Management of Technology

Management, Development, Commercialization (MDC) Framework

The following MDC framework addresses the management, development, and commercialization of a technology and its associated products.

Management (M): Perform steps 1-5 concurrently.

1. (Firm-level Strategy). Map the industry-market landscape for the technology/product using Porter's Five Forces model, and then establish the overall competitive strategy, technology strategy, and market strategy of the technology firm.
2. (Business Goals). Establish the business goals and objectives (ROI, %market share, revenue, and growth aspirations). These business goals need to be clearly related to the (clearly stated) vision and mission of the technology firm (also see Steps 4, 17).
3. (Developmental Goals). Define the overall development goals to align business goals, competitive strategy, technology strategy, and market strategy.
4. (Functional Maps). Create functional maps (time-based evolutionary maps) for engineering, manufacturing, and marketing in order to rationally decide which technologies and products to develop (also see Step 1. A revenue map based on product/market segmentation is crucial for the selection of the appropriate target markets (also see Steps 2, 6, 13, 17).
5. (Identifying Potential Projects). Identify potential projects for the Aggregate Project Plan by relating high-level customer needs to potential market segments.
6. (Aggregate Project Plan). Use probabilistic decision analysis to develop an initial aggregate project plan, which is the mix of products to be developed (also see Steps 13, 17):
   - Research & advanced development
   - Breakthrough
   - Platform
   - Incremental (Enhancements, derivatives, hybrids)
   - Alliance, or partnered projects
7. (Development Funnel). Create an appropriate development funnel to refine and firm up the aggregate project plan. The development funnel is a process for identifying and screening projects over time.
8. (Project Planning). Establish a cross-functional team for each technology/product development project. Develop a project plan using the design/development structure matrix, and GANTT, PERT, and CPM charts.

Development (D): To develop each product, **concurrently engineer** (CE) steps 9-13.

9. (Quality Function Deployment). Develop a comprehensive House of Quality (HOQ) to correlate customer needs to technical metrics and specifications.
10. (Reverse Engineering). Dissect existing products which are similar to the proposed new product using the Function Analysis Systems Technique (FAST).
11. (Conceptual Design). Create a function structure (FS) for your product, and use this FS to generate a morphological matrix (MM). Use the MM to generate several design

concepts. Select one (or more) concepts using a utility function, which is based on an appropriate set of weighted selection criteria.

12. (Prototyping Strategy). Develop an appropriate prototyping strategy (physical vs. analytical; focused vs. comprehensive). Build and test proof-of concept and other appropriate prototypes based on the prototyping strategy.
13. (Product Architecture/Product Strategy). Establish the technology platform and product platform. Define the appropriate product lines to serve the target market segments (also see Steps 4, 6, 17).
14. (Detailed design). Develop the detailed embodiment design of the product
15. (FMEA).Perform a failure modes and effects analysis (FMEA) of the detailed design.
16. (DFX). Perform DFX: Design for manufacturability(X=M) and quality (X=Q)

Commercialization (C) (Steps 13-16, above, are the transitions from D to C).

17. (Financial Model). Develop a base-case (nominal) Net Present Value (NPV) financial model in order to determine the expected profits (payoffs) from the product development projects. The NPV analysis models the appropriate cash-flows (sales revenues, development, production, marketing, and other relevant costs). Perform sensitivity analyses on the base-case financial model in order to understand and quantify trade-offs between time, cost, and quality (also see Steps 2, 4, 6, 13).
18. (Robust Design). Design the product for performance and robustness using "Design of Experiments".
19. (Product Release Map). Create the product release roadmap (closely related to Step 13).
20. (Supply Chain Management). Design the supply chain and distribution network for your product (addressed in MOT II: Supply Chain Management)