Patterns: An Approach for CMMI Adoption

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Background

- Patterns are a common way of expressing common contexts and problem-solution pairs, and are often used in software design
- In CMMI-based improvement, patterns can be used to show how sets of improvement practices can be combined to achieve successful improvements
- This presentation will introduce some typical patterns in process improvement

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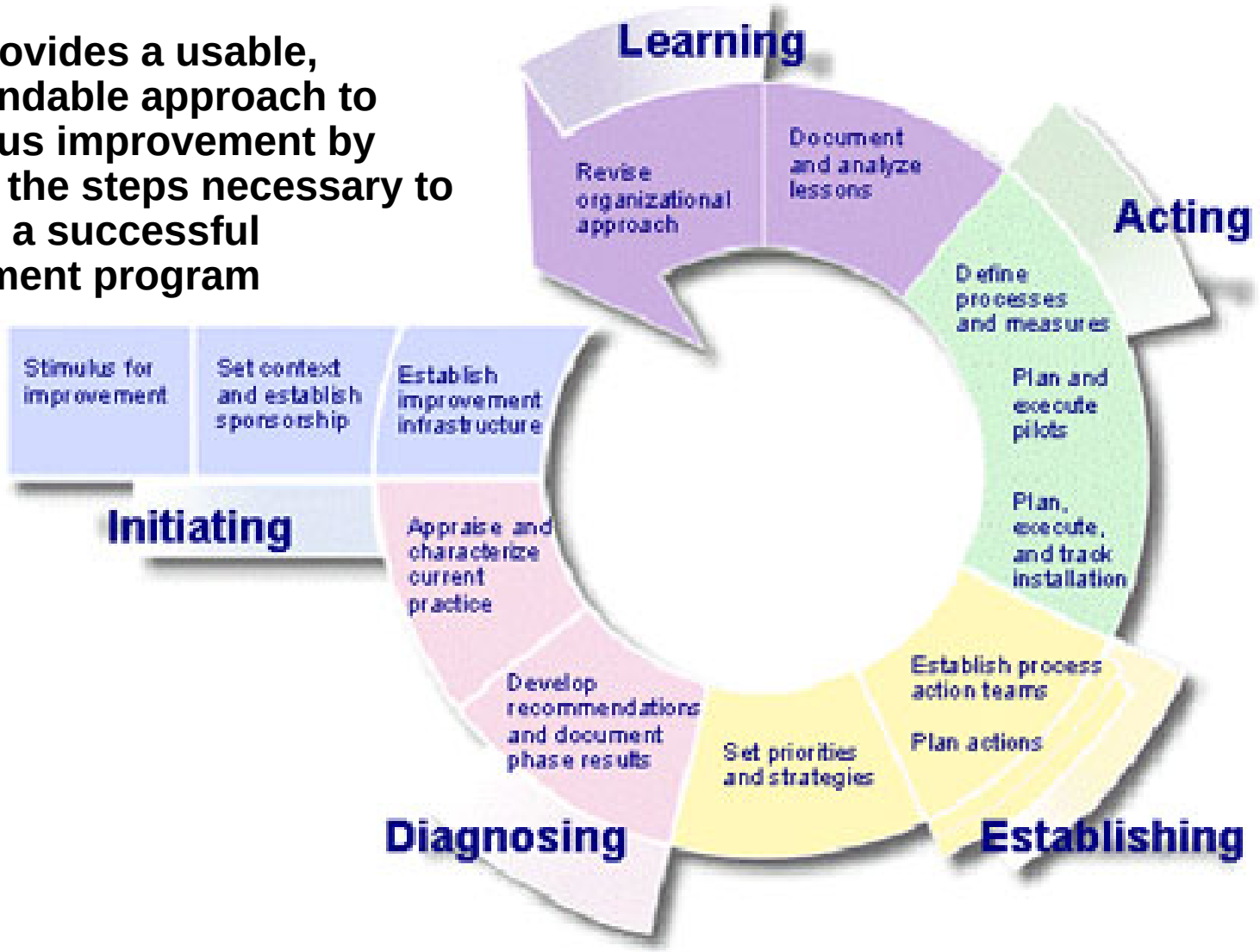
The IDEAL Model[SM]

