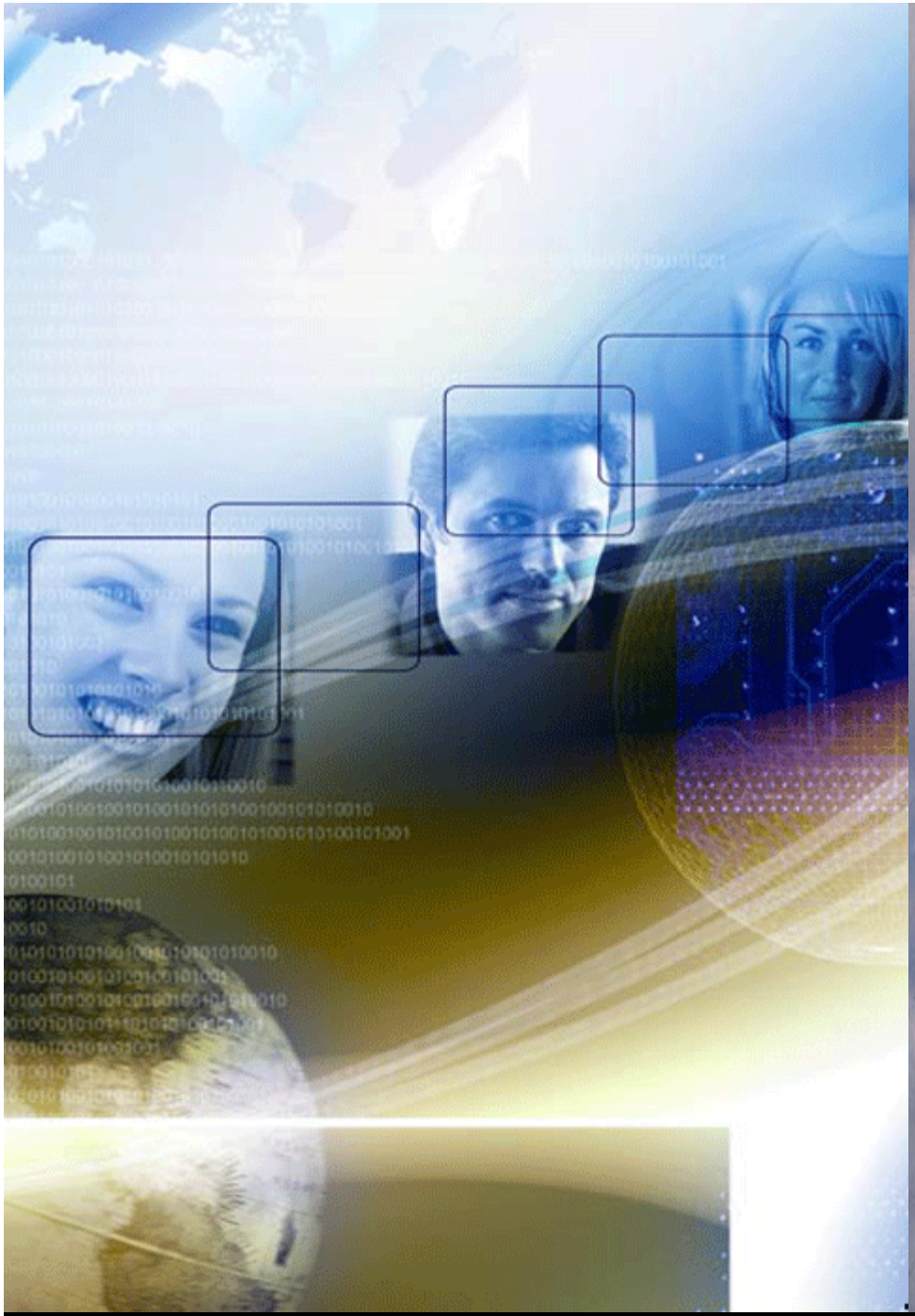

CREATING AN EFFECTIVE GATE REVIEW PROCESS

Kenneth Crow
DRM Associates
PD-Trak Solutions

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ABOUT THE SPEAKER

Kenneth A. Crow is President of DRM Associates, a consulting and training firm specializing in product development, and is a Principal of PD-Trak Solutions, a provider of NPD project/process management software. He is a recognized expert in the field of new product development with over twenty-five years of experience consulting with major companies in aerospace, automotive, capital equipment, consumer products, defense, high technology, and medical equipment.

