# Assuring Mission Success in Complex Settings

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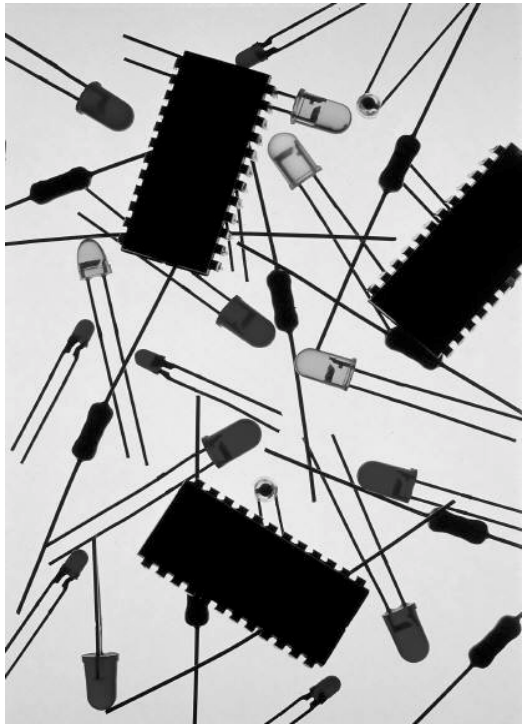
# Managing Complexity

Managers are responsible for overseeing increasingly complex projects, programs, and operational processes.

- **Multiple points of management control**
- **Complex tasks**
- **Complex, distributed support technologies**
- **Multiple, detailed status reports**
- **A variety of management techniques (project, security, financial, technology, etc.)**
- **Requirements of multiple stakeholders**

# Need for a New Approach



Traditional analysis and management approaches not designed for complex environments

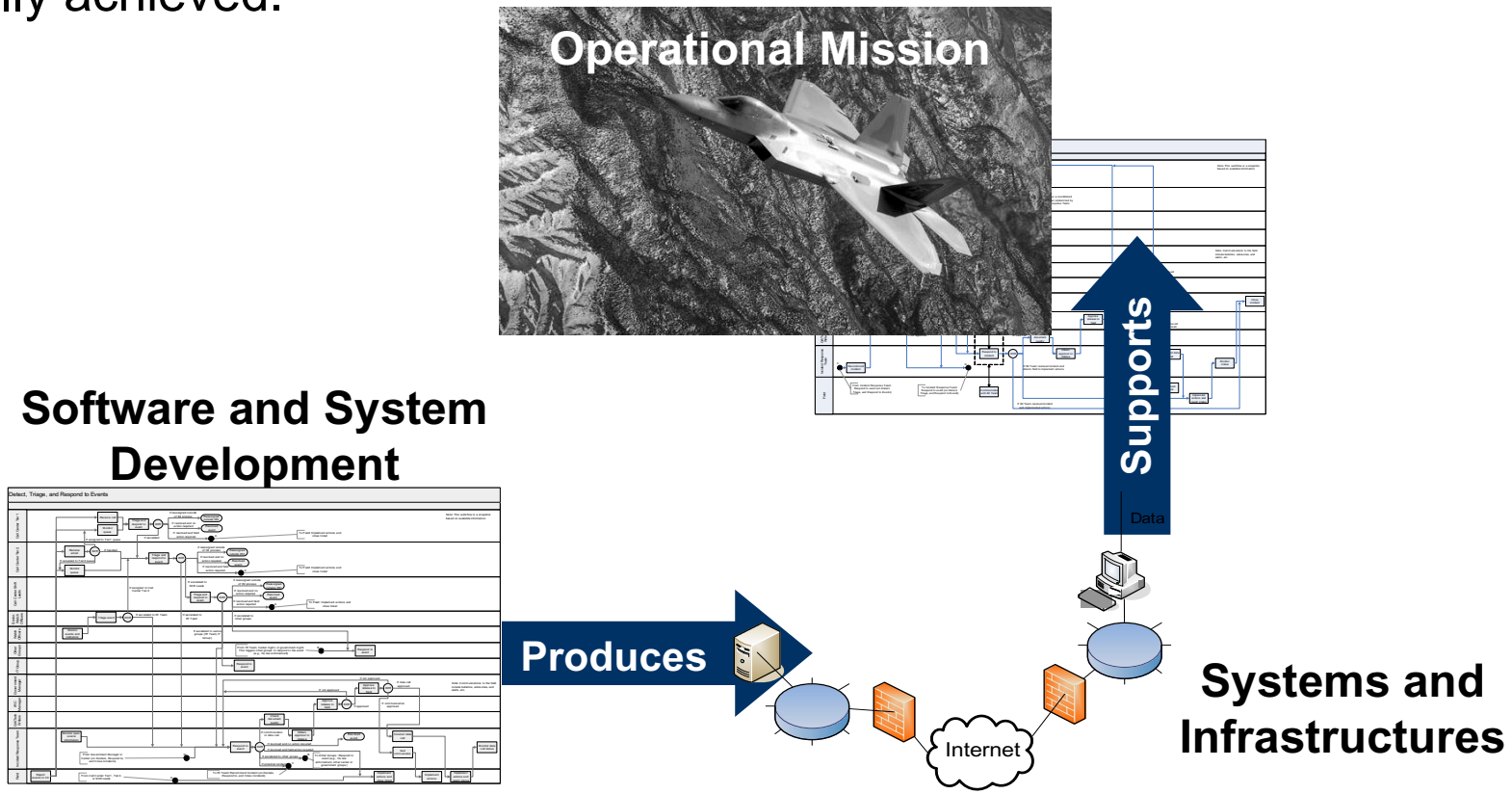
- **Cannot handle organizational and technological complexity**
- **Do not easily scale to distributed environments**

Need new methods, tools, and techniques to

- **Position projects, programs, and processes for success**
- **Establish and maintain confidence in achieving objectives**

# Managing for Mission Success

Managing for mission success requires establishing and maintaining a reasonable degree of confidence that a mission's objectives will be successfully achieved.



# SEI MOSAIC:
## Managing for Success

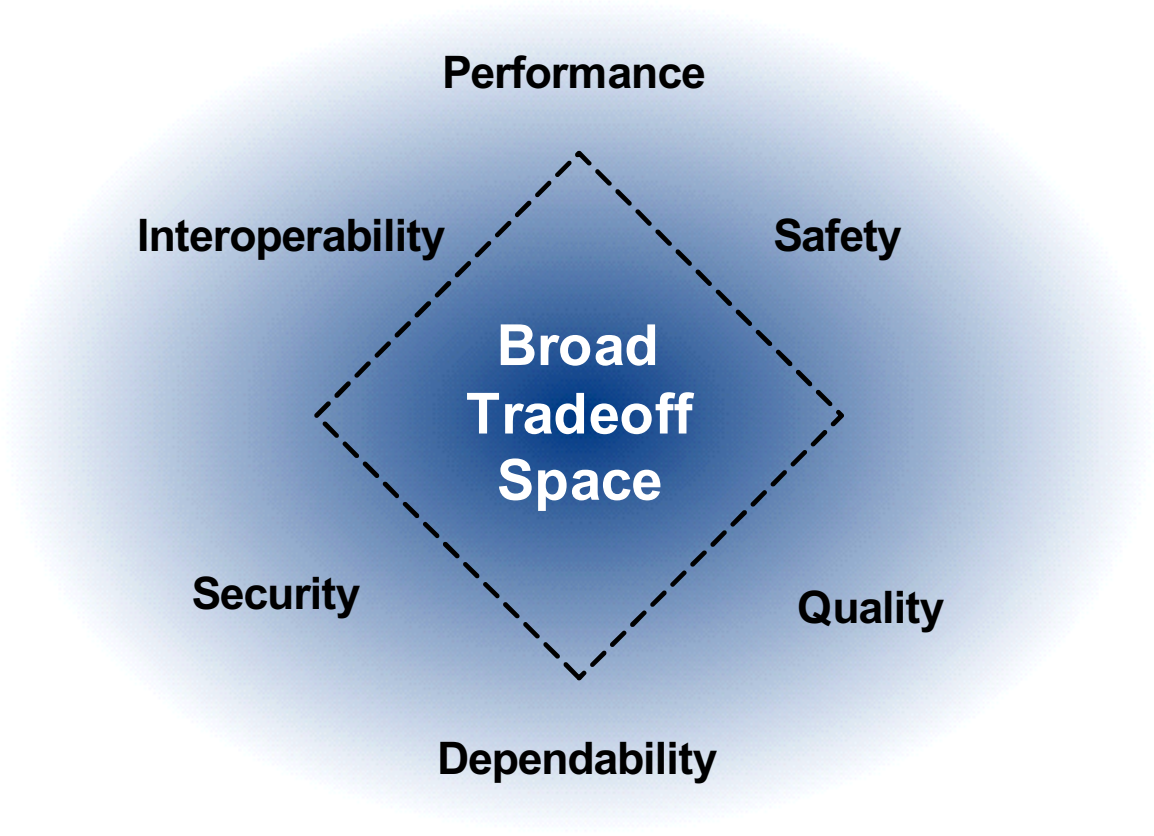
# Overview

SEI Mission-Oriented Success Analysis and Improvement Criteria (MOSAIC) is a structured decision-making approach that

