VPE/CTO 

Product Development Excellence

Driving Ideas into Products

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Introducing PRTM

PRTM — Leading thinking for lasting results

PRTM is the leading management consulting firm to technology-intensive businesses

PRTM was founded in 1976 with a unique focus — "Results, Not Reports"

Experience and Innovation

More than 1,200 clients

- Over 6,000 successful projects

Thought leadership and innovation

- Product And Cycle-time Excellence® (PACE®)
- Strategic IT Management (SITM)
- Supply-Chain Operations Reference-model (SCOR)
- Customer Management

Staff Depth

Over 500 consultants

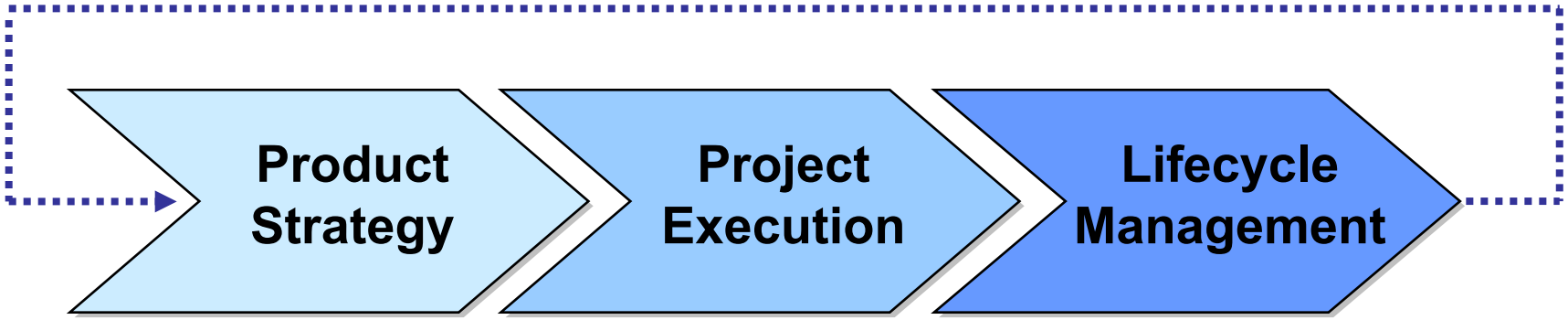
- Technical backgrounds and MBAs from top schools
- Practical industry experience
- Low director to consultant ratio

Industry Expertise

Financial and Information Services, Software, Communications, Consumer Products, Electronics, Aerospace and Defense, Automotive, Chemicals, Medical Devices, Pharmaceuticals, Semiconductors

Overview of PACE®

Effective product development requires attention to three areas



Agility and Leverage	*Speed and Quality*	*Profitability and Growth*
• Market anticipation	• Customer-inspired development	• Effective customer feedback
• Platform leverage	• Rapid time-to-market	• Efficient product transitions
• Technology readiness	• Minimal waste	• Well-managed end-of-life
• Capability readiness	• Operational readiness	• Loyal customer base
• Balanced investment timing, risk, and mix	• Resource alignment	• Rapid time-to-profitability • Cost-effective operations

Using the PACE® model, we have identified 10 different levers to improve Innovation Productivity

Innovation Productivity =

A. Innovation Output
The quantity and value of new products and services released to the market over a particular period of time

B. Innovation Input
The total investment in capital and resources required to create and launch new products and services over a particular period of time

Innovation Productivity Levers

1. Co-Development and Partner Leverage 
2. Platform and Architecture Leverage 
3. Portfolio and Product-Line Management Leverage 
4. Ideation and Idea Management Leverage 
5. Technology and IP Leverage 
6. Resource Management and Scheduling Leverage 
7. Information and Automation Leverage 
8. Knowledge and Process Leverage 
9. Organizational Leverage 
10. Customer and Channel Leverage 

All levers can positively impact both the top line (A) and the bottom line (B)

How do the 10 different levers for Innovation Productivity help to address your concerns?





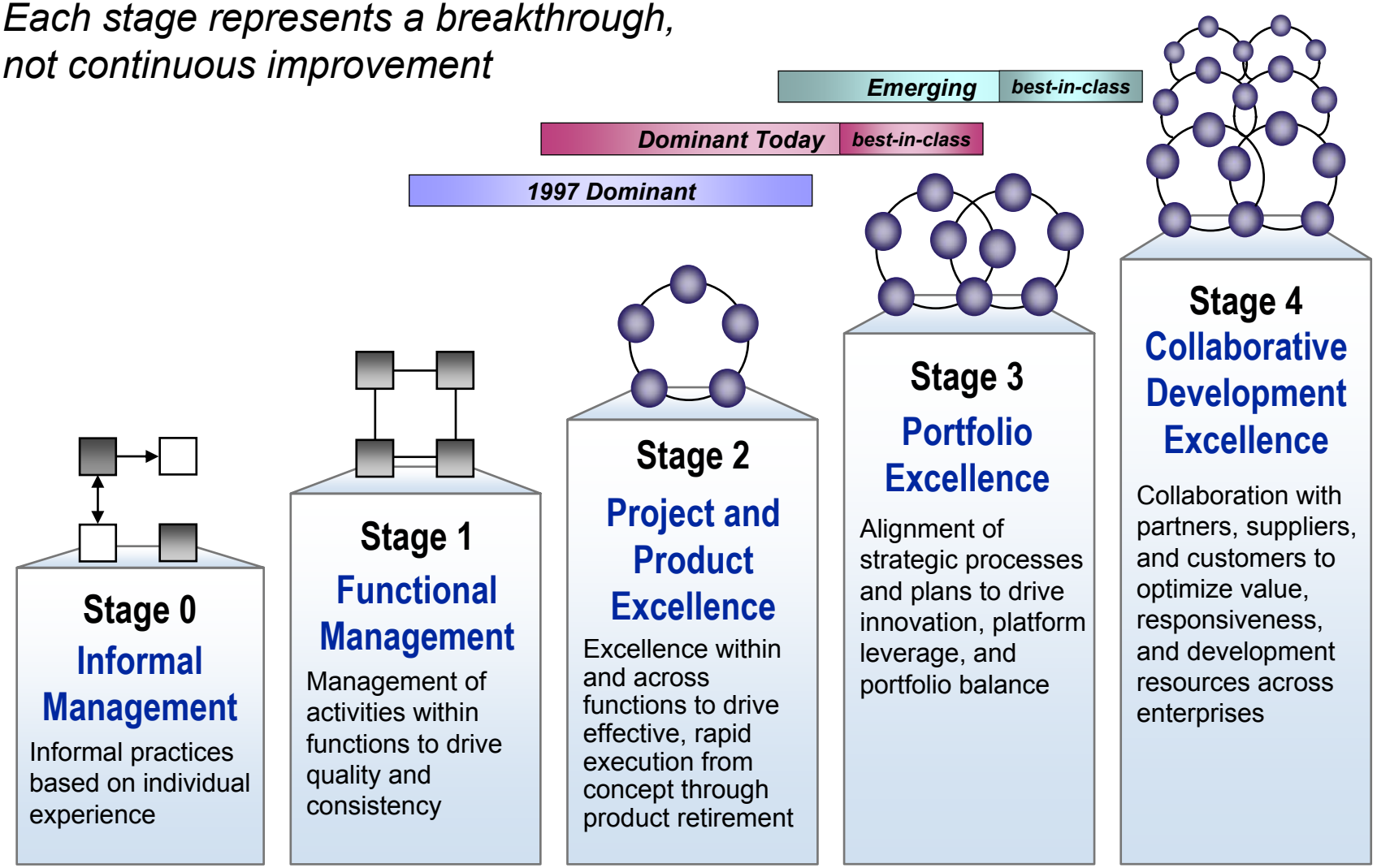




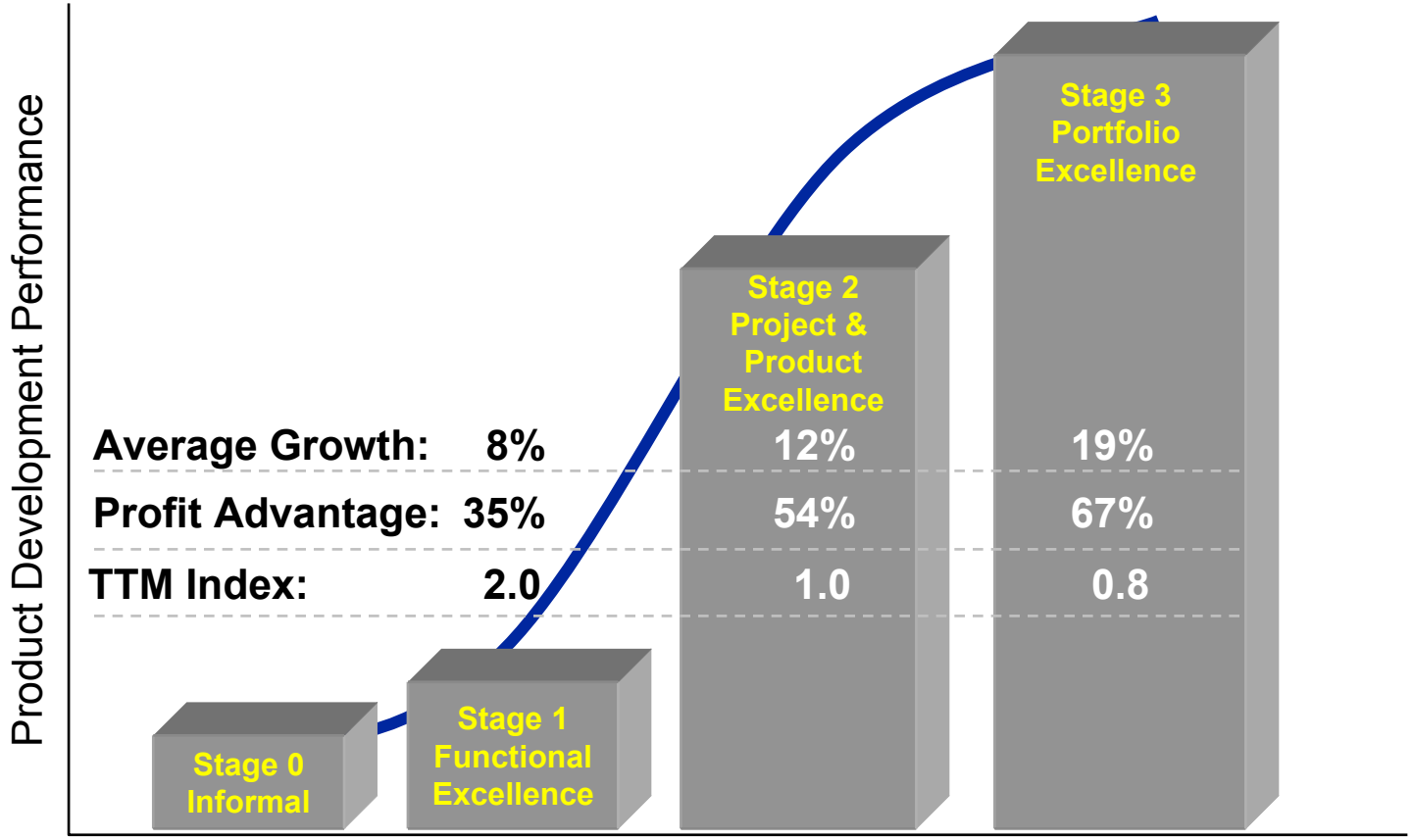

Top Innovation Productivity Concerns for Executive Teams	Co-Development and Partner Leverage	Platform and Architecture Leverage	Portfolio and Product-Line Mgt Leverage	Ideation and Idea Management Leverage	Technology and IP Leverage	Resource Mgt and Scheduling Leverage	Information and Automation Leverage	Knowledge and Process Leverage	Organizational Leverage	Customer and Channel Leverage
How do I ensure greater success for our products/services?				✓						✓
How do I optimize the return on my development assets?		✓				✓	✓	✓	✓	
How do I balance my investments in new products to best support our company strategy?		✓	✓							
How do I acquire and retain leading-edge innovation capabilities?	✓				✓				✓	

Companies progress through distinct stages of process capability

Each stage represents a breakthrough, not continuous improvement



Increased maturity drives performance



Stage 3 companies grow 50% faster than Stage 2 companies, and Stage 1 companies lag far behind

Industry Segments: Aerospace and Defense, Chemicals and Applied Materials, Computers, Telecommunications Equipment, Electronic Equipment, Business Software, Medical Devices and Equipment, and Semiconductors

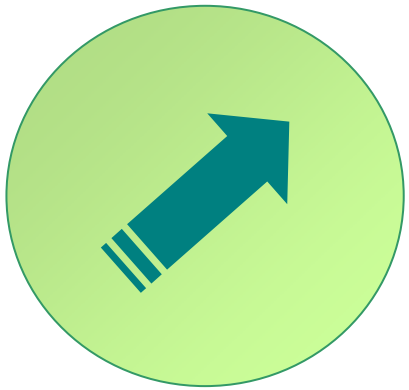
Source: The Performance Measurement Group, LLC (a PRTM company)

Introduction to Innovation Management

Successful business innovation requires more than just good ideas

The goal is to provide customers with novel business value, which brings the opportunities for growth and profit

Leadership



Discovering the customer

Setting the context

Providing direction

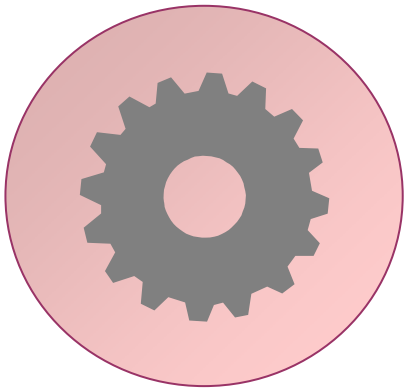
Intuition

Creating novel insights

Enabling ideation

Comprehending value

Execution

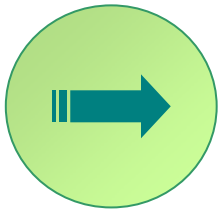


Delighting customers

Winning markets

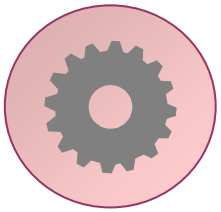
Driving growth and profit

Innovation strategy guides and catalyzes how we uncover novel business value



- Who is the real customer?
- Where should we look for opportunities?
- What forms of innovation do we invest in?
- How should we be positioned on sustaining innovation and disruptions?

