

**Prosperity  
Heights  
Software**

***Domain-specific Engineering™***

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# Motivation for Action

- **Who:** Organizations that repeatedly build similar products
- **What:** Institute an effective reuse strategy
- **Why needed:**
  - Effort duplicated across projects
  - Scarcity of people with critical expertise
  - Difficulty finalizing customers' requirements
  - Schedule slippages/excessive time to market
  - Poor or inconsistent product quality
  - Inflexible solutions (high cost to change or customize)

# **Making Reuse Pay**

*Do the right thing*

**Focus reuse investments on how to rapidly build a set of similar products**

*Do it right*

**Adopt reuse as part of a systematic process improvement initiative**

# Basic Reuse Tenet

The only sound basis for reuse is an envisioned set of *similar* products: a family

## ■ Similarity

- Commonality: the basis for *standardization* of work products and process
- Variability: the *flexibility* needed to accommodate different needs

## ■ Adaptability

- An explicit representation of similarity
- A characteristic set of deferred decisions that distinguish among the members of a family

# **Making Reuse Pay**

*Doing the right thing*

**Domain-specific Engineering (DsE)**

*Doing it right*

**Reuse-driven Process Improvement (PI<sub>r</sub>)**

# **Domain-specific Engineering (DsE)**

**A framework and discipline for the  
engineering and manufacture  
of similar products**

# **Why Organizations Adopt DsE**

**Gain competitive advantage  
*by being more responsive to diversity and  
change in customer and market needs***

**Improve productivity and product quality  
*by focusing efforts on a set of similar products***

# What Makes DsE Different?

*Standardizing on the most effective solutions  
to a class of similar problems*

- Focusing exclusively on a market with customers who have similar needs
- Achieving an informed consensus on how and why customers' needs differ
- Developing a product family and process for building similar customized products rapidly



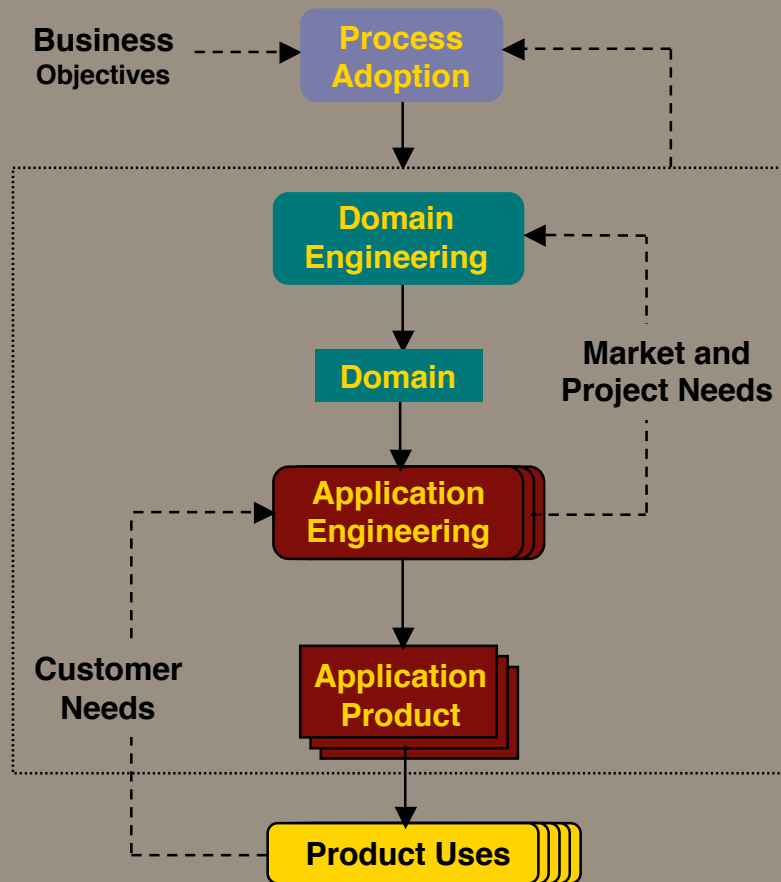
# Goals of DsE

- **Make domain knowledge and expertise an organizational asset**
- **Express customer needs in a standardized form and terminology**
- **Standardize processes to foster more predictable schedules and cost estimates**
- **Streamline processes to reduce time and effort to deliver similar products**
- **Improve the quality of products by improving the quality of the product family**

