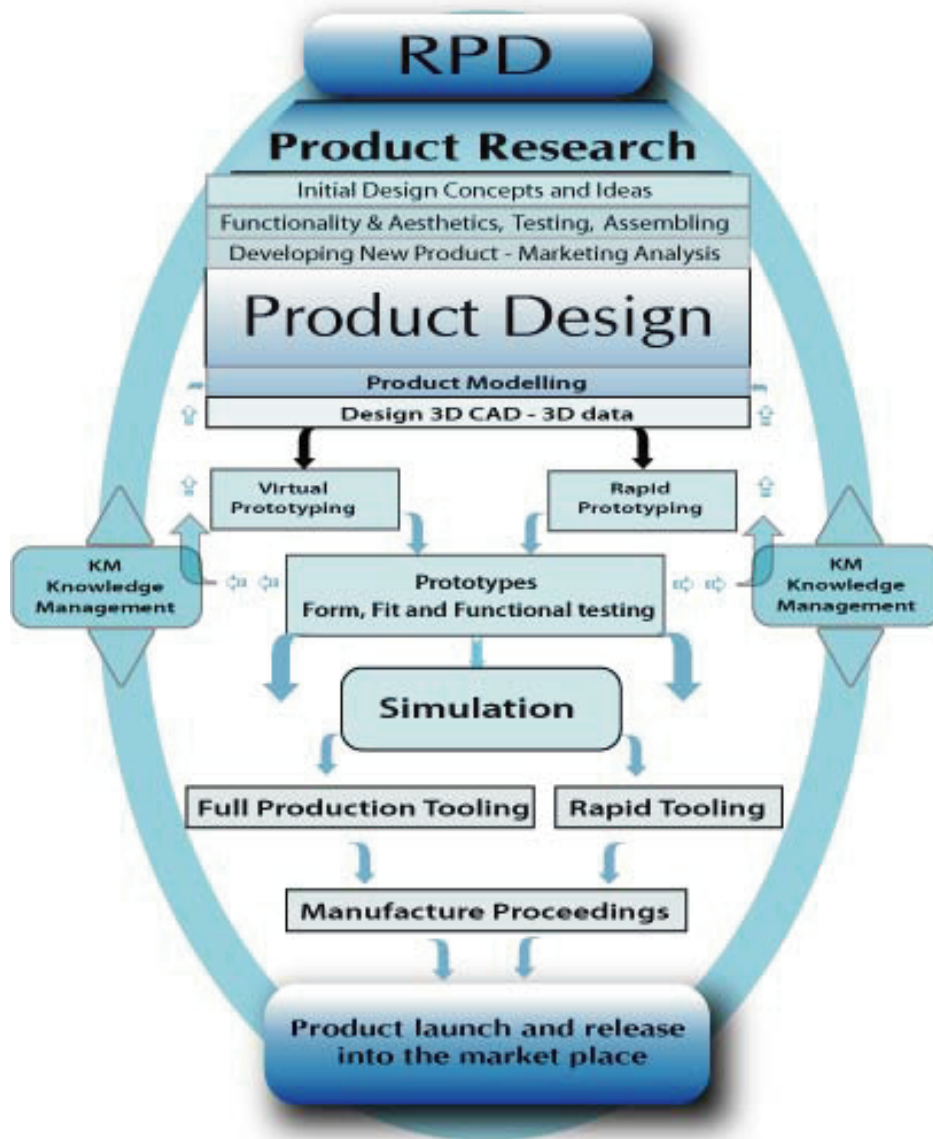


INTRODUCTION TO RAPID PRODUCT DEVELOPMENT (RPD)

SCHEMATIC REPRESENTATION FOR NEW INTERNATIONAL PRODUCTS DEVELOPMENT

The scheme below considers the product design concept, main outlines and shape were defined before real product design. Other suppositions are Industrial Subcontracting, assembling, packaging and storage subcontracting in every country involved in the distribution targets [35 countries considered].



