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Leadership of Management for Complex Adaptive Systems

INCOSE
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Agenda

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- A Changing Environment
- Agile and Adaptive
- Impact on Management Practices
- Actions Forward

A Changing Environment

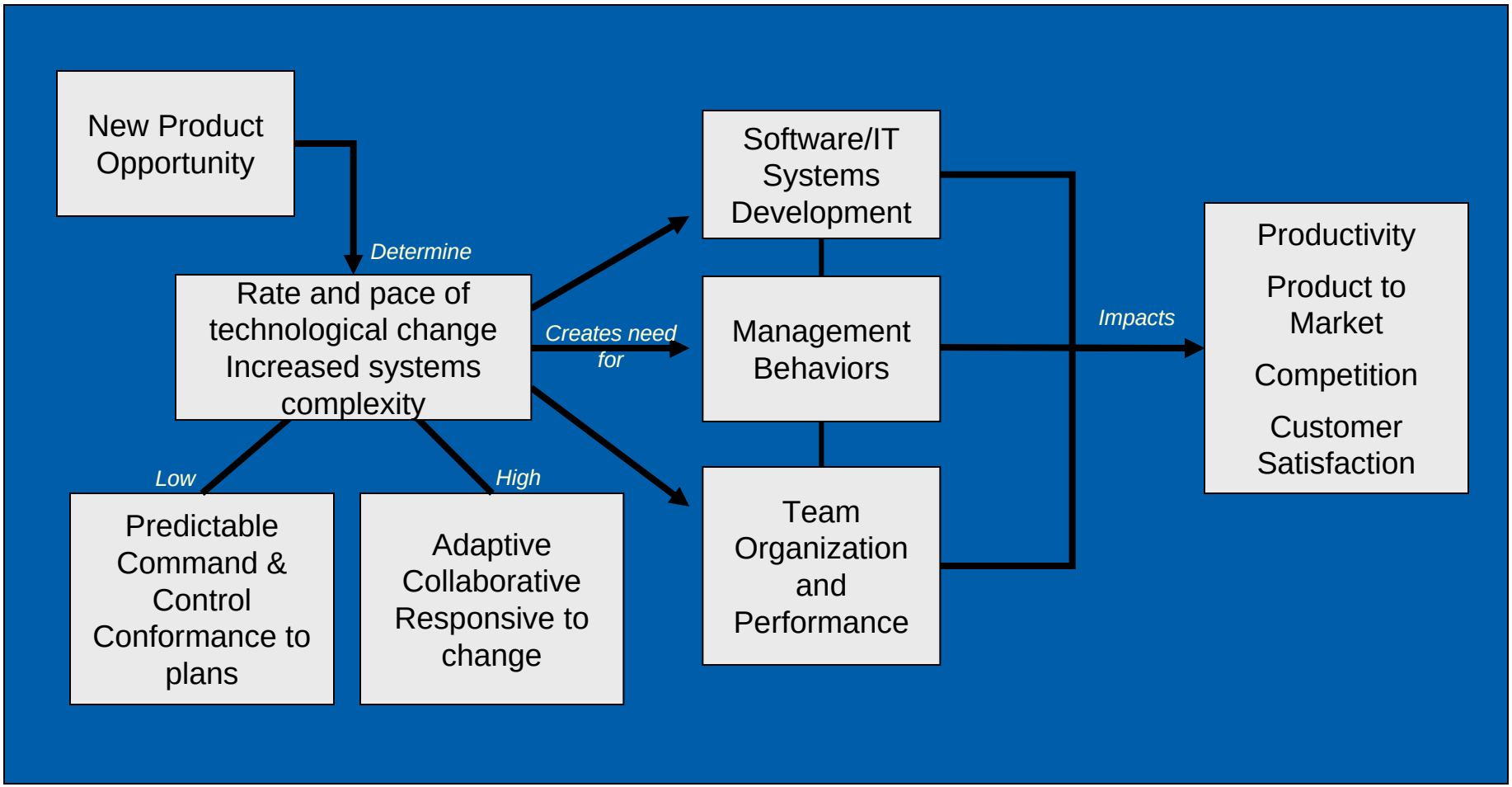
In all development, chaos and complexities arise preventing wanted functionality

The Problem… Military Advantage Eroding

"There is growing concern within Congress and among Department of Defense (DOD) leadership that the nations' military advantage may be eroding. *The deliberate process through which weapon systems and information technology are acquired by DOD cannot keep pace with the speed at which new capabilities are being introduced in today's information age* -- and the speed with which potential adversaries can procure, adapt, and employ those same capabilities against the United States."

