Utilizing Lean Six Sigma to Attain CMMI® Maturities

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November 15, 2011

Agenda

- Presentation goal
- Background about SPAWAR PACIFIC
- Current situation
- Improvement focus
- Challenges
- Approach
- Questions

SPAWAR is the Navy expert in delivery and sustainment of C4ISR systems

SPAWAR = Space and Naval Warfare Systems Center   C4ISR = command, control, communications, computers, intelligence, surveillance, and reconnaissance

Presentation Goal

- How the organization utilized Lean and Six Sigma® process improvement techniques to affect implementation of CMMI® practices
  - Occurs during simultaneous organizational realignment
  - Involves consolidation of five major service-oriented projects
  - Focused on early improvements for the individuals working on the projects (In the trenches)
  - Assisted with institutionalizing selected targeted practices utilizing some Level III practices

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Space and Naval Warfare Systems Center Pacific – SSC PAC

- DOD U.S. NAVY Organization
  - More than 4,000 scientists and engineers
  - Located in San Diego and throughout the globe

- INDUSTRY PATTERNS DOD U.S. NAVY Organization
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Mission – Information Dominance

- Design, build, and sustain C4ISR information dominance systems

(Radar, networks, command and control, crypto devices, satellite communications, submarines electronic systems, etc.)

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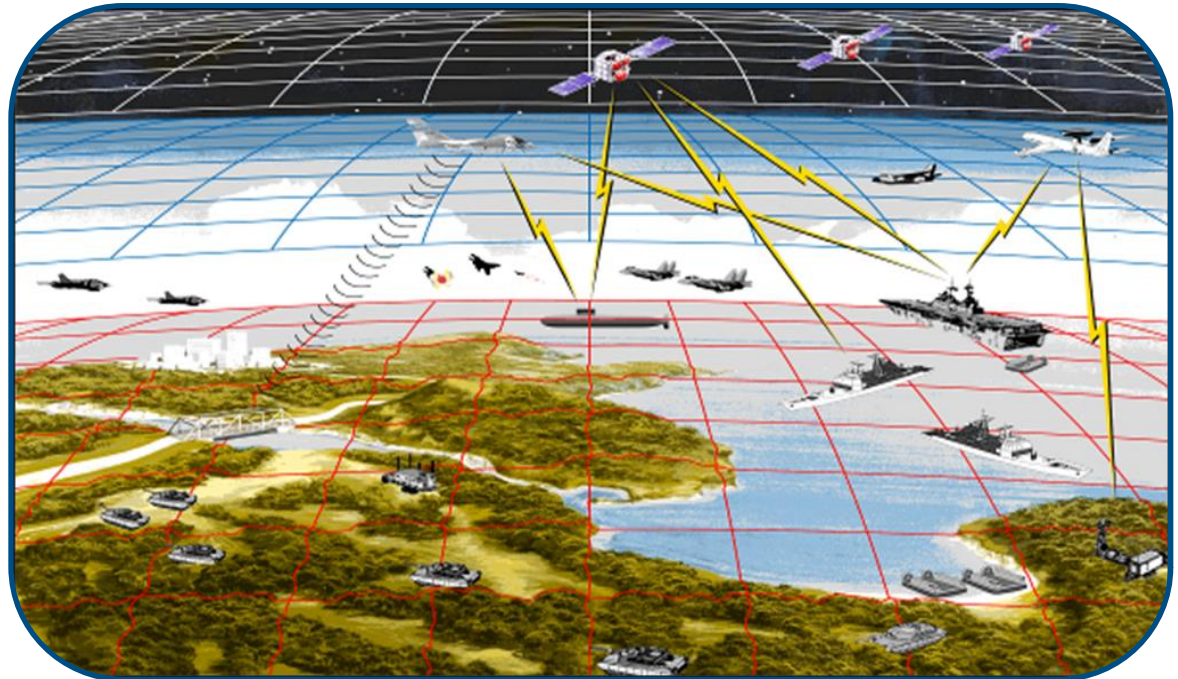**Systems Center PACIFIC**

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Systems Engineering for Mission Success

⭐ Reliability

⭐ Availability

⭐ Maintainability

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SPAWAR Systems Center Pacific CMMI Timeline

1988
- Implemented Software (SW) Capability Maturity Model® CMM ® predecessor of CMMI® model.
- Systems Engineering Process Office (SEPO)

2000
- Attained SW-CMM Level 3 in October 2000.
- SSC PAC transited from SW-CMM to CMMI- DEV model and continues with its process improvement road.