IDEAL provides a usable, understandable approach to continuous improvement by outlining the steps necessary to establish a successful improvement program

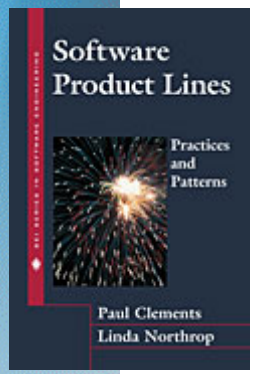


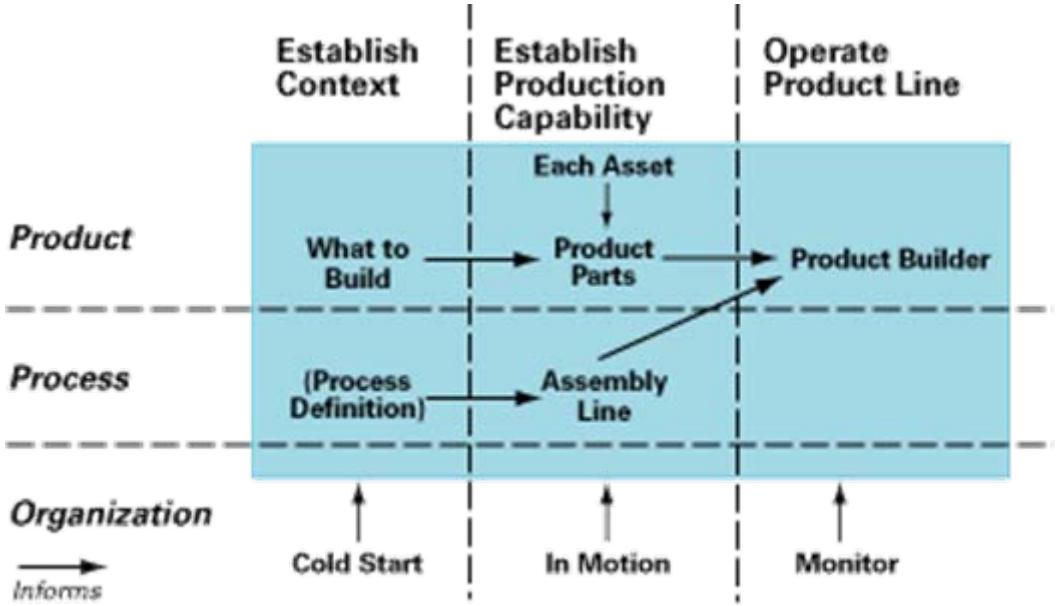
"IDEAL: A User's Guide for Software Process Improvement ," Robert McFeeley, Software Engineering Institute, CMU/SEI-96-HB-001

Patterns

Could patterns be applied to CMMI adoption?

- **Patterns are a common way of expressing common contexts and problem-solution pairs**
  - The context is the organizational situation
  - The problem is what part of a effort needs to be accomplished
  - The solution is the grouping of practice areas and the relations among them that together address the problem for that context
- **The book Software Product Lines: Practices and Patterns defines 12 patterns and 11 variants**





Adoption Factory Pattern

The Adoption Factory pattern is a composite pattern that describes the entire software product line organization.

