 2%
- Computing - 16%
- Other Fields - 6 %

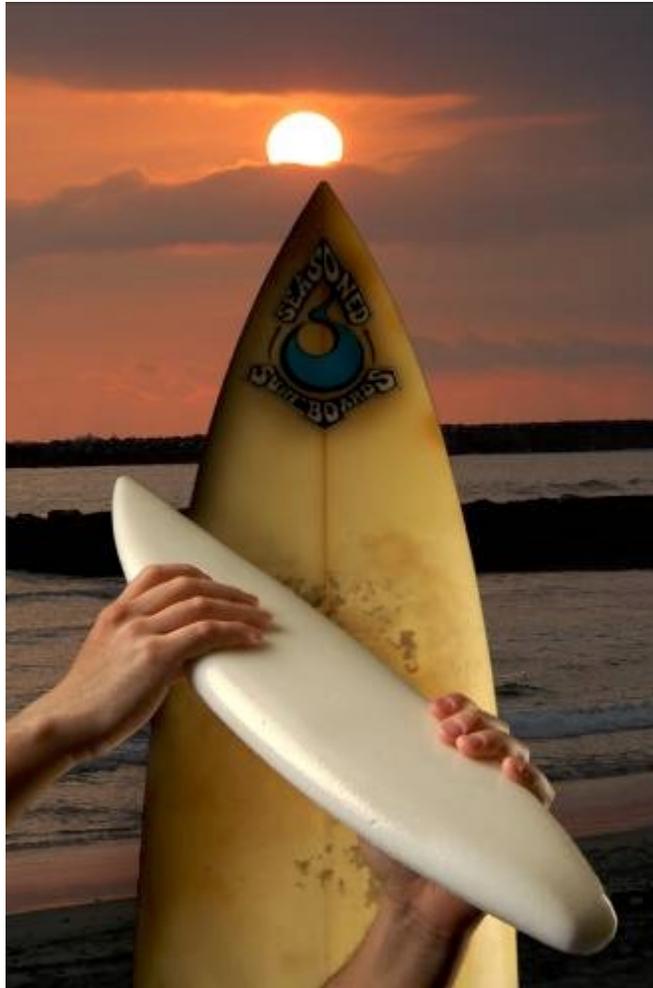


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All of this just to result in cool stuff!



Stronger
Surf
Boards



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Ensuring Quality at All Levels

September, 2006

Tom Cuyler



Purpose of this presentation is...

Death by PowerPoint





Why the Formal Process for non-software

- **Common problems**
 - **Conflicting or ill-defined vision**
 - **Weak boundaries on scope**
 - **No measurement of outcome**
 - **Poorly defined roles and accountability**
- **The Applying formal process creates**
 - **Explicitly documented outcomes, vision, and future state**
 - **Means to measure progress and success**
 - **Agreements on roles and accountabilities**
- **Process emphasizes quality of Cost, Schedule, and Performance at all levels starting at the highest levels which have the greatest impact**



Why use a structured framework for non-software projects

- A means to begin to bring process discipline to complex activities that is not a software initiative
- Structured framework provides the correct environment to define how the project performs work
 - Enables definition of the process and sub-practices
 - Creates the ability to manage the initiative
 - Allows for understanding when a deliverable is complete
- Part of an END to END process
 - Measure progress and take corrective actions if necessary
 - Deliver the integrated components of the initiative
 - Review the entire process and make improvements