- **Establishes a reasonable degree of confidence in the potential for a successful mission**
- **Helps ensure mission success in projects, programs, processes, and systems**

# Strategic Allocation of Resources

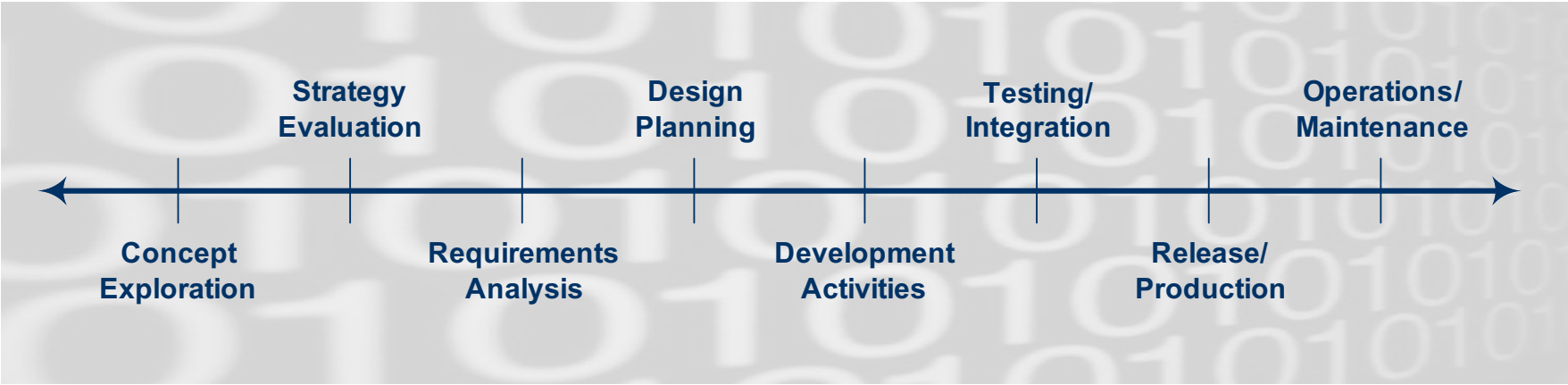
People need a way to make appropriate tradeoffs among a broad range of factors.



# SEI MOSAIC: A Lifecycle Approach

**Perform during any lifecycle phase**

**Supports most system lifecycle models**



# Managing the Outcome

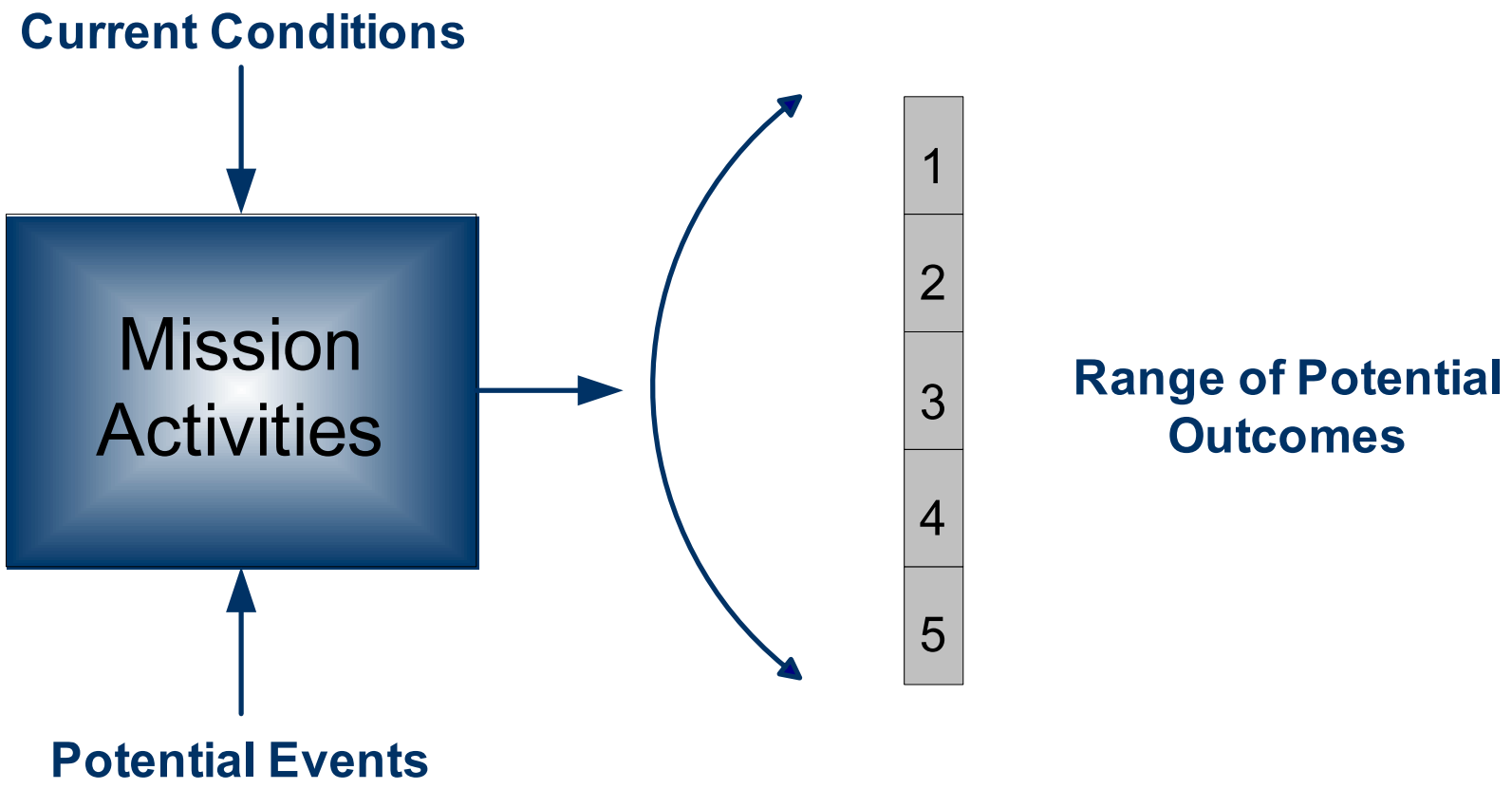
An outcome is the result achieved when executing a mission.

- **A range of potential outcomes is possible**
- **Some outcomes are acceptable—success**
- **Some outcomes are unacceptable—failure**

SEI MOSAIC defines an approach for managing the expected outcome in relation to the desired outcome.