- How do we build great intuition about the customer?
- How do we best engage our collective creativity?
- How do we know what concepts are truly promising?



- What capabilities do we need to complement our innovation goals and win?
- What mechanisms can we employ to take advantage of innovation?
- How will we build a business around an innovation?

What Enablers do we need?

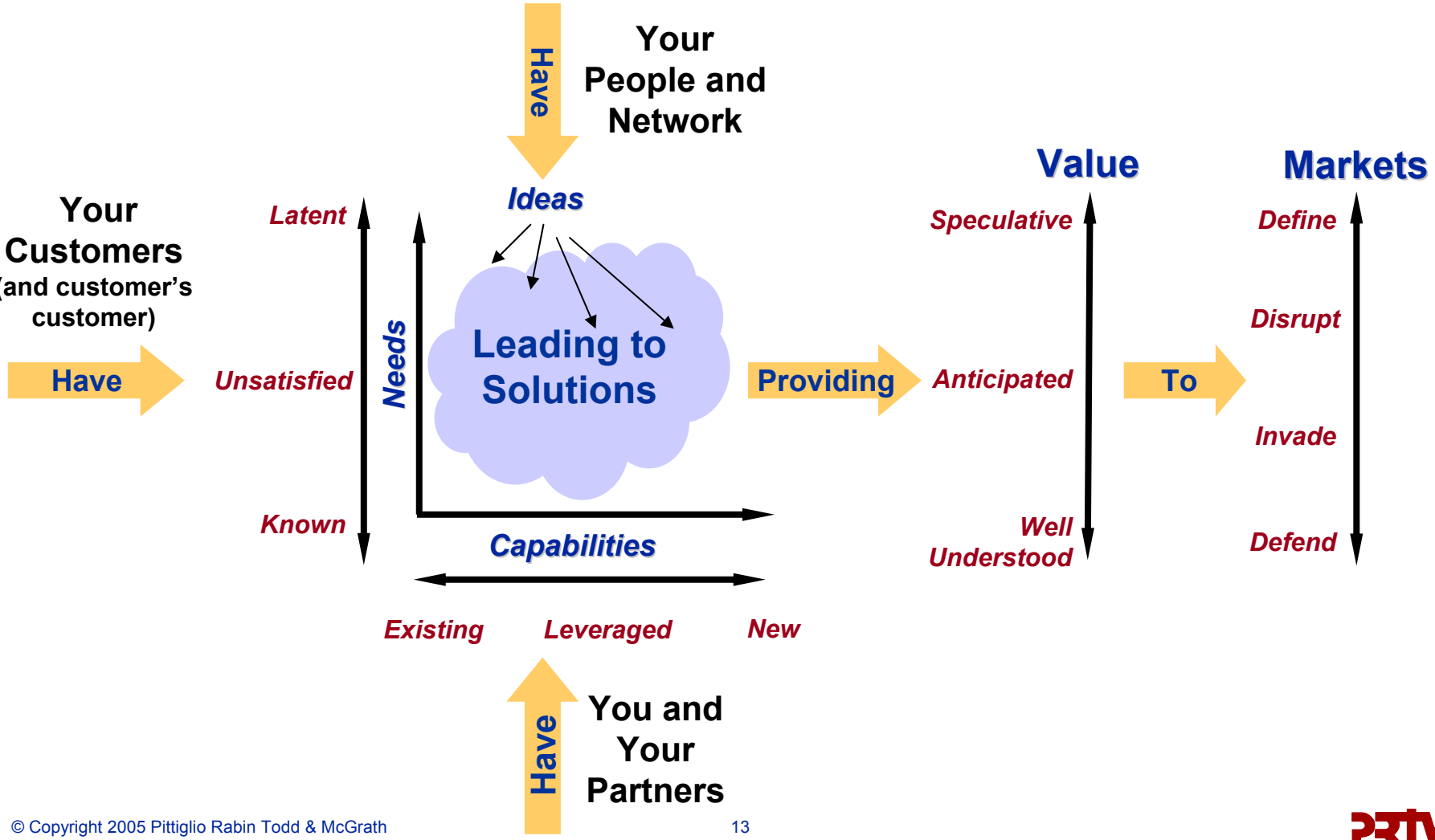
- Organizational linkages
- Incentives and rewards

- Mentoring and coaching
- Skill development

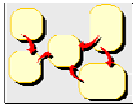
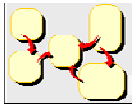
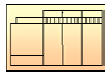
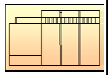
- IP asset management
- Systems and tools

Uncovering novel business value starts with an understanding of a company's ecosystem

There needs to be a match among customers needs, company capabilities, the expected value, and the expected market impact

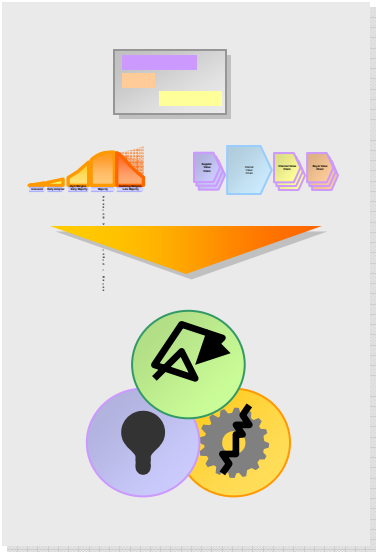


Voice-of-the-customer feedback is continuously collected to improve probability of market success

Steps / Situation	Plan	Visit	Understand Context	Translate Voices	Customer Requirements Insight	Generate Metrics	Survey	Create Solutions	Screen	Test Concept	Select	Outcome
	Plan											
Major New Product or Platform	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	***Innovative, perhaps break-through***
Derivative	✓	✓		✓	✓			✓		✓	✓	***Customer-delighting extension***
Narrow Solution	✓	✓		✓	✓	✓		✓		✓	✓	***On-target solution***
Continuous Improvement of Existing Product	✓	*Input from sales and service*		✓				✓			✓	***Customer-inspired improve-ments***

Choose the set of capabilities and imbed them into your business

Assess Context and Needs → **Define Innovation Levers** → **Apply Levers to PD Framework** → **Facilitate Org Change**



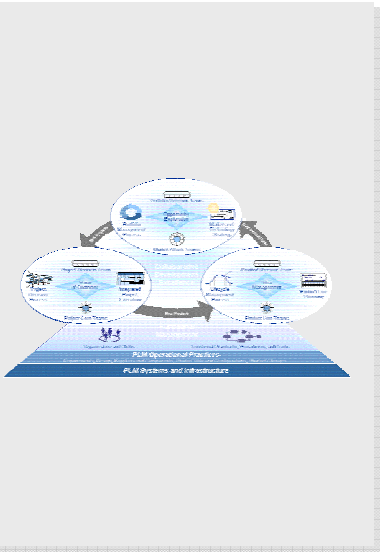
Understand basic innovation problem

- Strategy
- Ideation
- Execution

Define the gaps and opportunities for innovation

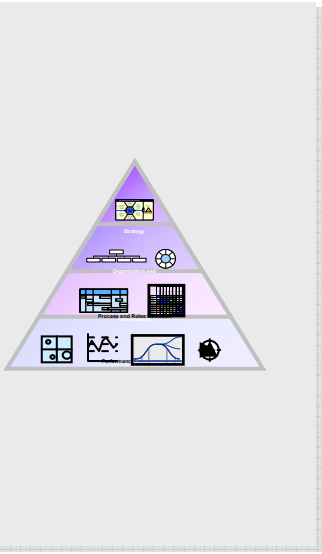
Scope and prioritize areas for change and areas for ideation

- Strategic focus
- New ideas
- Improved capabilities
- Enabling culture and structure



Verify/refine the robustness of the product development management framework

Implement new ideas through the PD framework

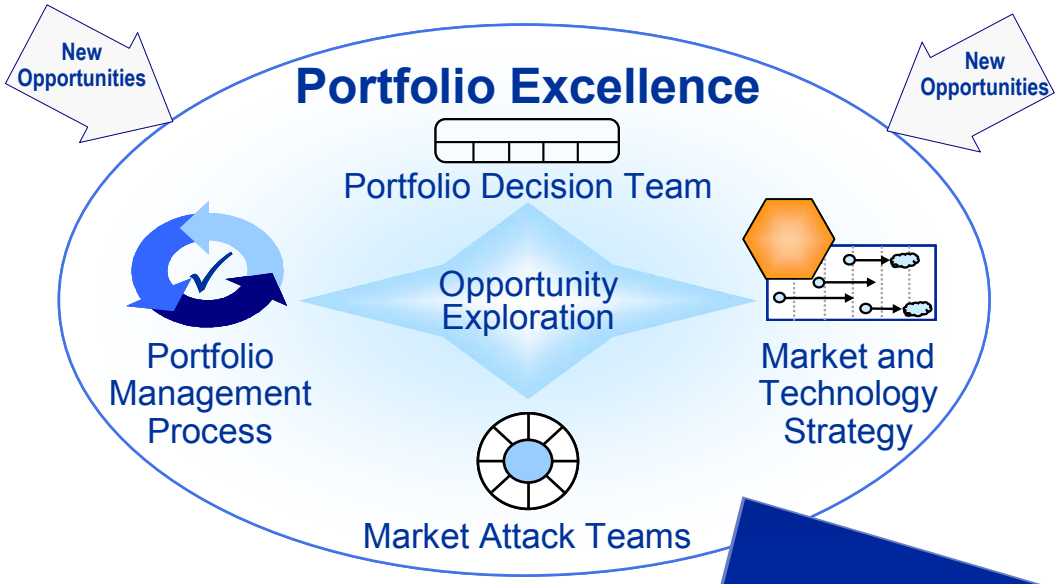


Facilitate change, new perspectives, and direction

Collaborate on new strategies, ideas, and concept development

Define new capabilities and structure

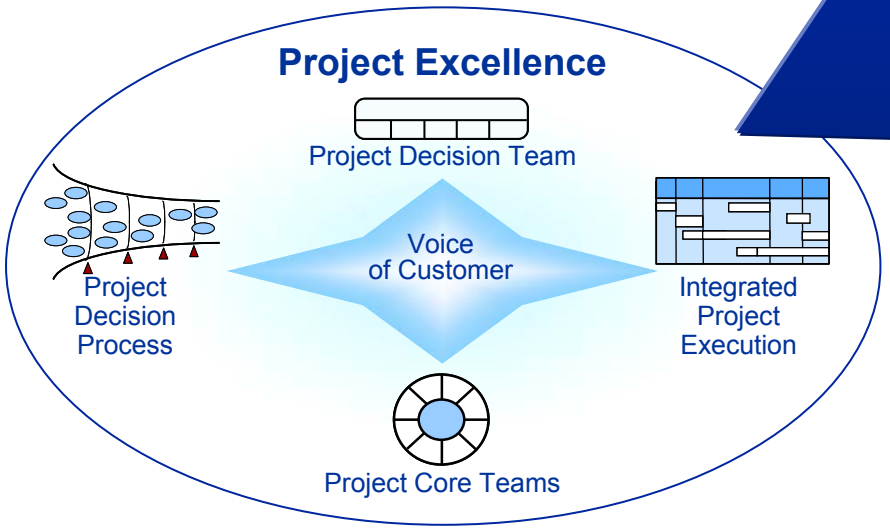
What are the key *strategic practices* for managing product innovation?



STRATEGIC PRACTICES

- Market Strategy
- Technology Strategy
- IP Strategy and Management
- Discovery of New Opportunities
- Technology Scanning
- Portfolio Planning
- Market Attack Planning
- Portfolio Management
- Platform Planning
- Strategic Market Research and VoC
- Innovation Governance
- Innovation Metrics

What are the key *tactical practices* for managing product innovation?



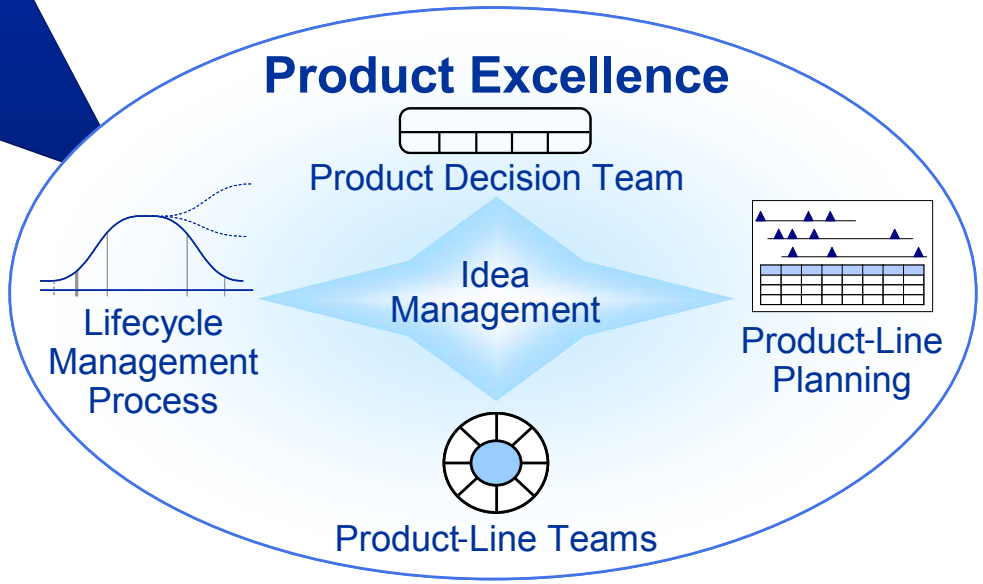
TACTICAL PRACTICES

- Culture of Innovation
- "Targeted" Voice of the Customer
- Requirements Development and Management
- Idea Generation and Concept Development
- Concept Screening
- Proactively-Managed Product Development
- Project Decision Process
- Efficient Product Development
- Cross-Functional Collaboration
- Recognition and Rewards

What are the key *sustaining practices* for managing product innovation?