# Implications

- **Management focuses on domain investment, not costs of single-product crafting**
- **Projects focus on resolving key problem/solution variations for reuse-based solutions**
- **Marketing focuses on selling product line capabilities, with good cost-risk estimates**
- **Everyone focuses on fast, flexible responses to diverse and changing customer needs**

# The Point Being to Build Products

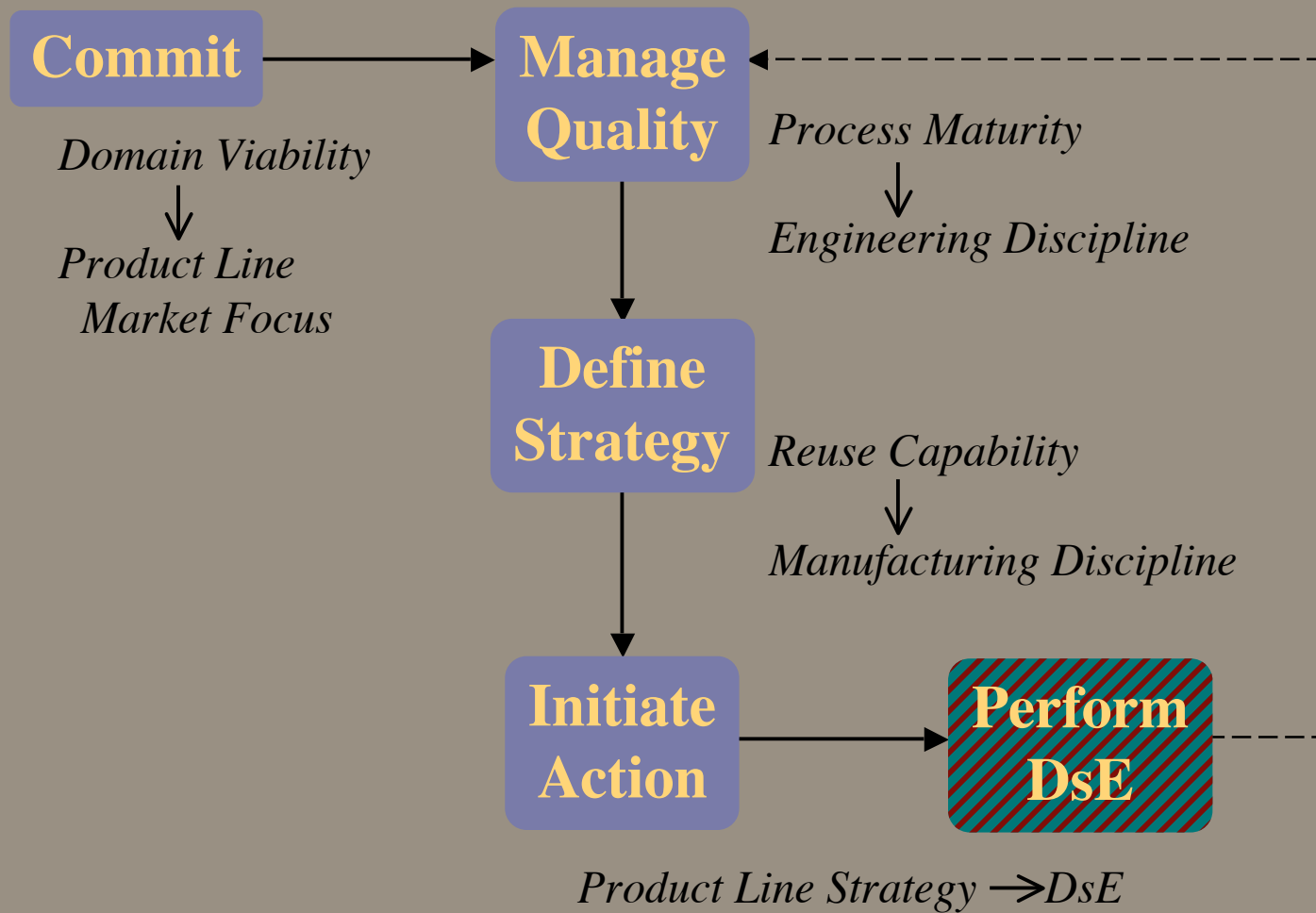


Institute & improve a product line business

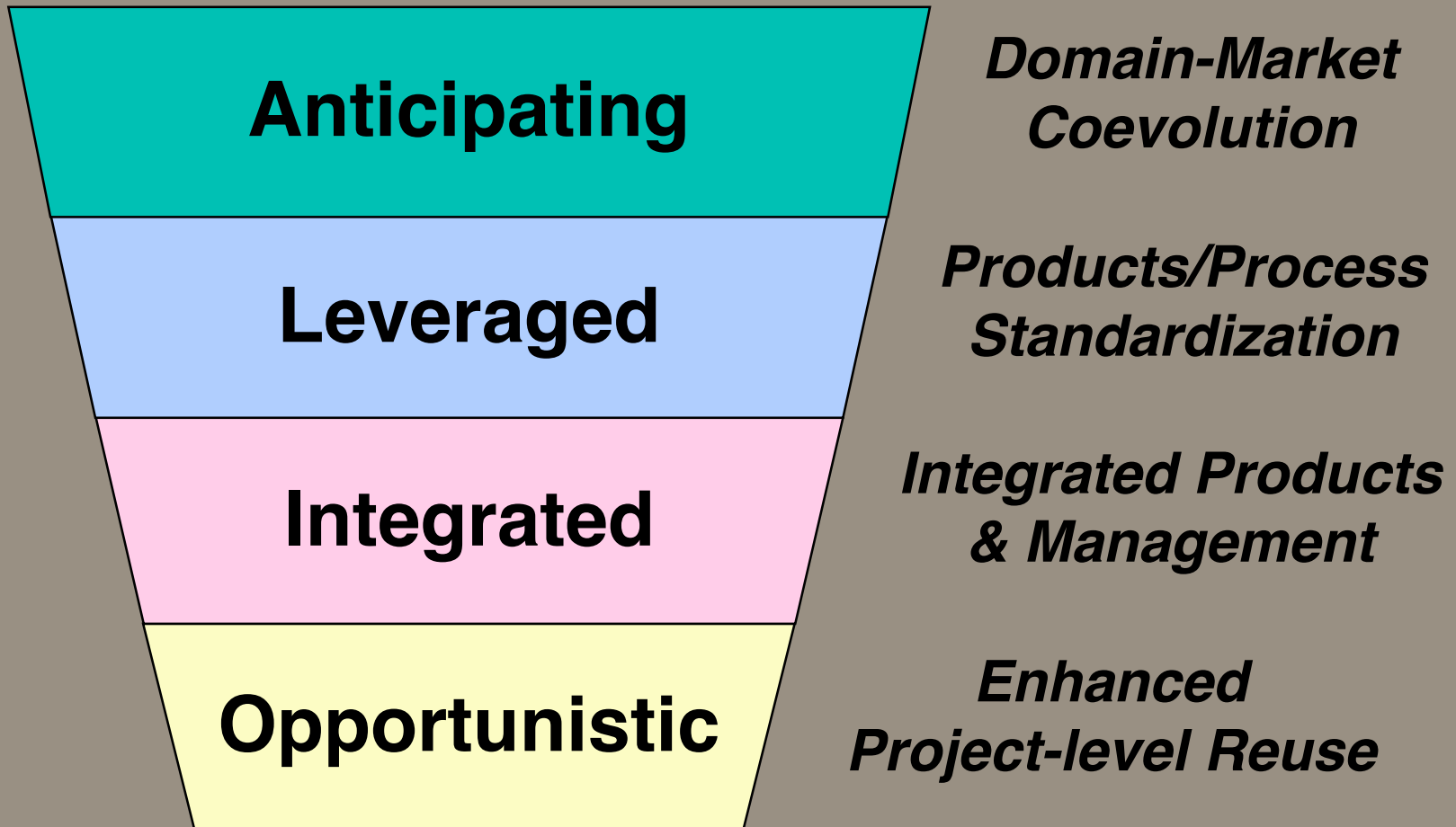
Create a domain (process, tools, and assets) for building similar products