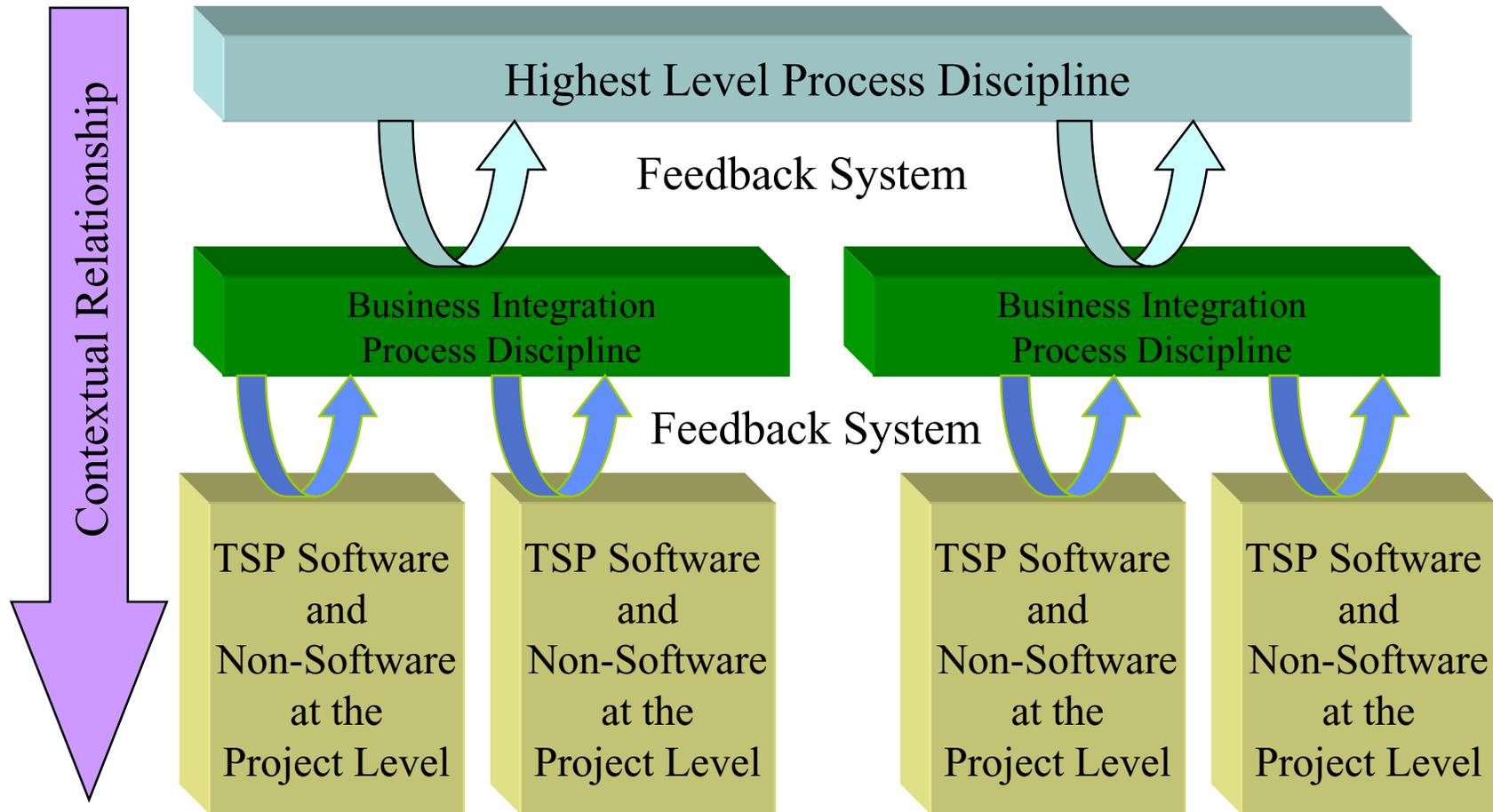


Organizational Objectives

- **4500 Process Standards and objectives**
 - Currently we are assessed at SW-CMM level 3
 - Culturally: we wish to obtain CMMI Level 4
- **Our Strategy**
 - Enable our organizational process to meet the objectives of CMMI Level 4
 - Implement at the practitioner level, practices that support the CMMI Level 4 behaviors and activities
 - Measure our success