SUSTAINING PRACTICES

- "Routine" Voice of the Customer
- Idea Capture and Management
- Idea Screening
- Lifecycle Management
- Product-Line Planning
- Innovation in Customer Lifecycle Management
- Innovation in Service and Support
- Innovation in Channels and Distribution

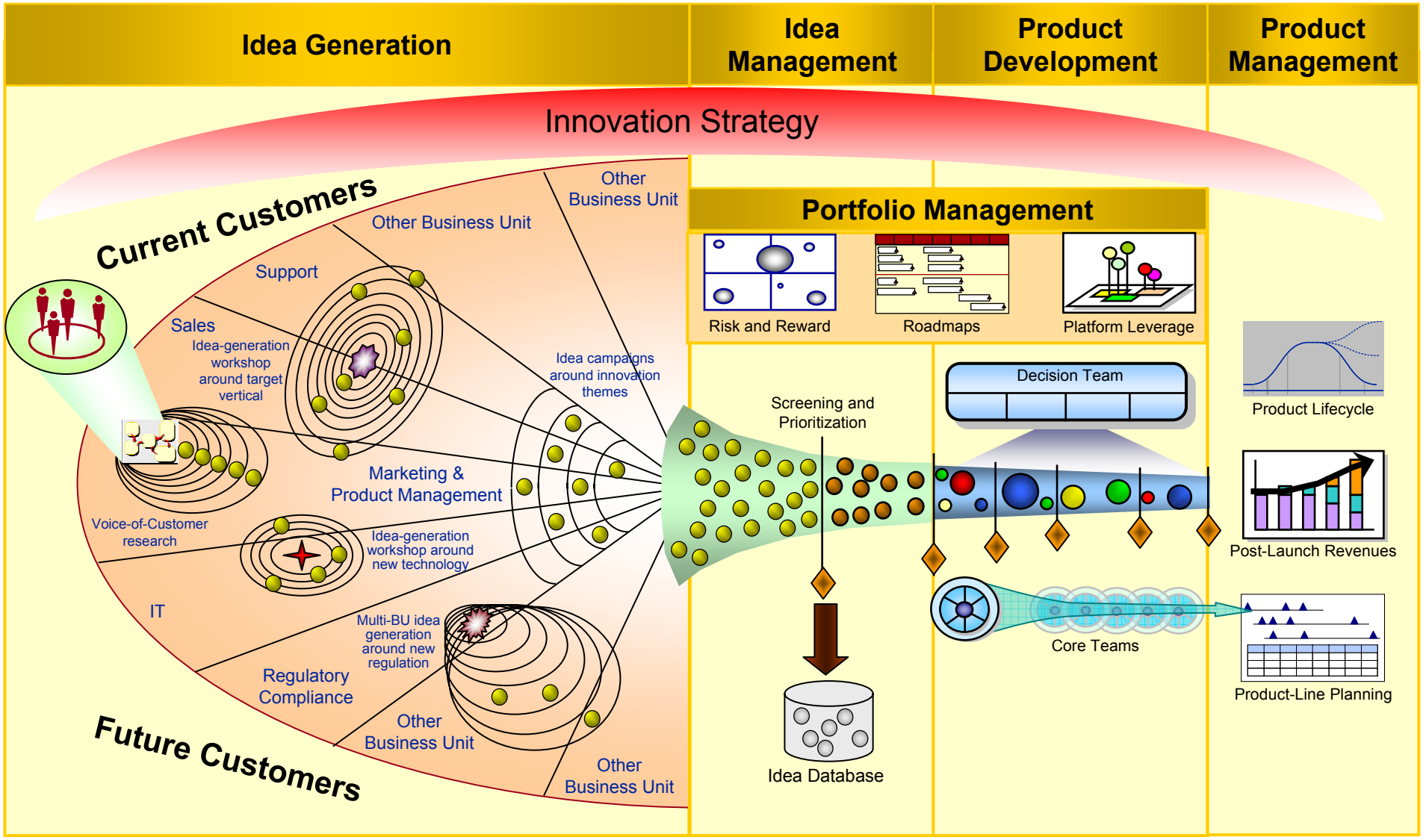


What are the key *enabling practices* for managing product innovation?

ENABLING PRACTICES

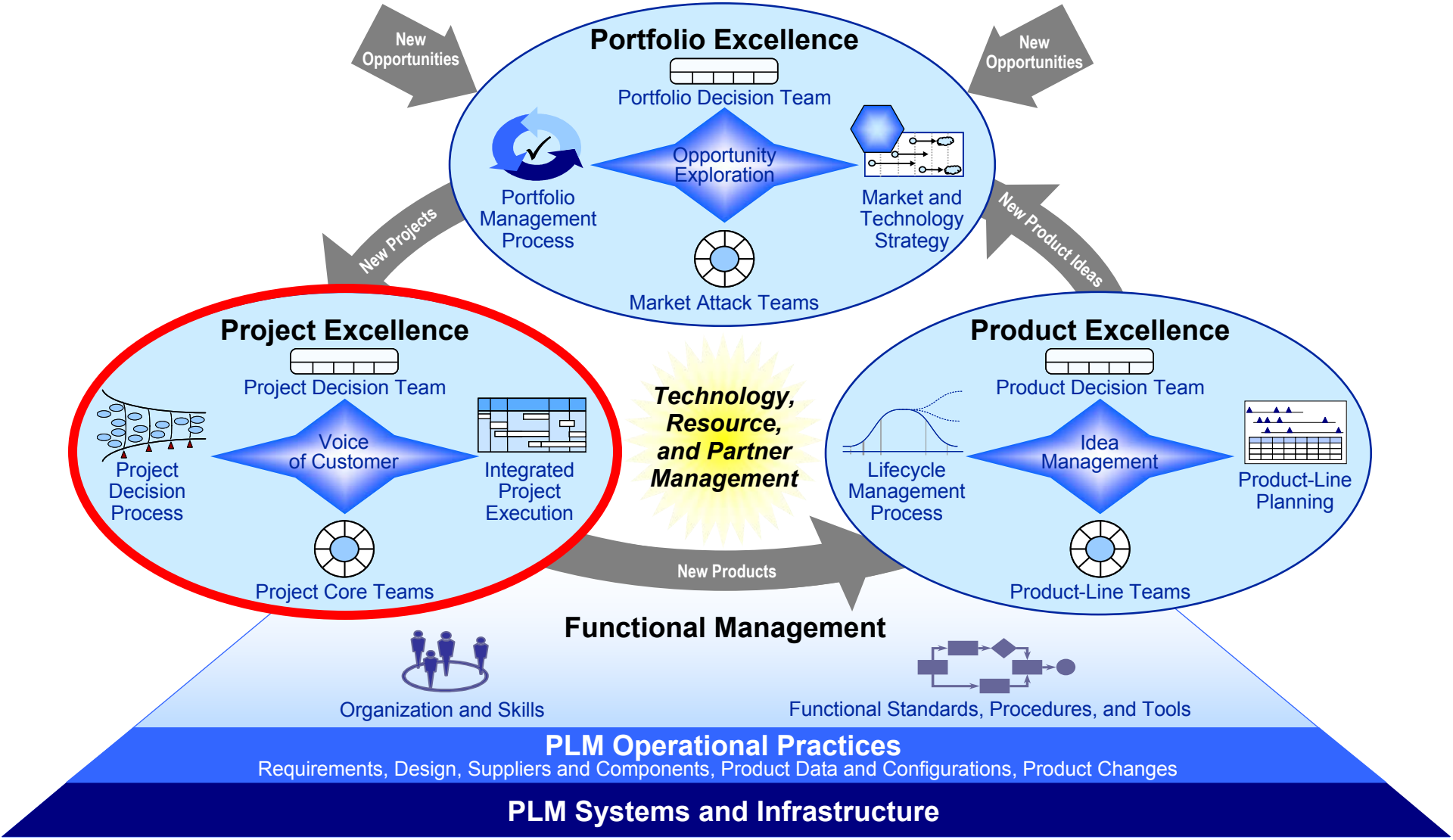
- Technology Development
- Collaborative Development
- Licensing
- Acquisitions

Example of an “innovation blueprint”

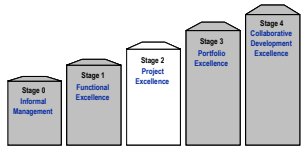


Introduction to PACE®

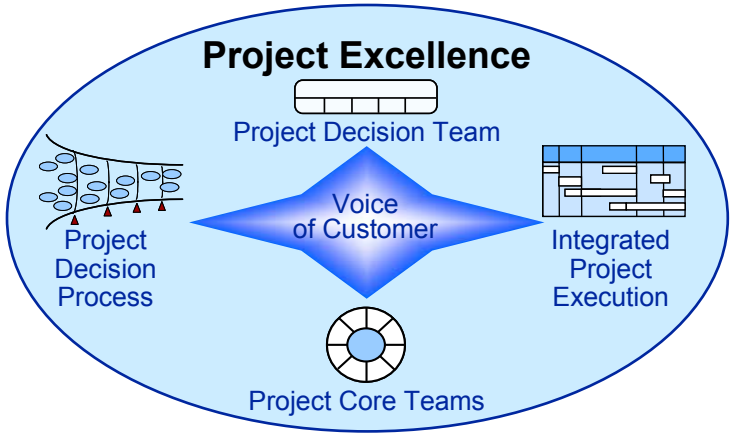
PACE® is a comprehensive PLM reference model for driving innovation and development productivity



Stage 2: Companies achieve Project Excellence and benefit from speed and quality

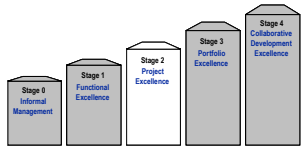


Project Excellence

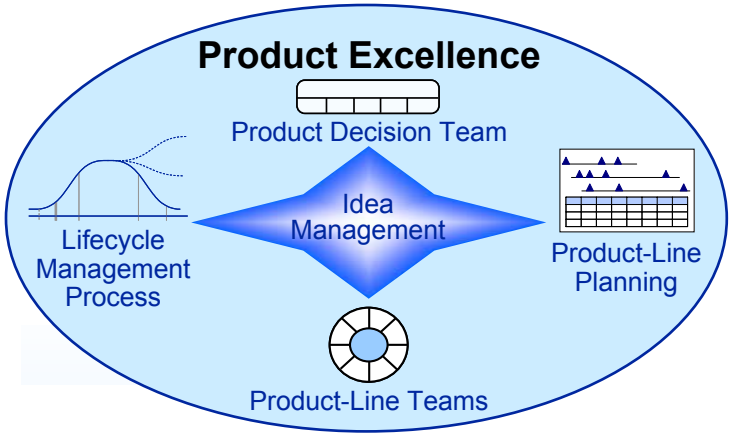


- Empowered, cross-functional Core Teams drive projects from concept to market launch
- A structured development process provides an efficient, flexible, and customer-centered guide for managing projects
- Cross-functional decision teams ensure alignment with business priorities
- Crisp, business-based decisions are made early in the lifecycle of each project
- Voice-of-the-customer feedback is continuously collected to improve probability of market success

Stage 2: Companies achieve Product Excellence and benefit from profitability and growth

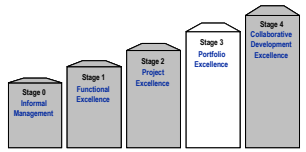


Product Excellence

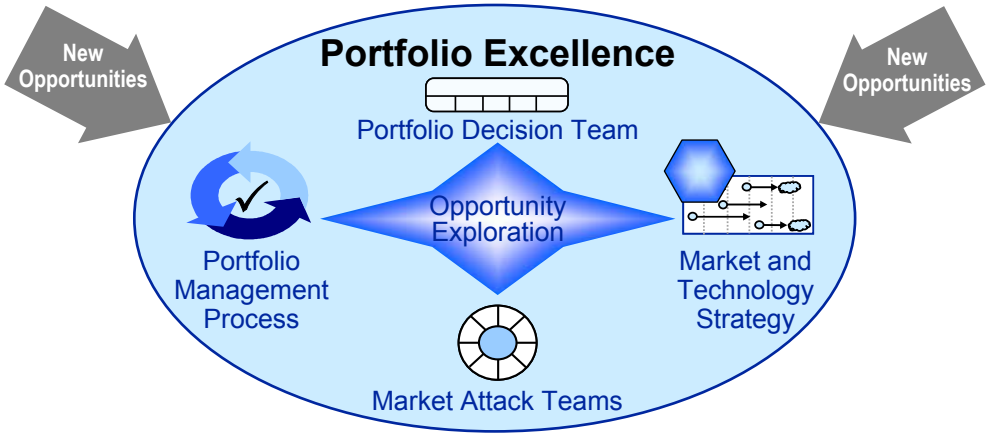


- Small product-line teams manage multiple products within each product line
- Product-line plans include multiyear roadmaps and anticipate future market demands and requirements
- Product lifecycles are continuously monitored to apply the most appropriate innovation lever to each lifecycle stage
- Decision teams approve product-line plans while ensuring product rationalization decisions and timely EOL decisions
- Idea management mechanisms capture product enhancement ideas from multiple sources

Stage 3: Companies achieve Portfolio Excellence and benefit from agility and leverage

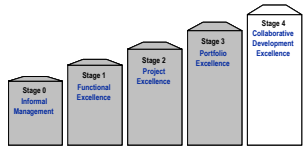


Portfolio Excellence

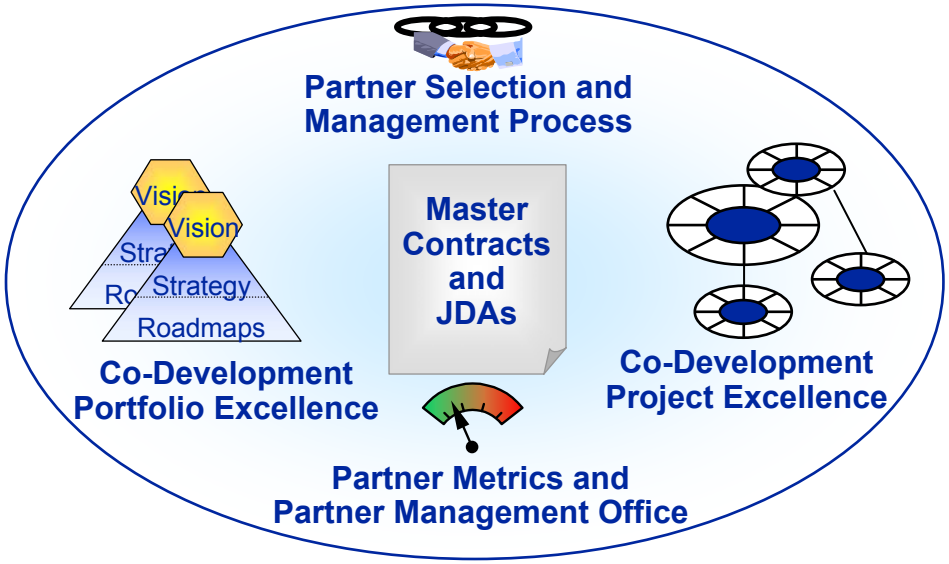


- A product strategy process feeds the development pipeline and links vision to executable roadmaps
- Market attack teams provide a focal point for new idea generation and screening around selected target markets
- Portfolio decision teams provide oversight to market attack teams ensuring consistency with market and technology strategy
- Portfolio decision cycle enables regular portfolio balancing and clear project selection and priority-setting
- Opportunity exploration is systematic and proactive, targeted towards breakthrough innovation