Build tailored products for customers

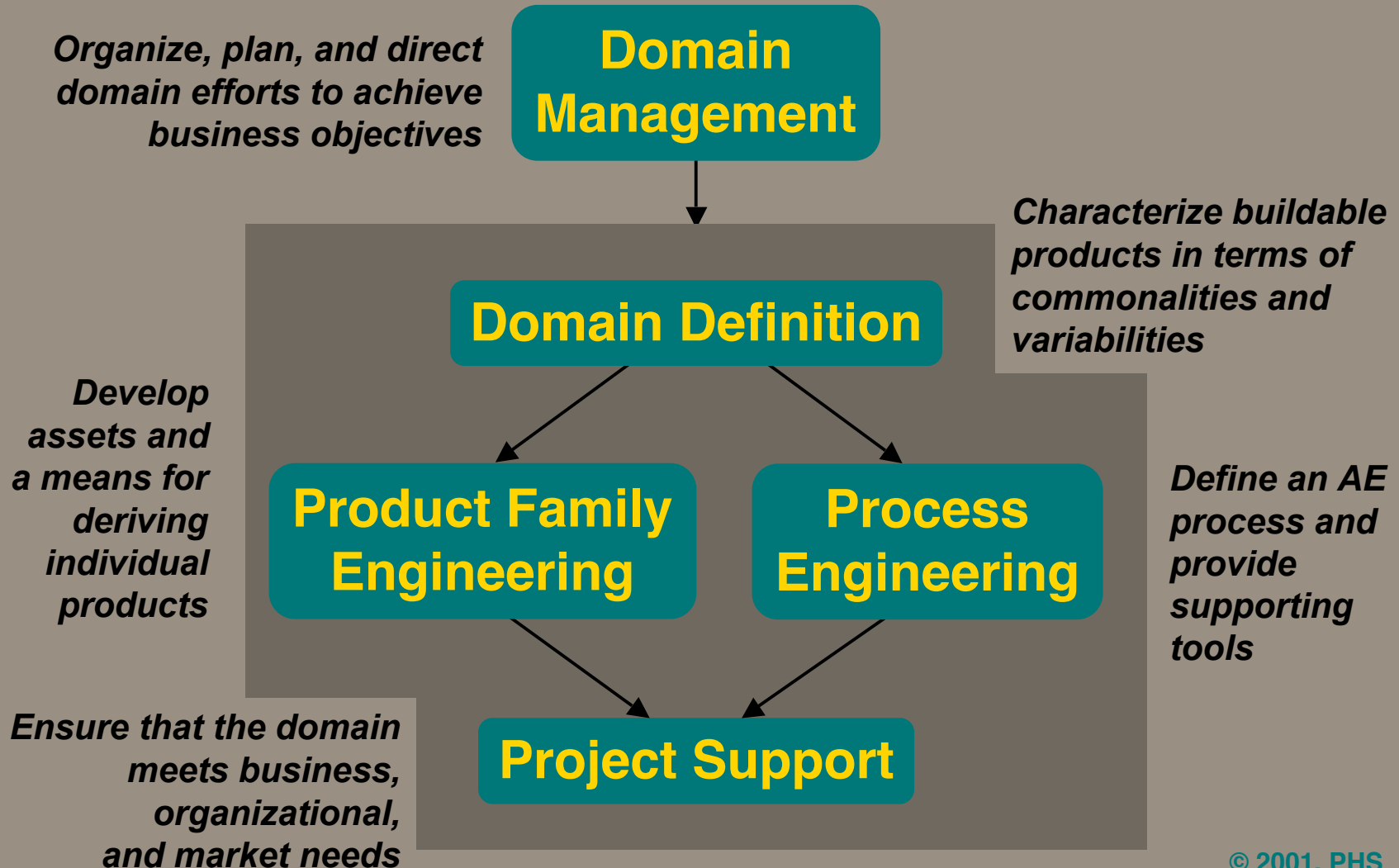
# Process Adoption



# Reuse Capability Levels



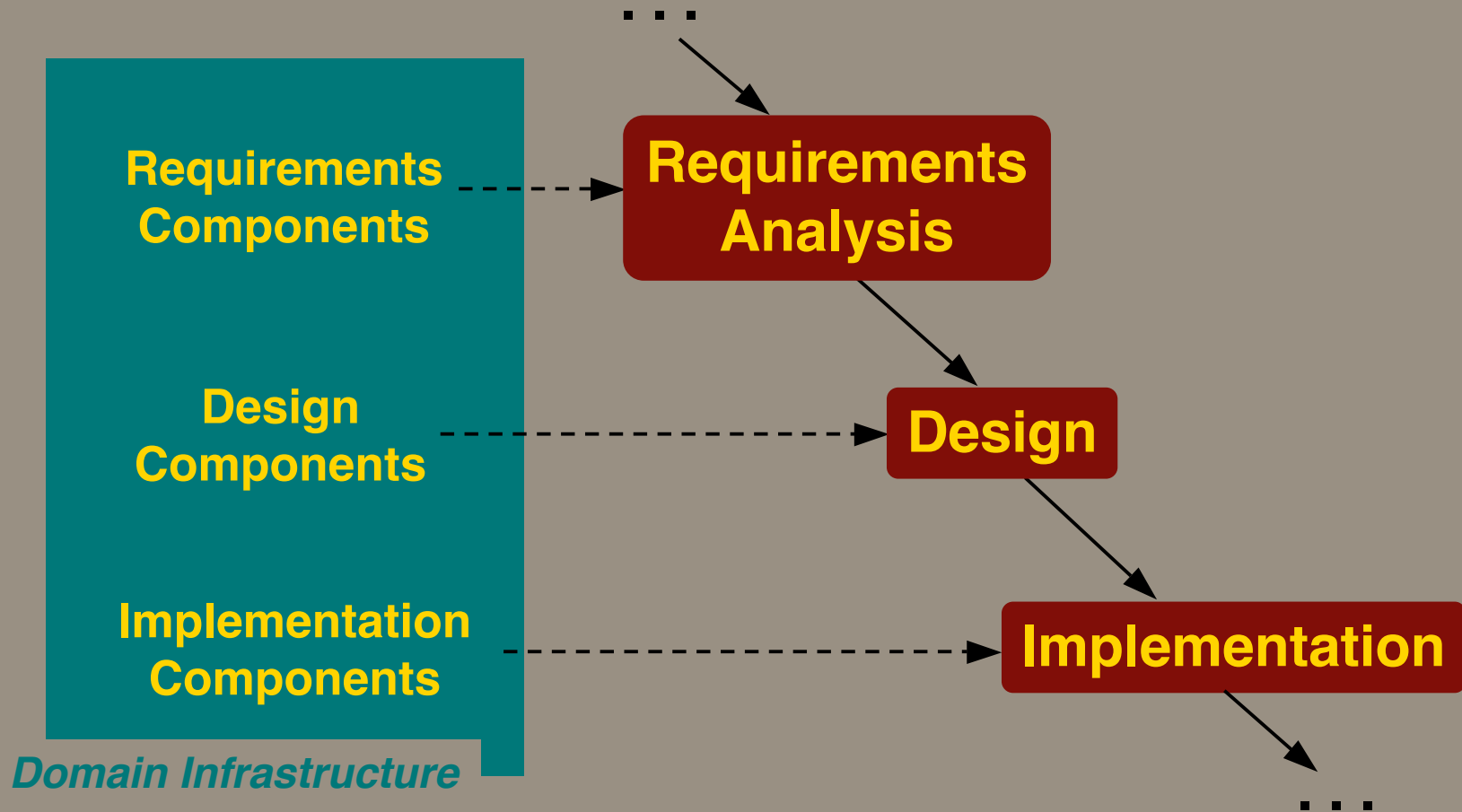
# Domain Engineering



# The Role of Decisions

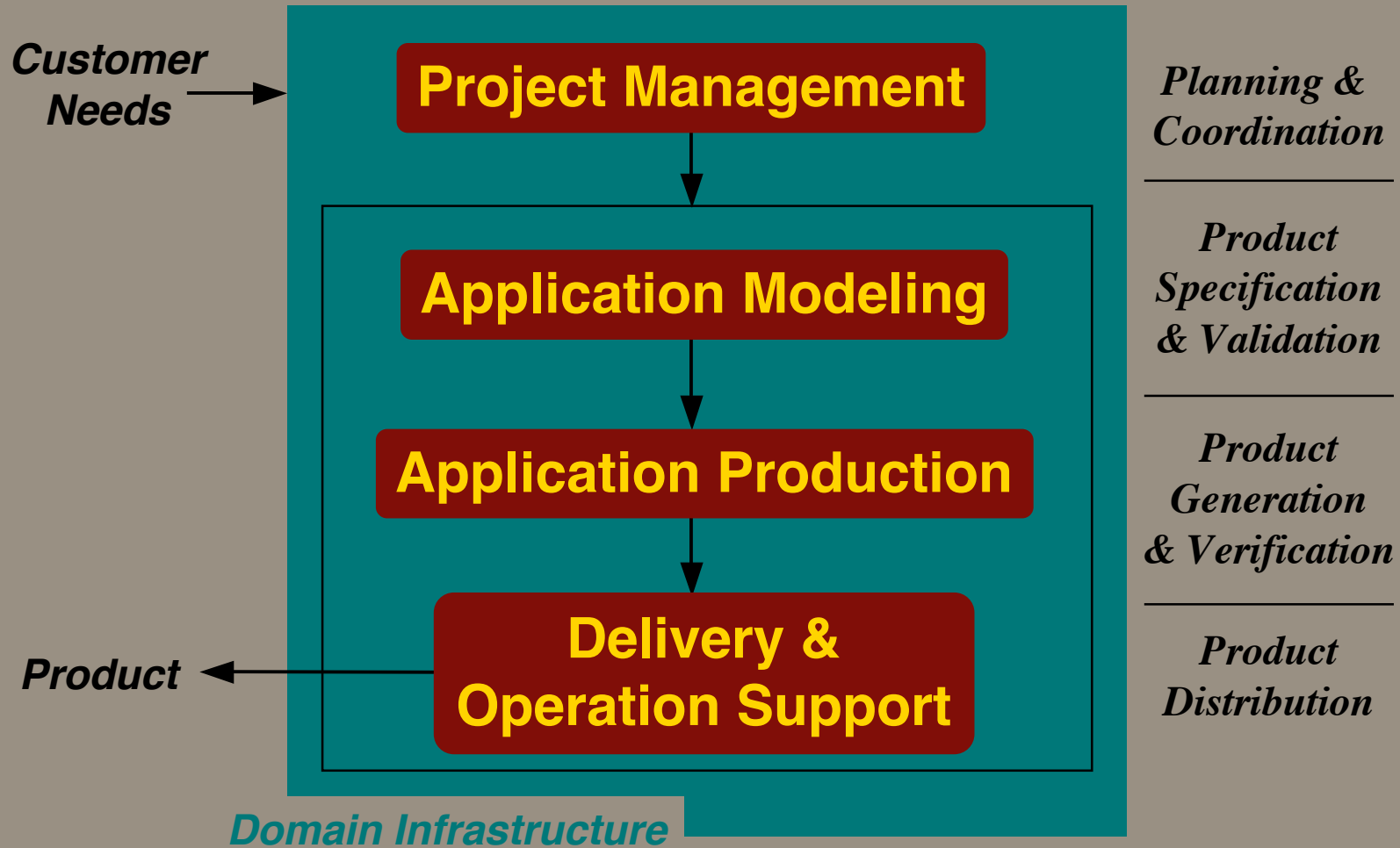
- **Engineering is a decision-making process.**
- **A product family shows how different ways to resolve a set of decisions lead to different products.**
- **Decisions represent:**
  - **Customer requirements (needs and constraints).**
  - **Engineering tradeoffs (such as cost, quality, ease of change, esthetics, and feasibility).**
- **A focus on similar problems (a family) enables standardization, reducing number, variety, and complexity of decisions.**

# Opportunistic/Integrated Application Engineering





# Leveraged/Anticipating Application Engineering



# Who Else Has Used DsE?

- **Rockwell: message switching systems, global positioning receivers**