- **What is the mission likely to achieve?**
- **What do I want the mission to achieve?**

# Range of Potential Outcomes



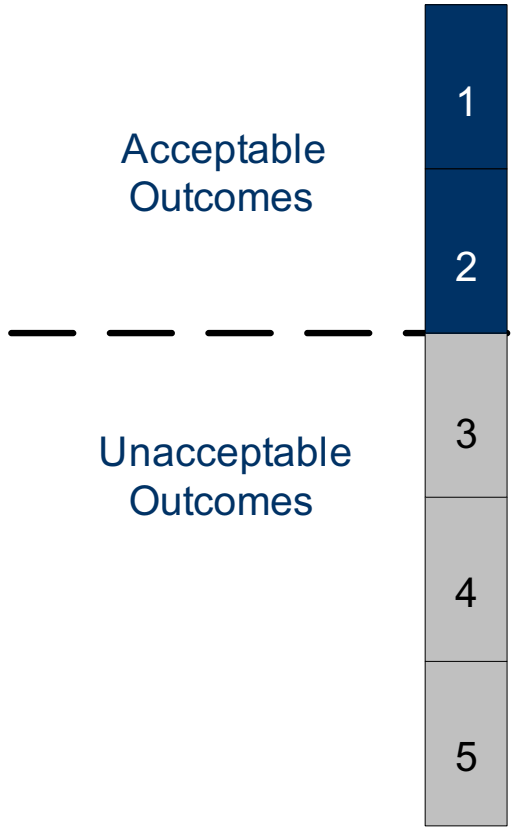
# Positioning for Success

**A range of outcomes is possible for any given mission.**

**Conditions and potential events**

- **affect mission execution and influence a mission's eventual outcome**
- **must be appropriately managed to position a mission for success**

**The objective is to drive the expected outcome toward acceptable states.**



# Unique Features of SEI MOSAIC

| Traditional Risk Management | SEI MOSAIC |
|---|---|
| Narrow scope (single project, system, or organization) | Broad scope (distributed processes, systems of systems) |
| Linear view of risk (cause-effect pairs) | Interrelated view of risk |
| Threat-driven | Outcome-driven |
| Hazard avoidance | Opportunity seeking |
| "Playing not to lose" | "Playing to win" |

# SEI MOSAIC Project

# Characteristics of Current Approaches

A prevalence of one-size-fits-all analysis and management methods

- **Complex solutions that are not easily tailored (especially to small organizations)**
- **Tied to specific domains or problems**

Locally optimized results

- **Narrow tradeoff space**
- **Subset of the lifecycle**
- **Narrow scope (e.g., single project, system, or organization)**

# SEI MOSAIC Approach

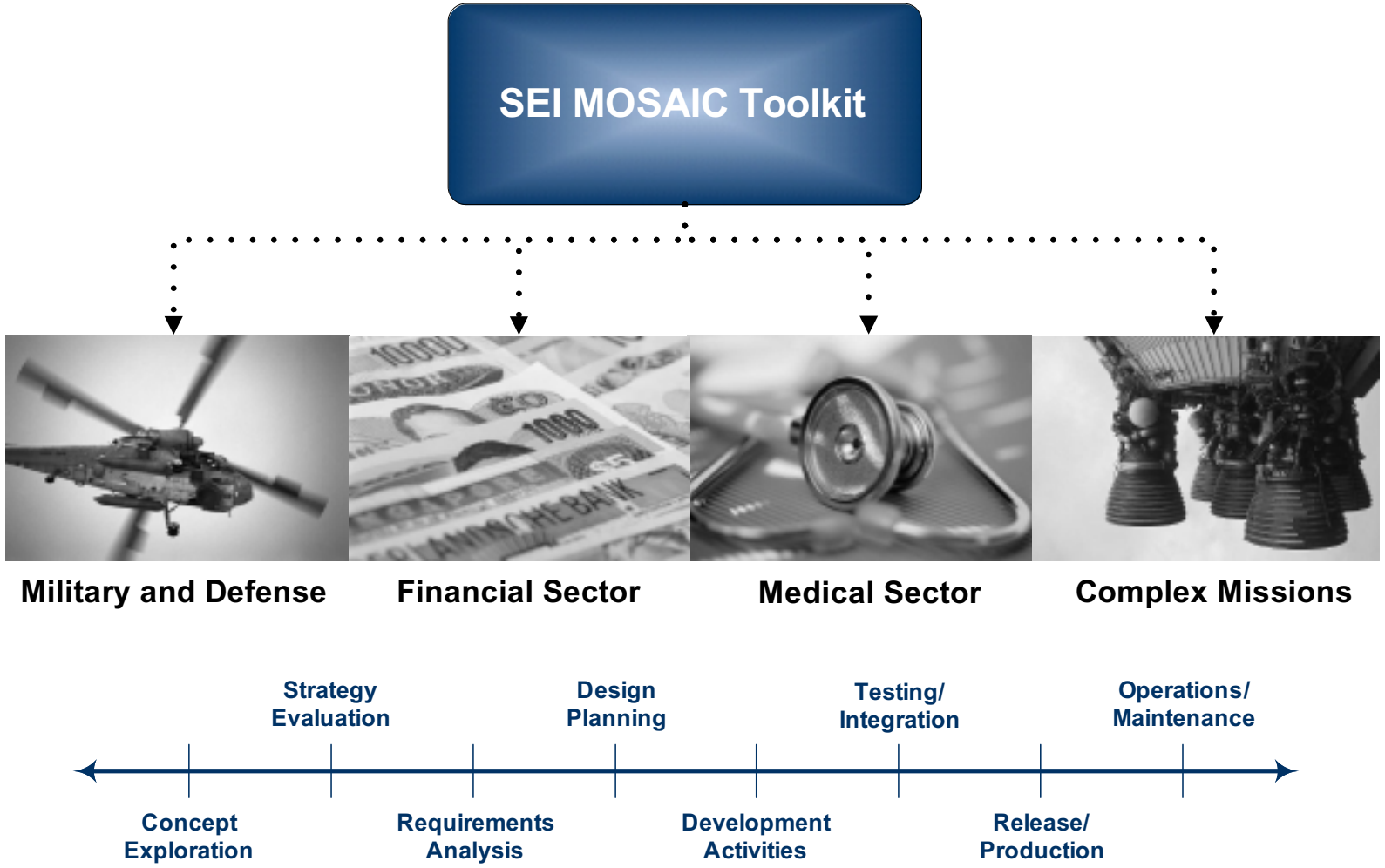
Each SEI MOSAIC method is tailored to

- **A given situation, problem space, or lifecycle phase**
- **The domain or application area**
- **The circumstances at hand**

SEI MOSAIC is focused on global effectiveness and mission success.

- **Broad tradeoff space**
- **Lifecycle focus (development and operations)**
- **Broad scope (e.g., distributed processes, supply chains, systems of systems)**

# SEI MOSAIC Toolkit



# SEI MOSAIC Methods

Our current work is focused on developing a suite of analysis methods.


Two methods so far:

- **Mission Diagnostic is a basic approach that provides a quick, high-level evaluation.**
- **Mission Assurance Analysis Protocol (MAAP) is a comprehensive approach that provides an in-depth evaluation.**

# Mission Diagnostic

**What**
A time-efficient means of assessing the potential for success

**Why**
To determine whether conditions are favorable for a successful outcome

**Key Results**
An evaluation of key indicators and an estimate of the success potential

# Key Indicators


Evaluate a set of indicators representing key aspects of management, for example:

- **Realistic goals**
- **Customer requirements**
- **Staffing requirements**
- **Technology feasibility**
- **Plans and schedules**

***"Are customer requirements and needs well understood?"***

# Evaluating Key Indicators

| Question | Answer | | | | |
|---|---|---|---|---|---|
| | **No** | **Likely no** | **Equally likely** | **Likely yes** | **Yes** |
| **1. Are goals realistic and well articulated?** | q | q | q | n | q |

Each indicator is evaluated based on the data that have been collected.