He has worked with management to develop product strategies and plan NPD improvement initiatives. He has assisted product development teams develop their teamwork, plan and manage projects, define customer requirements, plan their product strategy, develop a business case, and apply DFM/A, QFD, VA, & Target Costing to optimize their designs. He has helped assess and reengineer clients' product development processes, assisted with the evaluation and implementation of NPD project/process management and PDM systems, and instituted portfolio management and pipeline management processes.

He has written papers, contributed to books, conducted training, and spoken at many conferences on product development and manufacturing. He is the past President and founding member of the Society of Concurrent Product Development and a member of PDMA and Engineering Mgt. Society. He is a Certified New Product Development Professional through PDMA. For further information, contact:

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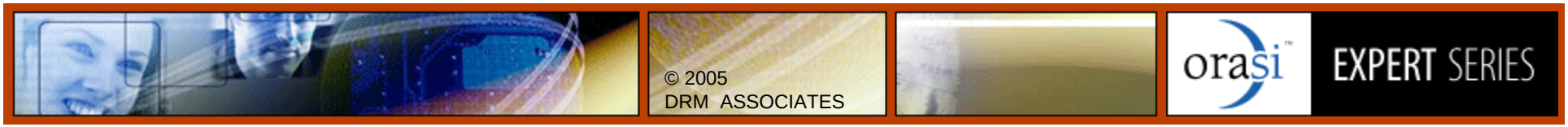
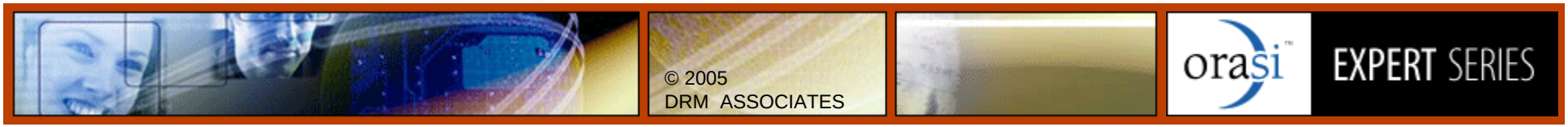
Web sites: www.npd-solutions.com | www.pd-trak.com