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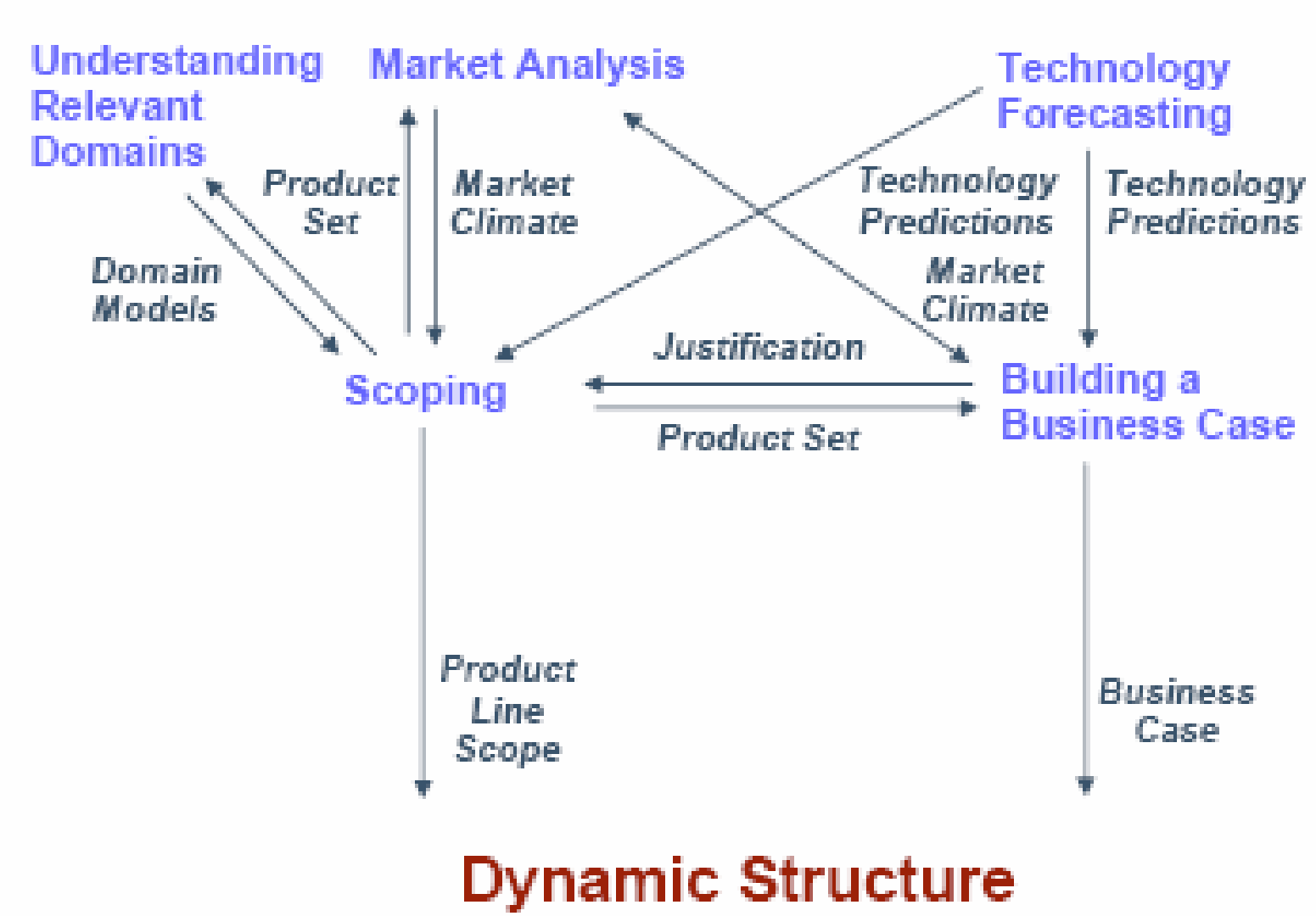
Example – What to Build Pattern (Software Product Lines)



What Benefits Would Patterns Provide?