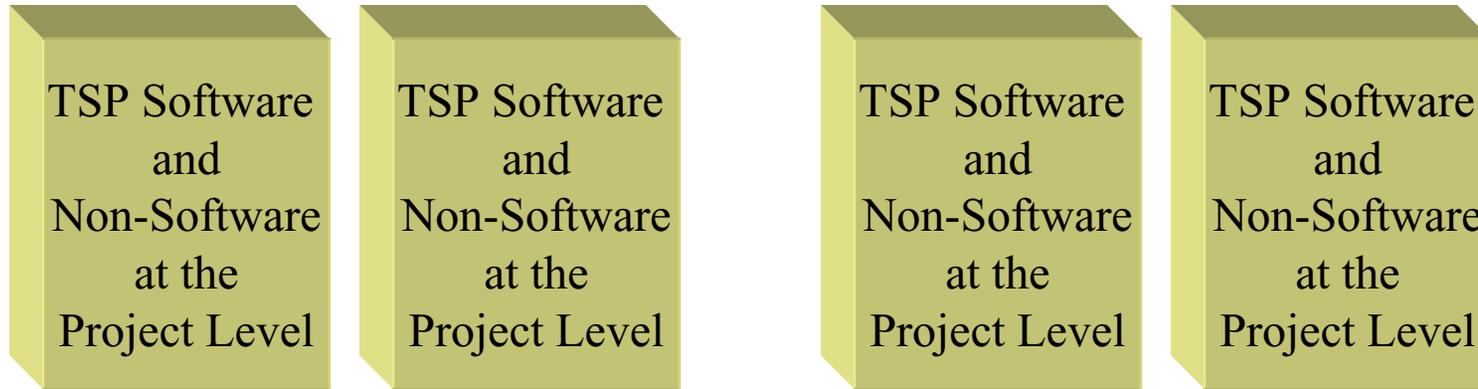


Process Discipline at All Levels





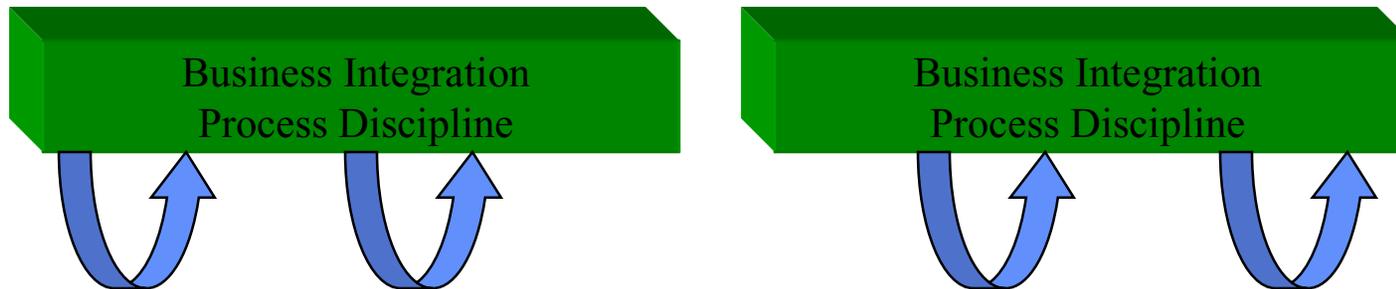
Continuous Improvement at Every Level



- An agreed upon set of stakeholder objectives with defined ownership that can be managed and tracked as a project.
- A Project plan that provides meets the objectives or our stakeholders that the team would plan, execute, and track the detail work needed to achieve the goals.
- Provides feedback to the next level up contextually as feedback to process improvement.
- Team lead is a project lead and members of the team are staff members with appropriate skills.