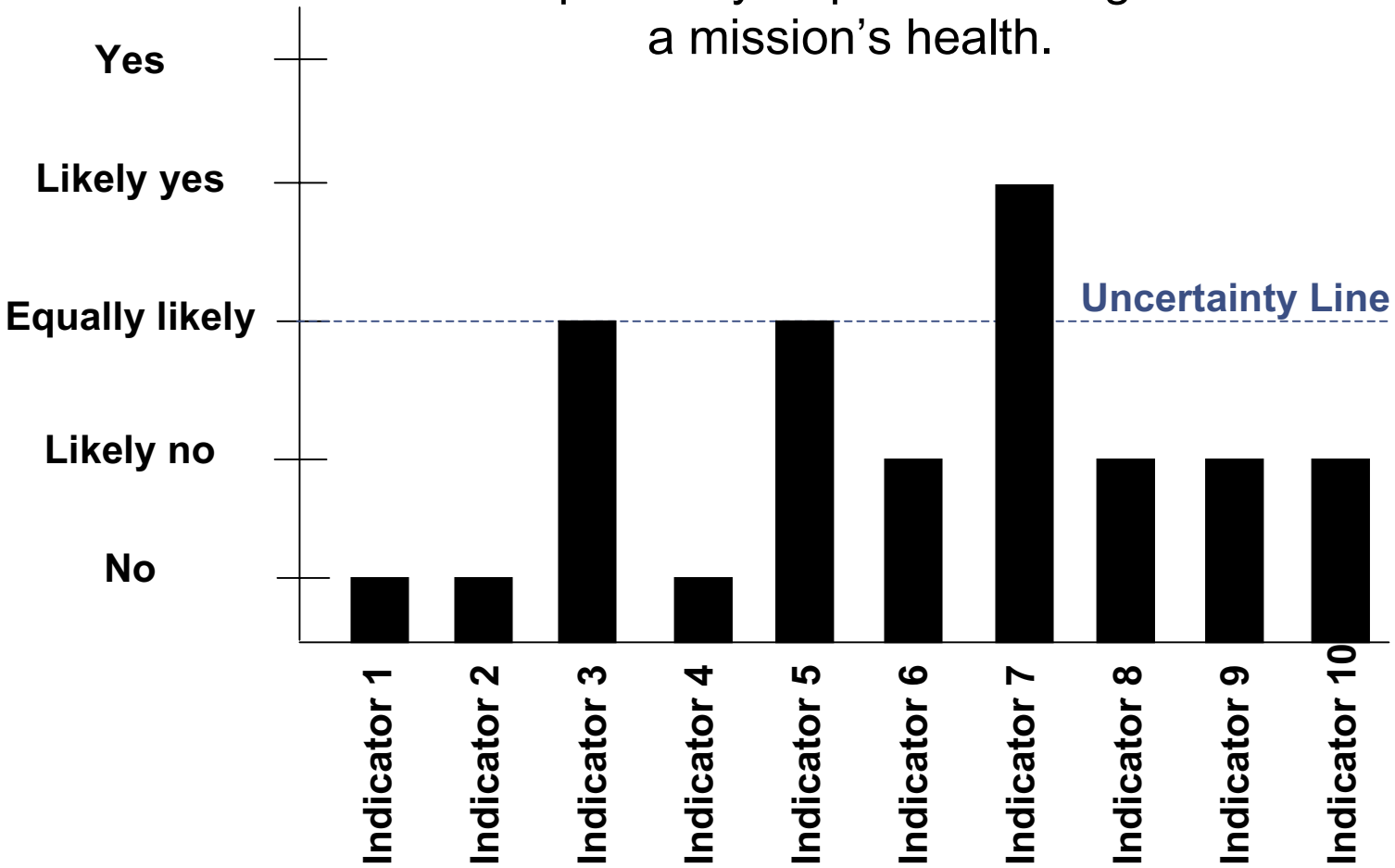
Uncertainty is incorporated into the range of answers for each indicator.

# Indicator Evaluation Criteria

| Answer | Definition |
|---|---|
| Yes | The answer is almost certainly "yes." Very little uncertainty exists. |
| Likely yes | The answer is most likely "yes." However, a degree of uncertainty exists. |
| Equally likely | The answer is just as likely to be "yes" or "no." A high degree of uncertainty exists. |
| Likely no | The answer is most likely "no." However, a degree of uncertainty exists. |
| No | The answer is almost certainly "no." Very little uncertainty exists. |

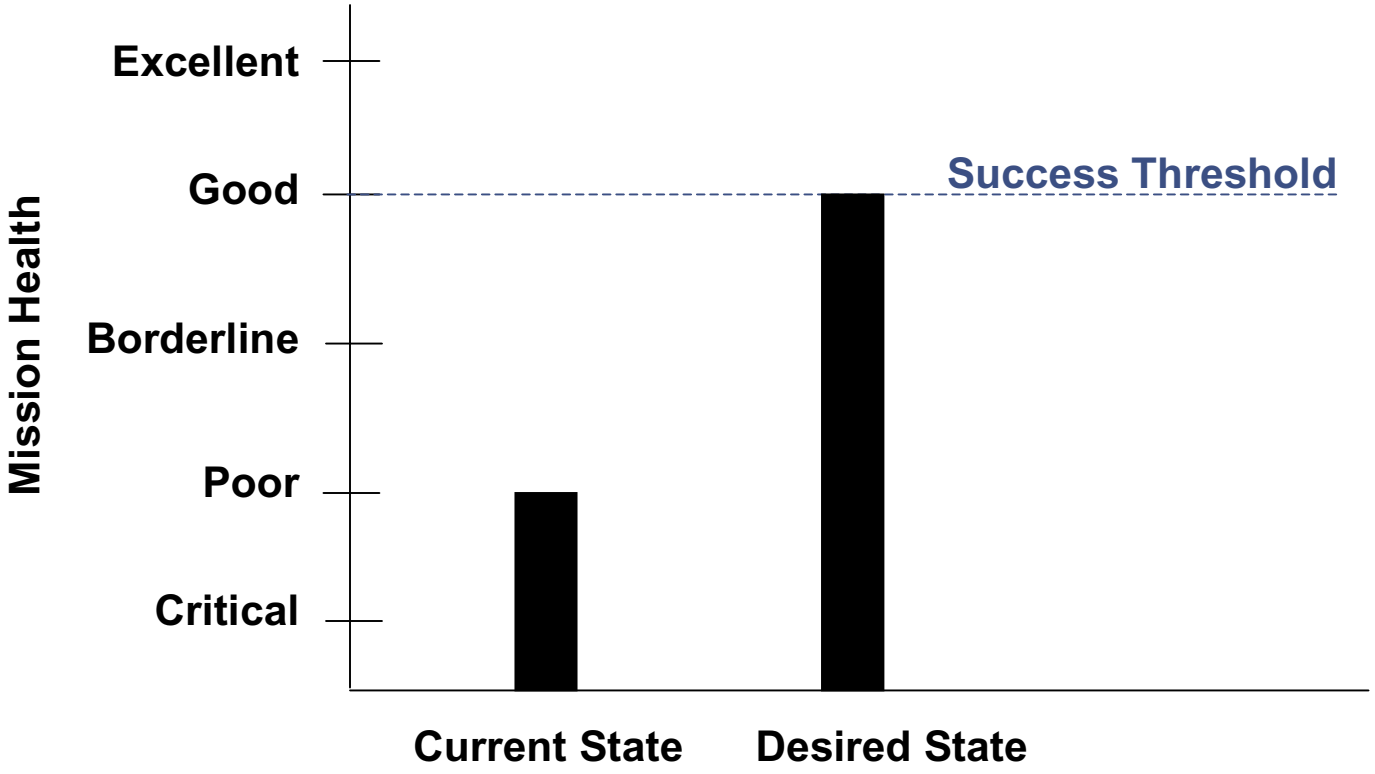
# Indicator Analysis

A simple analysis provides insight into a mission's health.



# Managing the Potential for Success

The goal is to improve a mission's current state of health.



# Indicators for Software Development Programs

- Are goals realistic and well articulated?
- Are communication and information sharing about mission activities effective?
- Are customer requirements and needs well understood?
- Are stakeholder politics or other external pressures minimal?
- Does the process design support efficient and effective execution?
- Are process control mechanisms are effective?
- Is task execution efficient and effective?
- Are staffing and funding sufficient to execute all mission activities?
- Are the technological and physical infrastructures adequate to support all mission activities?
- Are changing circumstances and unpredictable events effectively managed?