- **Address recurring CMMI adoption problems that arise in specific situations and present solutions to them**
- **Document existing, well-proven CMMI adoption experience**
- **Identify and specify abstractions that are broader in scope that single practice areas**
- **Provide a common vocabulary and understanding for CMMI adoption**
- **Document, explain, and plan CMMI adoption efforts**
- **Help manage the complexity inherent in CMMI adoption**
- **Can be combined to build complex CMMI adoption solutions**

Adapted from Pattern Oriented Architectures: A System of Patterns, Bushmann, et al, 1996 and Software Product Lines: Practices and Patterns, Clements and Northrop, 2005

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Structure of a Pattern

- **Context: Organizational situation**
  - Defense contractor
  - Commercial contractor
  - Small organization
- **Problem: What part of a effort needs to be accomplished**
  - Adopt CMMI for the first time
  - Transitioning from CMMI v1.1 to v1.2
  - Transitioning from Level 3 to Level 5
  - Maintain Level 5
- **Solution: The grouping of practice areas and the relations among them that together address the problem for that context**

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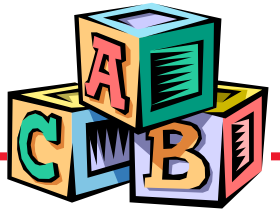
What Building Blocks Do We Have?