2009
- Implementing CMMI-SVC ML2 model 1.2 for Services projects
- Achieve CMMI-DEV ML3 on 2012

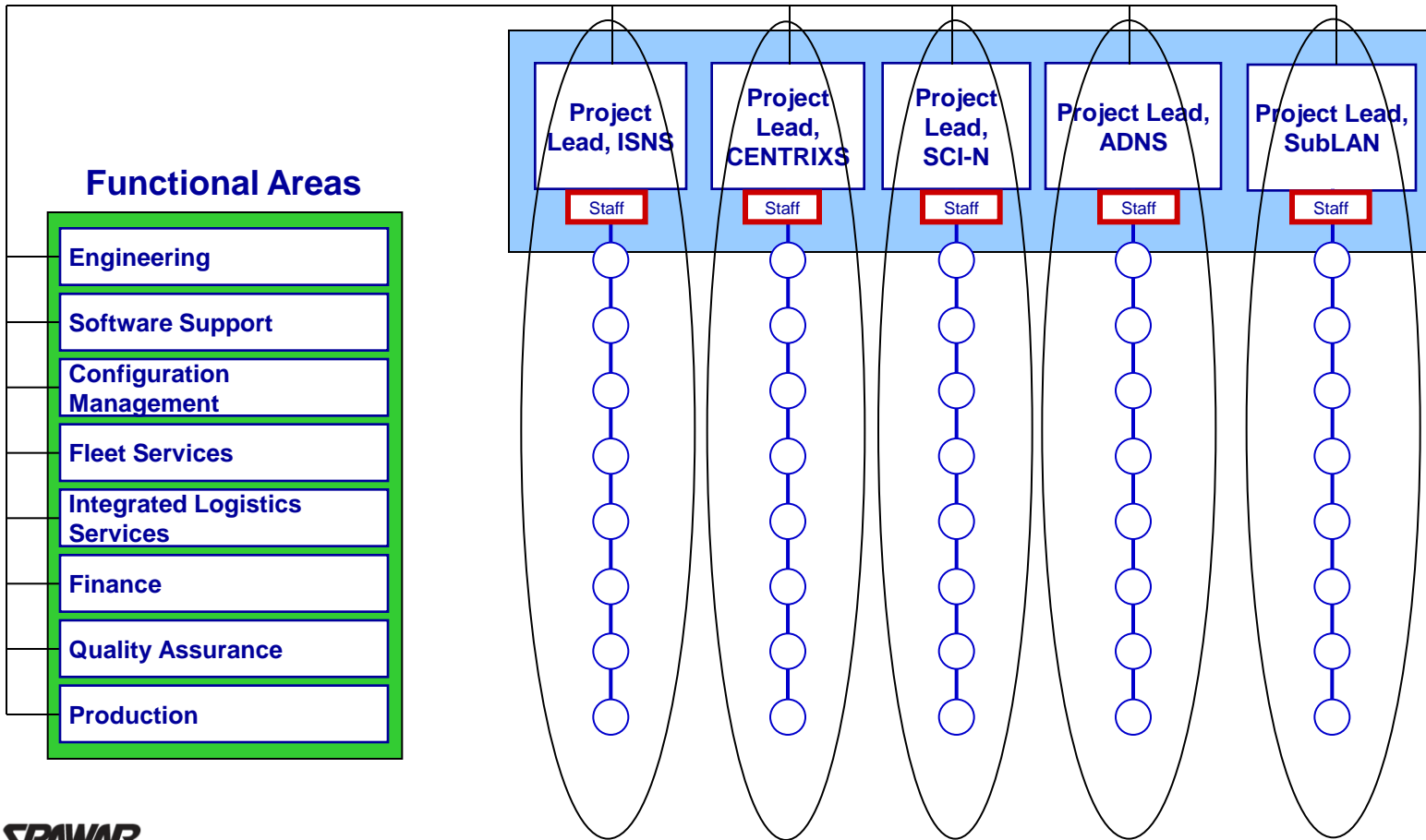**SPAWAR**
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Capability Maturity Model, CMM, and CMMI are registered in the U.S. Patent and Trademark Office by Carnegie Mellon University.