# Evaluating Indicators

The following data are recorded for each indicator:

- **Indicator score**
- **Rationale for indicator score**
- **Analysis approach (for example, intuition, qualitative analysis, quantitative analysis, other)**
- **Potential actions**
- **Evaluators**
- **Date**

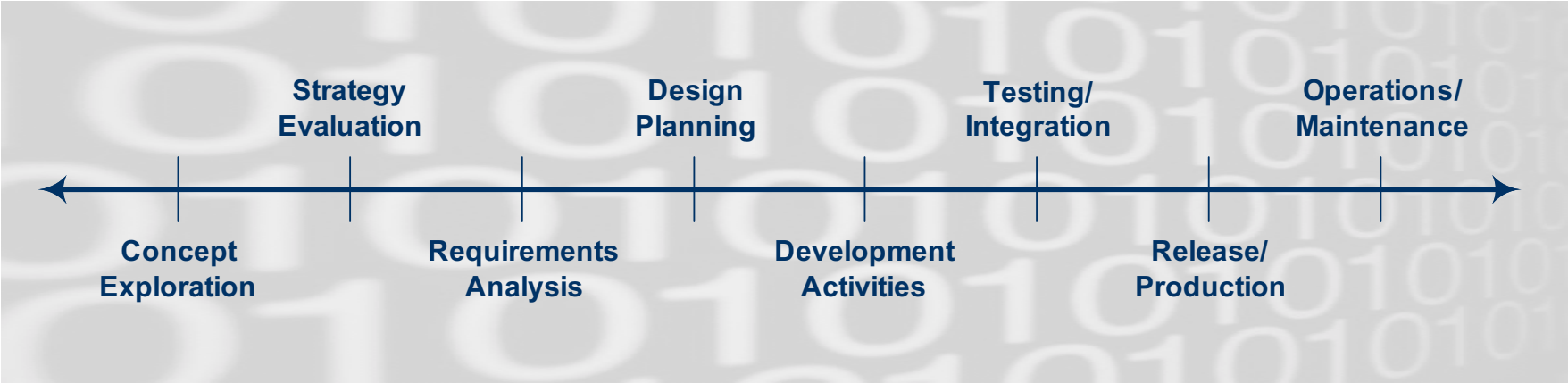
# Mission Diagnostic Exercise and Handout

# Tailoring Questions

The following questions can be used when tailoring or developing a set of indicators:

- **What constitutes a successful result for the project or process?**
- **What constitutes an unsuccessful result, or failure, for the project or process?**
- **What circumstances or conditions tend to produce a successful outcome when conducting the project or process?**
- **What circumstances or conditions tend to produce an unsuccessful outcome, or failure, when conducting the project or process?**

# Mission Diagnostic Across the Lifecycle




How much uncertainty in these indicators can you tolerate at different points in the lifecycle?

# MAAP

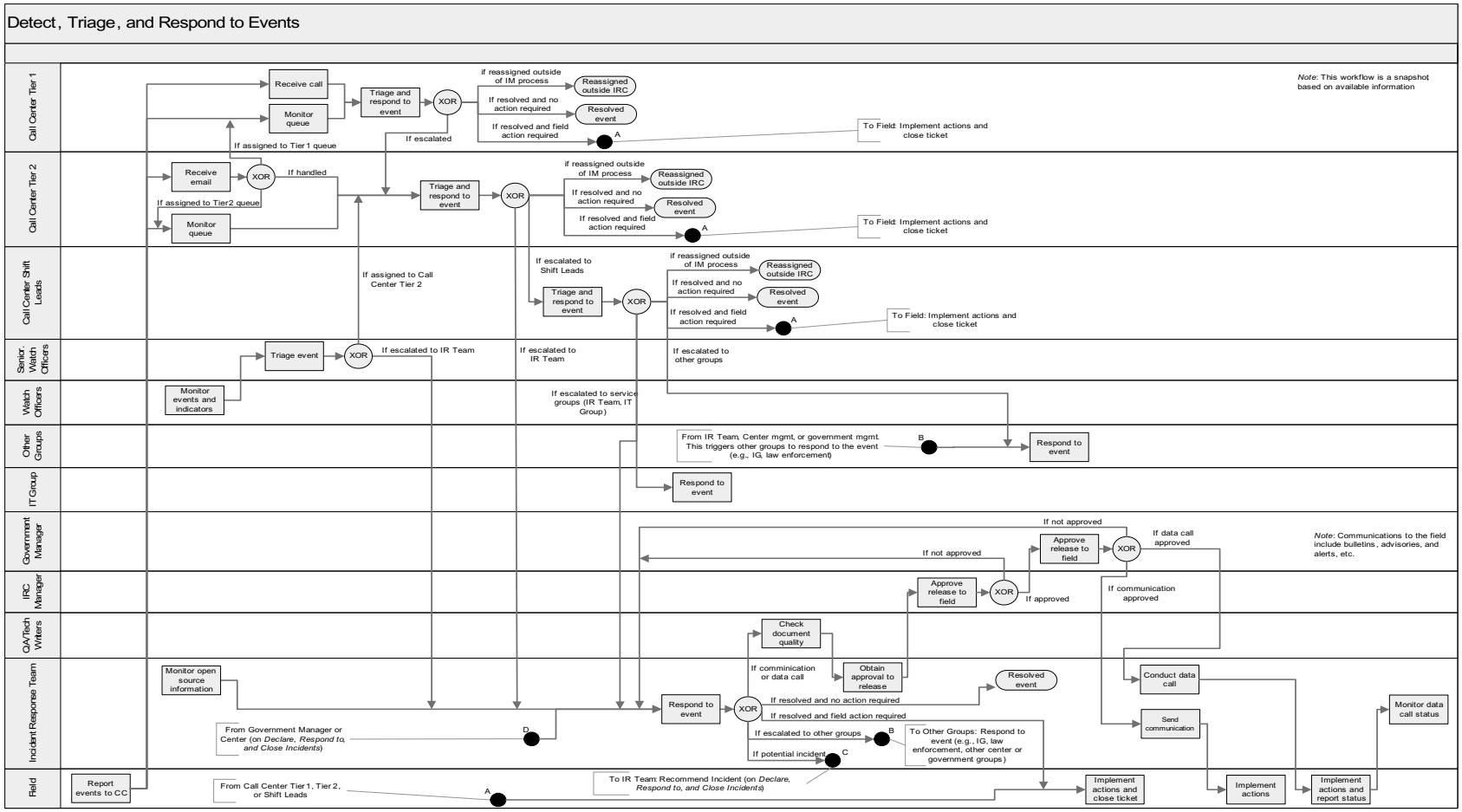
**What**
A systematic approach for thoroughly analyzing the potential for success

**Why**
To characterize the full range of drivers affecting the success potential

To set management priorities to ensure the success potential is maintained within tolerance

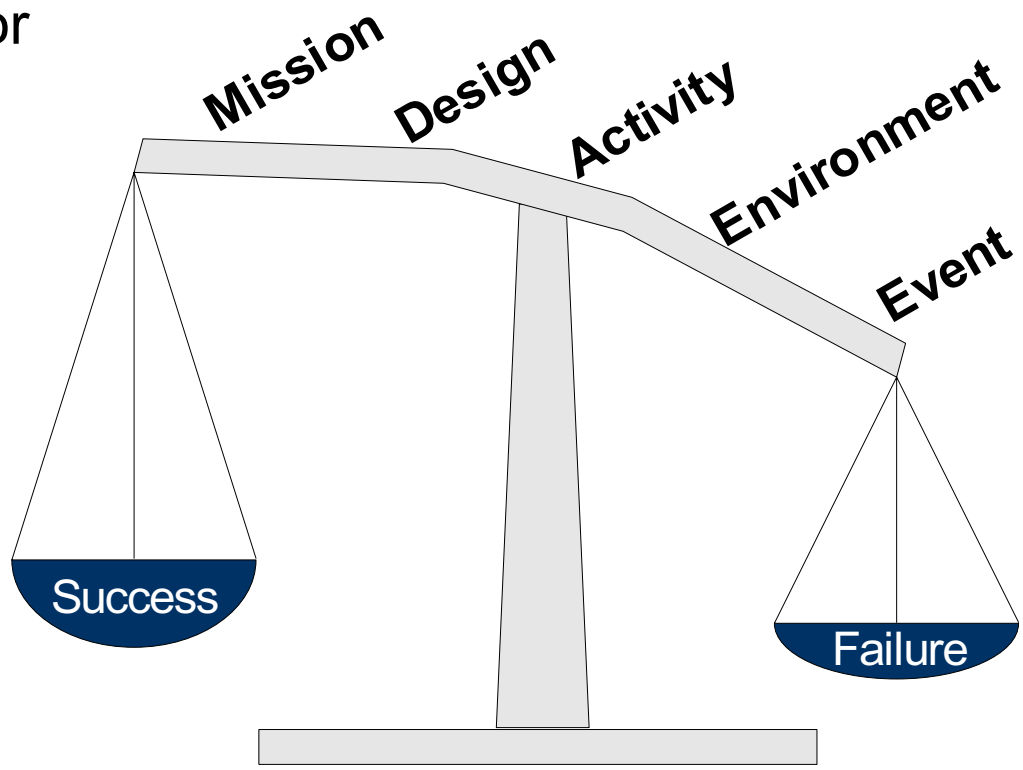
**Key Results**
An operational model, customized analysis artifacts, a measure of the success potential, and strategies for keeping the success potential within tolerance