Software Product Lines

PRACTICE AREAS

Software Engineering	Technical Management	Organizational Management
Architecture Definition	Configuration Management	Building a Business Case
Architecture Evaluation	Data Collection, Metrics, and Tracking	Customer Interface Management
Component Development	Make/Buy/Mine/Commission Analysis	Developing an Acquisition Strategy
COTS Utilization	Process Definition	Funding
Mining Existing Assets	Scoping	Launching and Institutionalizing
Requirements Engineering	Technical Planning	Market Analysis
Software System Integration	Technical Risk Management	Operations
Testing	Tool Support	Organizational Planning
Understanding Relevant Domains		Organizational Risk Management
		Structuring the Organization
		Technology Forecasting
		Training

IDEAL Model

- Stimulus for Change
- Establish Context
- Build Sponsorship
- Charter Infrastructure
- Characterize Current and Desired State
- Develop Recommendations
- Set Priorities
- Develop Approach
- Create Solution
- Test/Pilot Solution
- Plan Actions
- Create Solution
- Test/Pilot Solution
- Refine Solution
- Install Solution
- Analyze and Validate
- Propose Future Actions

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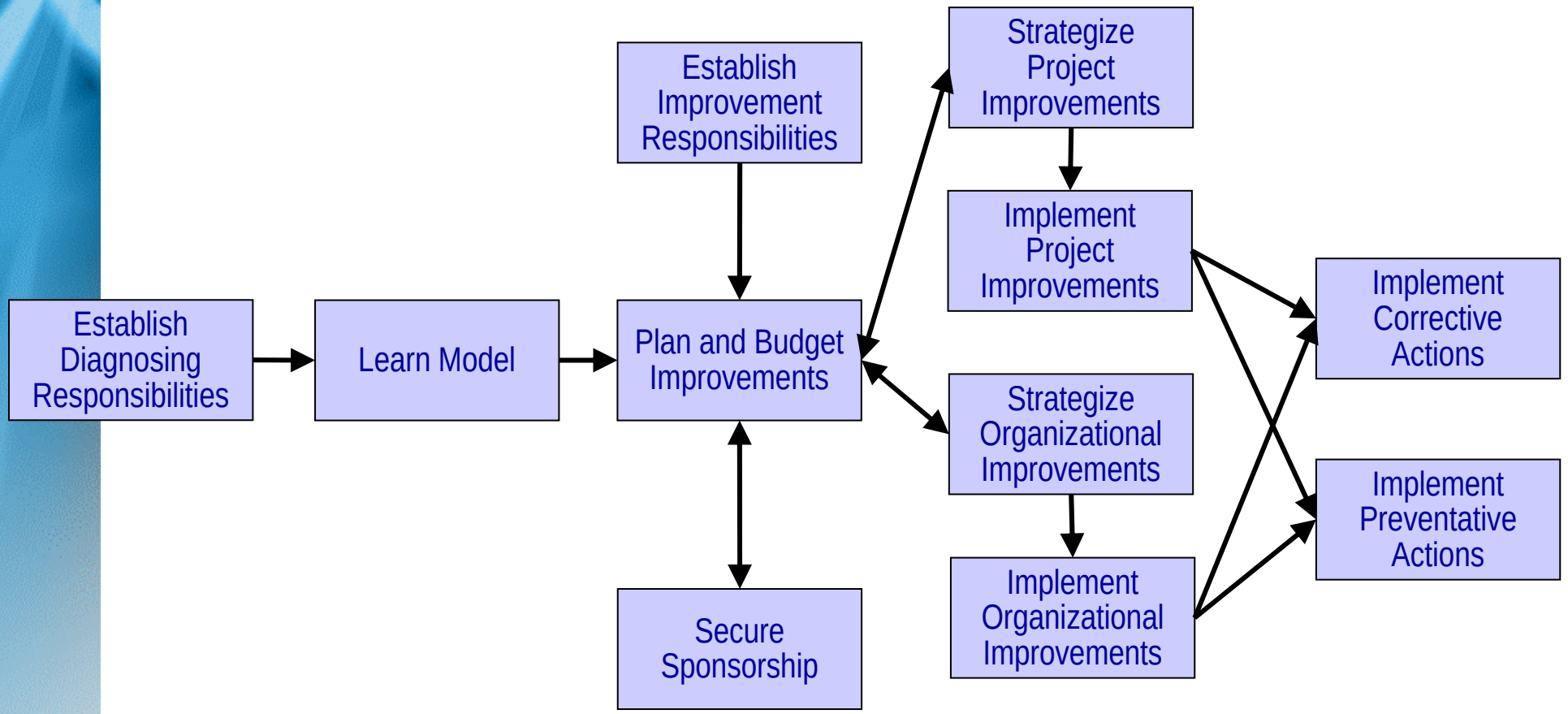
A Preliminary Set of CMMI Adoption Practice Areas