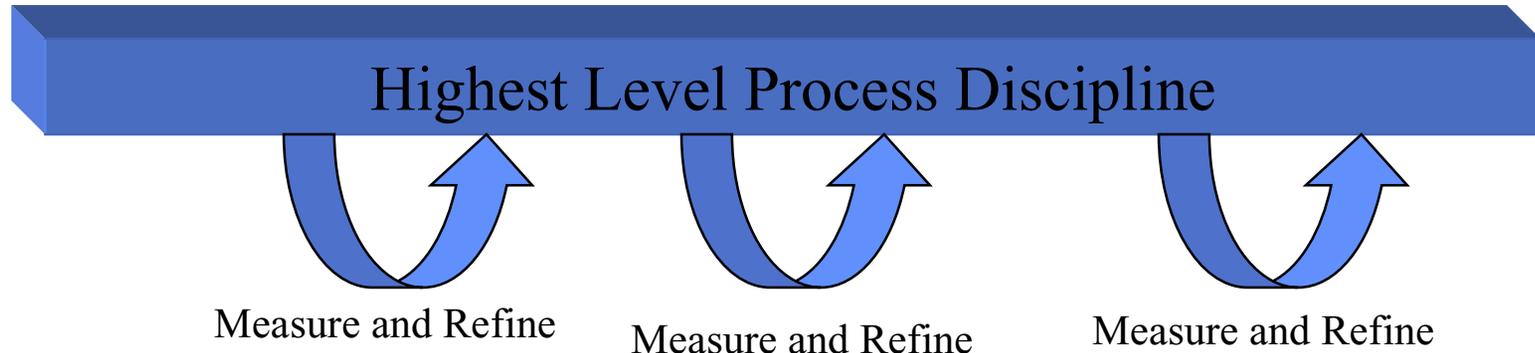
Continuous Improvement at Every Level



- An agreed upon set of cross project commitments and objectives of the program being integrated.
- A consolidated plan that provides and tracks the combined efforts of projects as they implement their plans and to communicate progress towards the organizational plan.
- Measures of the next level work products that provide validation or input to needed improvements in the sub-projects or the master plan.
- Team lead is program office or business integration lead while team members are analysts and project leads.



Continuous Improvement at Every Level



- An agreed upon set of high-level commitments with defined ownership that can be managed and tracked as a project.
- A master plan that provides the high-level requirements and connections to the sub-projects that would plan, execute, and track the detail work needed to achieve the master plan's goals.
- Measures of the next level work products that provide validation or input to needed improvements in the sub-projects or the master plan.
- Team lead is a director and team members middle management



Why Apply this to non-software

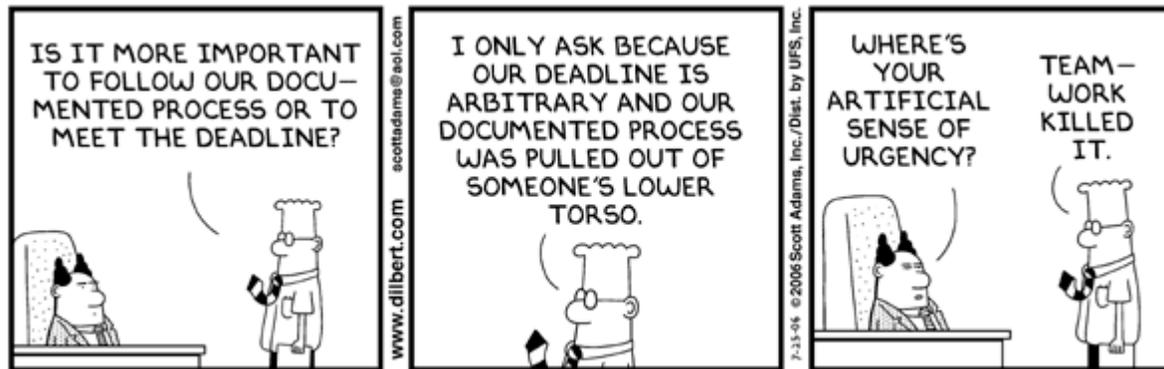
- **Ensure Quality at all levels**

- At the most detailed levels of software development, we are already applying formal process discipline (TSP)
- Non-software projects generally have large impact on organizational structure and behavior, often heavily influencing later software projects.
- The highest levels and business integration levels of decision making and coordination have enormous impact on the detailed work that is intended to deliver results.
- There is an improvement opportunities gained by applying process discipline through:
 - Creation of a repeatable and manageable process that supports the correct context
 - Adding Structure
 - Tracking Progress
 - Making course corrections
 - Measuring outcomes or impact on business