# Operational Model of Mission Activities



# Drivers of Success and Failure

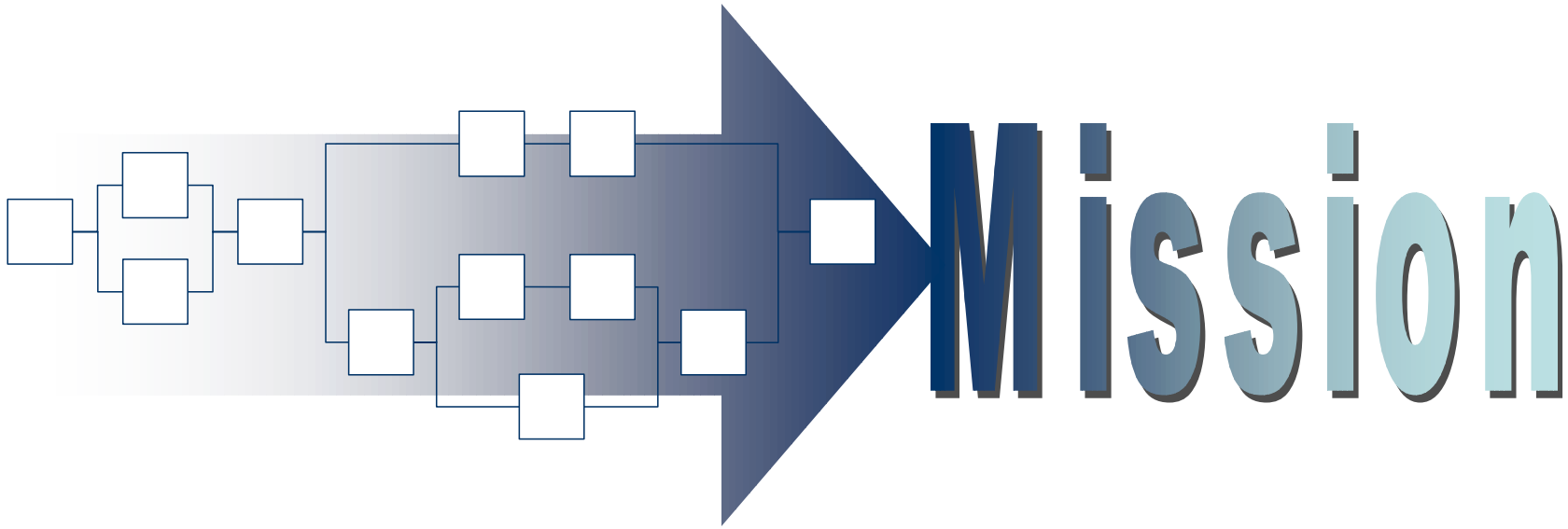
A broad range of drivers must be considered when analyzing the potential for mission success.



# Mission

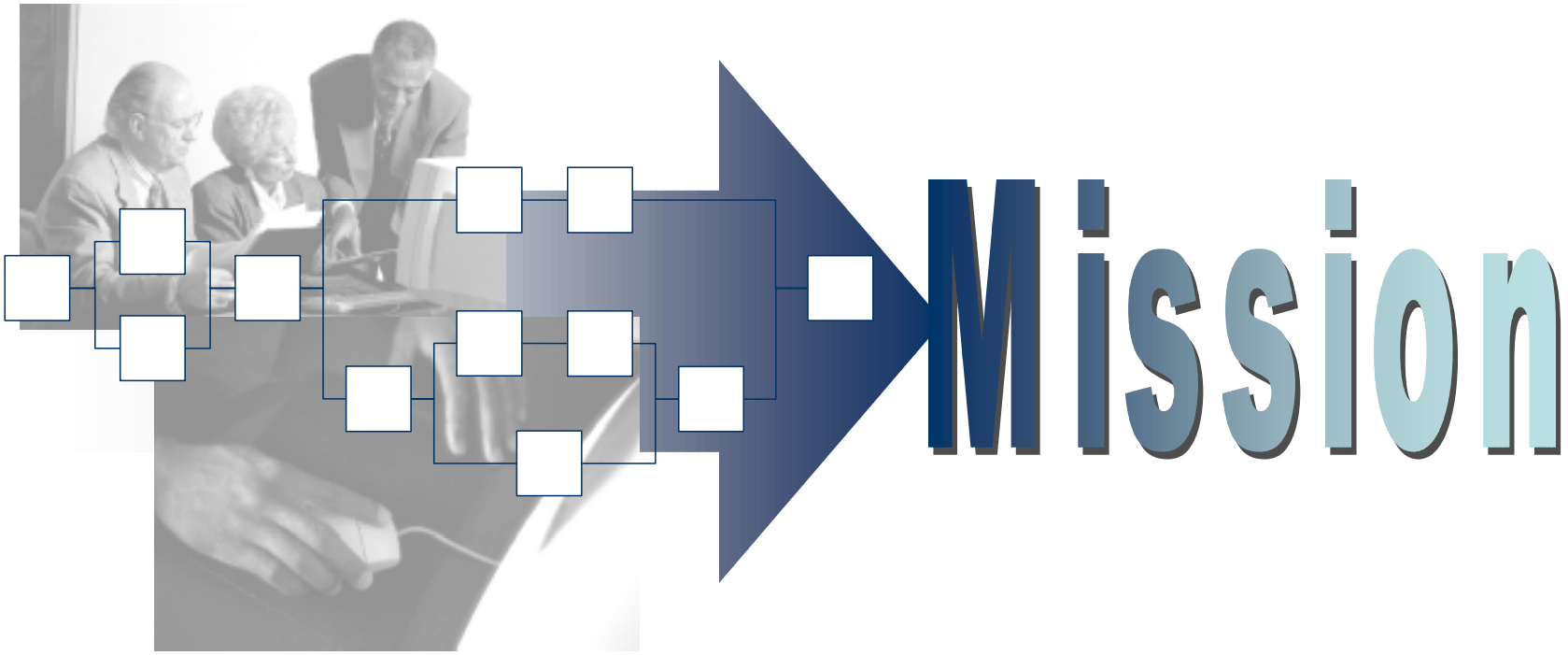

A **mission threat** is a fundamental flaw, or weaknesses, in the purpose and scope of a work process.