Stage 4: Companies achieve Co-Dev Excellence and benefit from cross-enterprise collaboration



Collaborative Development Excellence



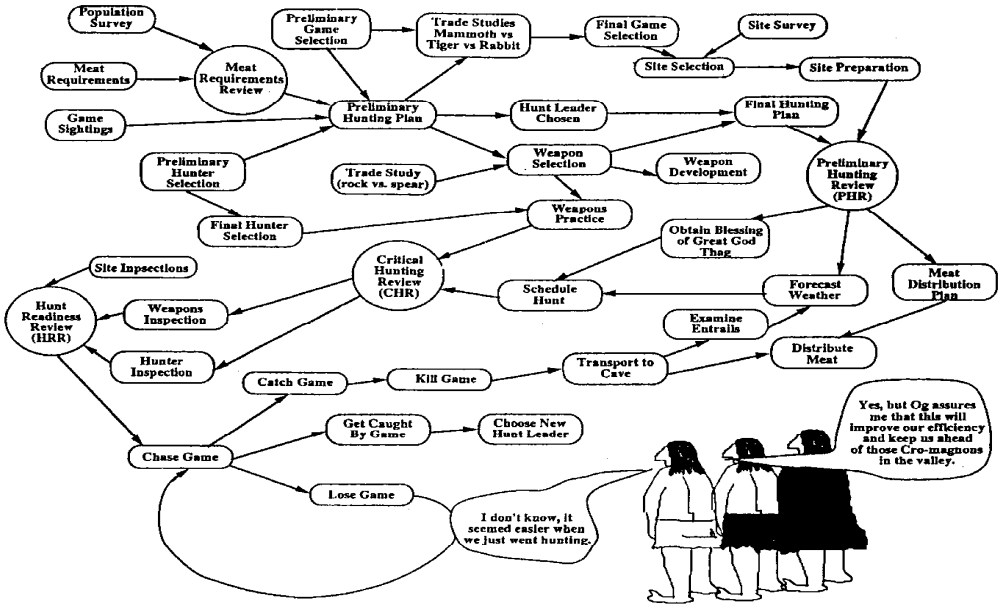
- The development chain is configured to leverage core competencies and maximize R&D throughput by utilizing the capabilities of development partners
- Sourcing decisions optimize investments and help drive innovation
- Joint development agreements (JDAs) supplement legal contracts
- There is a process in place for selecting development partners and initiating productive relationships
- Linkages with development partners are clear and there are tactical processes to enable smooth interactions and objective evaluation of progress

Stage 2: Project Excellence

Unstructured versus too structured

"And so you just threw everything together?...Mathews, a posse is something you have to *organize*."

Source: Larson



• Why the Neanderthals Became Extinct •

Source: Unknown

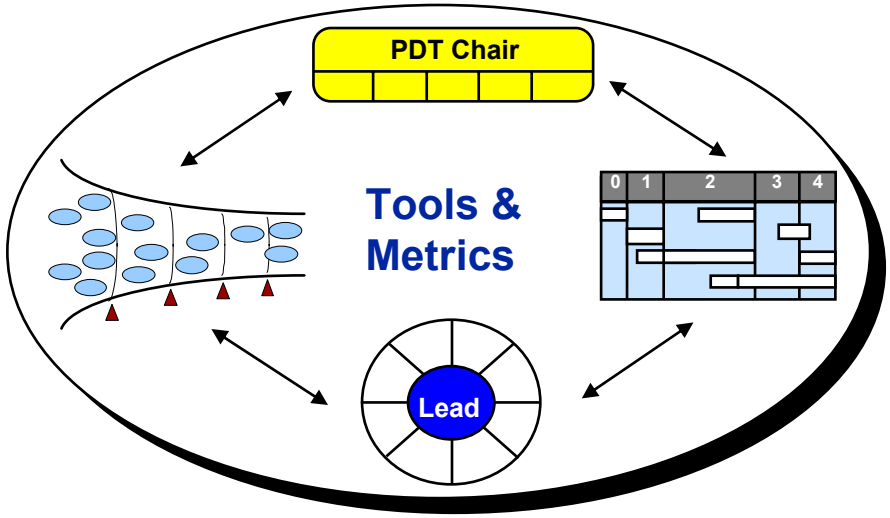
Stage 2: Companies apply a balanced, best practice system for achieving Project Excellence

Project Decision Team

- Clearly defined decision makers
- Effective resource allocation
- Management of the development “pipeline”

Decision-Making Process

- Event-driven
- Business perspective
- Contract for next phase



Structured Development Process

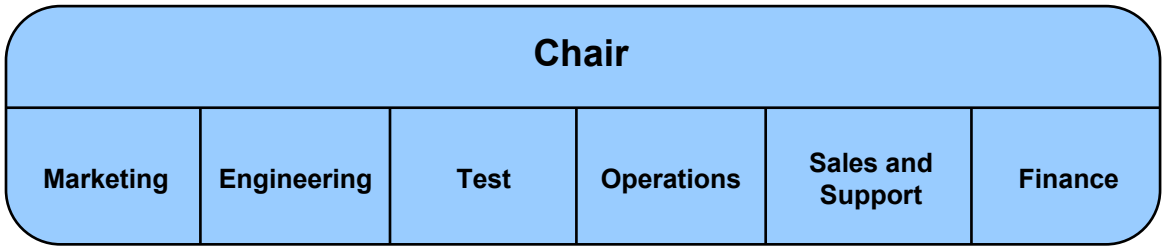
- Roadmap for projects
- Consistent terminology
- Interfunctional linkages

Core Teams

- Small, cross-functional teams representing entire project
- Effective communication and coordination
- Project focus with clear responsibility and authority

The Project Decision Team ensures alignment with business priorities

Senior managers with the authority to approve projects and assign resources



Sets direction and commits resources

- Reviews and approves product roadmaps
- Makes proceed, cancel, or redirect decisions at the conclusion of each phase
- Assigns resources to projects

Establishes and manages priorities

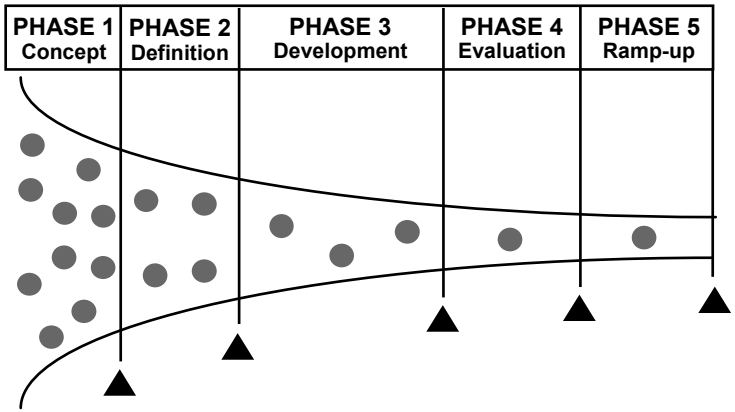
- Balances resources across projects
- Authorizes startup of new projects
- Ensures consistency between strategy and projects in the pipeline

Assures that projects are well planned and on track

- Establishes a contract with each team for the next phase of development
- Reassesses projects that have reached a predefined boundary

Crisp, business-focused Phase Reviews enable explicit management decisions at specific points

Event-driven evaluation of projects from a business perspective



Provide a mechanism for making a *business* decision on each project

- Define standard, measurable checkpoints
- Establish contracts that define next-phase targets, as well as boundaries for conducting an interim review
- Ensure forward-looking focus on business viability

Allocate resources to approved projects

- Provide resources consistent with business priorities
- Help maintain capacity-demand balance across the pipeline of projects

Empower Core Teams and foster a sense of urgency

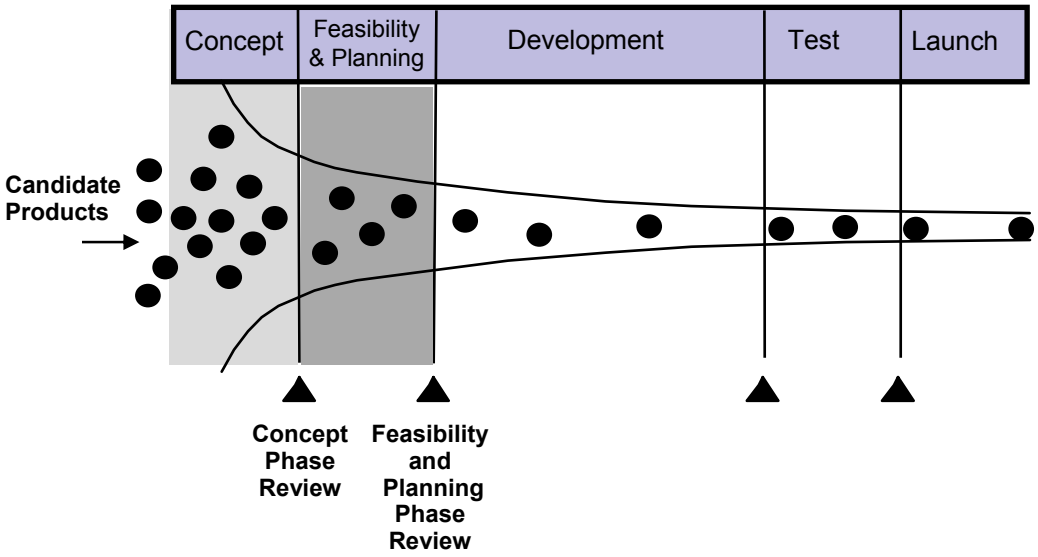
The right decisions early on reduce development waste and accelerate time-to-market

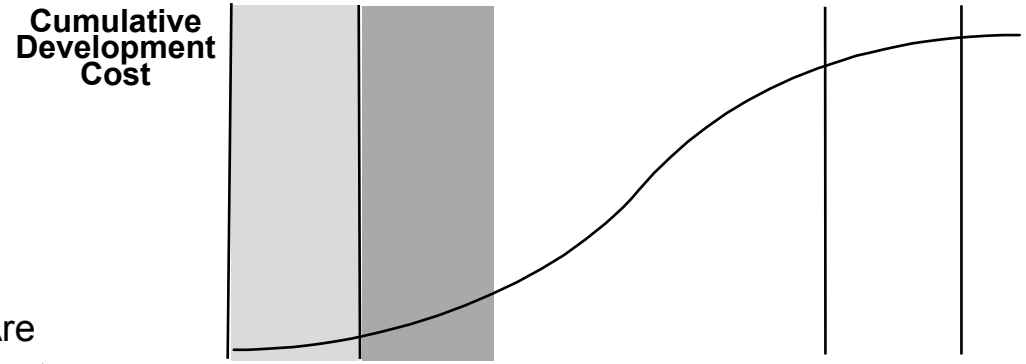
Concept Phase Review

- Understand initial product concepts and market potential
- Evaluate preliminary product plan and strategic fit
- Determine who will be on the Core Team
- Ask: "Should this product move on to detailed definition and planning?"

Feasibility and Planning Phase Review

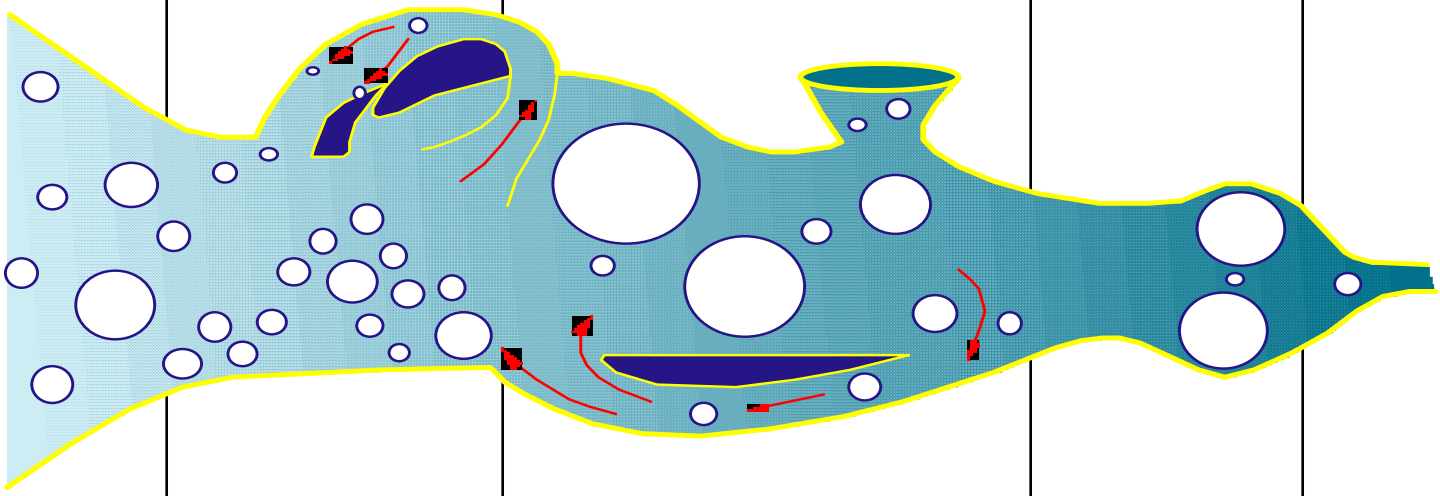
- Define product clearly
- Assess technical and operational feasibility
- Rigorously review the business case
- Ask: "Is this a good investment?"; "Are risks understood?"; "Is the development plan achievable?"