Initializing	Diagnosing	Establishing	Acting	Learning
Identify Need for Change	Learn Model	Identify Potential Improvements	Develop Infrastructure	Determine Appraisal Readiness
Scope Improvement Context	Identify Appraisal Goals	Establish Priorities	Pilot Implementations	Plan SCAMPI A
Establish Sponsorship	Select Appraisers	Strategize Approach to Infrastructure	Implement Project Improvements	Conduct SCAMPI A
Establish Diagnosing Responsibilities	Plan Gap Appraisal	Strategize Project Improvements	Implement Organizational Improvements	Conduct Causal Analysis on Findings
Identify Business Goals	Complete PIIDs	Strategize Organizational Improvements		Implement Corrective Actions
	Validate PIIDs	Establish Improvement Responsibilities		Implement Preventative Actions
	Conduct Gap Appraisal	Plan and Budget Improvements		
	Analyze Process Performance	Secure Sponsorship		

Example – Transitioning from CMMI v1.1 to V1.2

- **Context: Organization that has achieved their CMMI v1.1 goals**
- **Problem: Achieve similar goals against v1.2 quickly and cheaply**



Reference: "A Practical Roadmap for Transitioning to CMMI v1.2", R. Hefner, 2006 CMMI Technology Conference and User Group

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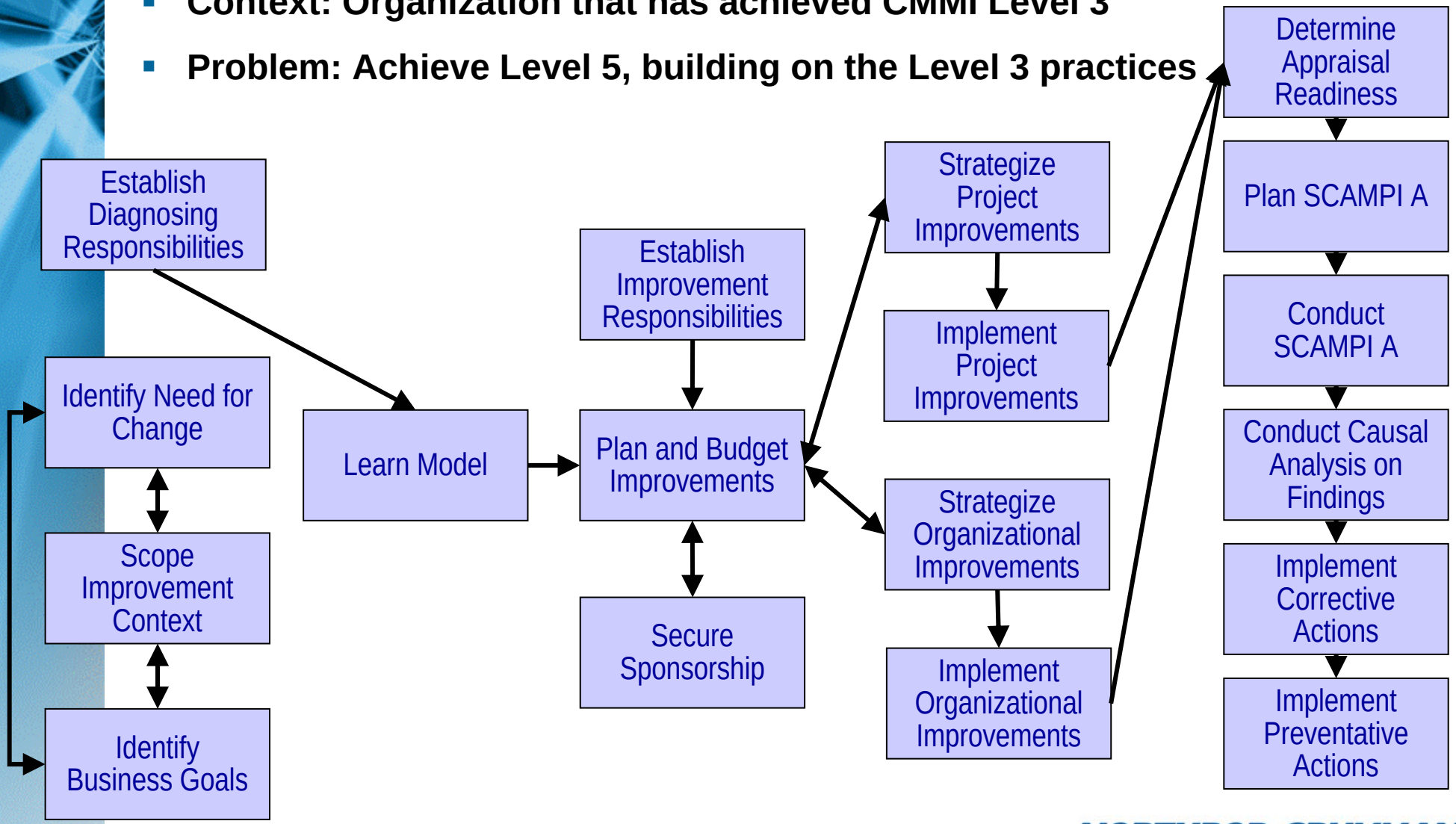
Example – Transitioning from Level 3 to Level 5

- **Context: Organization that has achieved CMMI Level 3**
- **Problem: Achieve Level 5, building on the Level 3 practices**



Reference: "**A Practical Guide to Implementing Levels 4 and 5**" (tutorial), R. Hefner, 2006 CMMI Technology Conference and User Group