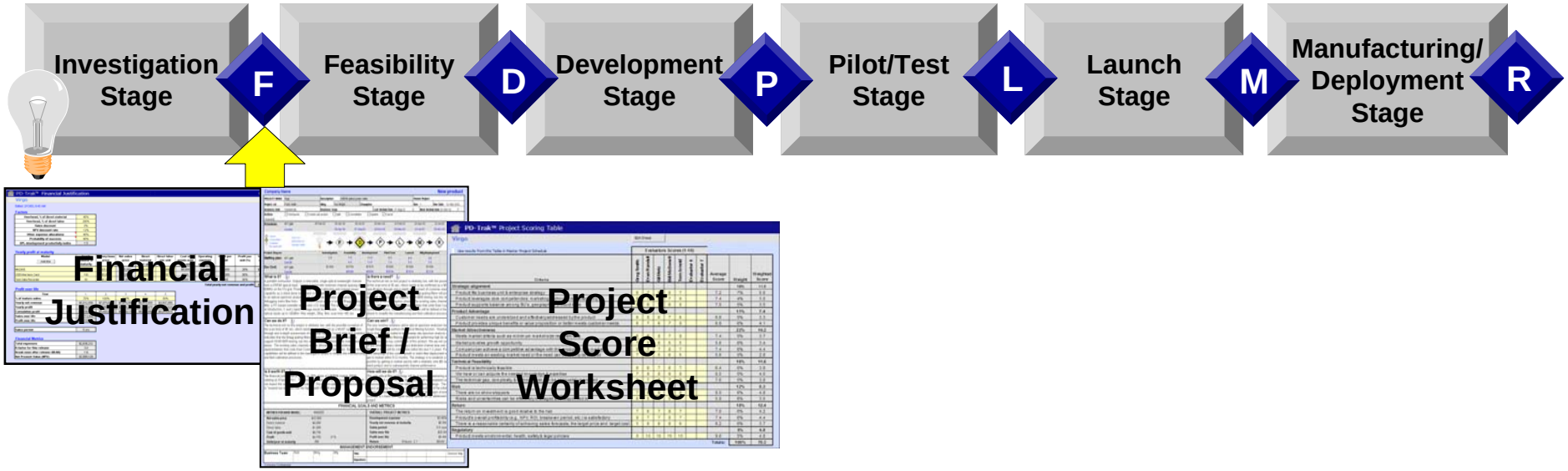
GATE REVIEW OBJECTIVES

Ensure that:

- A valid business case for the development project exists – project will provide adequate return with acceptable risks
- Program is still aligned with company strategy
- Continued investment in the product development or R&D project is warranted
  - Significant issues are being addressed
  - The project plan & request for resources is sound
- The project has a high priority relative to other project portfolio opportunities



STAGE / PHASE-GATE PROCESS



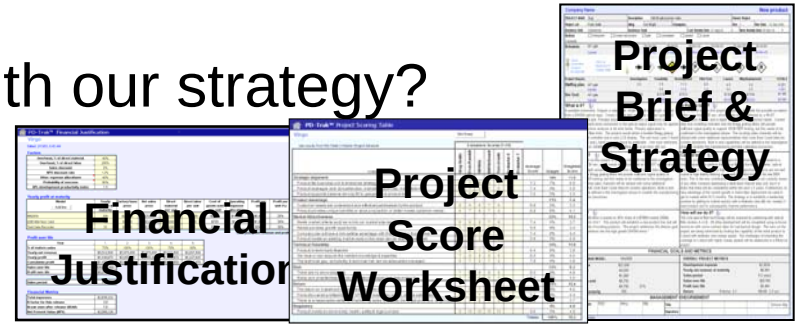
- Program organized into logical stages or phases with a management review & decision to go (proceed), kill (cancel) or suspend program at each gate
- Initial screening of project proposals for adequate business case & fit – rigor prevents expenditure of resources for less desirable projects
- Subsequent gate reviews ensure resources are only applied to projects that fit the portfolio criteria and have a high priority

Source: PD-Trak Solutions, www.pd-trak.com

3 DECISIONS TO PASS A GATE REVIEW

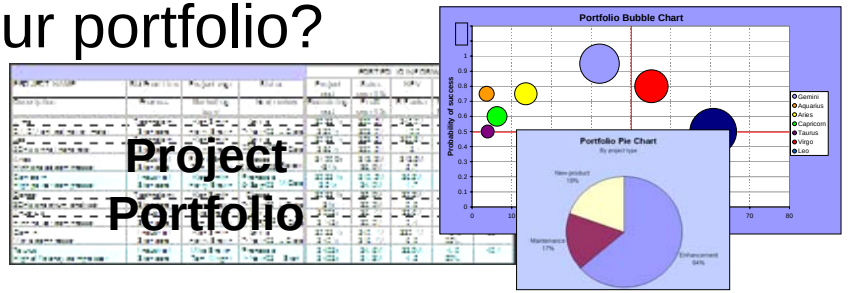
1. Is the project attractive and fit with our strategy?

   Go or kill



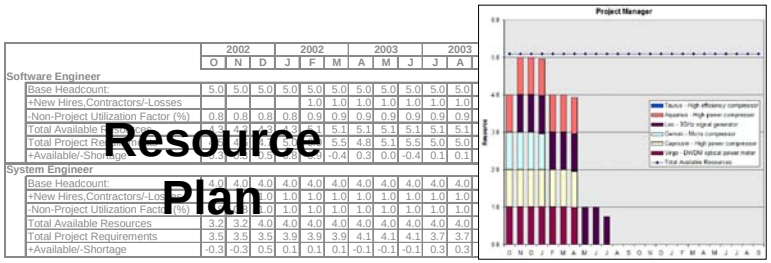
2. Does this project rank favorably compared with other project opportunities in our portfolio?