Ineffective Phase Review decision making increases product development cycle times

Phase 1 Concept	Phase 2 Feasibility & Planning	Phase 3 Development	Phase 4 Test	Phase 5 Launch

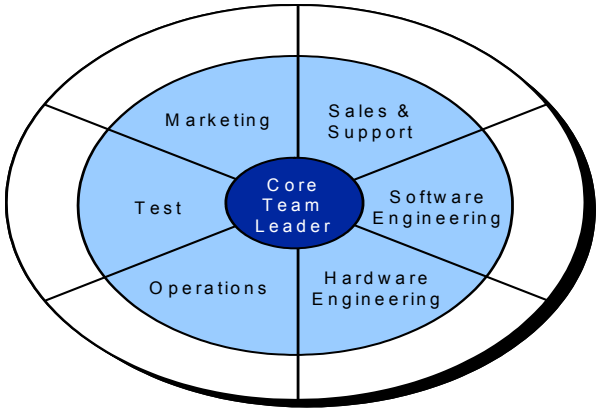


Typical decision behavior

Phase 1 Concept	Phase 2 Feasibility & Planning	Phase 3 Development	Phase 4 Test	Phase 5 Launch
• Avoid decisions altogether • Approve without identifying resources for design or funds for market research	• Postpone and reschedule meeting • Redirect rather than remove • Send forward without resources needed	• Micromanage development • Make late changes now that design is understood • Make up for lost time by adding features from next release	• Approve new features that postpone launch further • Question strategy fit and redirect to Phase 1	• Discover costly over-sights • Senior management dives in to firefight

Empowered cross-functional Core Teams drive projects from concept to market launch

Core Teams are empowered to plan and execute the definition, implementation, and deployment of high-integrity customer-focused solutions



Core Team approach

- Downstream functions are involved early and stay involved through the development cycle
- Core Teams are small with members representing multiple departments
- Team members play a driving role
- Team membership remains constant over the course of the product development cycle
- Performance reviews are directly tied to team performance

Core Team leader

- The Core Team leader is consistent throughout the project and is accountable for project and business success

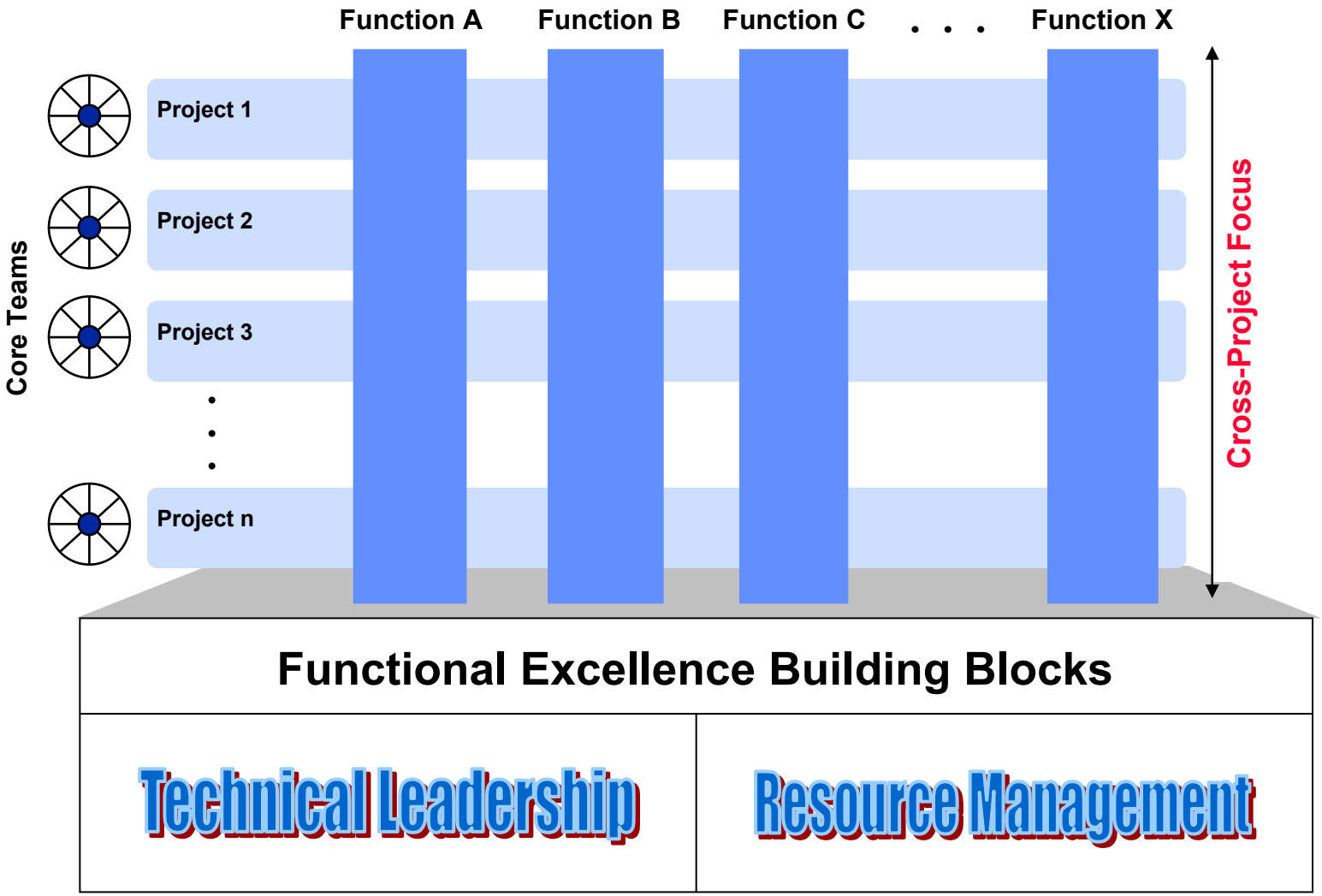
Core team members

- Five to eight people dedicated to the project, instead of 20 – 30 weekly meeting attendees
- Makes decisions as a team
- Accountable for project performance

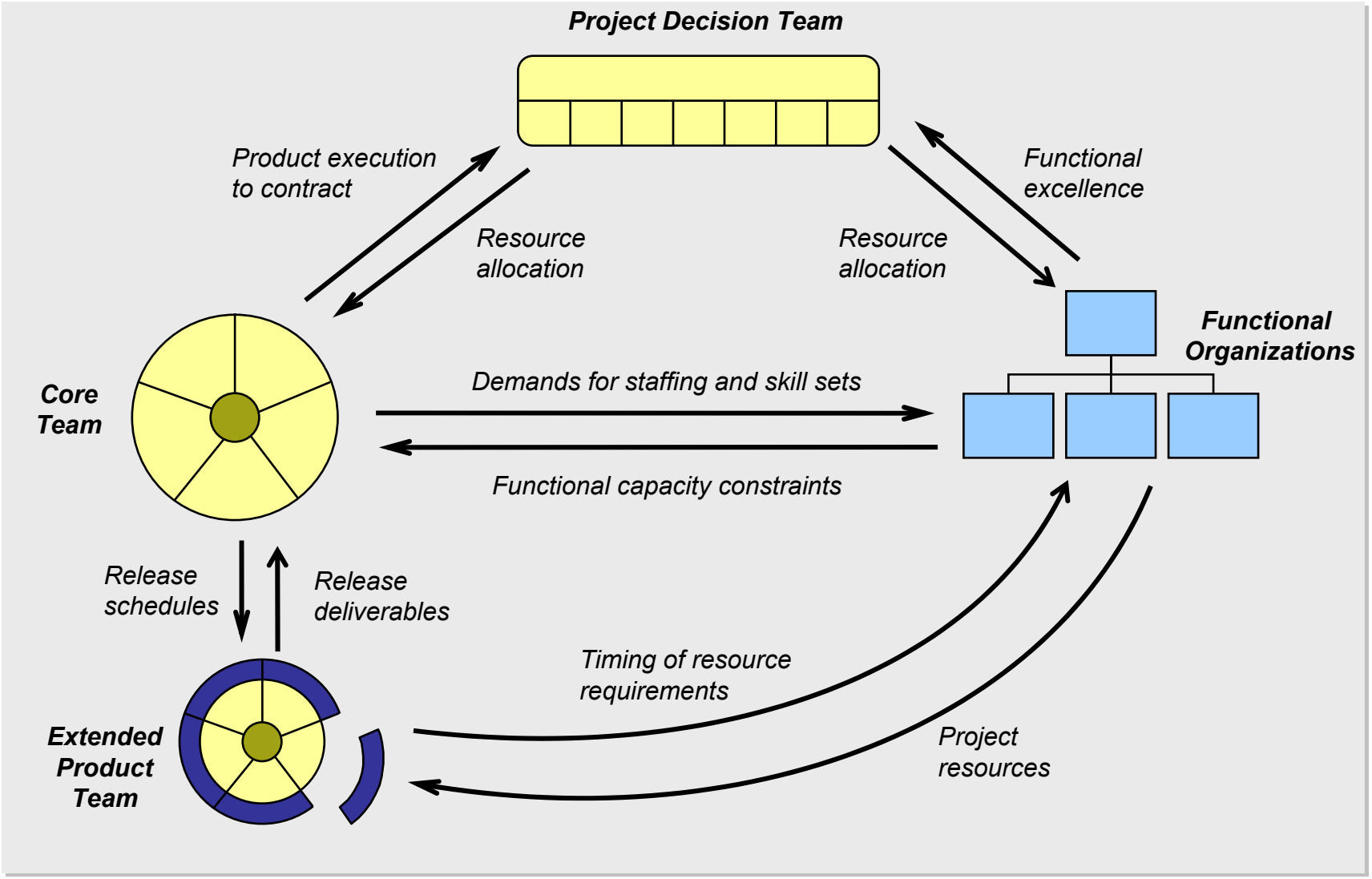
Extended team members

- Includes all other project team members
- Supports the project part-time or full-time
- Works on specific tasks that are coordinated by a designated member of the Core Team

Functional managers coordinate functional resource allocation across product development projects

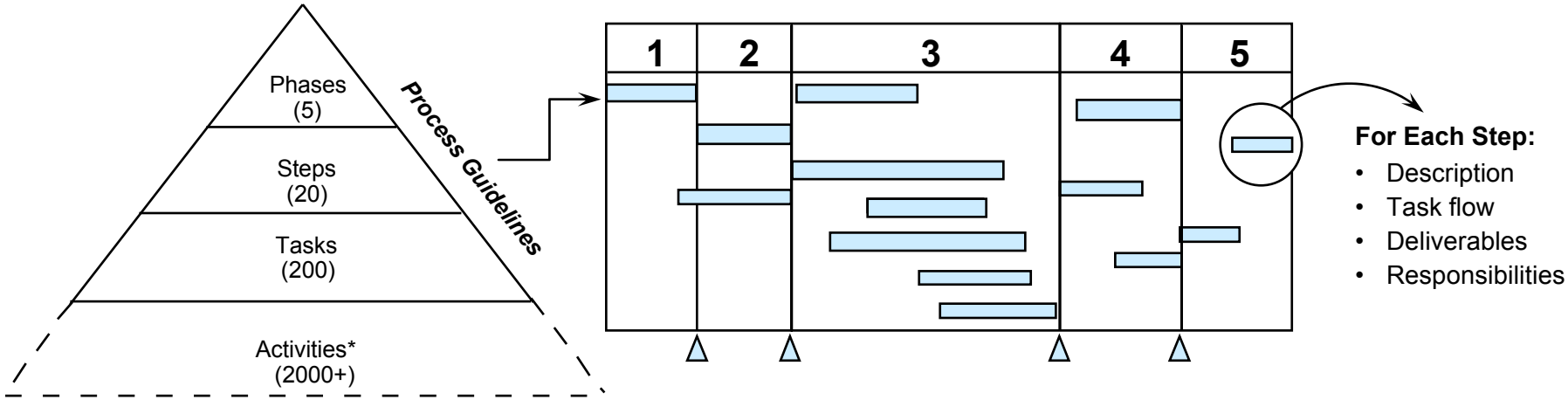


Stage 2 practices result in an integrated project management system for new product development



The structured development process provides a flexible guide to teams executing individual projects

A common, integrative structure for managing product development activities



* *Beyond the scope of process guidelines and typically not value-added to track in Core Team schedules*

Integrates different perspectives of participants

Minimizes confusion by providing common terminology

Coordinates levels of detail using a multilevel structure

Ensures critical tasks are not overlooked, and enables reliable scheduling

Links cross-functional projects to practices for functional excellence

Attaining full Stage 2 capability has distinct benefits

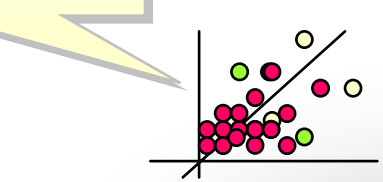
	Functional *Stage 1*	Transitional *Stage 2a*	Mature *Stage 2b*
Revenue Growth Rate	■	✚	✚✚
Wasted Development	■	✚	✚✚
Commercialization Success	■	✚	✚
Goal Attainment	■	✚	✚
Marketplace Renewal	■	✚	✚✚
Time-to-Market	■	▬	✚✚
Time-to-Profitability	■	▬	✚
Pipeline Throughput	■	▬	✚✚

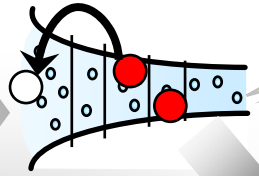
■ Baseline ▬ Worse than Baseline ✚ Better than Baseline ✚✚ Much Better than Baseline

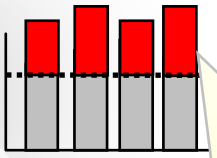
Source: The Performance Measurement Group, LLC (a PRTM company)