INDUSTRIAL SUBCONTRACTING

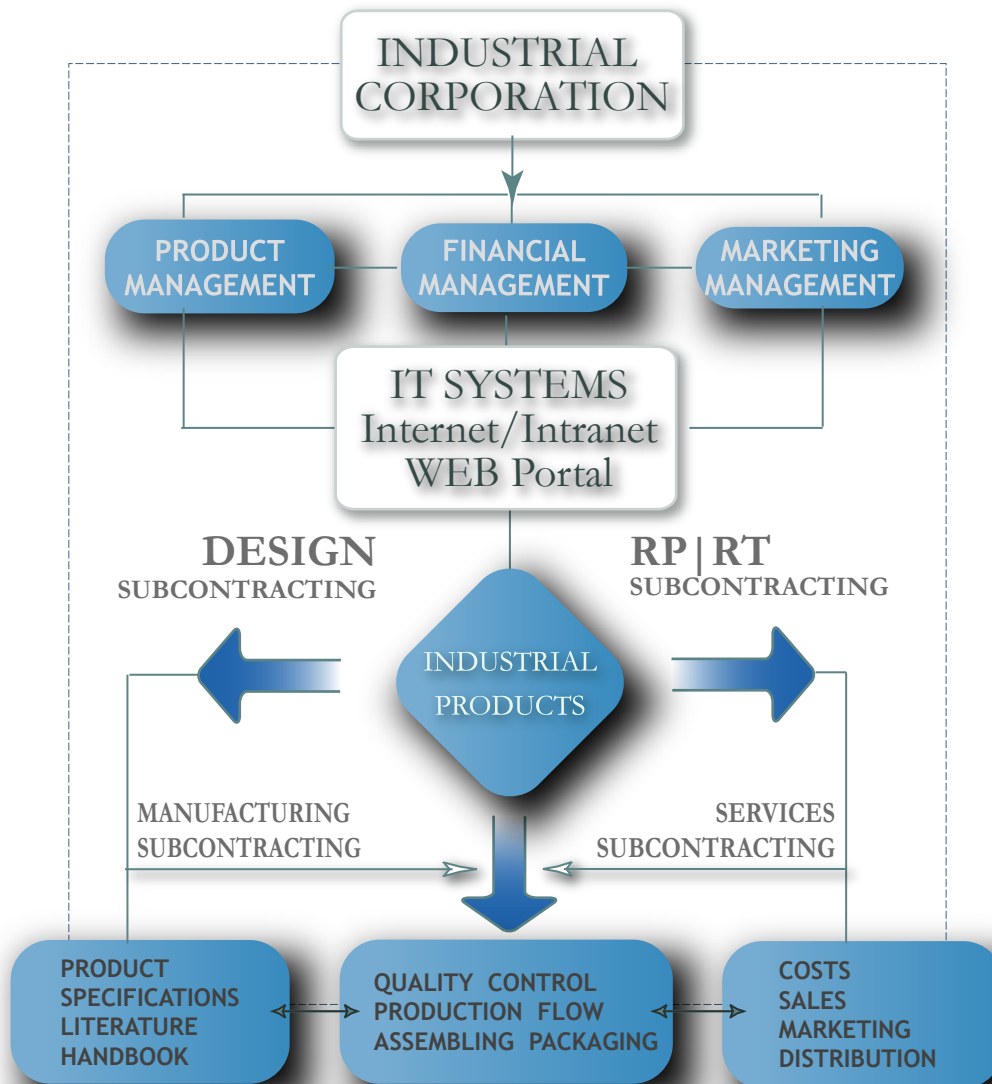
Rapid products development within an international market perspective, involves a strategic planning, quite facilitated with the advent of Internet high rate of data transmission.

The main barriers for the fast production and distribution of products and real time management of production and sales are removed.

Inside of this perspective, two new development axes project, distinguishing actions within international products development.

The first is the evolution of subcontracting as principal vector of the new industries, in reason that it optimizes the productive section, altering the industrial profile substantially. Industrial suppliers, services suppliers, third parties production, they can maintain high level of equipments occupation of and human resources, offering costs extremely inferior compared to the traditional industries.

The second is the establishment of the industry without own facilities, or meaning industries without own manufacture; creating this new vector the most recent model of the industrial sector. The industrial organization is rather in charge of the industrial development, and the intense research of process and methods, for solutions optimizing, canceling definitively the high cost of industrial facilities and production optimization.