Defense Science Board. (March, 2009). Department of Defense Policies and Procedures for the Acquisition of Information Technology. http://www.acq.osd.mil/dsb/reports/2009-04-IT_Acquisition.pdf

Problem Domain



Johnson, S. (2009). Dissertation.

Complexity Theory

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- Complex Adaptive Systems
  - A dynamic network of many agents
    - acting in parallel and reacting to what the other agents are doing
  - Principle of growth and evolution (high rate of change)
  - Control is dispersed and decentralized
  - Simple rules and governance used to direct behavior
- Complexity Leadership Theory
  - Built on complexity theory
  - Expands the locus of leadership from the role-based actions of an individual to interactions that occur across the organization and down to the individual and team level
  - Relationships are not defined hierarchically, but rather through interactions across the organization or project
  - The "Leader" role is an enabler of change

References:

Mike Cohn, MountainGoatSoftware

John Holland in *Complexity: The Emerging Science at the Edge of*

Marion, R., McKelvey, B., & Uhl-Bien, M. (2007). Complexity leadership theory: Shifting leadership from the industrial age to the knowledge era. Leadership Quarterly, 18(4), 298-318.

Order and Chaos by Mitchell Waldrop

Meso and Jain, Agile software development: Adaptive systems principles and best practices

A New Business Model

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Traditional Versus Adaptive Business Model

Traditional Business Model:

- **Make and sell model**
- **Industrial Age**
- **[illegible]**
- **Scheduled activities**
- **Excels at planning and control**
- **Founded upon Henry Ford's business concepts**
  - **Predictable**
  - **Efficient**

Printing the book (manufacturing)

Industrial Age

(1915)

Adaptive Business Model:

- **Inspect and Adapt**
- **Information/Knowledge Age**
- **[illegible]**
- **Responding quickly and appropriately to customer needs**
- **Focuses on capabilities, adaptability, flexibility, agility, and responsiveness**
- **Consists of dynamic teams making decentralized decisions**

Writing the book (creating)

Knowledge Age

(1973/1986)

Haeckel, L. (1999). *Adaptive enterprise*. Boston: Harvard Business School.

Agile and Adaptive

Promote rapid delivery of value to customers

Provide timely and regular visibility of the solution

What do we mean by "agile and adaptive?"

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- "Agility is the ability to both create and respond to change in order to profit in a turbulent business environment."
  - Jim Highsmith, Agile Software Development Ecosystems
- Emphasizes ongoing iterative development with completed, demonstrable functionality
  - for example: an iteration delivered at the end of every two weeks
- Flexibility balanced with structure
- Balancing on the edge between order and chaos determines success