   Go, kill or suspend



3. Do we have the resources to launch or continue this project or what should we do to get the needed resources?

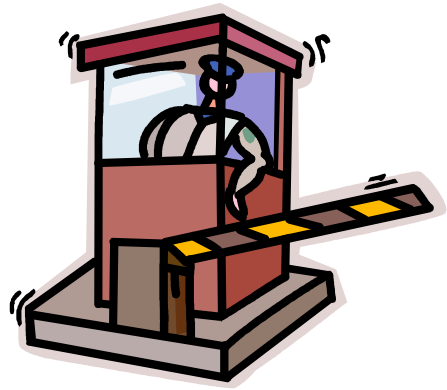
   Go, kill or suspend



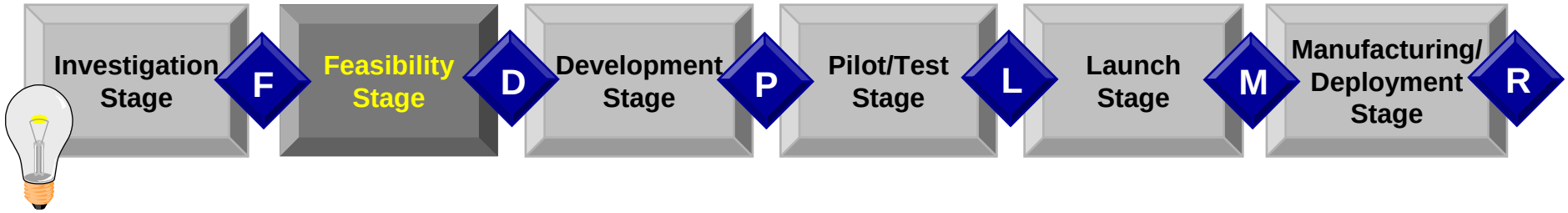
Examples courtesy PD-Trak Solutions, www.pd-trak.com

DECISIONS TO DEFINE GATE REVIEW PROCESS

1. **Where and when in the process should gate reviews occur?**
2. What information is needed for the gate review?
3. Who makes the gate review decisions?
4. What is the process for conducting gate reviews?
5. How do we make gate reviews more effective?



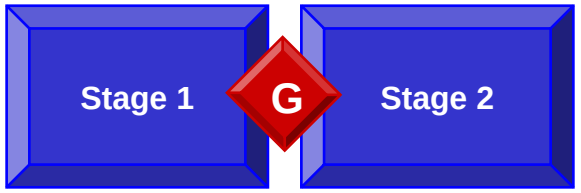
GATE REVIEWS IN THE PROCESS



- Have a minimum number of gate reviews to avoid adding overhead to the development process
  - Each review requires the team to create update project information and develop a presentation
  - Each review can add delays before team can move to the next gate
- Place gate reviews at points in the process prior to where there are major commitments of resources or funds or major risks, e.g., design, tooling, advertising & launch costs, etc.

SOFT vs. HARD GATES

- **Hard gates** require that all activities in a stage be completed before the gate review is conducted and no work in a subsequent stage is started until gate approval
  - Lower risk
  - Interrupts and delays work



- **Soft gates** allow some work in subsequent stage to proceed in parallel with planning and conducting the gate review
  - Some additional risk
  - Less disruptive and faster