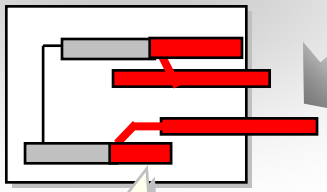
Stage 3: Portfolio Excellence

Poor portfolio management often leads to visible and chronic business problems









Predominance of short-term, reactive projects

Weak projects that persist in the portfolio; few project cancellations

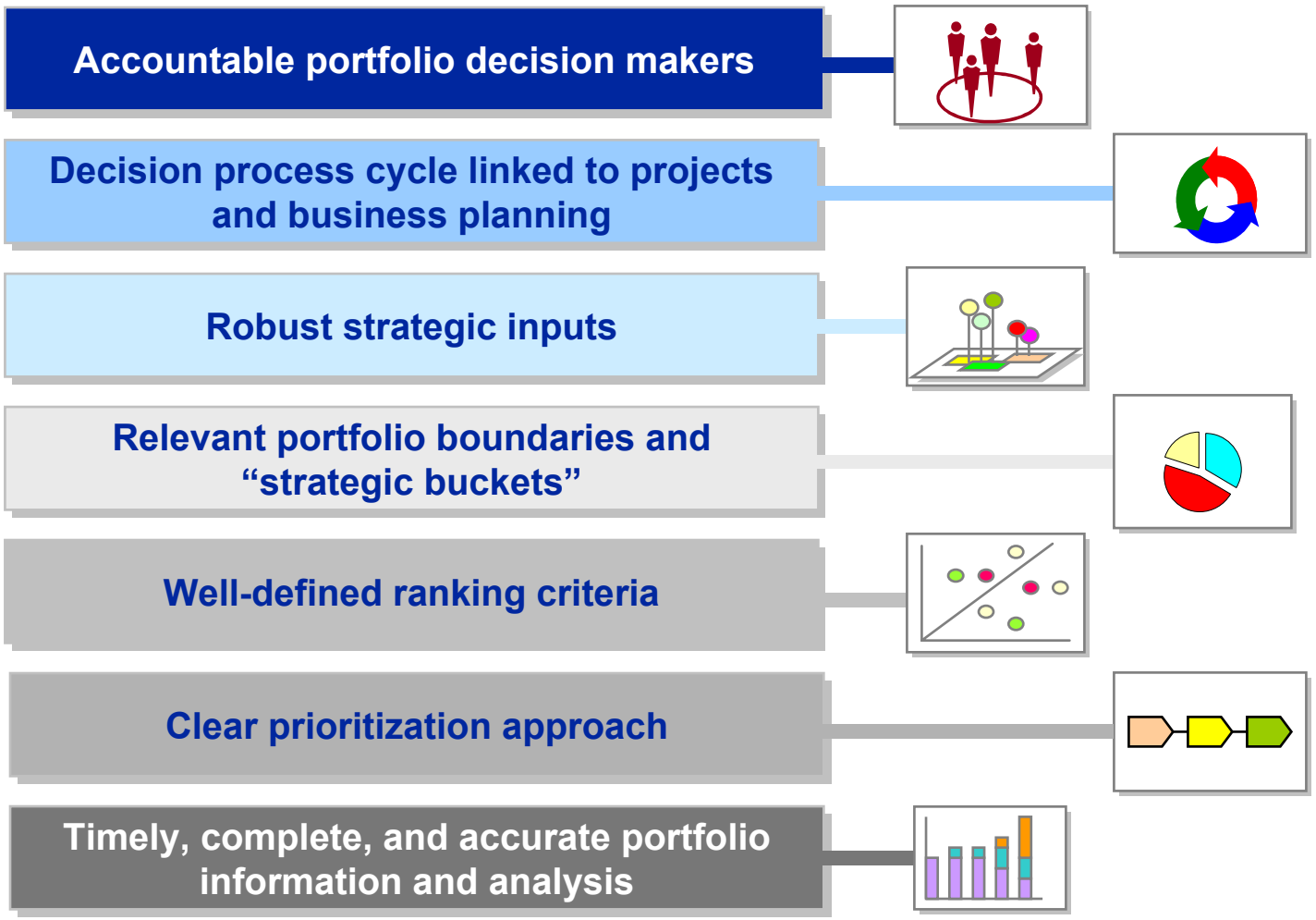
Resource overload and skill-set shortages

Project slippage and delayed product launches

Gaps relative to strategic priorities; unmet revenue plans

Successful portfolio management requires an integrated, best practice approach

Portfolio Management Best Practices



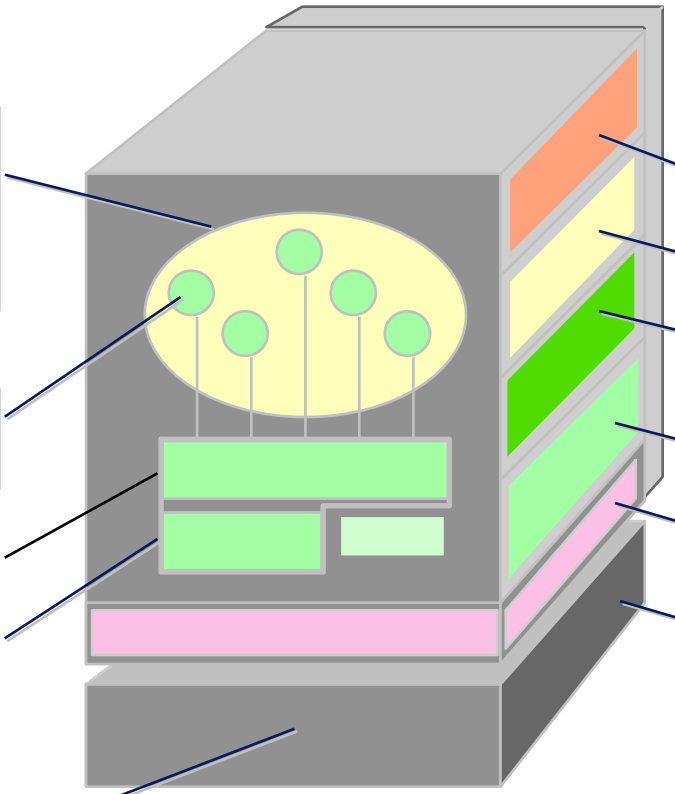
Portfolio management begins with comprehensive market platform plans (MPP)

Market Characterization, Segmentation, and Targeting
Customers' problems, competitors, and vector of differentiation

Set of Product Offerings

Platform Selection
Offering platform elements and architecture

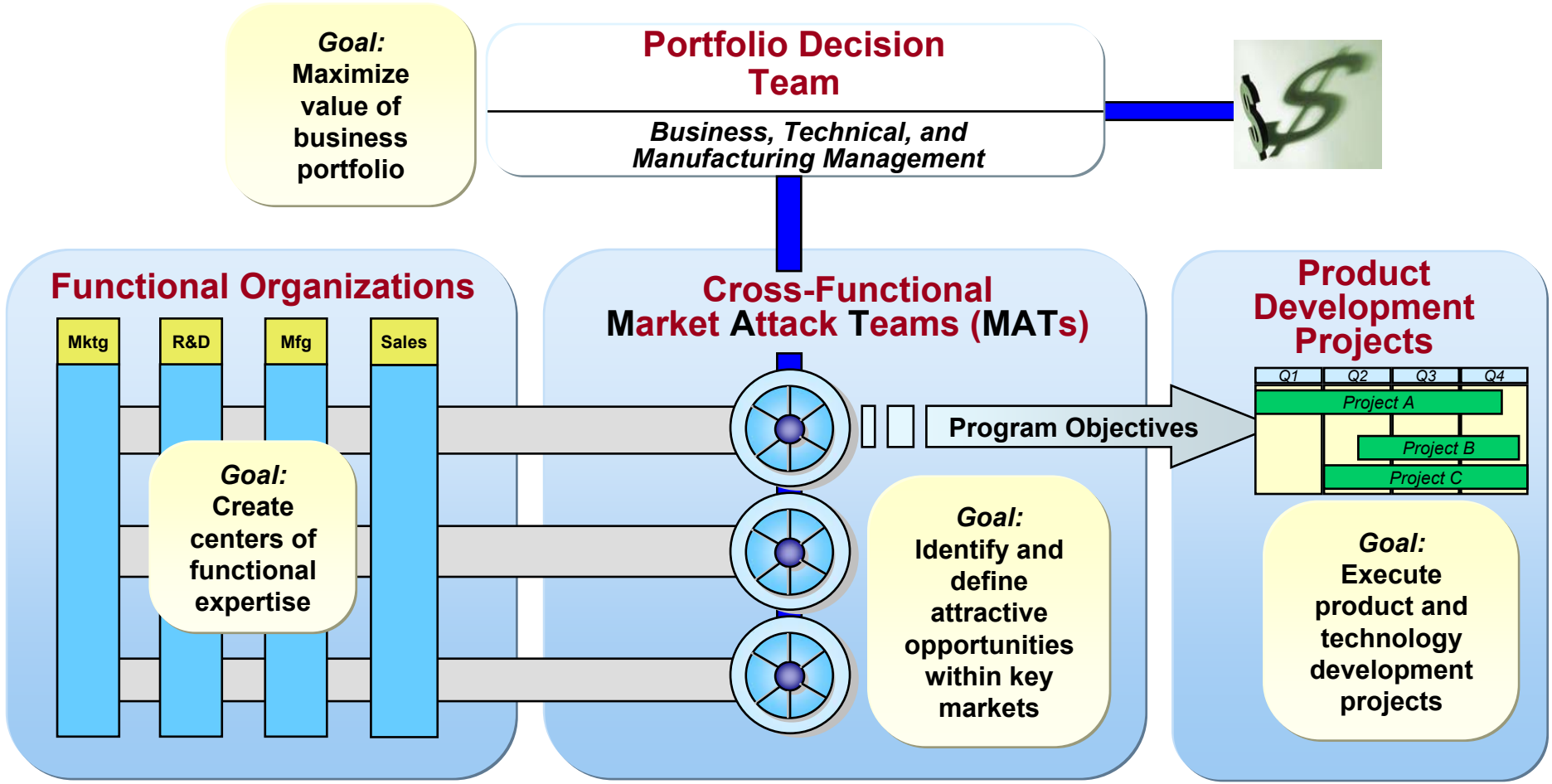
Economic Case



Implementation Plans

- Offering development plan
- Marketing and sales plan
- Operations plan
- Technology plan
- Overall skills and resource plan
- Financial metrics to measure market success

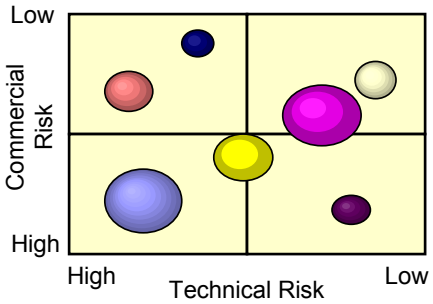
Portfolio decision teams oversee multiple market attack teams aimed at key market segments



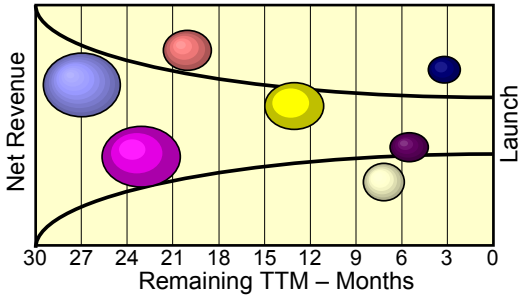
Standard portfolio views provide a common lens through which portfolio opportunities are viewed

Project Attractiveness

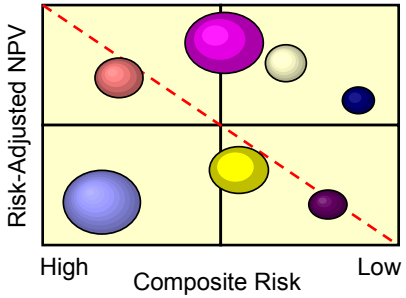
Risk Analysis



Revenue vs. Time-to-Market

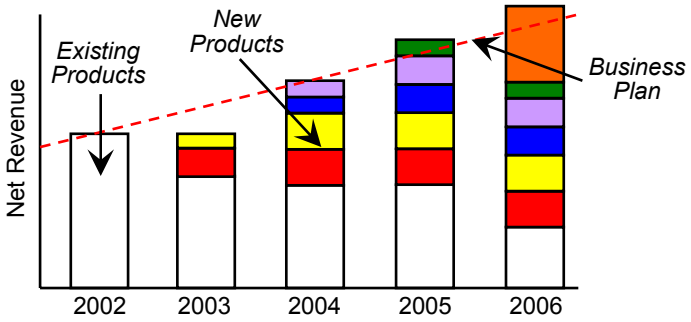


Return vs. Risk

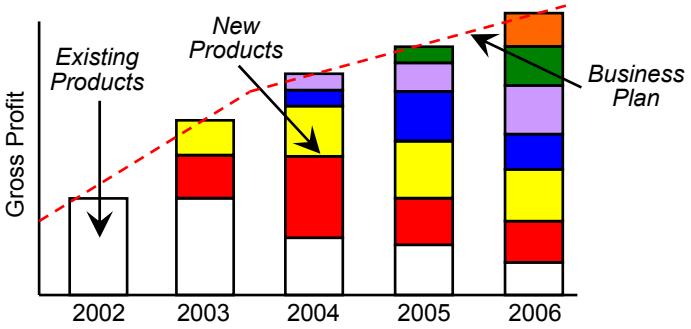


Business Impact

Risk-Adjusted Revenue "Stack"

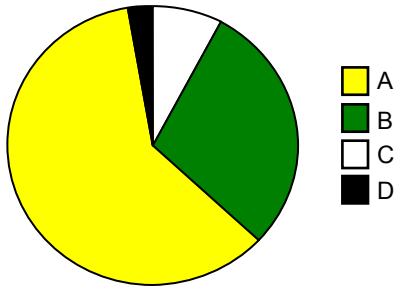


Risk-Adjusted Gross Profit "Stack"