Agile Principles

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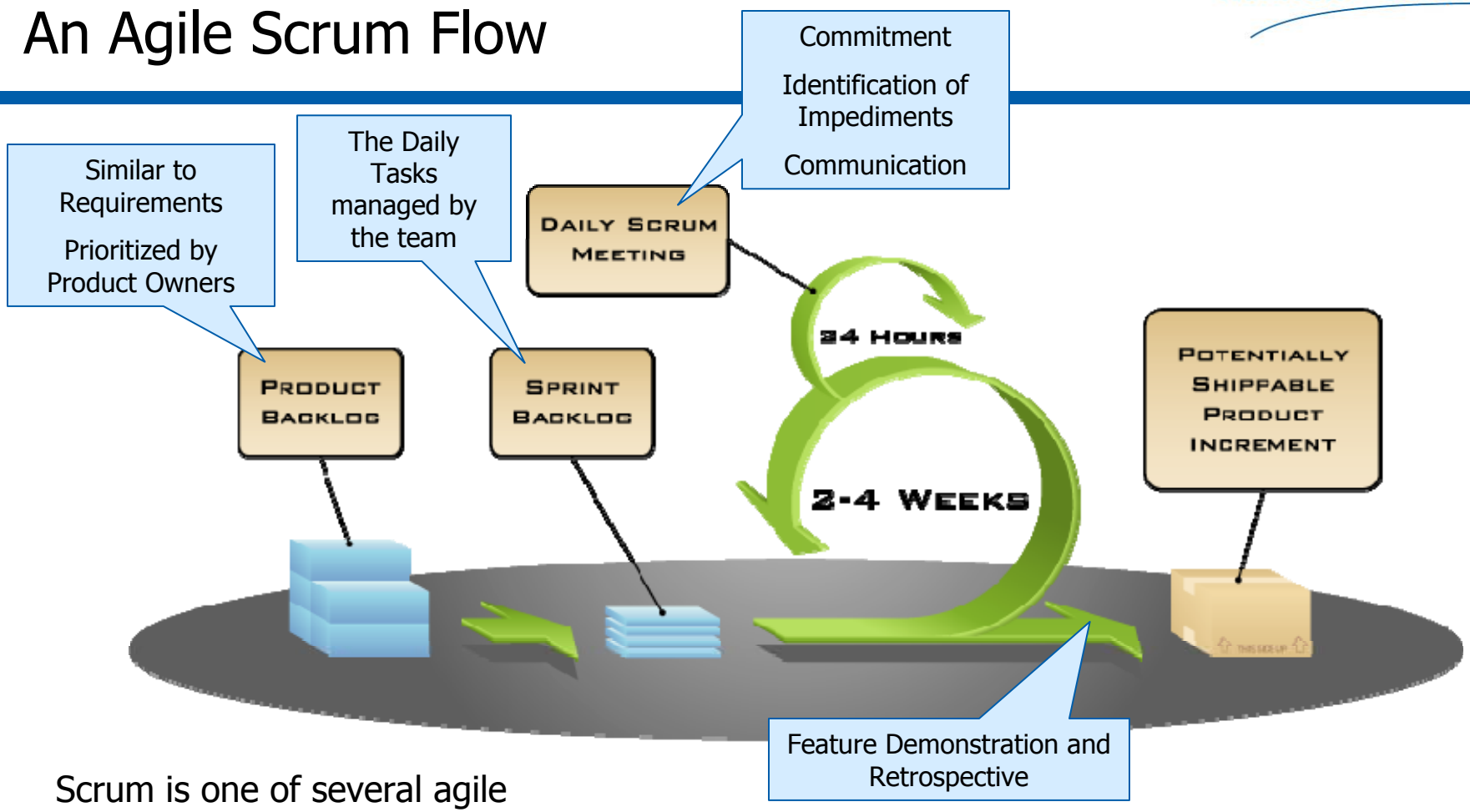
1. Our highest priority is to satisfy the customer through *early and continuous delivery of a valuable system*
2. *A working system* is the primary measure of progress
3. *Welcome changing requirements*
4. *Deliver* a working system *frequently*
5. Business people and developers must *work together* daily
6. Build projects around *motivated individuals*
7. *Face-to-face conversation*
8. *Promote sustainable development*
9. Continuous attention to technical excellence
10. *Simplicity*
11. The best architectures, requirements, and designs emerge from *self-organizing teams*
12. Regular team reflection on how to become more effective: Inspect and adapt

(http://agilemanifesto.org)

An Agile Scrum Flow



Scrum is one of several agile methods and is used by >70% of agile teams according to VersionOne survey, 2008.

