

T. H. E. Solution LLC

Taming the development of intelligent products

The Reference Product Development Process Model

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Principal

BACKGROUND

A business process is nothing more than the description of the steps to be taken to perform a specific business activity. When appropriate, it is the formalization of good “practice”. Such an activity is product development. It requires the interaction of multiple individuals in different business units to accomplish the desired goal.

A process model, like any other model, is based on a perception of the system to be modeled. This includes basic assumptions about what is important. More often than not these underlying assumptions are ignored or often not even consciously recognized. The assumptions behind T. H. E. Solutions’ reference product development process model are outlined below:

1. The biggest problem in product development is communications. Especially between departments with inherently different models of “reality”.
2. There is no single method, methodology or technique that will provide answers to complex chains of human activity such as product development. The silver bullet is the appropriate application of people, process and tools.
3. Quality is customer satisfaction. It reflects meeting or exceeding customer expectations. It is composed of multiple components. One of these is functional quality, the measure of the products conformance to specification (i.e. it functions “correctly”). Customer satisfaction requires much more including (but not limited to) price, availability and the “right” function set.
4. A manufacturer wants to:
 - a. Develop the “right” products
 - i. Customers want it
 - ii. The manufacture can make and sell it
 - iii. It is profitable
 - b. Make the products as profitably as possible. In terms of what the product development chain impacts this translates to the highest possible customer perceived value with the lowest lifetime direct costs (see Figure 1)