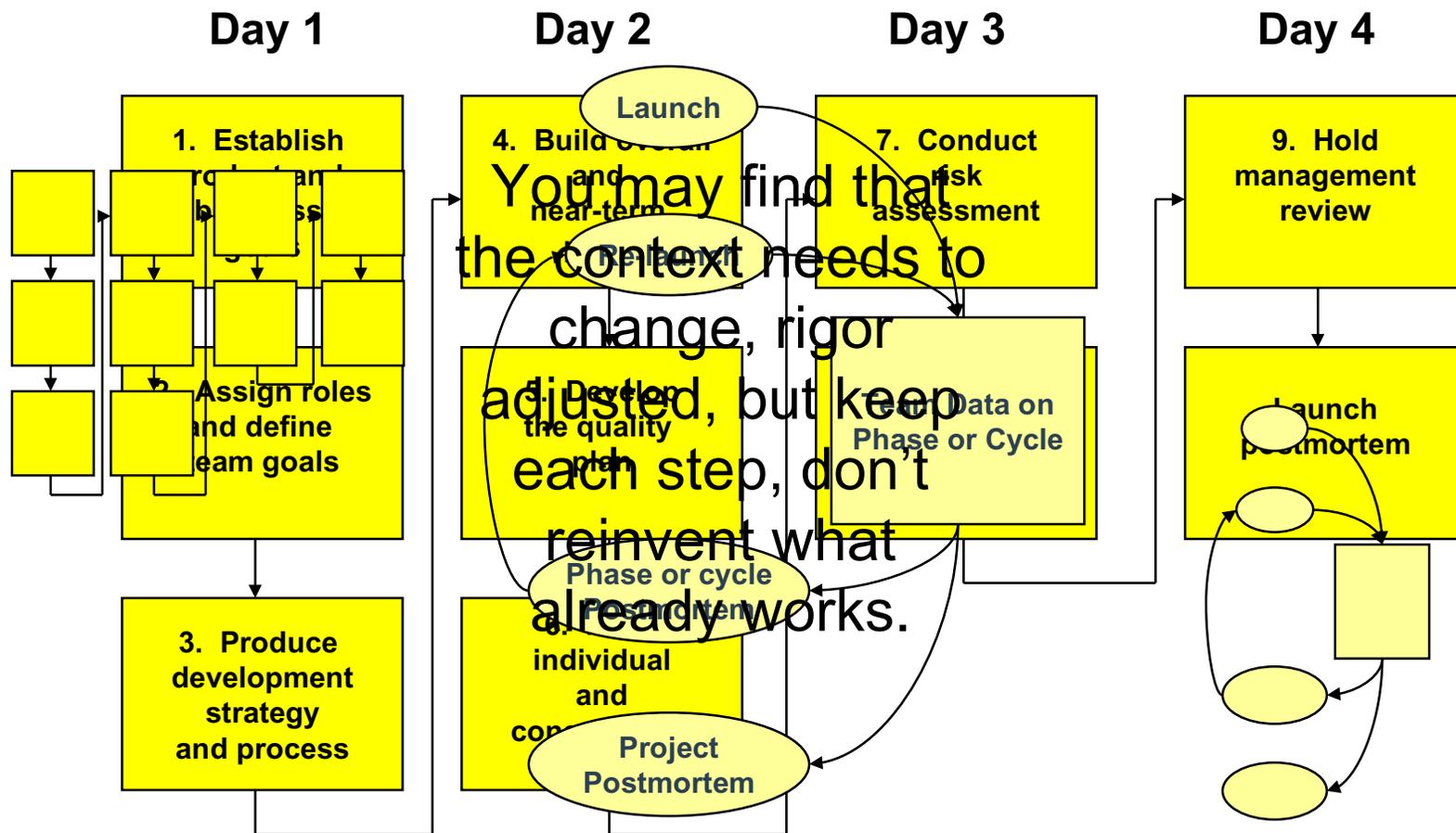
When we create a process structure on our own

The typical flow outlining the introduction of, implementation of, and acceptance of our process that we invent goes something like this:





Instead we found that this works with the proper context





Commonality of the “TSPs”