DECISIONS TO DEFINE GATE REVIEW PROCESS

1. Where and when in the process should gate reviews occur?
2. **What information is needed for the gate review?**
3. Who makes the gate review decisions?
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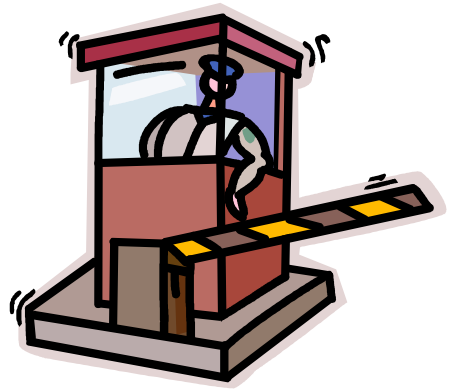
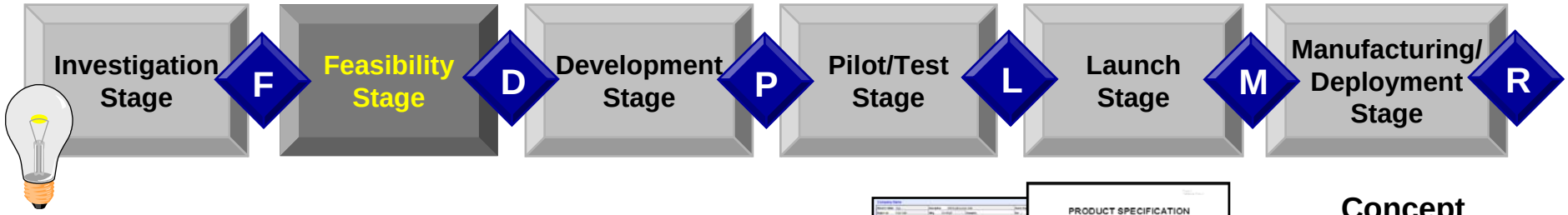


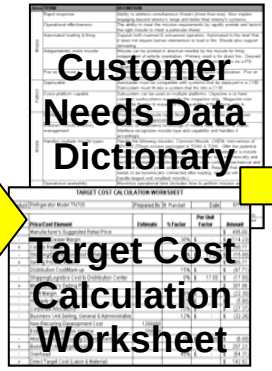
INFORMATION NEEDED FOR GATE REVIEW

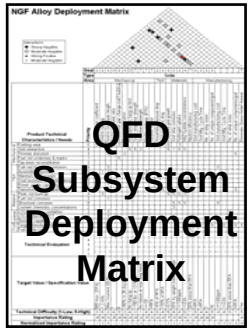
- Market definition, opportunity & forecast
- Key customer needs
- Product definition
- Product strategy
- Technology and intellectual property plan/issues
- Manufacturing and supply chain plan/issues
- Marketing plan/issues
- Project budget & schedule
- Business case, projected profit & return on investment
- Project risks
- Regulatory, environmental and safety issues

DEFINE PROCESS & DELIVERABLES REQUIRED

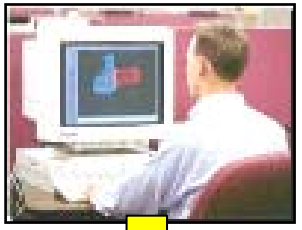


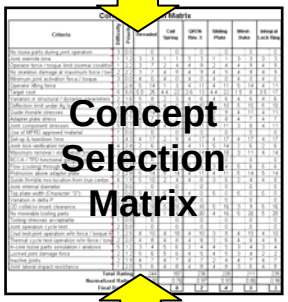
Voice of the Customer

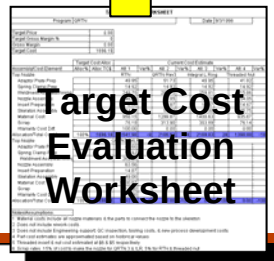




Concept Development







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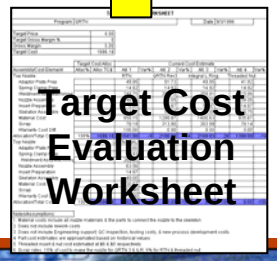
DEFINE PROCESS & DELIVERABLES REQUIRED

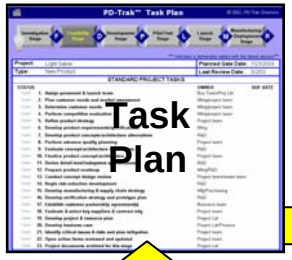
Investigation Stage **F** Feasibility Stage **D** Development Stage **P** Pilot/Test Stage **L** Launch Stage **M** Manufacturing/ Deployment Stage **R**

