



Domain Engineering

Applied to JISC Development Programmes

based on: Generative Programming,
Czarnecki & Eisenecker, Addison Wesley, 2000

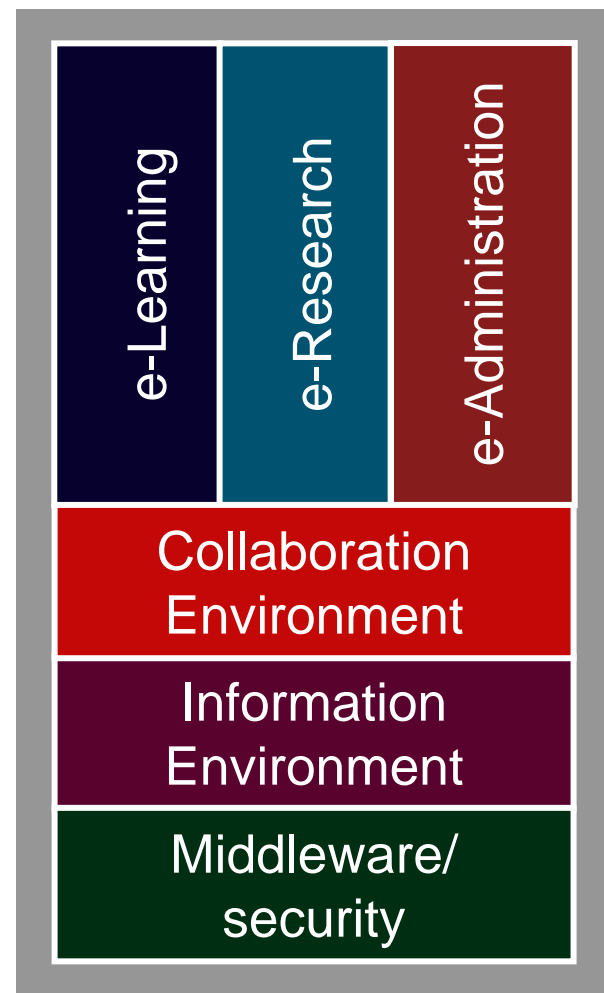
Bill Olivier
JISC Development
Director, Systems & Technology

Based on models of domain-based user requirements, the aims are to:

- Move towards more automated production of applications
- Move from single applications to application families
 - By determining commonalities & variabilities
 - in needs
 - in corresponding features
 - In order to design
 - reusable components and services
 - common architectures for system families

- A system application is specified by
 - Selection from domain requirements
 - Corresponding selection of the required components / services
 - Configuration of components / services
- Used as a basis for complete or partial generation of the application

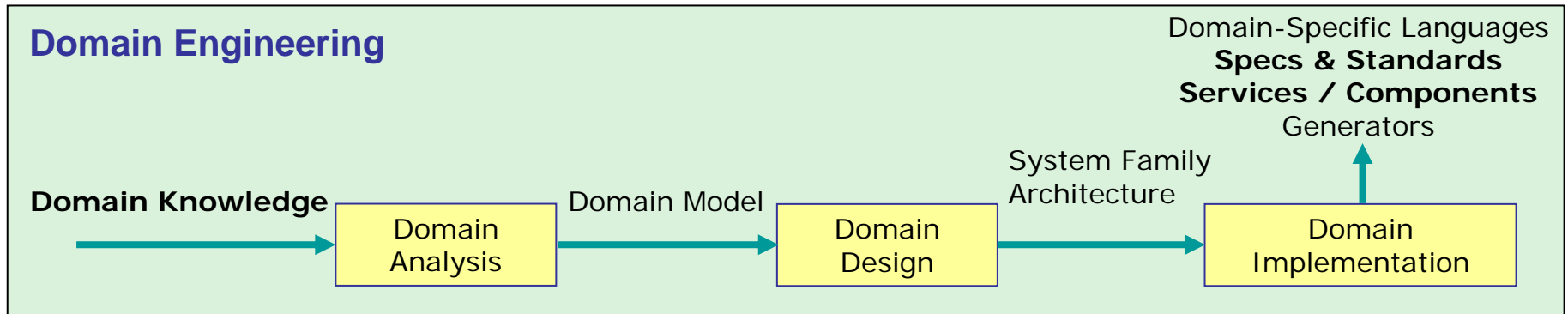
- Software is often classified by its 'domain of application'
 - Vertical Domains might include
 - Learning, Research, Administration, Student Records, Libraries
 - Personnel, Accounting, Resource Management
 - Horizontal Domains might include
 - Repositories, Security, Collaboration
 - Workflow, Messaging, Databases
- Applications within a domain often have features and functions in common