Factors contributing to Speed & Accuracy on Rapid Product Development:

- a. Understanding the Industry's pre-requisites and requirements to realize the rapid prototyping and manufacturing evolution
- b. Select role and power of Rapid Prototyping or Virtual Prototyping for each product requirements
- c. Improving new developments in RP – Rapid Prototyping and RM – Rapid Manufacturing
- d. Managing CAD/CAM systems to enhance accuracy and efficiency.
- e. More extensive utilization of IT- Information Technology and KM- Knowledge Management to support product development
- f. Introduce simulation technologies into the Rapid Product development Technologies
- g. Abandoning slow, time consuming traditional product design processes by employing latest rapid prototyping and simulation solutions
- h. Redefining the ideal skill set for product design manager
- i. Defining, measuring and continually improving design investments
- j. Understanding and applying the latest product innovation strategies through Rapid Product Development technologies.

1.1 Product Design Planning

- a. Identify Market Opportunities
- b. Evaluate and Prioritise Projects
- c. Allocate Resources and Plan Timing
- d. Comprehensive Pre-project Planning

1.2 Product Requirements Identification

- a. Define the Product Requirements Scope
- b. Gather and Infer Data
- c. Management Requirements
- d. Establish Worth
- e. Permanent Development Improvement

1.3 Product Architecture*

- a. Translate and Realize Functional Requirements
- b. Determine Types of Product Architecture
- c. According to Impacts – Market and Environment

1.4 Product Specifications

- a. Establish Target Specifications
- b. Refine Specifications
- c. Functional Analysis

1.5 Design for Manufacturing

- a. Preliminary Project Estimates
- b. Factored Project Estimates
- c. Detailed Project Estimates
- d. Address Manufacturability Issues Early in the Design Cycle
- e. Identify Costly Aspects of Design
- f. Iterate Process to Improve Design and Reduce Costs

1.6 Concept Generation/Selection

- a. Concept Selection Matrix
- b. Rate and Rank Concepts
- c. Combine and Improve
- d. Select Best Concept
- e. Review the Process

1.7 Computer Aided Product Design

- a. Shape Design & Styling
- b. Product Design and Functional Evaluations and Manufacturing Planning
- c. Product Lifecycle Management
- d. Internet-facilitated Collaborative Product Design

1.8 Industrial Design

- a. Design Visualization and Communication Methods
- b. Form Design Basics
- c. Functional Analysis
- d. Ergonomics Principles

1.9 Prototyping and Modelling

- a. Determining Prototypes Functions
- b. Principles and Types of Prototypes According to product design
- c. According Prototyping Technologies
- d. Virtual Prototyping
- e. Modelling and Simulation

2.0 Tooling

-
- a. RT – Rapid Tooling
- b. Full Production Tooling

2.1 Product Development Economics

- a. Product Economics
- b. Cost and Schedule Variance Analyses and Reports
- c. Net Present Value
- d. Sensitivity and Trade-off
- e. Analysis for Development

2.2 Product Manufacturing

- a. Manufacturing Process
- b. Contractors and Suppliers Assessment and Recommendation
- c. Safety, Training, Operation and Equipment Manuals

2.3 Knowledge Management Applications

- a. Developing KM applications
- b. Using the proceedings applied in the product development and introduction of a Rapid Product Development – KM System

RAPID PRODUCT DEVELOPMENT (RPD)

RPD Objective Procedures & Strategies

The tools for effectively and efficiently decode requirements from users or market to evolve new or enhance existing products in a globally competitive environment, involves the product design and development process with considerations for multi-disciplinary and collaborative design, as well as the adoption of information and communication and processing technologies for design, simulating, prototyping and manufacturing.

RPD Structure - Phases involve identification of market opportunity, key concepts, methodologies for detail design and prototype making. Techniques and Tools to Facilitate and Shorten Product Design and Development; Emerging Trends according:

□ Product Design Planning:

- 1. Identify Market Opportunities
- 2. Evaluate and Prioritise Projects
- 3. Allocate Resources and Plan Timing
- 4. Comprehensive Pre-project Planning

➔ See the next pages subcontracting strategies for International Rapid Product Development

INDUSTRIAL SUBCONTRACTING

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The inventive process induces to the research of several suppliers, avoiding the production bottleneck in any of the components and varying suppliers when obtaining better suppliers strategies.

A reduced team can develop and to administer the whole section of products and production, and suppliers of external service completes the picture of necessary specialties. With this all the indexes variables involved in products seasonality and productivity are reduced to a condition practically minimal in the corporation's profile.

