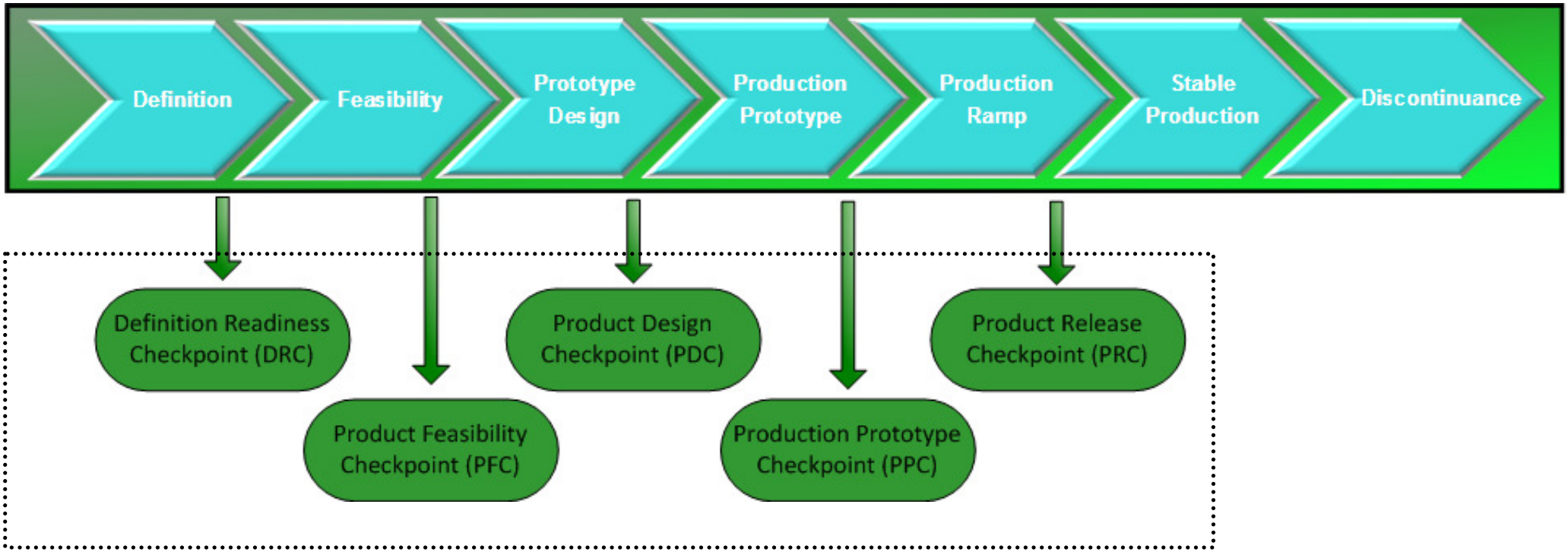
Commercialization Life Cycle

Commercialization Phases



Commercialization Checkpoints

Definition Phase

1. Product Alignment with Company Strategy and Roadmap

2. Competitive Analysis
   - Lessons/feedback from existing products in market
   - Analysis of competitor's product functional performance and features
   - Intellectual Property (IP) Landscape Search and Protection

3. Product Data Sheet/Product Requirements
   - Desired performance, functional, and interface requirements
   - Industrial design requirements
   - Human factors requirements
   - Installation, support, service, and maintenance requirements
   - Qualification, regulatory, safety, and standards compliance requirements
   - Compatibility requirements
   - Packaging, shipping, and labeling requirements

4. Engineering Data Sheet/Product Specifications
   - Translation of the product requirements into engineering specifications

5. Program Management/Product Development Plans
   - Program schedule
   - Program budget
   - Program risk assessment
   - Quality system implementation plans
   - Program priorities: scope, cost, schedule

Definition Readiness Checkpoint (DRC)

1. Product Development Plan Document
   - Preliminary schedule and budget approved
   - Program priorities approved
   - Strategy, cost, schedule, risks, quality expectations, and product goals aligned

2. Product Data Sheet/Product Requirements Document
   - Document approved and under revision control

3. Engineering Data Sheet/Product Specifications Document
   - Document approved and under revision control

Feasibility Phase

1. Product Architecture
   - Identify functional subsystems in architecture
   - Define interface between functional subsystems
   - Define critical functional parameters of functional subsystems
   - Define interface protocols between all functional engineering disciplines
   - Develop proof-of-concept testbeds based on functional subsystems
   - Refine industrial design and human factors

2. Qualification, Verification, and Regulatory
   - Verification of subsystem functional performance parameters
   - Product qualification, regulatory, and compliance testing requirements
   - County ship-to list impact on qualification

3. Program Management/Product Development Plans
   - Preliminary bill of materials
   - Cost of goods sold analysis
   - Nonrecurring costs (engineering, prototyping, qualification)
   - Prototyping strategy (methods, quantities, packaging, regulatory req'ments)
   - Feasibility issue tracking list management
   - Updated program schedule

4. Design Review
   - Review of designs relative to Engineering Data Sheet/Product Specs

Product Feasibility Checkpoint (PFC)

1. Product Architecture Document
   - Industrial design and human factors documents approved
   - Product architecture and interface document approved
   - Proof-of-concept testbed designs documented