- Software companies specialising in a domain, when creating new applications, reuse:
 - domain knowledge
 - existing, domain-related software elements

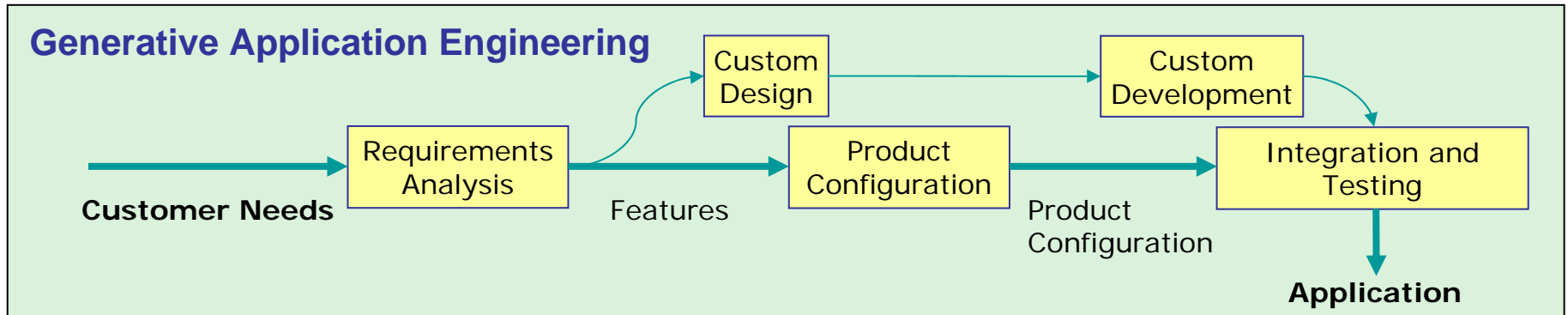
- Reasons for adopting Domain Engineering:
 - to capture this in the form of reusable assets
 - in order to create new applications
 - in less time
 - at lower cost
 - with higher quality

- Domain Engineering is a systematic approach to achieving this goal
- Domain Engineering has three elements:
 1. Domain Analysis
 2. Domain Design
 3. Domain Implementation