This reality is being incorporate the last fifteen years, by most of the largest world industrial groups like Nike, Adidas, HP, main clothes brands, etc.

The subcontracting is well regulated, and sustains effective ethics principles, processing formalities and specific contracting forms and guarantees normalized.

From the **Industrial investor's** point of view the resources are extensive, the risks reduced, and the investment profitability surpasses largely the previous indexes in multiple times, overcoming the commerce business profits for the first time in the industrialization history.

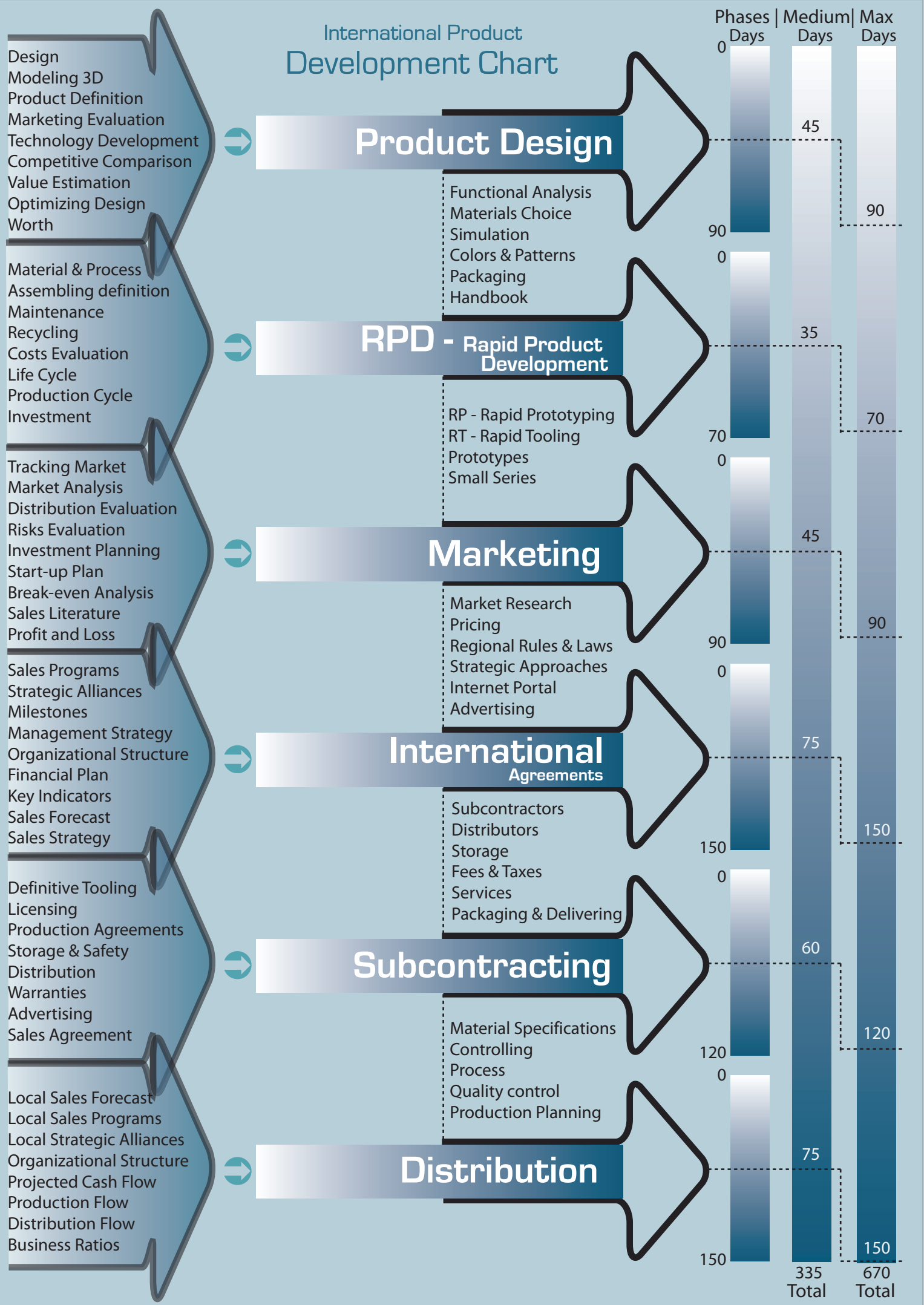
➔ See the next pages Schema for International - Rapid Product Development

SCHEMATIC REPRESENTATION FOR NEW INTERNATIONAL PRODUCTS DEVELOPMENT

The scheme in the next page considers the product design concept, main outlines and shape were defined before real product design.