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Previous Organizational Structure

Functional Areas

- Engineering
- Software Support
- Configuration Management
- Fleet Services
- Integrated Logistics Services
- Finance
- Quality Assurance
- Production

Project Lead, ISNS — Staff

Project Lead, CENTRIXS — Staff

Project Lead, SCI-N — Staff

Project Lead, ADNS — Staff

Project Lead, SubLAN — Staff

ISNS = Integrated Shipboard Network Systems CENTRIXS = Combined Enterprise Regional Exchange System SCI-N = Sensitive Compartmented Information Networks ADNS = Automated Digital Network System   SubLAN = Submarine Local Area Network

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Different Levels of Existing Consolidation

Functional Areas

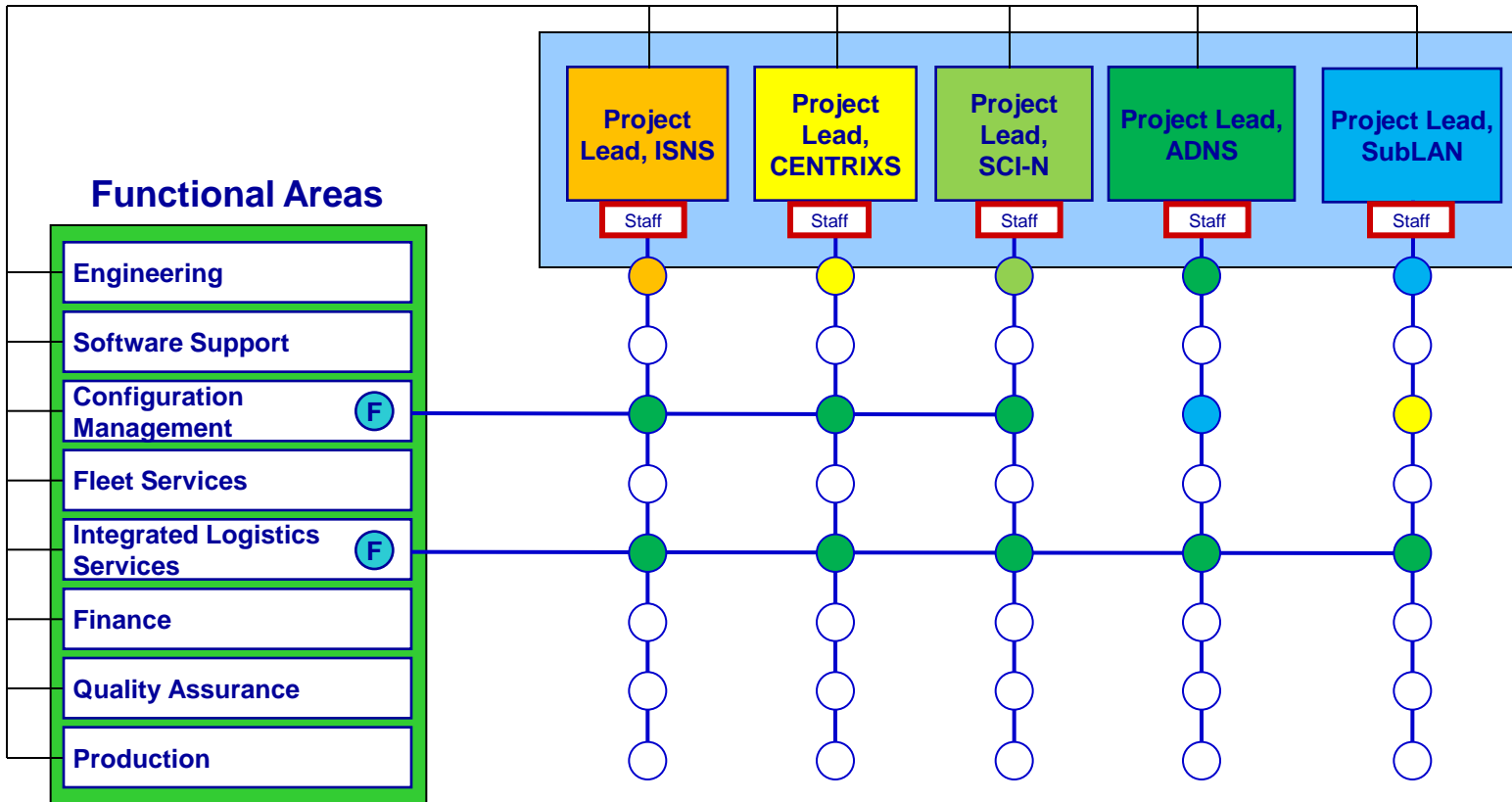|	Project Lead, ISNS	Project Lead, CENTRIXS	Project Lead, SCI-N	Project Lead, ADNS	Project Lead, SubLAN
	Staff	Staff	Staff	Staff	Staff
Engineering	●	●	●	●	●
Software Support	○	○	○	○	○
Configuration Management (F)	●	●	●	●	●
Fleet Services	○	○	○	○	○
Integrated Logistics Services (F)	●	●	●	●	●
Finance	○	○	○	○	○
Quality Assurance	○	○	○	○	○
Production	○	○	○	○	○