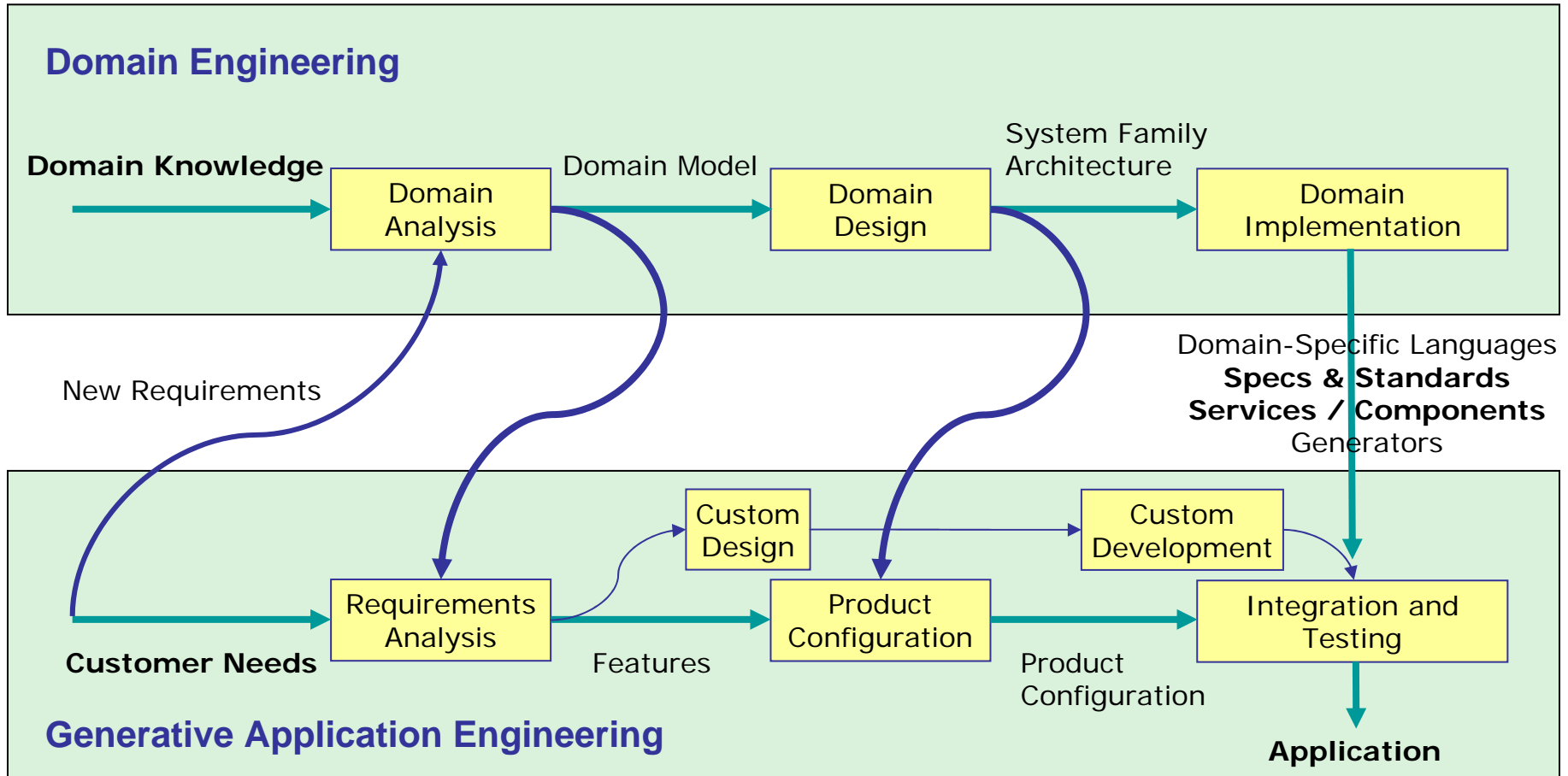
from: Generative Programming, Czarnecki & Eisenecker, Addison Wesley, 2000

- Application Engineering, based on Domain Engineering, also has three elements:
 1. Application Requirements Analysis
 2. Product Configuration
 3. Product Integration and Testing



from: Generative Programming, Czarnecki & Eisenecker, Addison Wesley, 2000

Relationship between Domain & Application Engineering



from: Generative Programming, Czarnecki & Eisenecker, Addison Wesley, 2000

■ Domain Analysis

- Domain Scoping
- Defining a set of reusable, configurable Requirements for systems in the domain

■ Domain Design

- Developing a Common Architecture for systems in the domain
- Devising a Production Plan

■ Domain Implementation

- Implementing reusable assets
 - Specifications and Standards
 - Service definitions, Service Adapters and Services
 - Reusable Software Components and software Frameworks (e.g. uPortal, Eclipse RCP)
 - Domain Specific Languages (e.g. IMS Learning Design)
 - Generators and a Production Process
 - Reuse infrastructure (asset organisation, storage, metadata, etc. e.g. the e-Framework)

■ Purpose

- Select and define the Domain (as seen by Practitioners in the Domain)
- Collect Domain Information
 - Stakeholders
 - External Context/s in which the Domain operates
 - Types of Practitioner within the Domain
 - The Concepts and Entities used in the Domain and their Relationships
 - Main Tasks and Functions and their Relationships
 - Existing Practices & Processes used to carry out the Tasks and Functions
 - Existing Systems used in the Domain and their exchanges
 - Current Trends and Developments within the Domain
 - Problem Areas and Areas of Opportunity
- Integrate into a Domain Model

- Domain Scope
 - Boundaries, Context, Stakeholders, Practitioners, Goals
- Domain Definition
 - Defines the Scope of the Domain
- Domain Vocabulary *linked to*
- Concept Models
 - Describe the Concepts used in the domain (e.g. Concept Map + Text &/or Object & Activity Models)
- Feature Models
 - Define a set of Reusable and Configurable Requirements (Features)
 - Describes
 - Which features combinations are meaningful / permitted
 - Which features are preferred under what conditions, and why
 - Represent the configuration aspects of a Concept Model
 - Used as the basis for developing concrete Applications