High level and business integration

- Document Desired outcomes, expectations, constraints, success factors
- Documents Future State
- Documents Strategy for obtaining Future State
- Create the Master Plan
- Assigns responsibility for plan activities
- Documents Roles, Responsibilities, and Authorities
- Creates a Risk Plan
- Creates a Communication Plan

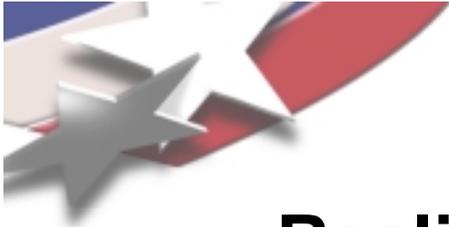
TSP Software and Non-software

- Management shares vision, outcomes, success measures, and objectives with the team
- TSP team defines the work to be done and defines the strategy
- Create the Overall plan
- Assigns Work Products to team members
- Creates team roles for a self-managed team. Defines Responsibilities
- Creates a Risk Plan
- Creates a Communication Plan



Reality hits for Core Assets Management

- **Core Assets Management**
 - CAM is a service to provide a reuse repository for our software development teams
 - They needed measurable processes from everything to reviewing an asset to cataloging the asset, etc.
- **Significant Launch Accomplishments**
 - The conceptual model of the service was defined and communicated to all team members
 - Each major service type had a corresponding process defined
 - The Top-Down provided a complete list of known activities that would need to be completed and met objectives by management and the team
 - The team picked customer satisfaction and use metrics to measure their quality of the service
 - Bottom up struck total fear: “WOW”, you mean we can not get done everything we want?
- **Lessons Leaned**
 - Lessons learned: Follow-Launch script (Don’t leave anything out). Rigor needs to be applied correctly
 - Comment: Meeting 3 was intentionally extended 1.5 working days and as a result 5 to 6 processes were produced and documented. “This has taken us 6 months to get to this point and we did it in less than 2 days.”



Reality hits for Enterprise Architecture

- **Enterprise Architecture**
 - A service designed to perform business architecture, system architecture, and information system architecture for the Sandia enterprise.
- **Significant Launch Accomplishments**
 - EA is a high level impact project on Sandia
 - Complex processes were created
 - We found that we were misaligned with the expectations and the kind and quantity of resources necessary to complete
 - Defined process brought reality to effort required of tasks
 - Needed to be able to get Quantified data to management to help asses impact of change in requirements.
 - Regrets are now managed.
- **Lessons Leaned**
 - Again, don't try to modify the scripts, instead, adjust the rigor appropriately.
 - We need a better tool for rapid change in tasks and multiple projects.



The Day after

- **CAM**

- Wow, I am surprised on how much this took to do?
- I can not compete this task because of
 - Discovery of process change with data
 - First time they used quantifiable data to make a process change
 - Impacted schedule
- Our over achieving culture is challenged by data
 - Data stairs members in the face
 - Must admit they can not get it done
 - Re-plan to adjust and being in deliverables on-track (sort of)
 - Stick to the plan has helped a great deal.



Where are we?

- **Highest Level Team Process**

- Three Launches have been conducted
- Enterprise person is first executive team to fully implement
- Next Year
 - We are going to expand the current model through our Director as a champion. This will be a service from our capability office.
 - We will expand this to another center at Sandia as they see the value of this approach

- **Middle Level Team Process**

- Two launches has been conducted and concluded
- One program office team is ongoing. Re-launch every 6 months.
- Sub teams include TSP teams and non-TSP teams. Used to populate the FY07' budget needs and strategies.

- **Project Level Non-Software TSP Process**

- Tool enabled
- Two Teams used process: One to conclusion, One on-going
- Next year
 - We will have our Enterprise Architecture Team continue with TSP adding more quality management activities and measures
 - Database service team will use TSP in January



Primary objections to overcome....

- **Tool support for services:**
 - Some services are very irregular
 - Customer phases defining engagement are needed
 - The ability to participate on multiple projects with one tool
- **Quality Management:**
 - Not well defined
 - To measure effectiveness of a process, what is measured
 - Agreement of these measures



Contact Information

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