Concept Development

Concept Selection Matrix

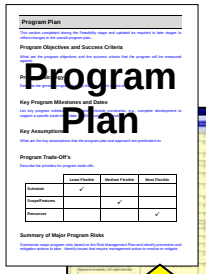


Target Cost Evaluation Worksheet

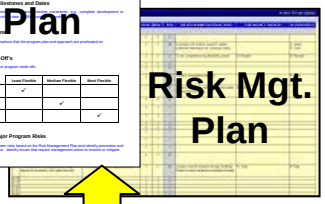


Task Plan

Selected Concept



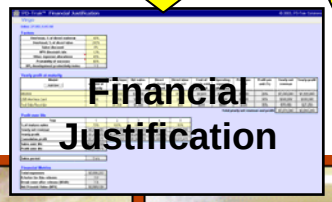
Program Plan



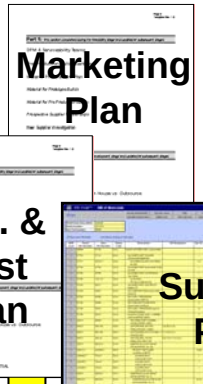
Risk Mgt. Plan

Project Plan

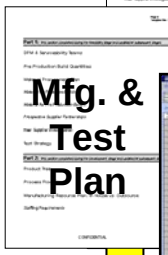
Budget & Schedule



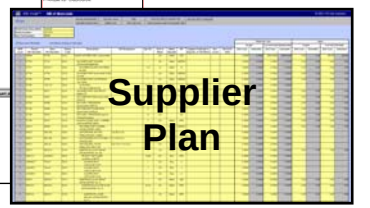
Financial Justification



Marketing Plan



Mfg. & Test Plan



Supplier Plan

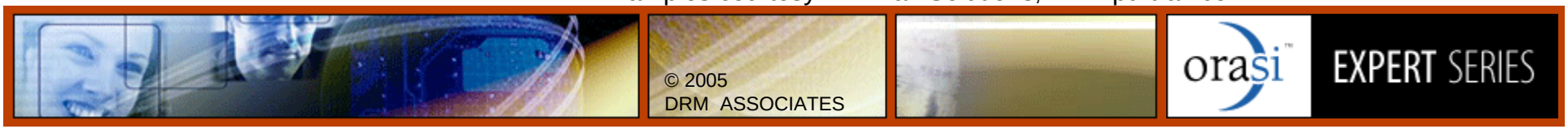
Product/ Project Brief

DEVELOP THE BUSINESS CASE

1. Estimate development costs by estimating phase durations, headcount requirements & NRE

Gates		S	F	D	P	L	M	R
Gate Dates		3-Aug-02	23-Oct-02	14-Feb-03	23-May-03	7-Nov-03	6-Feb-04	30-Apr-04
Stages		Investigation	Feasibility	Development	Pilot	Launch	Manufacturing	
Stage Duration (wks)		11.6 wks	16.3 wks	14.1 wks	23.9 wks	13.0 wks	12.0 wks	
On Hold Start Date								
On Hold Duration								
Project Manager	$210 k/yr	1	1	1	1	1	1	
Electrical Designer	$140 k/yr	1	1	2	1	0.5		
Electrical Engineer	$200 k/yr	1	2	4	2	1		
Mechanical Designer	$140 k/yr	0.5	2	1	0.5			
Software Engineer	$210 k/yr	1	2	3	2	1		
System Engineer	$220 k/yr	0.5	0.5	0.5				
Manufacturing Engineer	$130 k/yr	0.5		0.5	1	1	1	
Total headcount		5.5	8.5	12	7.5	4.5	2	
Human resources		$224k	$489k	$604k	$631k	$205k	$78k	
Market research			$40k					
Tooling					$60k			
Total cost by stage		$224k	$529k	$604k	$691k	$205k	$78k	
Total development expense							$2,331k	