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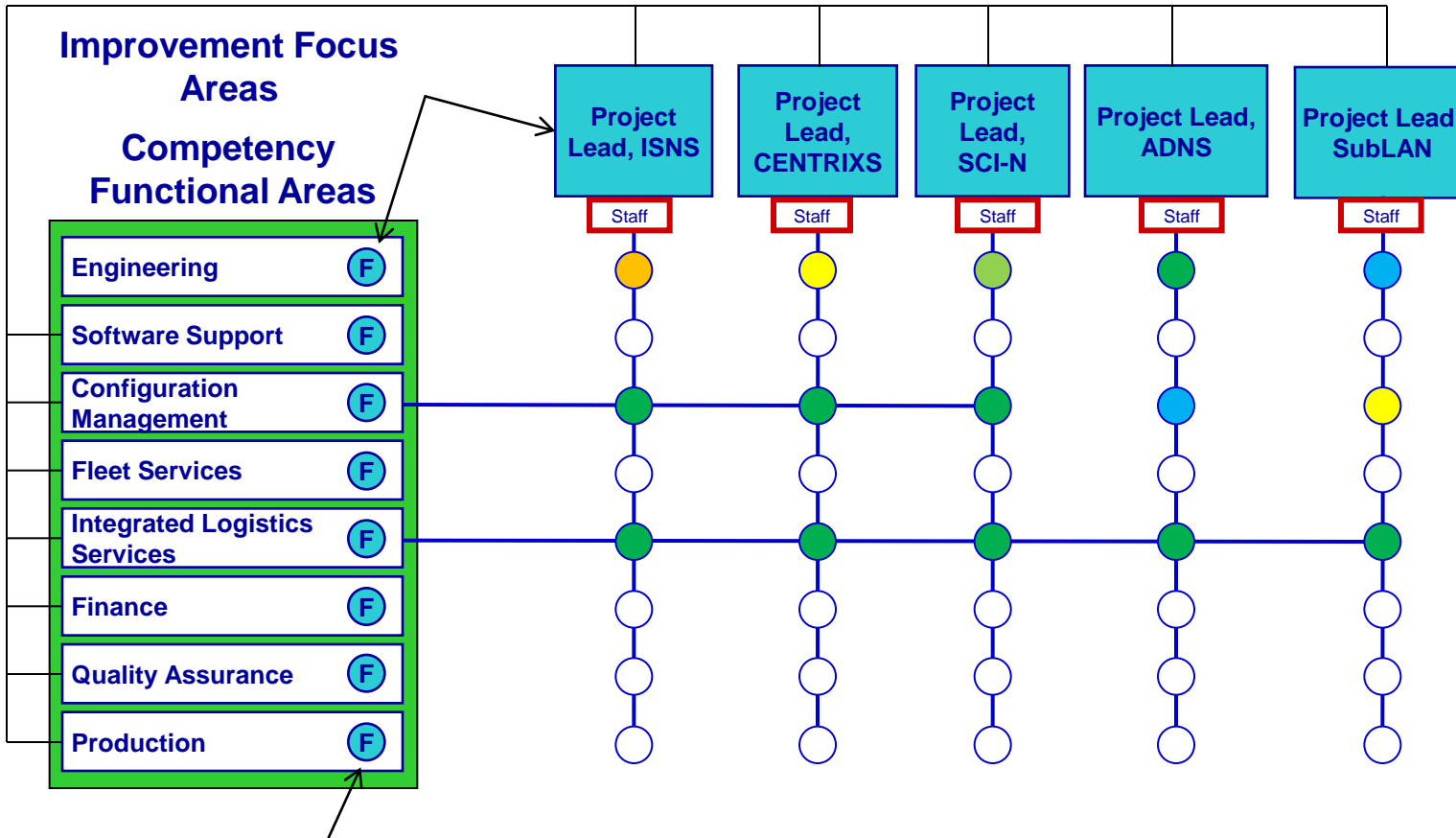*SPAWAR*
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Major Challenges