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International Product Development Chart



Design
Modeling 3D
Product Definition
Marketing Evaluation
Technology Development
Competitive Comparison
Value Estimation
Optimizing Design
Worth

Product Design

Functional Analysis
Materials Choice
Simulation
Colors & Patterns
Packaging
Handbook

Material & Process
Assembling definition
Maintenance
Recycling
Costs Evaluation
Life Cycle
Production Cycle
Investment

RPD - Rapid Product Development

RP - Rapid Prototyping
RT - Rapid Tooling
Prototypes
Small Series

Tracking Market
Market Analysis
Distribution Evaluation
Risks Evaluation
Investment Planning
Start-up Plan
Break-even Analysis
Sales Literature
Profit and Loss

Marketing

Market Research
Pricing
Regional Rules & Laws
Strategic Approaches
Internet Portal
Advertising

Sales Programs
Strategic Alliances
Milestones
Management Strategy
Organizational Structure
Financial Plan
Key Indicators
Sales Forecast
Sales Strategy

International Agreements

Subcontractors
Distributors
Storage
Fees & Taxes
Services
Packaging & Delivering

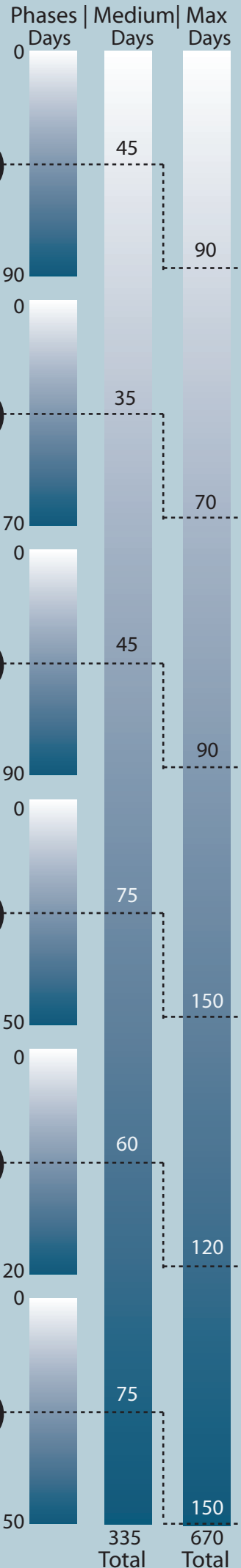
Definitive Tooling
Licensing
Production Agreements
Storage & Safety
Distribution
Warranties
Advertising
Sales Agreement

