

3.2 DsE Program Management

A DsE program is chartered by executive management with specified scope and objectives to establish a capability for producing and sustaining products that will serve the diverse needs of customers in an identified coherent market. DsE program management, as an extension of the conception discussed in section 2.1, is the designated governing authority over a set of related projects. The focus here is on the initiation and management of projects associated with a DsE-targeted market in which customers' needs differ sufficiently to warrant building multiple similar products or for the managed evolution of a single multi-variant product over time.

Program management characterizes the market to which products are targeted, charters domain engineering and product manufacturing projects, obtains resources needed for these projects, and coordinates and evaluates the performance of these projects against program objectives.

The scope of a DsE-based program is the current and future needs of customers comprising a coherent market and an associated *domain*: an envisioned set of similar products and the means to derive instances of that set customized to each customer's needs. A DsE-based program charters a domain engineering project and one or more associated product manufacturing projects. The domain engineering project focuses on the needs of the targeted market as a whole and the needs of the associated product manufacturing projects to build products. Each product manufacturing project is focused on the needs of a single customer or simple market within the program-targeted market.

Program management is responsible for defining the process and practices that the domain engineering project will follow. The domain engineering project is delegated responsibility for collaboratively defining the process that product manufacturing projects are to follow.

Each product manufacturing project uses domain capabilities to build a product that meets the needs of its designated customer. As those needs change, a revised product is derived that will suit those changed needs. The domain itself is revised over time in

accordance with changes in project and market needs (corresponding to customer needs in aggregate).

DsE program management is organized upon an approach for determining the viability of a DsE-based approach to product development plus approaches for addressing the three perspectives on a defined process (as defined in section 1.3): maturity, capability, and performance. These provide the basis for an iteratively improving effort for building an evolving domain for building an evolving set of market-responsive products. DsE program management is defined by an associated model¹ [Figure 3.2-1].

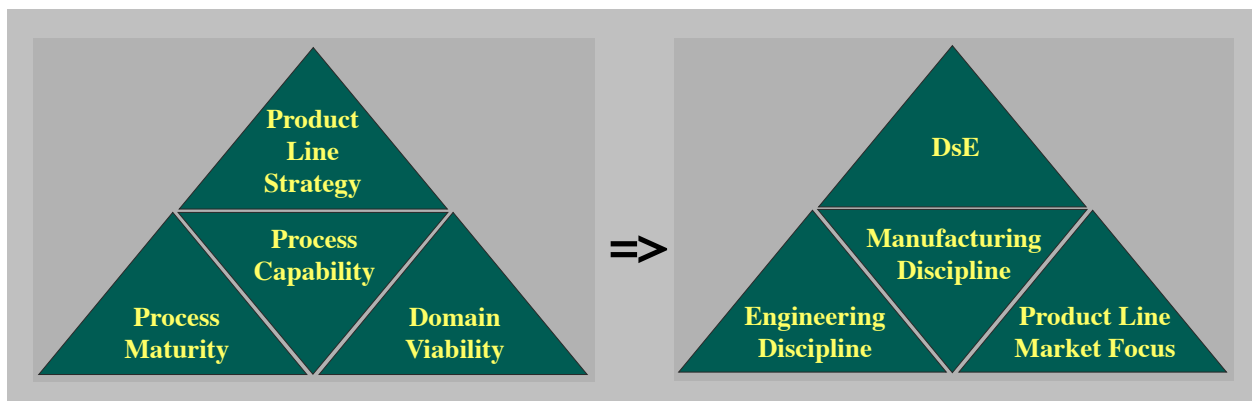


Figure 3.2-1. Program Management Models and Corresponding Objectives

This model defines the means by which program management articulates and evaluates, and reviews and revises on a recurring basis in consultation with enterprise management, the market opportunity, technical competence, and enterprise commitment required to operate a viable domain enterprise. It further iteratively manages improvements in engineering and manufacturing practices appropriate to the program's market focus and technical competence. Periodic reviews by enterprise management of a program's performance and market viability may lead to revisions in the program's scope and charter.