Inspect and Adapt

Visibility and Transparency

Image from: Mike Cohn, MountainGoatSoftware.com

Agile Misconceptions

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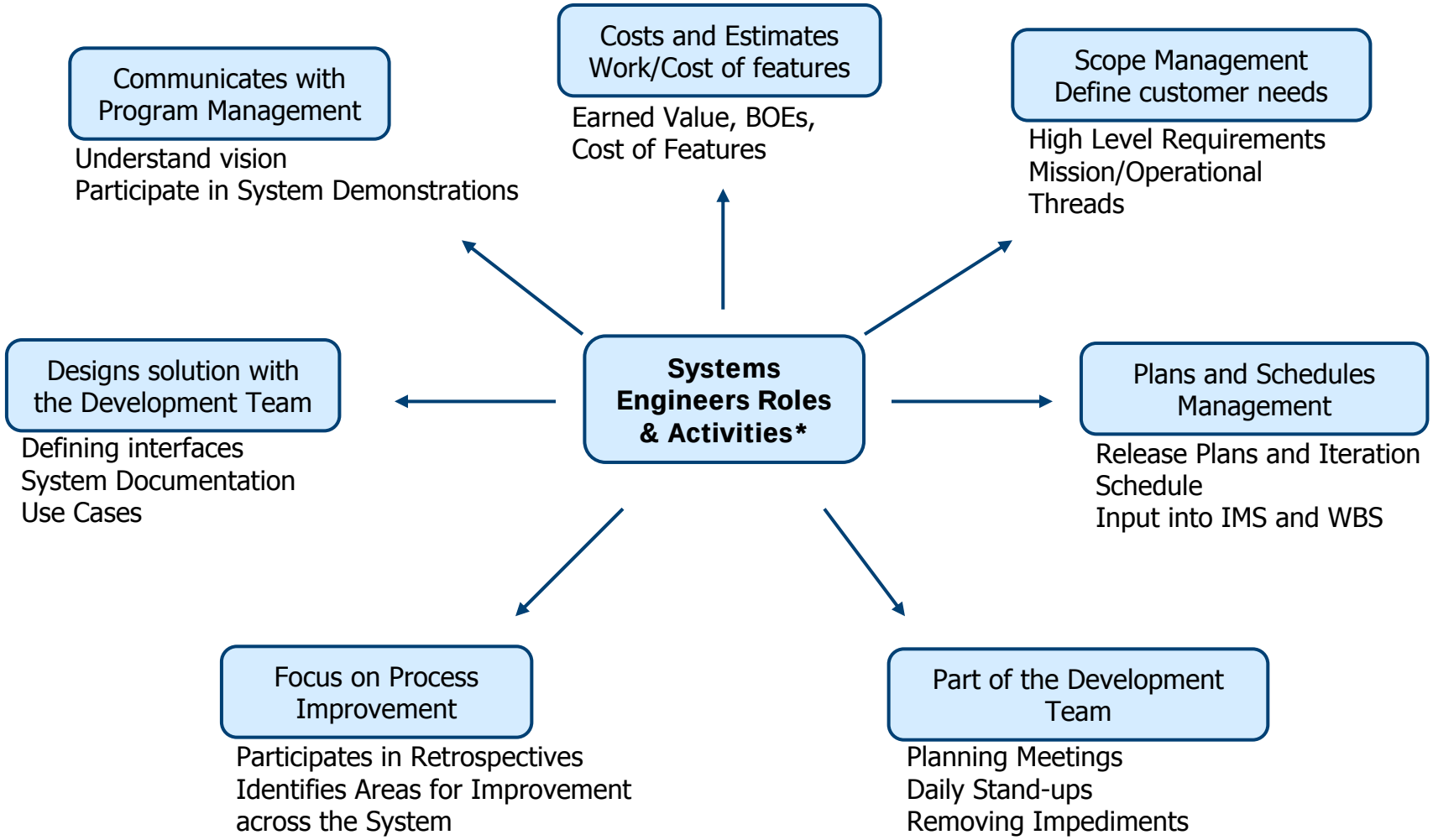
- There is no discipline within an Agile Process
  - False. It requires MORE discipline.
- Agile is only for software development teams
  - False. Implementing Agile practices require culture change at all levels.
- The solution to any problem is more process
  - False. Too much process stifles innovation and results in endless workarounds.
- Agile is only for small sized software efforts
  - False. Project sizes of 200 – 600 people are becoming more common.
- Agile is "turn-key"
  - False. The transition from traditional to Agile will take time

What does this mean for Systems Engineers?



*Not all inclusive, but meant to serve as examples

Expectations

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- Expectations of the Team
  - Commits to planned work during release planning, iteration planning, and daily
  - Communicates impediments
  - End-to-end ownership and accountability
  - Self-organizes around the work
  - Daily team collaboration
  - Demonstrates functionality
  - Works together to resolve team conflicts
  - Keeps a working system
- Expectations of the Customer
  - Participates in setting priorities
    - We ask, "Is what we are doing useful to you in meeting your goals?"
  - Participates in demonstrations of functionality
  - Provides feedback and engages in dialogue about requirements and expectations

Inspect and Adapt

Visibility and Transparency

Impact on Management Practices

Create a workplace where people want to be, where people are valued, and are full contributors to forming and supporting the direction of the company

Who is *The Manager*?

