

Product Life Cycle Management Guideline

EDM-P-212
New Product Introduction of Electronics
V1.2
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The Product Life Cycle Management Guideline

The Product Life Cycle Management (PLCM) Guidelines intend to provide guidelines for the overall management of the life cycle of electronics and of the electronics' aspects of products containing electronics with focus on the design, manufacturing, operation, reliability and end-of-life aspects. Marketing and business development aspects lie outside the scope of the guidelines.

- The recommendations given in the guidelines are intended to help the user in the Product Life Cycle Management of electronics and products with integrated electronics.
- The PLCM guidelines promotes the use of scientific methods such as physical modeling, physics-of-failure based accelerated testing, simulation, virtual prototyping, etc. Physical models extend the capability of predicting the designed product's properties and behavior beyond experience. This provides a cutting-edge innovation advantage over an experience and test-based development approach.
- Physical models reduce the development cost and time by reducing product testing and, especially, the number of design iterations.

Product Life Cycle Stages and Phases

The following Product Life Cycle stages and phases are distinguished.

Innovation Stage New Product Exploration

1. Problem Research

Evaluation of the product idea by experts and stakeholders on its technological feasibility, its viability of providing a solution to a user problem and its business potential. Brainstorming, expert consultancy and literature study form the basis of a low-cost evaluation methodology in this phase. It delivers a **Product Research plan** with a rationale and a budget proposal for more in-depth evaluation and validation of product options, priorities and opportunities.

2. Product Research

Validation of most viable product options using functional software and hardware evaluation kits or test models, product mock-ups, etc. The output of this phase is **Validated Concept**, demonstrating the desirability, feasibility and viability of the product solution.

Innovation Stage New Product Planning

3. Product Specification

Based on the Validated Concept and in-depth understanding of the stakeholder needs and business opportunities, the requirements for the product are created. The output of the Specification phase is a high-level description of the product to be designed: the **Product Requirements Document (PRD)**.

4. Product Planning

The planning phase creates a business, operations and development plan for the product. It contains the main targets and their critical milestones and timing specified in a comprehensive **New Product Introduction (NPI) plan**.

Innovation Stage New Product Introduction

5. Architecture

Based on the PRD the product's architecture is defined, the **Detailed Product Specification** and the **detailed NPI project plan** are created.

6. Design

Execution of the detailed design based on the output of the Architecture phase, evaluation of engineering solutions using simulations and engineering prototypes. Specification of the new product including manufacturing instructions for the product prototypes.

7. Prototyping

Design evaluation and product qualification on product prototypes.

8. Industrialization

Preparation of the regular production of the product and hand-over to operations.

Product-to-customer Stage

9. Production

Product manufacturing including quality management throughout the operational lifetime of the product.

10. Distribution

Distribution of products from the production warehouse(s) to the customer(s).

Product-at-customer Stage

11. Installation

Installation and start-up of the product at the customer's site.

12. Product Operation

Product operation including aspects like reliability and maintenance throughout the operational lifetime of the product.

Retirement Stage

13. Decommissioning

Actions taken to end the product's use.

14. The End

Re-use, recycling and/or waste handling of products that have been decommissioned.

Product Life Cycle related and supporting activities

The following related activities are identified:

1. Technology Development (product independent)
2. Component Development (product dependent)

The following supporting activities applicable to a class of products are identified (not limiting):

1. Technology qualification program
2. Design methods and guidelines
3. Product verification, validation and certification
4. Qualified supply chain
5. New Product Introduction Program
6. Product Change Program
7. Quality Control Program
8. Maintenance Program
9. Decommissioning Program
10. Re-use, recycling and waste handling

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1. Applicable Documents

This Product Life Cycle Management Guideline refers the most recent version of the following documents:

ISO/IEC/IEEE 15288	Systems and Software engineering – System life cycle processes
ISO/IEC/IEEE 24748-1	Systems and Software engineering – Life cycle management – Part 1: Guidelines for life cycle management.
EDM-P-200	Predictive Product Life Cycle Management of Electronics
EDM-D-008	Technology and Manufacturing Capability Mapping of PBA Designs

2. Applicability of the PLCM Guideline EDM-P-212

- 2.1. EDM-P-212 describes a physics-based approach to New Product Introduction (NPI) of electronics and products integrating electronics.
- 2.2. This PLCM guideline focusses on the electronics' NPI. The integration aspects of the electronics' NPI in the PLCM of the final system, e.g. a car or machinery, lies beyond the scope of this guideline.
- 2.3. This guideline covers New Product Introduction starting from a Product Requirement Document and a New Product Introduction plan until Release for Production and hand-over to regular operations, see Fig. 1 and EDM-P-200 for background.
- 2.4. The New Product Introduction trajectory interacts with the Technology Development trajectory if a new technology is used for the first time in a product to be marketed, see Fig. 1.
- 2.5. The interaction with custom component development, see EDM-P-200 section 3.4 and Fig. 2, is covered by this guideline.

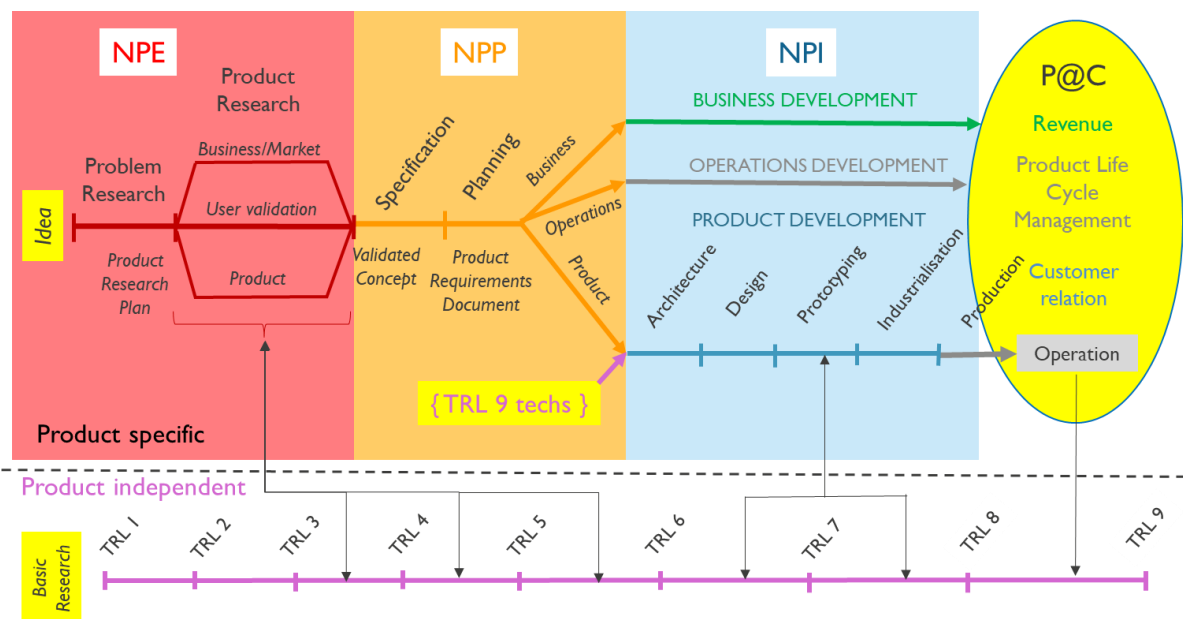


Figure 1: Exploded view on Product Innovation stages and the life cycle phases and interaction with technology development. EDM-P-212 covers the New Product Introduction trajectory.