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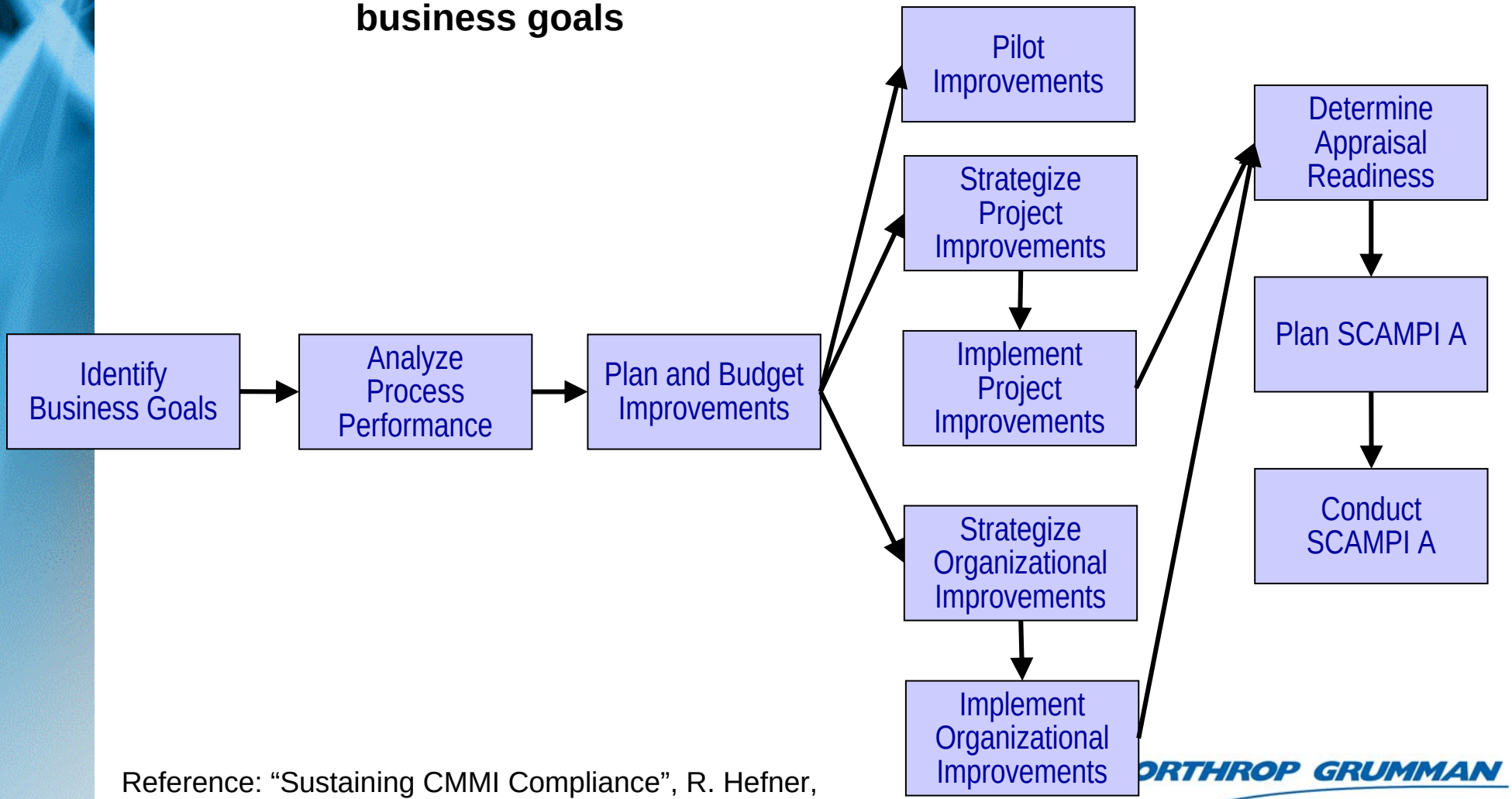
Example – Maintaining CMMI Level 5

- **Context: Organization that has achieved CMMI Level 5**
- **Problem: Maintain Level 5 process performance in light of changing business goals**



Reference: "Sustaining CMMI Compliance", R. Hefner, 2006 CMMI Technology Conference and User Group

Conclusions

- Patterns can be used to show how sets of improvement practices can be combined to achieve successful CMMI adoption
- Further work must be done to fully define the set of practice areas and the most common context-problem-solution sets

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