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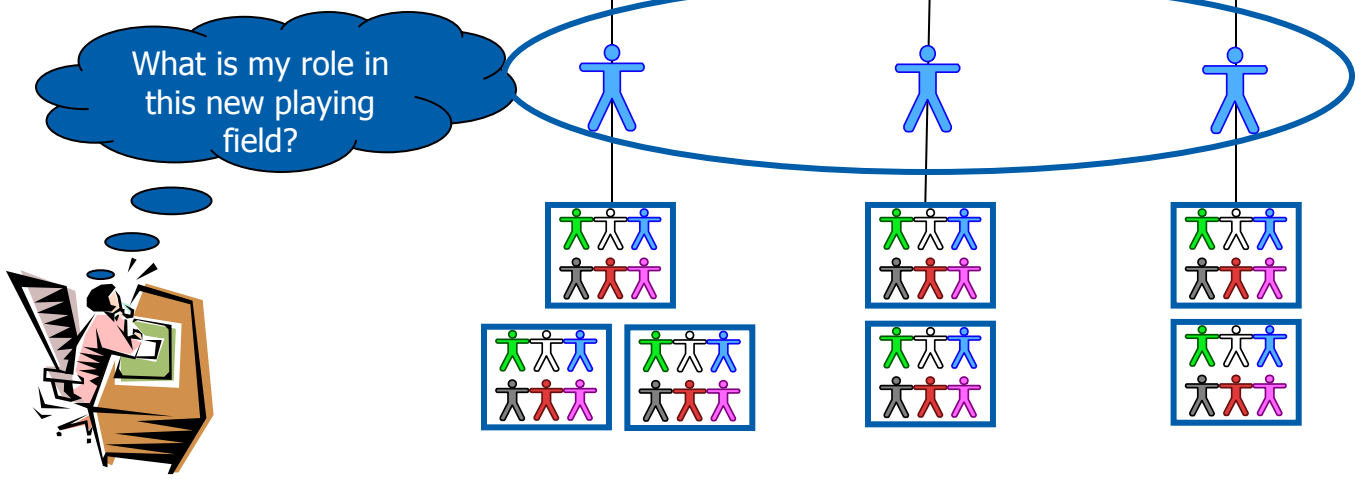
Managers want to contribute.

Managers want to provide value.

They need to understand their role in an agile organization so they can be effective and so others can be productive.



Executive management influences

This level includes: PMO, Vice President of the Organization, etc.

Management can have great impact

This level includes: Chief Product Owners, Chief ScrumMaster (removes impediments), Chief Systems Engineer, Chief Architect, etc.)

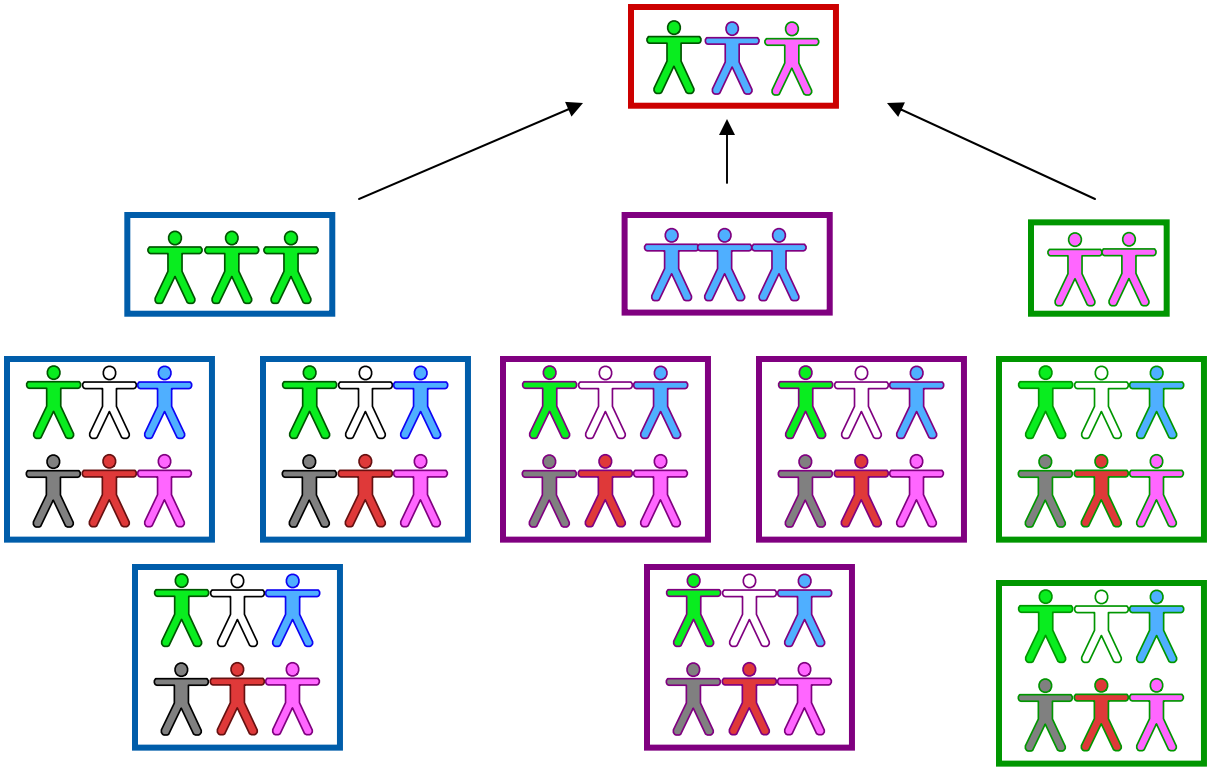
The Chief Systems Engineer is responsible for developing, executing, and maintaining the Systems Engineering Plan (SEP) / Systems Engineering Management Plan (SEMP).