- **Boeing: flight training simulators**
- **Lockheed-Martin: satellite avionics, test equipment**
- **Thomson-CSF (*corporate standard*): air traffic control, training simulators, . . .**

# Case Study: Thomson-CSF

- **Corporate-level advocacy and coordination**
- **Multiple business unit adopters**
  - **Air traffic control centers**
  - **Ground vehicle operator trainers**
- **Integrated with process improvement efforts (SEI SW-CMM)**
- **Improvements cited:**
  - **100% productivity improvement in 1 year**
  - **Standardization of requirement & design specs**
  - **New opportunities seen for test cost reduction**
  - **Bid/no-bid based on domain capability**

# **Actions to Institute DsE**

## **Organizational actions**

- | Evaluate utility**
- | Initiate pilot efforts**
- | Provide training and support**

## **Domain-specific actions (3-4 month pilot efforts)**

- | Define & evaluate a preliminary product line focus**
- | Analyze commonalities and variabilities**
- | Develop selected adaptable components**
- | Initiate formal Process Adoption**

# How PHS Can Help You

- Website < <http://www.domain-specific.com> >
- DsE course and tutorials
- Assistance with DsE efforts
  - Facilitate adoption steps
  - Mentor and assist DE managers
  - Facilitate DE domain definition activity
  - Assist with engineering methods and tools
  - Review work products
- Adaptable Components method and tool

# **For More Information on Domain-specific Engineering**

**Prosperity Heights Software**

**[www.domain-specific.com](http://www.domain-specific.com)**

*or*

**[info@domain-specific.com](mailto:info@domain-specific.com)**