Subcontracting

Material Specifications
Controlling
Process
Quality control
Production Planning

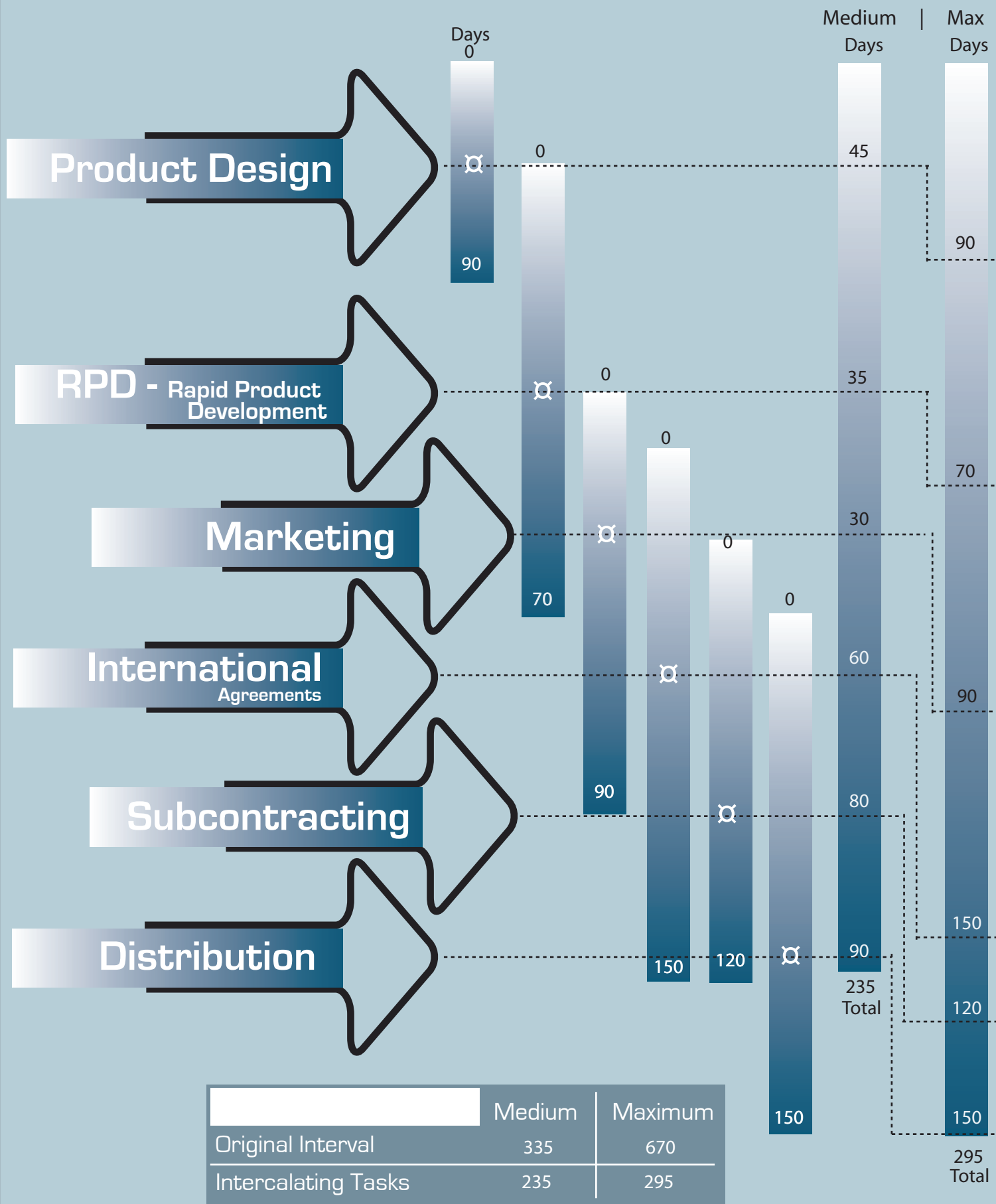
Local Sales Forecast
Local Sales Programs
Local Strategic Alliances
Organizational Structure
Projected Cash Flow
Production Flow
Distribution Flow
Business Ratios

Distribution



International Product Development Chart

Optimizing Tasks



OPTIMIZING

The optimization represented in before page incorporates the accomplishment of multiple integrated tasks, or meaning, starting from the instant where the information are available from the product design process, dependent tasks are simultaneously established.

This procedure is indeed possible whereby the staff organization is established and within organized systems in a WEB portal tool that allows available internally information (Intranet) and externally (through Internet) surely operating in collaborative international project with the services subcontractors and suppliers.

The proposed procedures, times & methods are pragmatic, obtained from the study of several organizations and projects development, from large multinational to SME companies.

CONCLUSION

Due to the requirement of improving products quality and the pressing time constraints, the essential evaluation of all feasible design alternatives with lowest cost and time is required actually for a sustainable product development.

Computer aided design; manufacturing and analysis technologies provide a valuable resource tool for the innovative design. Recent advances in technologies like reverse and concurrent engineering, rapid prototyping, virtual prototyping, simulation and rapid tooling are progressively improving fast, inexpensive practices to create parts directly from computer aided design models. The promising way allowed by these technologies are giving outstanding significance to the engineering process and the impact will be revolutionary for the worldwide industries.

The experience of the experts in this area are encouraging to introduce these technologies as part of engineering modern technologies & associated equipments as well as software for Rapid Product Development in large-scale industries like automobile, aerospace, research institution like defence, space and small-scale industries and other application fields like biomedical, art and archaeology.

Traditional manufacturers need to learn and have a platform and ways to incorporate rapid prototyping technologies in the business. The manufacturers need to understand that rapid product development is definitively become established and adopt its related technologies rapidly.