The performance of a process is determined by the maturity with which that process is performed. The capability of a process limits the productivity of practitioners in the

¹ Based on Grady H. Campbell, Jr., *A Framework for Product Line Adoption*, Prosperity Heights Software, 2002, and *Tutorial: Process Improvement for Software Product Lines*, Prosperity Heights Software, 2002.

performance of that process. A different or modified process can enable improvements in performance, relative to the same level of maturity in its practice. A primary motivation for the DsE approach is that it supports, over the development lifetime of either a singular product or each of a set of similar products, a significantly higher level of productivity than does a basic software product engineering approach.

Performance of program management, in more detail, consists of program conception including establishing domain viability, program governance and collaborative acquisition including addressing process maturity and process capability, and program performance following a DSE-based strategy for the initiation, coordination, and evaluation of a domain and associated projects.

Program Conception

The DsE approach frames conventional program management within an iterative organizational improvement discipline. A DsE-conforming program is conceived based on a perceived coherent market for a family of similar products and an existing (or intention to develop) organizational competence for building products of the type the family represents. A program is typically created based on one or more existing successful projects having developed similar products for that market. Alternatively, it may originate in recognition of a previously unrecognized market opportunity, such as may arise due to emerging technology, that the organization believes it can address.

Domain Viability

The domain viability model is the means to evaluate the charter by enterprise management of a defined market scope that aligns provider competence (ability to build) to types of products a market needs. This relies on perspectives of marketing, enterprise standards, and sources for appropriate funding and technical resources.

A part of this model is a model for profiling an economic analysis of the viability of a DsE approach for providing products that the program has the means to build to customers in the targeted market.

Program Organization

The generic form of a DsE program (defined in section 3.0 [Figure 3.0-1], analogous to the project model defined in section 2.0) consists of program management, a domain engineering project focused on a market-responsive domain, and multiple product manufacturing projects each focused on a customer-responsive product. Program management can organize the program's technical efforts into one of three structures [Figure 3.2-1]:

- Domain engineering is a service organization responsive to requests from projects for needed domain technical capabilities and resources;
- Domain engineering is the lead of a collaborative panel that identifies and prioritizes domain capabilities based on negotiation among projects;
- Domain engineering prescribes technical guidance for the capabilities and resources that are shared in use by all projects.

The appropriate organization is determined according to which is the best match to a program's priorities and degree of technical uniformity. All permit the flexible tasking of personnel with appropriate engineering or market competence to particular domain or manufacturing efforts as needed.

Program Governance and Collaborative Acquisition

A program is chartered through the allocation by an enterprise of business objectives, market scope, management authority, personnel and physical assets, and seed funding. In response to this charter, the program institutes a DsE adoption process to guide initiation with allocated resources of customer-directed projects and a projects-enhancing domain engineering effort.

<collaborative acquisition here? DE as primary provider and serves as acquirer agent for program; target is shared assets (dev tools, CM, env model, test framework, reusable assets, collective product data eg defects)>

The benefits of the DsE approach derive from the inherent tension it relieves between cost-reducing standardization and needs-fitting customization [Figure 3.2-2]. To build a

singular product depends on either focusing on a single customer's needs (one-of-a-kind) or comprising the product's fit to each customer so as to exploit the similarities in multiple customers' needs (one-size-fits-all). Building a product family appropriate to a targeted coherent market, the needs of every customer is expressed in the product family from which each customer's specific needs can drive the derivation of a customized instance product.