# Process Design



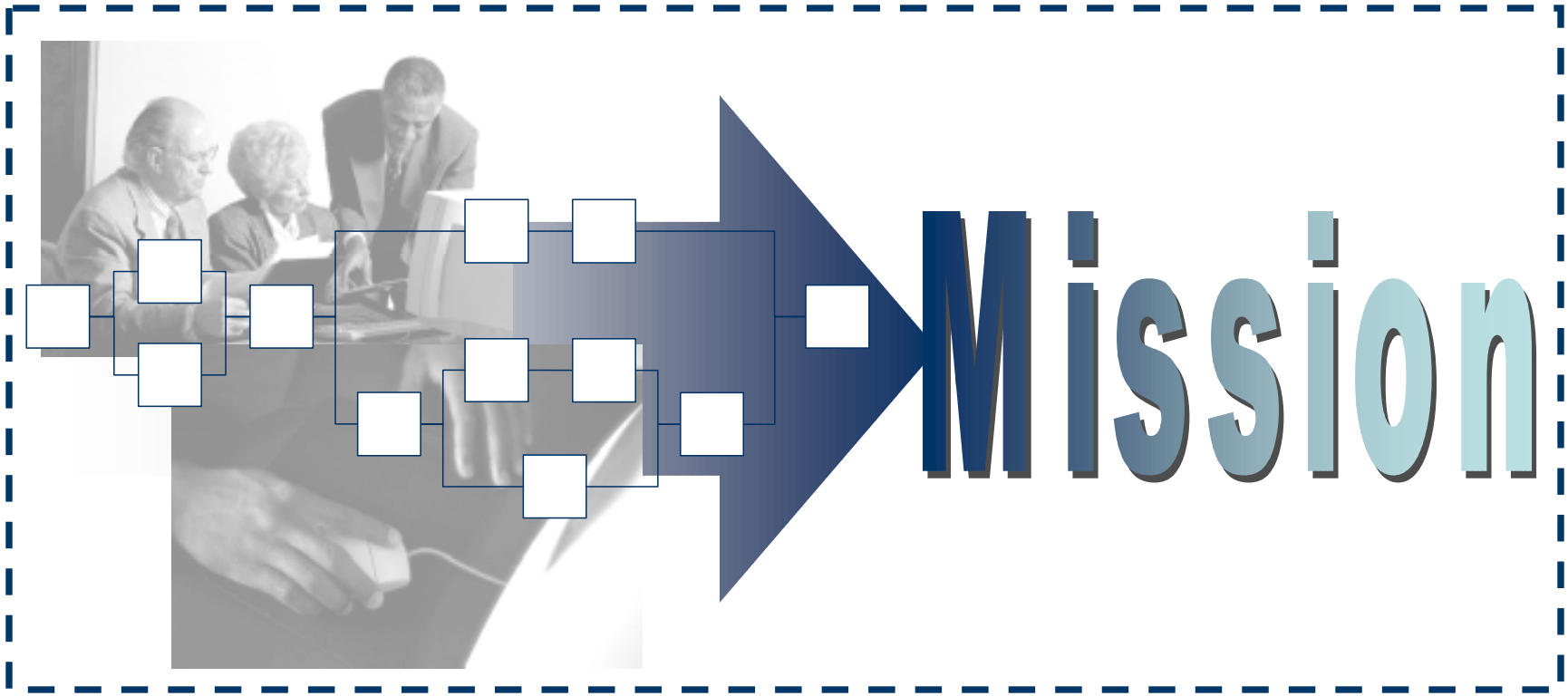

A **design threat** is an inherent weakness in the layout of a work process.

# Activity Management




An **activity threat** is a flaw, or weaknesses, arising from the manner in which activities are managed and performed.

# Operational Environment

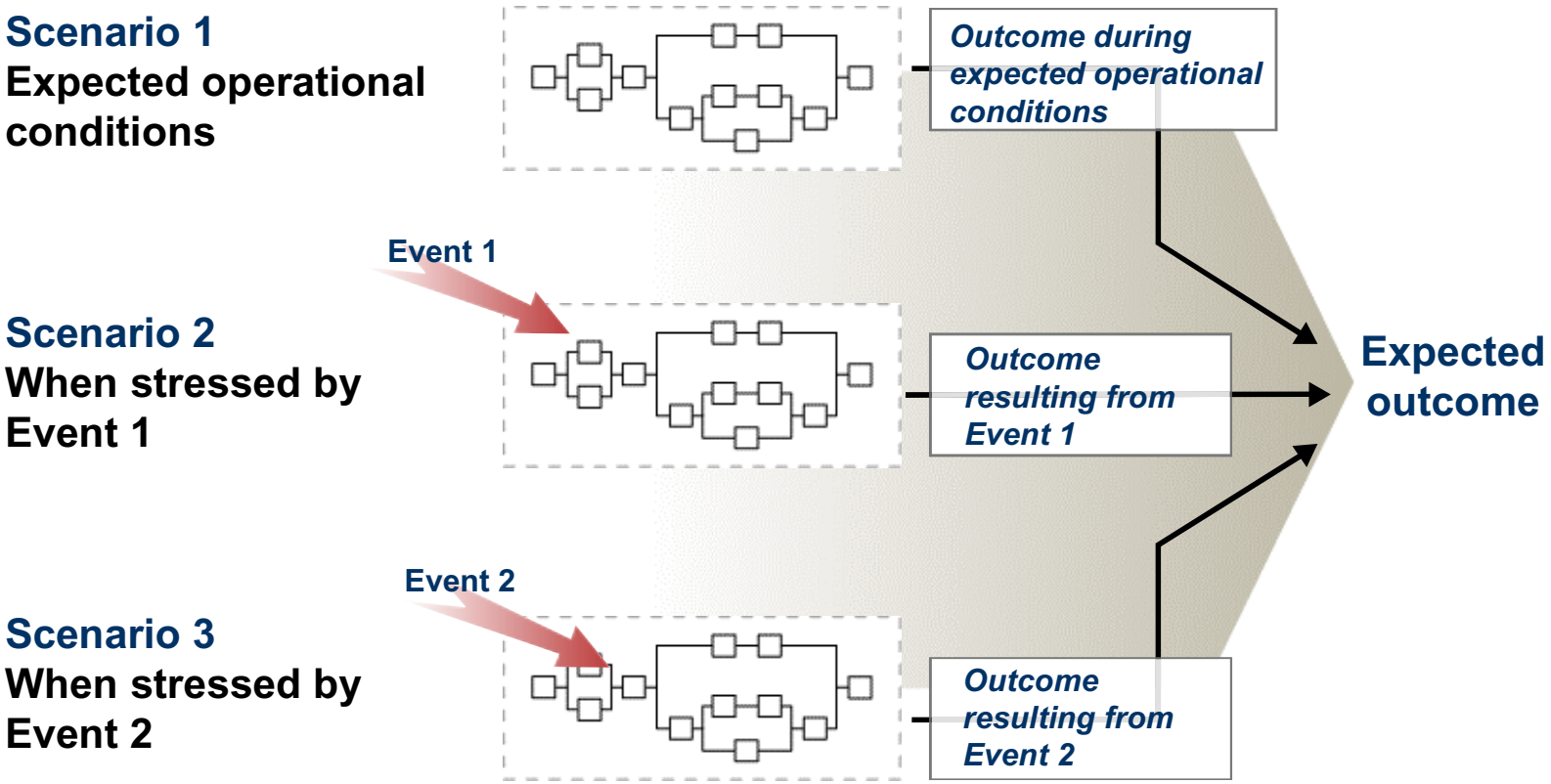



An **environment threat** is an inherent constraint, weakness, or flaw in the overarching operational environment in which a process is conducted.