The Manager as a Visionary and Leader

- Creates a vision for the team
  - Product Roadmap and setting priorities
  - Understands business value
  - Refocuses the team when they drift off course
- Keeps purpose alive
- Focuses on fixing processes not people
- Expects success; Accepts mistakes
- Encourages a learning organization
- Steps up when "it or he" is about to be thrown out the window
  - Teams solve their own problems, but sometimes management needs to step in

Establish the direction for where the team is headed

The Manager as a Communications Builder



- Encourages communication between teams and ensures that communication channels exist
- Communicates the roles and responsibilities within the communication process
- Practices the communication process with the management team
- May participate in team daily stand-ups to understand progress, but is not permitted to speak

The Manager as a Motivator and Encourager

- Encourages self-management
- Encourages people to sign up for work they want to do
- Participates in the iteration demonstrations and celebrates success; redirects as needed
- Works with individuals who are struggling when the team is unable to resolve problems

The Manager as a Productivity Expediter

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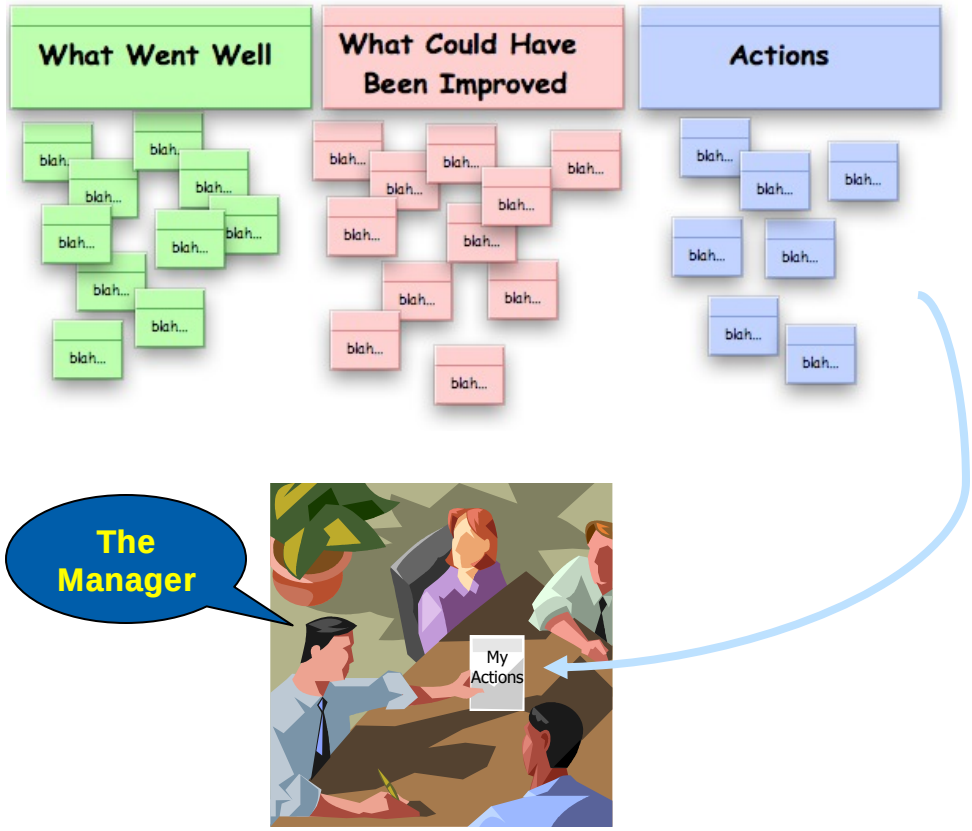
The Iteration Retrospective