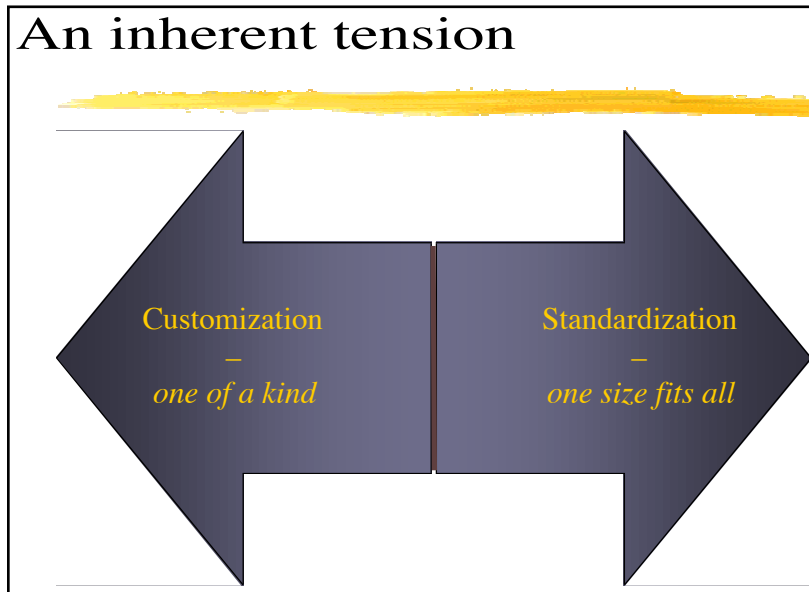


Figure 3.2-2. An inherent tension

Implications of cost-reducing standardization

Management focuses on domain investment, not costs of single-product crafting.

Market-focused business objectives lead to explicit limits on product diversity.

The development process is reduced to its essentials for a particular product line.

Projects focus on resolving key problem/solution variations, with reuse across projects.

Implications of market-focused customization

Program marketing is focused on promoting products that are viably based on domain capabilities, with more accurate cost-risk estimates.

Maturity

how able (competent) are developers to perform the elements of a specified process

[Figure 3.2-6]

Capability

how effective is the process as specified [Figure 3.2-7]

A program initiates development projects for customers whose needs are a good fit to past and planned domain investment.

Each project is committed to working with a particular customer to collaboratively determine the specific evolving needs of that customer and building a product that is a best-fit to those needs. The domain effort is committed to working with all projects to ensure it has the capabilities needed to build each product, consistent with program goals for the domain and market as a whole.

Program Performance

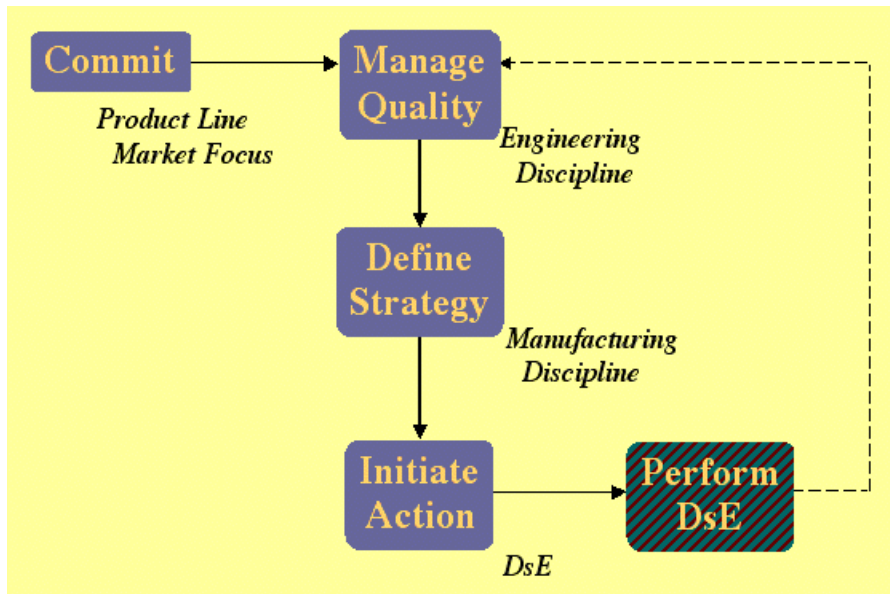


Figure 3.2-3. DsE Program Management Process

Performance

Initiating, managing, and monitoring the domain engineering effort (as the technical agent of program management) and associated product manufacturing projects using the provided domain capability. [Figure 3.2-8]