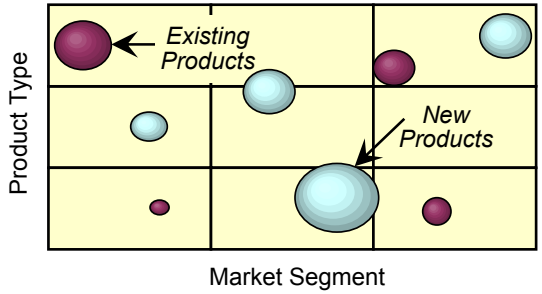


Portfolio Balance

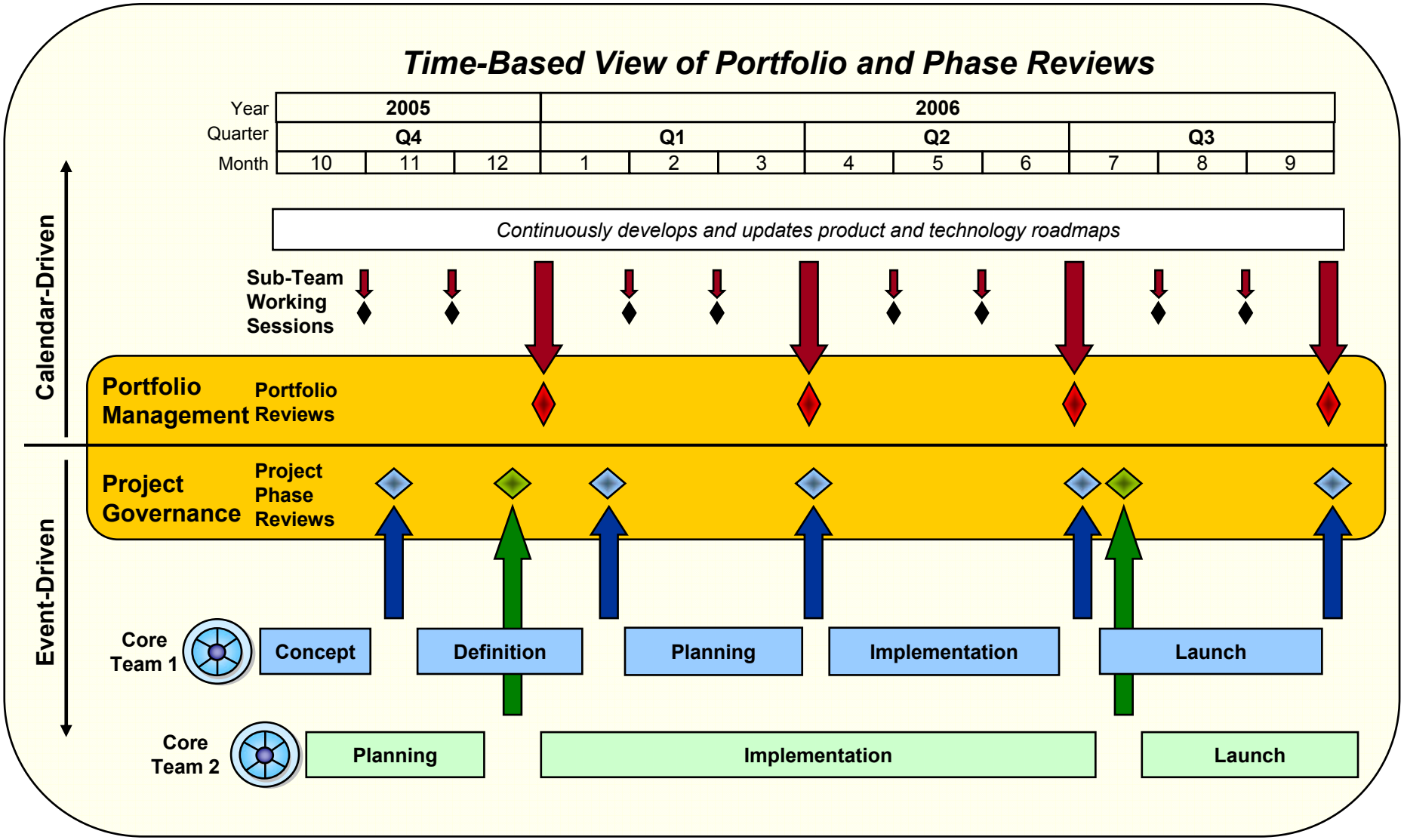
Investment Mix



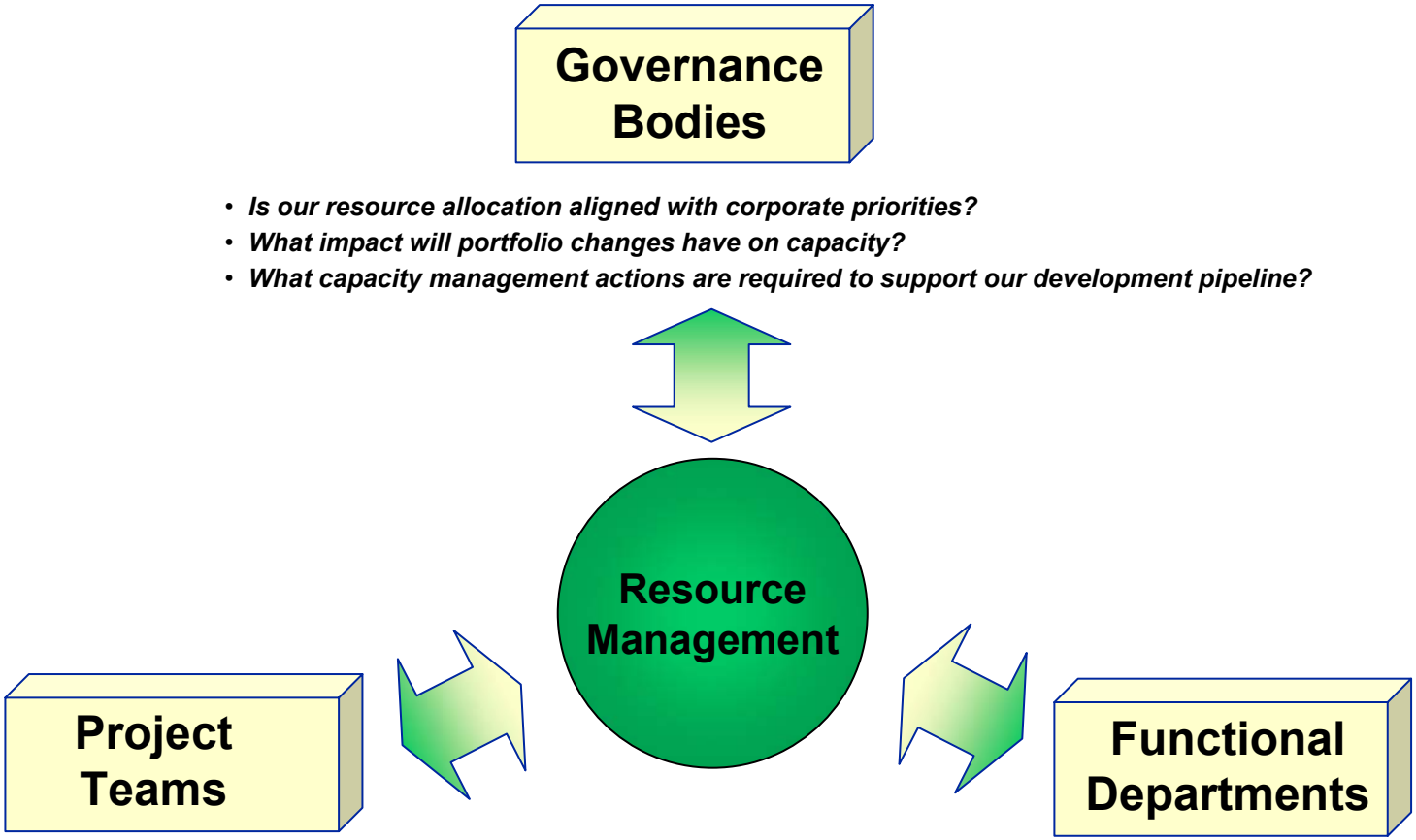
Market Coverage



Periodic reviews ensure strategic alignment, portfolio balance, and optimized project prioritization



A resource management process balances the needs of three key constituents



- *Is our resource allocation aligned with corporate priorities?*
- *What impact will portfolio changes have on capacity?*
- *What capacity management actions are required to support our development pipeline?*

- *Are critical path tasks sufficiently resourced?*
- *What options do we have for resources?*
- *Are we getting the resources we have been promised?*

- *What is the forecasted demand and what options do we have to support it?*
- *Where are our resources spending their time, how does it compare to the plan, and does it align with corporate priorities?*
- *Where are the bottlenecks both today and in the future?*

Case Study:

Implementing Project Excellence at ABC Co.

The challenge

ABC Co. had grown rapidly due to the extraordinary success of one platform

- Process and system investment had lagged growth, leaving ABC Co. with a product development infrastructure more characteristic of a smaller company

ABC Co. owed its success to the extraordinary vision of its founder and the heroic efforts of employees who were continually asked to make "diving catches"

- With the departure of their founder and CEO, ABC Co. had both the opportunity and need to re-examine its product development process
- The "diving catch" model was not providing the business with the level of predictability required by the marketplace
- Constant crisis management made it difficult to focus on root causes

ABC Co. growth and margins were under attack due to increased competition and market saturation

- ABC Co. faced the challenge of diversifying its revenue base and managing a more complex product portfolio
- There was a new emphasis on marketing, development, and operations improvements to regain margin points

Historically, ABC Co. had (like many Silicon Valley startups) been a founder-driven, engineering-centric organization

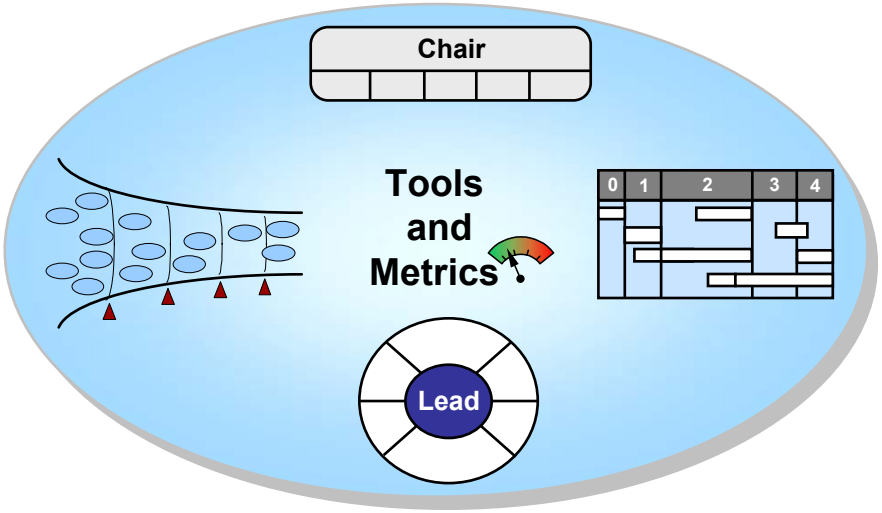
- To face the challenges of the future, ABC Co. needed to become a more market-driven organization

The solution: Five key elements must be designed and implemented as a system to achieve optimal performance

The key to improving ABC Co.'s ability to develop products efficiently is how these five key elements are designed and how they interact

Executive Oversight

Effective Decision Making



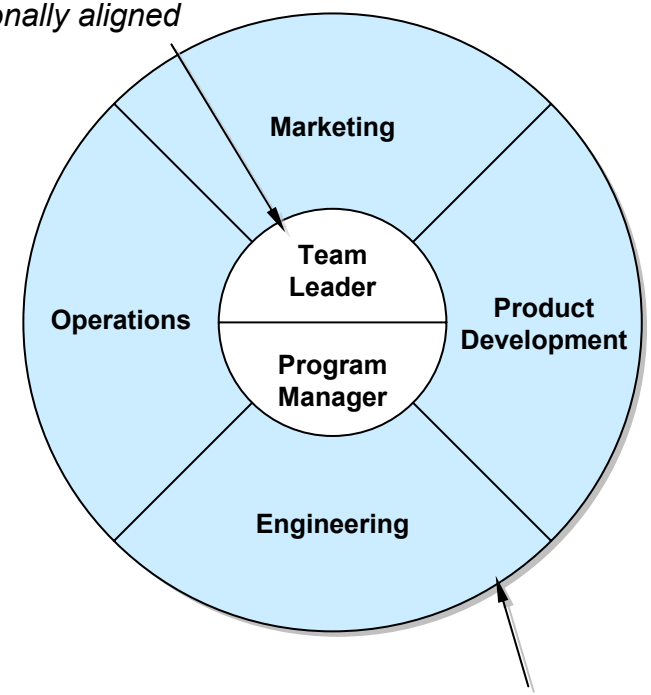
Structured Process

Empowered Project Teams

The Core Team

Small, cross-functional team empowered and accountable to lead development projects from concept through launch

The "Hub"—Team Leader and Program Manager are not functionally aligned

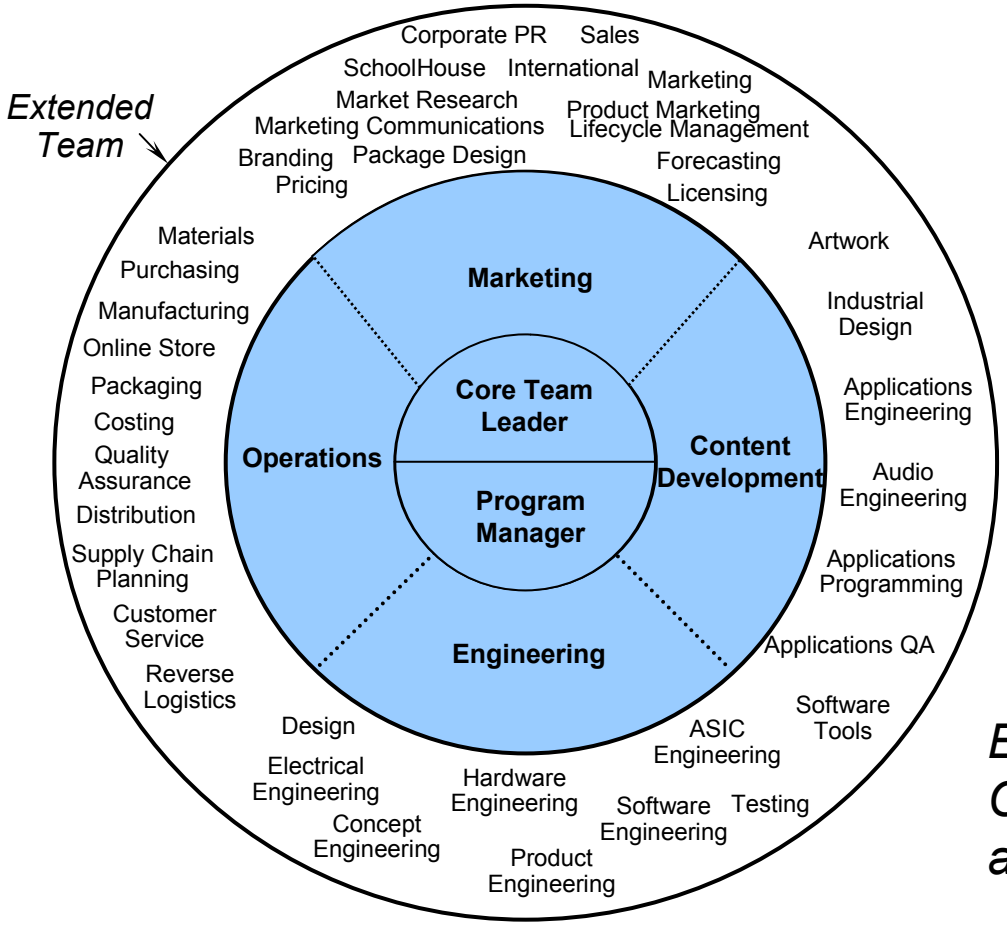


The "Wheel"—functionally-aligned Core Team members

- **Stays together with minimal changes to membership**
- **Creates and manages an integrated plan**
- **Negotiates staff needs and assignments**
- **Communicates project requirements and drives completion of tasks**
- **Makes tradeoff decisions and recommendations**
- **Resolves issues**
- **Acts as a project communication focal point**
- **Is accountable to the executive team for project results**