2. Qualification, Verification, and Regulatory Document
   - Plan documented, approved, and under revision control
   - Proof-of-concept testbed performance documented and approved

3. Product Development Plan Document
   - Updated schedule approval based on product feasibility results
   - Program financials and budget reviewed and approved
   - No outstanding issues on feasibility issue tracking list
   - Prototyping plan reviewed and approved

4. Design Review Documentation
   - All design review sessions documented

Design Prototype Phase

1. Detailed Design and Prototype
   - Product design that meets form, fit, and functional requirements
   - Develop packaging design
   - Product design reviews with cross-discipline team
   - Design margin and tolerance analysis for critical parts and assemblies
   - Generate all required design documentation
   - Fabricate quick-turn prototypes to validate integrated functionality
2. Qualification, Verification, and Regulatory Testing of Design Prototypes
   - Develop qualification plan that validates and verifies integrated functionality
   - Execute first phase of hardware, software, and firmware qualification plan
   - Test product under regulatory and compliance testing conditions
3. Supply Chain Strategy
   - Capacity, ramp plan, and product volume forecast
   - Develop production tooling strategy and schedule
   - Assurance of supply analysis for each component and vendor
   - Identify key suppliers and technologies
   - Initiate supplier contracts
   - Develop a distribution strategy
   - Develop a reverse logistics (service and support) strategy
4. Program Management/Product Development Plans
   - Align Engineering Disciplines to Overall Product Schedule
   - Review Intellectual Property and File any New IP
   - Implement a Defect Tracking System

Product Design Checkpoint (PDC)

1. Product Design Documentation
   - Integrated product design documentation
   - Design reviews sessions documented
2. Qualification, Verification, and Regulatory Document
   - Demonstrated functionality of quick-turn integrated prototypes
   - Updated qualification document
3. Supply Chain Strategy
   - Tooling strategy, assurance of supply, and supplier plan
   - Product forecast and capacity
   - Distribution and reverse logistics plan
   - Key supplier contracts
4. Product Development Plan Document
   - Program schedule, financials, and expenses approved
   - Documented release criteria for ship/no-ship

Production Prototype Phase

1. Production-Ready Design
   - Product design incorporates design-for-manufacturability
   - Production tooling released
   - Production prototypes built using production processes
2. Qualification, Verification, and Regulatory Certification of Production Prototypes
   - Qualify production prototypes using qualification plan
   - Verify product performance meets product specifications
   - Complete regulatory and certification testing and submission to agencies
   - Qualify final package design with in-box materials
3. Production and Manufacturing
   - Production line assembly and test processes designed and implemented
   - Assembly jigs and fixtures designed and fabricated
   - Production processes qualified for volume production
4. Supply Chain
   - Finalize all supplier contracts
   - All vendors qualified and capable of producing expected volumes
   - Distribution and reverse logistics operational plan generated
5. Program Management/Product Development Plans
   - Formal change management and revision control of designs
   - Defect tracking system linked with change management
   - Learning products draft complete and under revision control
   - Costed bill of materials under revision control
   - Complete product cost of goods sold approved
   - Expense budget managed to plan
   - Schedule details managed to plan

Production Prototype Checkpoint (PPC)

1. Product Design Documentation
   - Design files updated for volume production design
2. Qualification, Verification, and Regulatory Document
   - Production prototypes meet product specifications (zero no-ship issues)
   - Regulatory approvals and country certifications received
3. Supply Chain and Manufacturing
   - Production able to meet ramp, capacity, and product forecast
   - Production processes documented and approved
   - Supply chain able to meet ramp, capacity, and product forecast
4. Product Development Plan Document
   - Product financials meet profit and revenue goals
   - Product introduction date announced

Production Ramp Phase

1. Production Design
    - Build production products to fill the outbound supply chain
    - Resolve issues and defects that arise during ramp to steady-state volume
2. Qualification, Verification, and Regulatory Compliance
    - Develop on-going qualification and verification plan
    - Execute on-going quality plan with production samples
    - Develop regulatory and certification plans for new regions of distribution
3. Supply Chain and Manufacturing
    - Implementation of distribution strategy
    - Develop contingency plans for supply chain and manufacturing issues
4. Program Management
    - Cost of goods sold under revision control
    - Learning products and product labeling complete

Product Release Checkpoint (PRC)

1. Production meets demand fulfillment requirements
2. Products shipped with zero “no-ship" issues
3. On-going product qualification yield acceptable product performance
4. All financial product goals are met

Stable Production Phase

1. Stable Production Performance
   - Production line yield and productivity is monitored and stabilized
   - Production line output has reached expected volumes
   - In-factory product issues are resolved quickly
   - Flawless execution of demand fulfillment plans
2. Design Improvements
   - Design improvements fed forward to future products
   - Resolve critical field and customer issues and roll into current production
3. Program Management
   - Product development and management learnings rolled into future programs
   - Hand-off of design ownership to production team

Discontinuance Phase

1. Develop Discontinuance/Rollover Plans
   - Engineering support, technical support, and reverse logistics plan
   - Inventory requirements for repair and support
   - Plan to use parts in follow-on products
2. Discontinue Manufacturing and Sales
3. Disposition Inventory
4. Determine Support Requirements