- Standard organizational change resistance
- Limited budget to accomplish improvements and certification
- Individual participant perception that they were being asked to do more with limited or no additional funding
  - Consolidating existing processes
  - Addressing gaps in CMMI® practices that weren't currently being accomplished
  - Perception that improvement benefits weren't going to be easily or quickly realized
- Revolving individual roles and responsibilities

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Approach

- Defined the "organization" as part of this initial effort as the five projects while monitoring/participating in the wider organization (SSC PAC) CMMI® efforts

- Develop and utilize draft Organizational Process Focus (OPF), Organizational Process Definition (OPD) and Integrated Project Management (IPM) practices from the very beginning to support aligning five projects. Pursued a continuous versus a staged approach for the five projects.

- Simultaneous improvement emphasis on the project planning and project monitoring and control processes so that all practitioners (project managers and functional leads) are performing in a similar, integrated fashion

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Improvement Focus

Improvement Focus Areas

Competency Functional Areas

	Project Lead, ISNS	Project Lead, CENTRIXS	Project Lead, SCI-N	Project Lead, ADNS	Project Lead, SubLAN
	Staff	Staff	Staff	Staff	Staff
Engineering (F)	●	●	●	●	●
Software Support (F)	○	○	○	○	○
Configuration Management (F)	●	●	●	●	●
Fleet Services (F)	○	○	○	○	○
Integrated Logistics Services (F)	●	●	●	●	●
Finance (F)	○	○	○	○	○
Quality Assurance (F)	○	○	○	○	○
Production (F)	○	○	○	○	○