- Helps teams get the strategies and tools they need
- Listens to team members and individuals
- Takes action on results of the retrospective
- Removes external barriers that interfere with progress
  - Do you have what you need?
  - Where do you think we are most vulnerable?
  - Where are we not meeting our goals?

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What the Manager used to do that **the Team does now**

- Makes **commitments** on behalf of the team
  - Convinces team that the commitments made on their behalf are attainable
- **Gives direction** to the team on how to implement the work
- **Monitors the team's progress**, to make sure they stay on schedule, and isn't having problems
- Steps in and **determines the solution**
- Conducts **weekly status update** to surface issues and provide direction
- Pushes the team to work harder than they might want to, using carrots and / or sticks
- **Decides task** assignments among the team members
- **Is responsible for the team** doing the right thing at the right time in the right way.

Managers empower the team to make decisions to fulfill the team's commitments based on business/mission value

Reference: www.controlchaos.com

Scenarios: What Should the Agile Manager Do?

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1. The team is upset because a person on their team is frequently late and is struggling to complete his tasks. What should the agile manager do?
2. Some teams are never delivering what they committed to at the beginning of the iterations. What should the agile manager do?
3. The product owner/manager is upset with the team because they are only planning to work 18 of the 22 requirements that need to be done in this iteration. What should the agile manager do?

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Challenges Managers Face when Adopting Agile Practices

- Culture changes and fear of change
- Transitioning (the paradigm shift from command and control to empowered teams)
  - Follow through/action by management
  - Instilling discipline
  - Helping people through the new process
- Program or organizational constraints
- Organizing distributed teams
- Estimating complexity, especially when needed for future work
- Customer engagement and understanding of agile practices

Summary: Complexity Impacts Management Practices

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Historically traditional practices (low rate of change) emphasize…	Adaptive and agile practices (high rate of change) emphasize…
Directive and top-down	Leading, empowering, and collaboration
Managing the people and the work	Teams that are self-managed with distributed control
Limiting and reducing change	Adapts to and welcomes change
Enforcing compliance to processes	Readily adapting processes as needed with emphasis on the minimal amount needed
Top-down hierarchical management of people	Flat organizations where people manage themselves to meet the vision and goals of the organization

The opposite of control is discovery

Actions Forward

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- Create environments that emphasize collaboration, team empowerment, trust, and organizational learning
- Ask the right question in the interviews so we hire people that thrive in this environment
- Ensure managers are trained in the practices that are being implemented
- When in transition to agile practices, communicate the principles to which the organization plans to adhere
- Know and nurture the principles of the organization
- Focus on ensuring the needs of the team are meet
- Provide the tools the teams need including infrastructure environments

Suggested Reading List and References

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Creating Adaptive Businesses

- Adaptive Enterprise – Steven Haeckel
- Complexity leadership theory: Shifting leadership from the industrial age to the knowledge era – Marion, R., McKelvey, B., & Uhl-Bien, M. (2007). *Leadership Quarterly, 18*(4), 298-318.
- Five Dysfunctions of a Team – Patrick M. Lencioni
- John Holland in *Complexity: The Emerging Science at the Edge of Order and Chaos* – Mitchell Waldrop

Agile Development Practices

- Agile Project Management with Scrum – Ken Schwaber
- Agile Retrospectives – Esther Derby and Diana Larsen
- Agile Software Development: Adaptive systems principles and best practices – Meso and Jain
- Agile Software Development with Scrum – Ken Schwaber and Mike Beedle
- Implementing Lean Software Development – Poppendeick
- Scrum and The Enterprise – Ken Schwaber
- The Manager's Role in Scrum, ScrumGathering, Nov. 2007 – Henrik Kniberg
- www.mountaingoatsoftware.com – Mike Cohn

Managing Change

- Fearless Change – Manns and Rising
- The Fifth Discipline – Peter Senge
- Leading Change – John Kotter


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