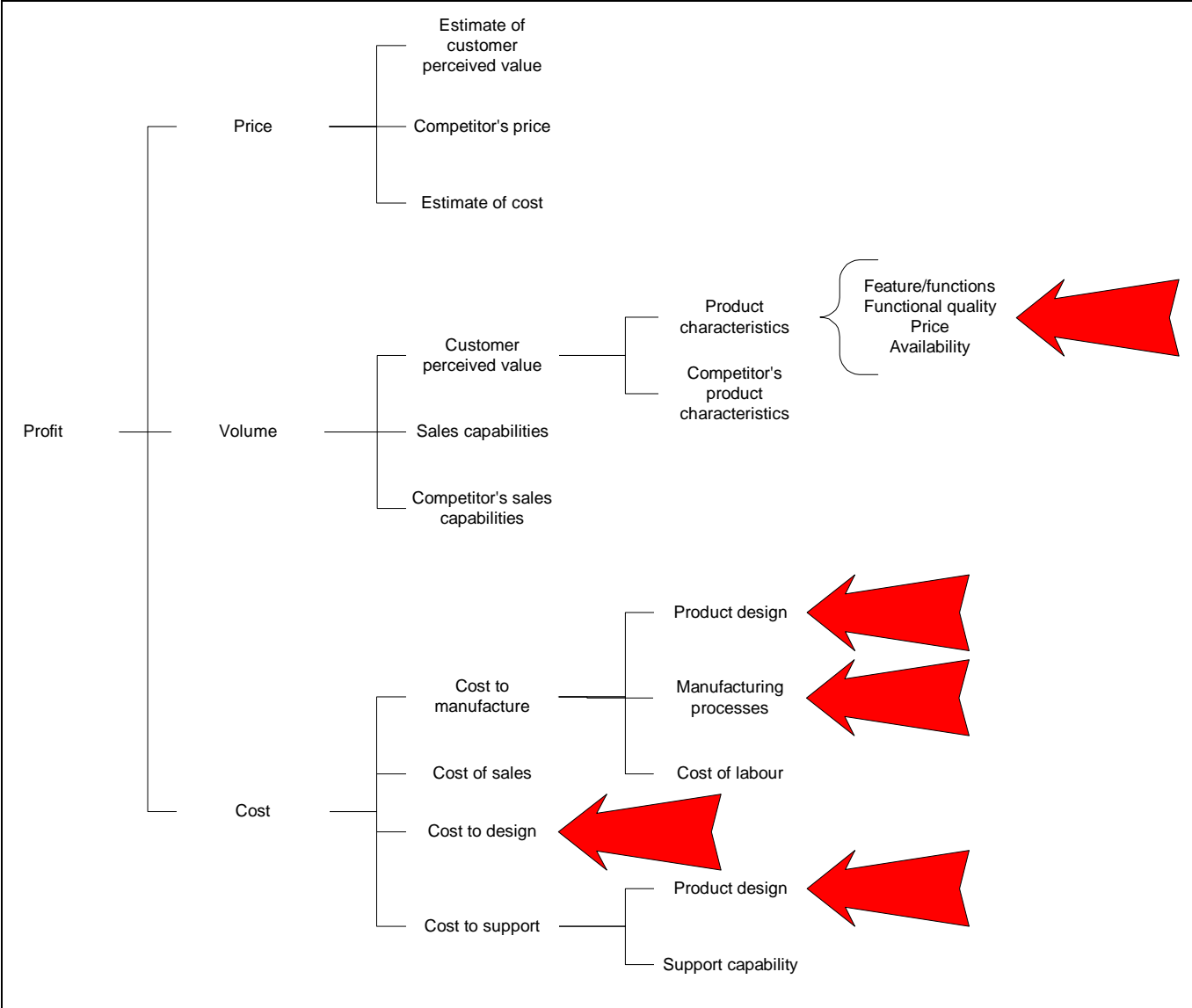
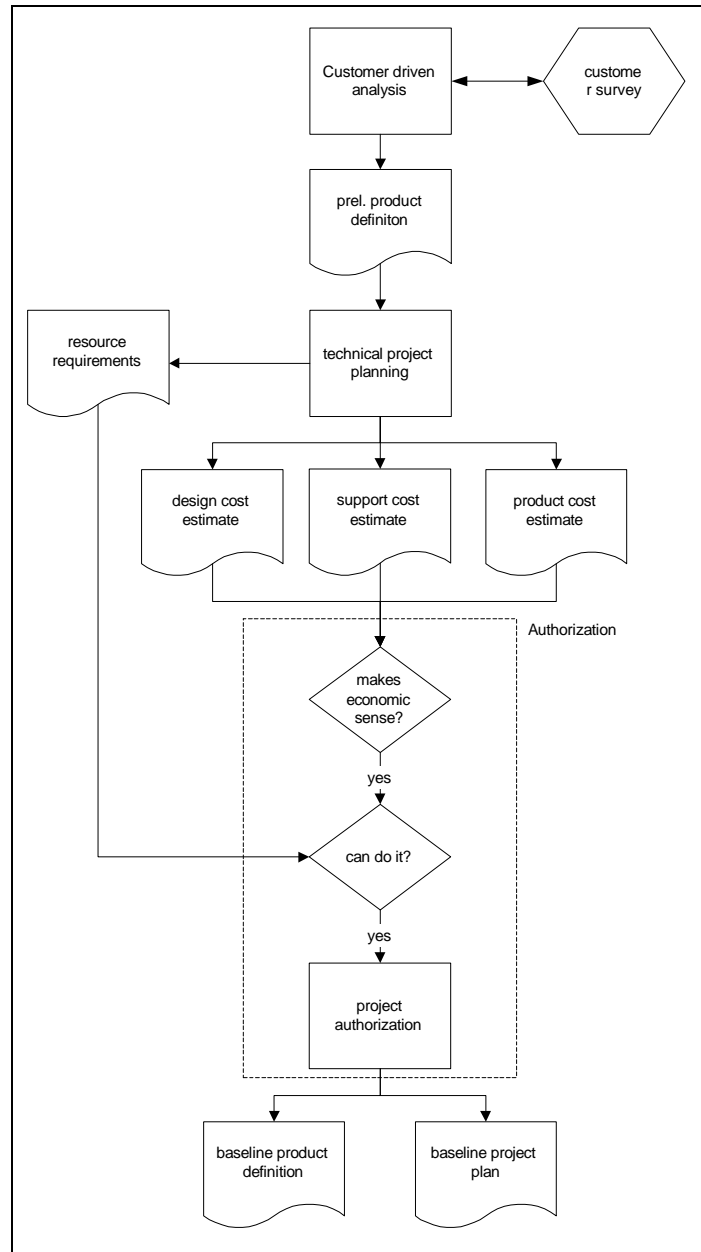


Figure 1, Manufacturer's Profit Tree

REFERENCE PROCESS MODEL

As a company follows the path on continual improvement, the appropriate process model will change and should become an increasingly better “fit” for that organization. Therefore, there is no single product development process model that is appropriate for every manufacturer of intelligent products. Instead, Silver Bullet Technology uses a straw man, the reference model, which serves as a good starting point for small to medium manufactures of intelligent products. This reference model is outlined below:

- I. Management practices
 - A. Continuous company monitoring
 - 1. Sales by product/product line
 - 2. Variable manufacturing cost ratio
 - 3. Cost of non-conformance (company and product/product line)
 - B. Periodic monitoring
 - 1. Product/product line competitive analysis
 - a) Top (3) competitors
 - b) Comparison of
 - (1) Product characteristics
 - (2) Component costs
 - (3) Direct manufacturing costs
 - 2. Customer perceived value “survey”
 - C. Project management
 - 1. Project teams used through all phases of development
 - a) Front end exploration
 - b) Development iterations
 - 2. Project metrics [project report card]
 - a) Product cost estimate
 - b) Design cost estimate (project cost)
 - c) Operations turnover date (duration)
 - d) Support cost estimate
 - e) Technical productivity and functional quality metrics (company, product/product line, project)
 - D. Continuous improvement as the framework
- II. Rational front end exploration
 - A. Who?
 - 1. Must have a person to “drive” the exploration
 - 2. Cross department participation (marketing, engineering, manufacturing ...).
 - B. Why?
 - 1. Eliminate projects that do not make business sense.
 - 2. Assure that authorized projects have a high probability of being successful.
 - a) The product meets or exceeds customer expectations
 - b) The product is profitable
 - C. How?



1. Customer driven analysis

a) Competitive analysis is the basic data gathering tool

(1) What is your market niche?

(2) Who is the competition?

(3) Who are the most successful competitors? (top 3)

(4) What are the characteristics of their product?

(a) Features/functions driven by customer requirements

(i) Must have

(a) Regulatory requirements

(b) The basics common to all products of this class

- (ii) Should have - often the areas covered in your competitor's sales bullet points
 - (iii) Exceed expectations
 - (a) Some may fall out of competitive analysis (the unique features of a specific product)
 - (b) Most often the stuff of innovation
 - (b) Price, availability and support targets
 - (5) How will you compete?
 - (a) Superior features/functions
 - (b) Lower price
 - (c) Better support
 - (d) Easier purchasing
 - b) QFD "lite"
 - (1) Competitive assessment matrix
 - (2) QFD phase 1 "lite" matrix
 - 2. Technical project planning
 - 3. Authorization
 - a) Can we design the product in a reasonable time?
 - b) Does it make economic sense? (System dynamics model)
 - c) Do we have (or can we get) the resources (people, process and tools) required?
 - d) What are the primary sources of risks to this development? Have they been adequately addressed?
- D. This activity produces the baseline product definition and project plan.
 - 1. Product definition (minimum)
 - a) Target audience description
 - b) Functional requirements
 - (1) Competitive assessment matrix
 - (2) Selected requirements
 - c) Price target
 - d) Support cost target
 - e) Product technical characteristics
 - (1) QFD phase 1 Lite matrix
 - (2) Selected characteristics
 - f) Competitive strategy
 - 2. Project plan (minimum)
 - a) Project resource requirements
 - b) Project cost estimate
 - c) Product cost estimate
 - d) Support cost estimate
 - e) Timeline
- III. Small step iterative development model
 - A. A series of fairly short development cycles (specify– design – implement – test) that add and/or change new features/functions. The features/functions included in a cycle are added based on priority and functional cohesion.

- B. Things change, the process handles this by doing incremental development with the implementation of each cycle being carefully reviewed (see G below).
- C. The primary failure is communication, especially between departments. The process addresses this during both the specifying and testing step of each cycle.
- D. Each cycle includes a short “post mortem” and a revised project report card (project metrics)
- E. The basic model supports central or distributed development, inhouse or outsourced.
- F. The basic model covers everything from the first development to the last modification.
- G. Test early, test often and test completely. Testing primarily based on 100 % regressive testing of prior cycle features/functions and new tests that cover this cycle’s added/changed features/functions. Testing includes operation review/user testing with all the “stakeholders” (e.g. customers, marketing, support ...) and possibly modification of the “product definition baseline”. Good customer surrogates include installers and field maintenance personnel.
- H. Must include definition of not just what, but also who and why.