Functional Area Leads
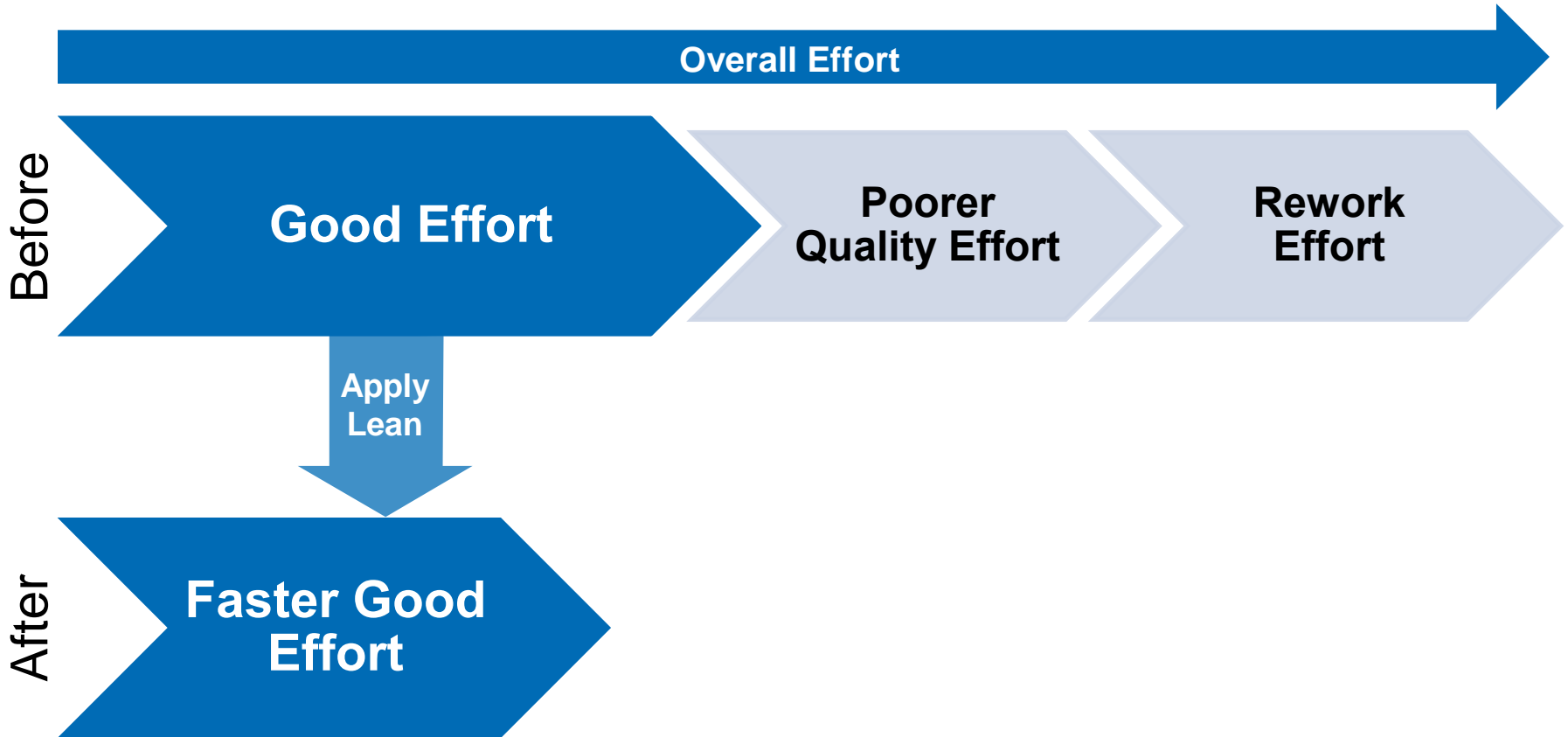
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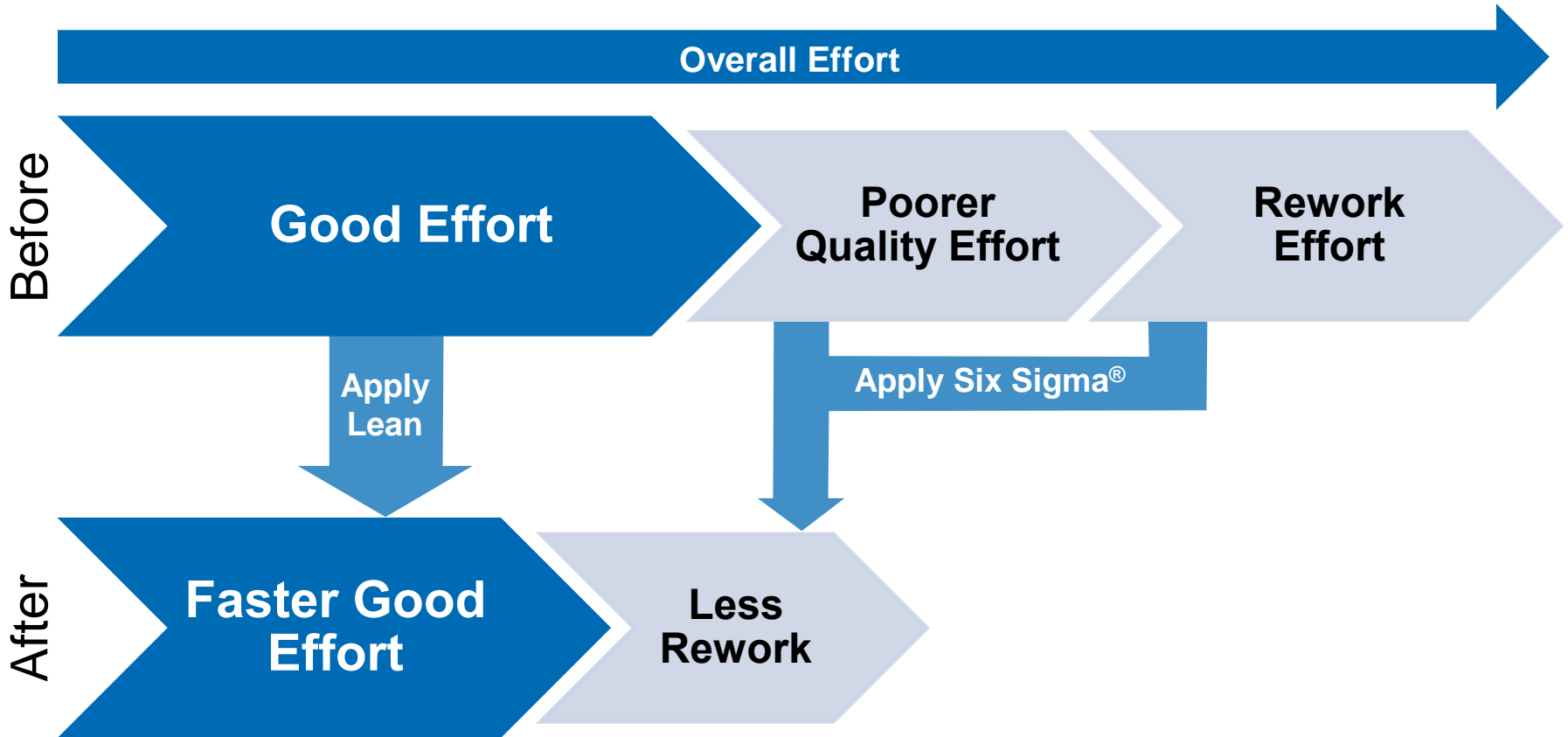
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Improvement Focus on Effort for a Particular Process Area