The Extended Team

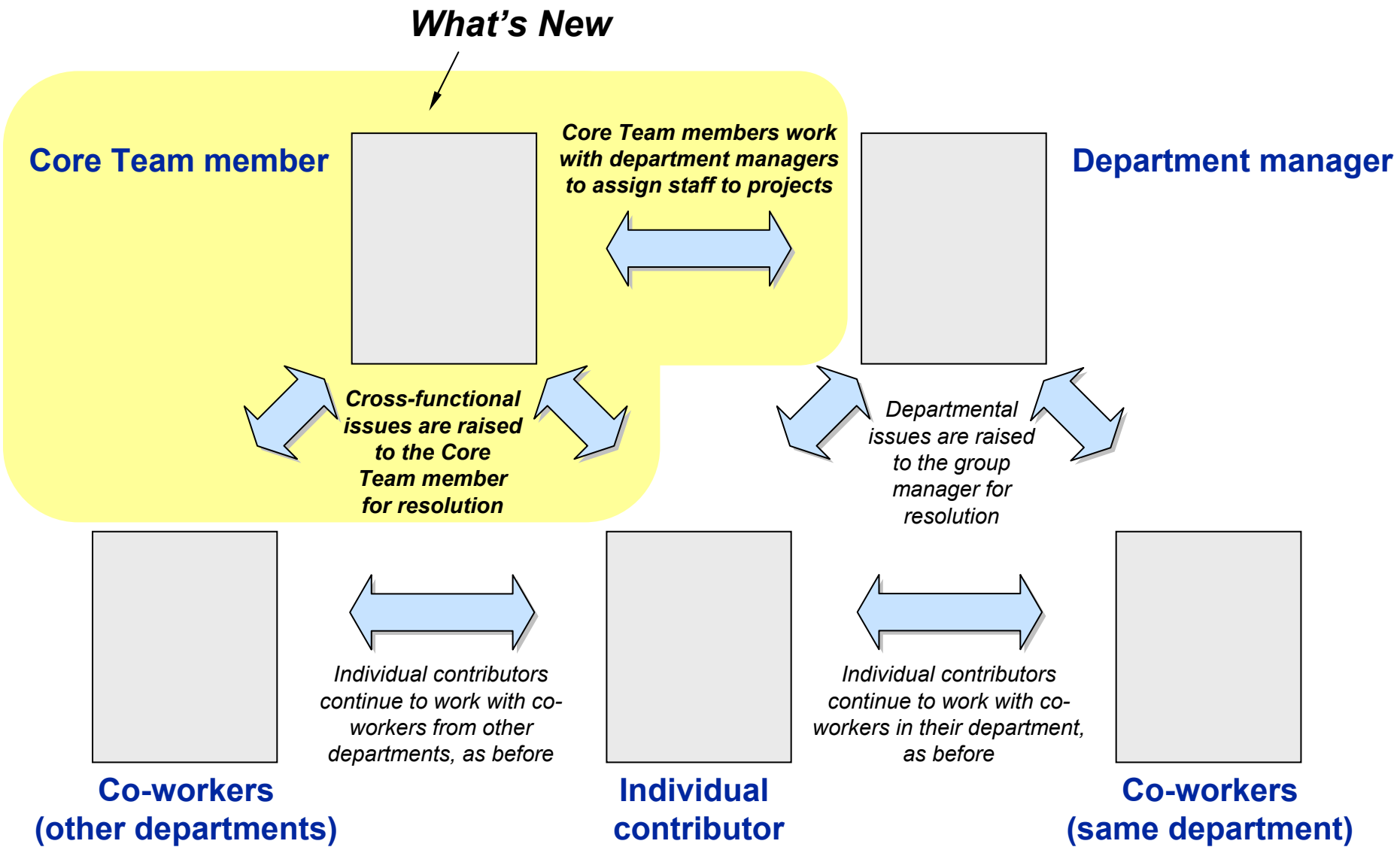
The Extended Team consists of all the individual contributors across the company involved in the program—the people who do the work!



- **Creates great products!**
- **Works to the plan approved by the Core Team**
- **Raises cross-functional issues to their Core Team member**
- **Raises departmental issues to their department manager**
- **Team size varies by project and by project phase**

Everyone on the Extended Team has a Core Team member responsible for their area

Product development from the Extended Team perspective



Portfolio Approval Committee (PAC)

Portfolio Approval Committee (PAC)						
Chair **<CEO>**	Marketing	Engineering	Operations	Finance	Technology	Sales
Facilitator **PRTM**	**<CMO>**	**<VP Engineering>**	**<VP Operations>**	**<CFO>**	**<CTO>**	**<VP Sales>**

Defines and charters Core Teams

Reviews and approves strategic plans

- Authorizes startup of new projects
- Approves project budgets and talent allocations
- Establishes and manages priorities

Reviews and approves Core Team contracts

- Establishes a contract with each team for each phase of development
- Assures that projects are well planned and on track
- Reassesses projects if a contract assumption is broken

Provides input through scheduled reviews

Project contract content

Clearly states critical project parameters and corresponding Core Team commitments

- Scope and rationale
- Financial assumptions
- Localization requirements
- Contract review dates
- Critical milestones
- Project costs
- Key assumptions

Each parameter is bracketed by a variance range

- Variances get tighter as projects progress and the team learns more
- If a variance is exceeded, the team meets with the PAC to address the situation

Product Release Contract for <Name>

Product Release Scope: <Insert concise statement and reference PRD release>

Rationale: <Insert single sentence that describes the rationale / goal for the product>

I. Target Product Parameters

Criteria	Target	Variance
Target MSRP ($)		+/- $#
Gross Margin – Hardware (%)		+/- #%
Gross Margin – Software (%)		+/- #%
Gross Margin – Blended (%)		+/- #%
Product Cost ($)		+/- $#
Breakeven (units)		+/- # units
ROI (%)		#%
Net Present Value (NPV) ($000)		$#
Initial Countries for Launch	<Co... Country>	
<Other Key ...ment>		

Example

II. Contract ...ws

Contract Review	Target	Variance	Actual
Proceed with Definition (Charter Proj.)	mm/dd/yy	+ # weeks	mm/dd/yy
Proceed with Development & Testing	mm/dd/yy	+ # weeks	mm/dd/yy
Lock Design	mm/dd/yy	+ # weeks	mm/dd/yy
Proceed with Launch	mm/dd/yy	+ # weeks	mm/dd/yy
Proceed with Ramp Up	mm/dd/yy	+ # weeks	mm/dd/yy

III. Critical Milestones and Outcomes Prior to Next Contract Review

Milestone	Target	Variance	Actual
<Critical Milestone>	mm/dd/yy	+ # weeks	mm/dd/yy
<Critical Milestone>	mm/dd/yy	+ # weeks	mm/dd/yy

Outcome	Must Achieve (Variance)
Outcome 1	Result 1
Outcome 2	Result 2
Outcome 3	Result 3

IV. Project Costs

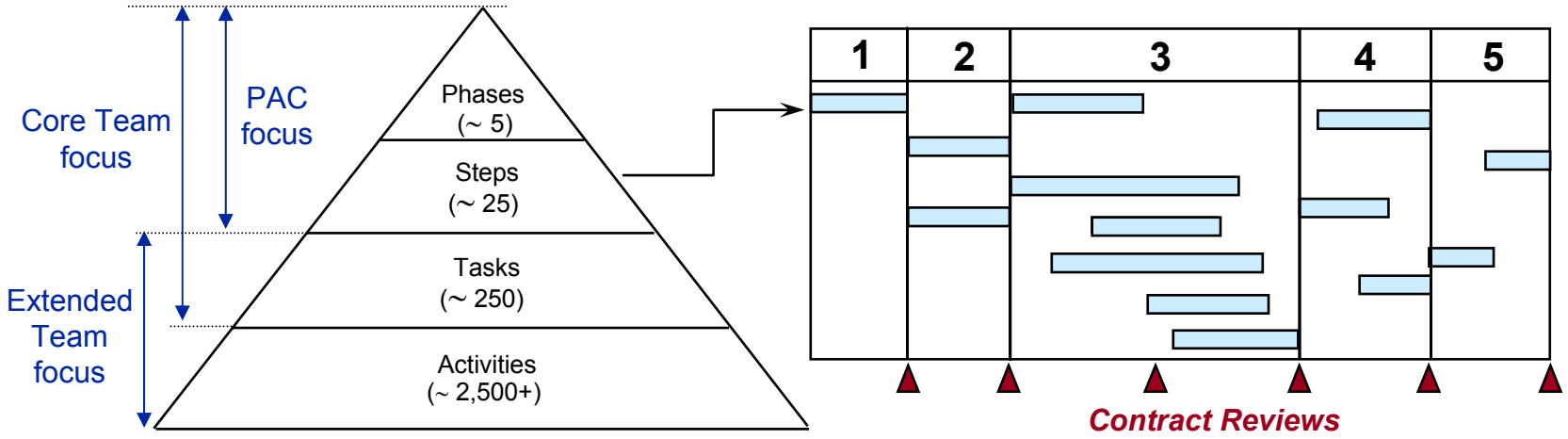
Cost Element	Cost to Next Contract Review		Total Development Cost	
	Target	Variance	Target	Variance
Expenses ($000s)	$#	+%	$#	+%

V. Key Assumptions

- <List key assumptions, including specific or unusual resource requirements>
- <List key assumptions, including specific or unusual resource requirements>
- <List key assumptions, including specific or unusual resource requirements>

A structured integrated process provides a roadmap to Core Teams

A common, integrated structure for managing product development activities



Integrates different perspectives of participants

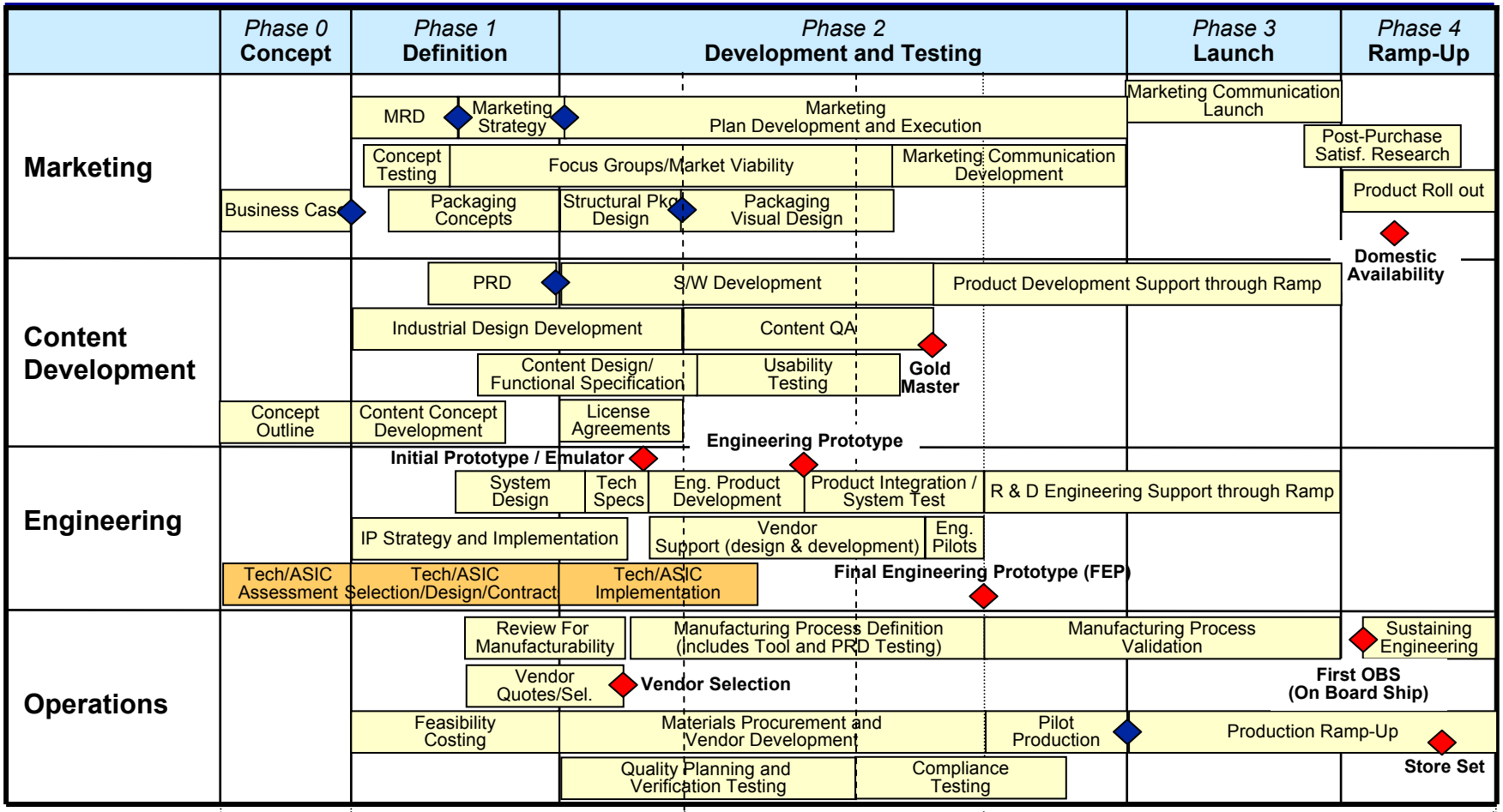
Minimizes confusion by providing common terminology and templates

Coordinates levels of detail using a multilevel structure

Ensures critical tasks are not overlooked and enables more reliable scheduling

Links cross-functional tasks to practices for departmental excellence

An overview chart provides a map for Core Team members and shows phases and steps



* **Note:** *The number of Contract Reviews will depend on the complexity of the product*