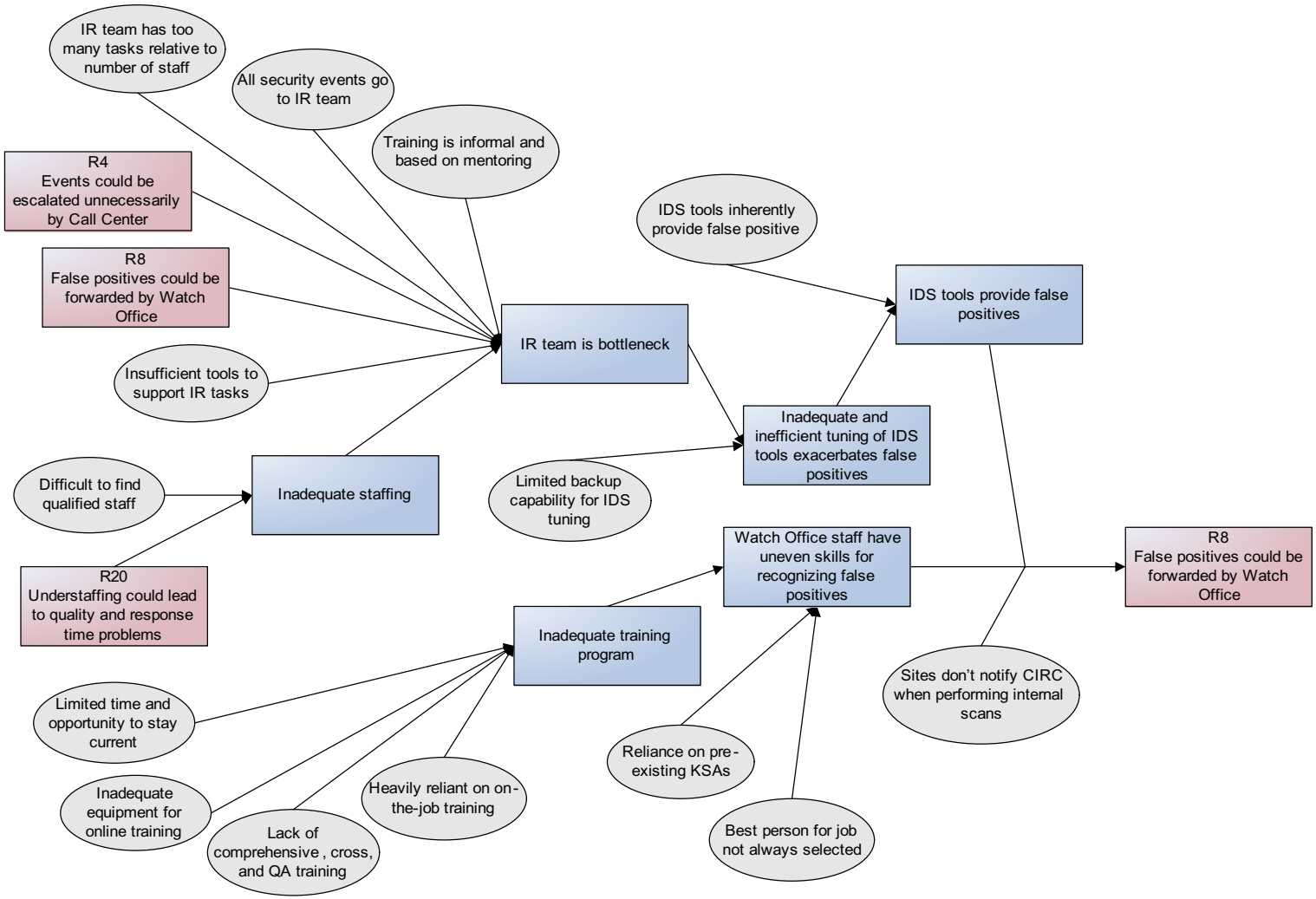
# Event Management


An **event threat** is a set of circumstances triggered by an unpredictable occurrence that introduces unexpected change into a process.

# Scenario-Based Analysis

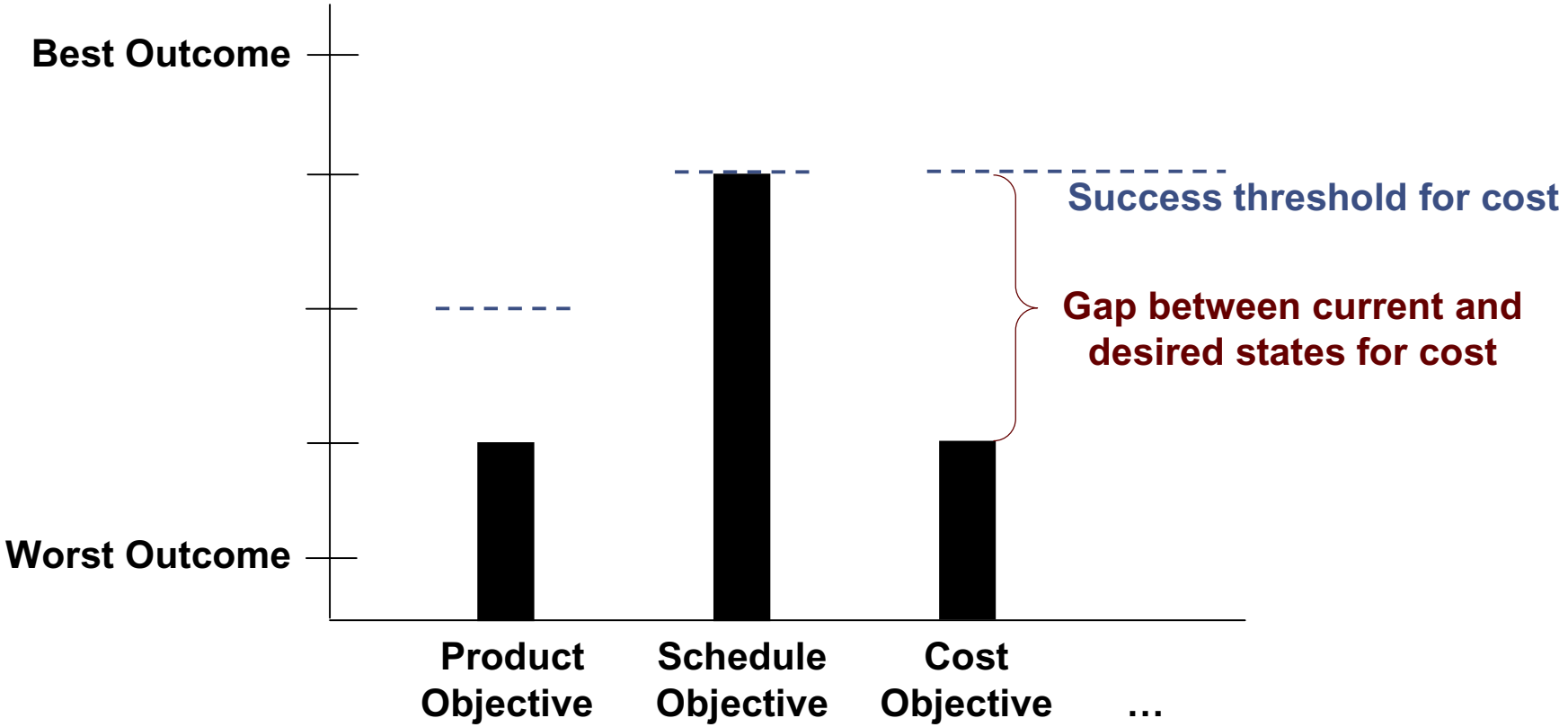


# Complex Risks



# Outcome Analysis

The goal is to ensure that the expected outcome for each objective in all evaluated scenarios is acceptable to key stakeholders.



# Unique Features of SEI MOSAIC

- Manages the potential for success
- Can be applied to highly distributed programs and operational processes
- Provides a ‘global’ view of a mission
- Analyzes issues that are too complex for other techniques

# Potential Application Areas

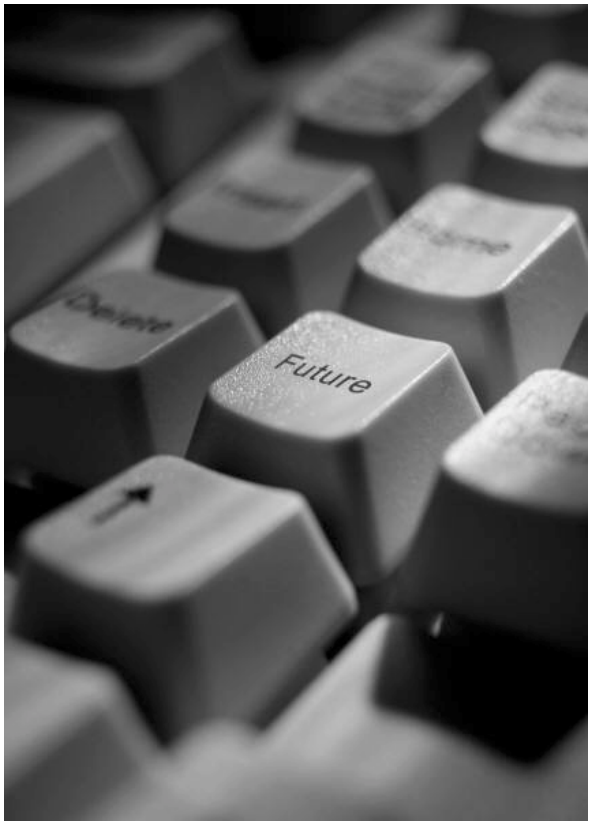
- Large, distributed software development programs
- Organizations in dynamic, rapidly changing business environments
- Organizations with strict reliability, security, and safety requirements
- Large, distributed supply chains
- Processes supporting critical infrastructures
- Distributed information-technology (IT) processes

# Future Research and Development

Refine the current SEI MOSAIC analysis protocols.

Define and pilot additional SEI MOSAIC analysis protocols.

Begin work on an approach for real-time monitoring and management of mission outcomes.



# For Additional Information

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