Overall Effort →

Before

| Good Effort | Poorer Quality Effort | Rework Effort |

Improvement Focus on Effort for a Particular Process Area

Overall Effort

Before

Good Effort

Poorer Quality Effort

Rework Effort

Apply Lean

After

Faster Good Effort

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Improvement Focus on Effort for a Particular Process Area

Overall Effort

Before

Good Effort **Poorer Quality Effort** **Rework Effort**

Apply Lean

Apply Six Sigma®

After

Faster Good Effort **Less Rework**

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Improvement Focus on Effort for a Particular Process Area

Overall Effort

Before

Good Effort

Poorer Quality Effort

Rework Effort

Apply Lean

Apply Six Sigma®

Allowing

After

Faster Good Effort

Less Rework

Added CMMI® Practices (Capabilities)

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Summary Approach

- Apply Lean Six Sigma® (LSS) improvement efforts to establish and/or improve the "How" of the focused project processes, making sure that you incorporate the gaps between the existing processes and the CMMI® best practices
- Simultaneously
  - Apply Lean efforts to remove waste in current, focused project processes
  - Apply Six Sigma efforts to improve the quality and reduce the rework of current focused processes
  - Ensure that the improvement phase incorporates the gaps and adapts CMMI practices to the business environment, thus improving the focused processes

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Additional Approach Considerations

- Get <u>really close</u> to the way the various personnel (practitioners) operate to apply the improvements and improve
  - To adopt practices practitioners need to be able to accomplish their work faster and with better quality and less rework

- Rather than adopt new technology (tools), we focused on improvements in the use of existing technology
  - This puts more focus on training and education as opposed to increased cost of acquiring new tools, adopting to existing processes, and conducting training
  - Practitioners are more comfortable with using existing tool sets but in improved ways as opposed to adopting newer, unfamiliar tool sets

- Design the new way (improvement) to doing business, ensuring that it incorporates the "What" of CMMI® practices for the particular process area

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Results

- Accomplished Level II certification on time for all five projects
- Continued to apply the improvement technique to mature the projects toward Level III selected process areas in a continuous approach

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Questions?