Examples courtesy PD-Trak Solutions, www.pd-trak.com



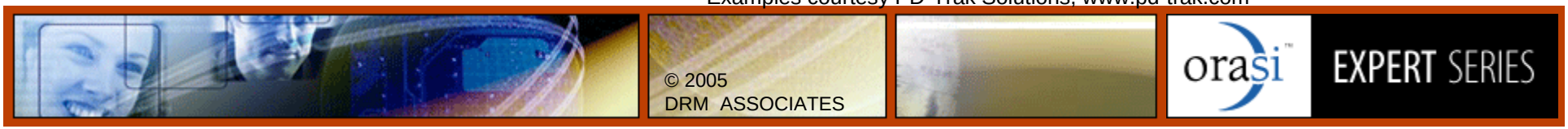
DEVELOP THE BUSINESS CASE

2. Forecast sales, establish preliminary price, and estimate product cost

Revenue and profit projection

Year	2003	2004	2005	2006	2007	2008
3GHz signal generator						
Units sold	100	200	400	300	200	100
Factory base price	$20,000	$20,000	$18,000	$18,000	$16,000	$16,000
Average discount	10%	10%	10%	10%	10%	10%
Direct material per unit	$2,000	$1,800	$1,700	$1,600	$1,600	$1,600
Direct labor per unit	$500	$400	$400	$350	$350	$350
Revenue	**$1,800,000**	**$3,600,000**	**$6,480,000**	**$4,860,000**	**$2,880,000**	**$1,440,000**
Profit	**$1,370,000**	**$2,856,000**	**$5,048,000**	**$3,873,000**	**$2,222,000**	**$1,111,000**
6GHz model						
Units sold	0	50	100	100	70	50
Factory base price	$0	$24,000	$24,000	$22,000	$22,000	$22,000
Average discount	0%	0%	0%	0%	0%	0%
Direct material per unit	$0	$2,400	$2,400	$2,200	$2,200	$2,200
Direct labor per unit	$0	$500	$500	$450	$450	$450
Revenue	**$0**	**$1,200,000**	**$2,400,000**	**$2,200,000**	**$1,540,000**	**$1,100,000**
Profit	**$0**	**$957,000**	**$1,914,000**	**$1,757,000**	**$1,229,900**	**$878,500**
Yearly net revenue	**$1,800,000**	**$4,800,000**	**$8,880,000**	**$7,060,000**	**$4,420,000**	**$2,540,000**
Cumulative net revenue	**$1,800,000**	**$6,600,000**	**$15,480,000**	**$22,540,000**	**$26,960,000**	**$29,500,000**
Yearly profit	**$1,370,000**	**$3,813,000**	**$6,962,000**	**$5,630,000**	**$3,451,900**	**$1,989,500**
Cumulative profit	**$1,370,000**	**$5,183,000**	**$12,145,000**	**$17,775,000**	**$21,226,900**	**$23,216,400**

Examples courtesy PD-Trak Solutions, www.pd-trak.com



DEVELOP THE BUSINESS CASE

3. Compare projected profit to development expense to determine financial return

Yearly net revenue	$1,800,000	$4,800,000	$8,880,000	$7,060,000	$4,420,000	$2,540,000
Cumulative net revenue	$1,800,000	$6,600,000	$15,480,000	$22,540,000	$26,960,000	$29,500,000
Yearly profit	$1,370,000	$3,813,000	$6,962,000	$5,630,000	$3,451,900	$1,989,500
Cumulative profit	$1,370,000	$5,183,000	$12,145,000	$17,775,000	$21,226,900	$23,216,400

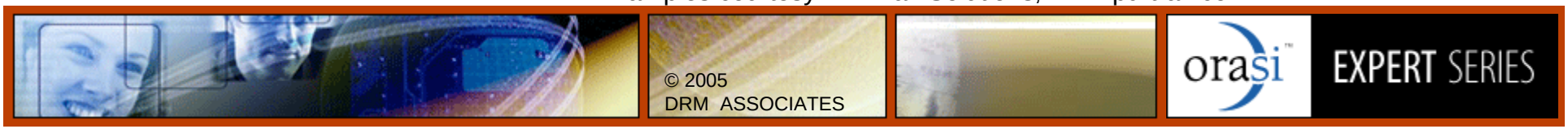
Sales over life	$29,500,000
Profit over life	$23,216,400

Sales period	6 yrs

Financial Metrics

Total expenses	$2,330,603
R-factor for this release	10.0
Break even after release (BEAR)	1.3 yrs
Net Present Value (NPV)	$45,213,797
Development Productivitity Index (DPI)	86.0

Examples courtesy PD-Trak Solutions, www.pd-trak.com



DEVELOP PROJECT BRIEF / PROPOSAL

4. Brief product description, strategy, plan & business case

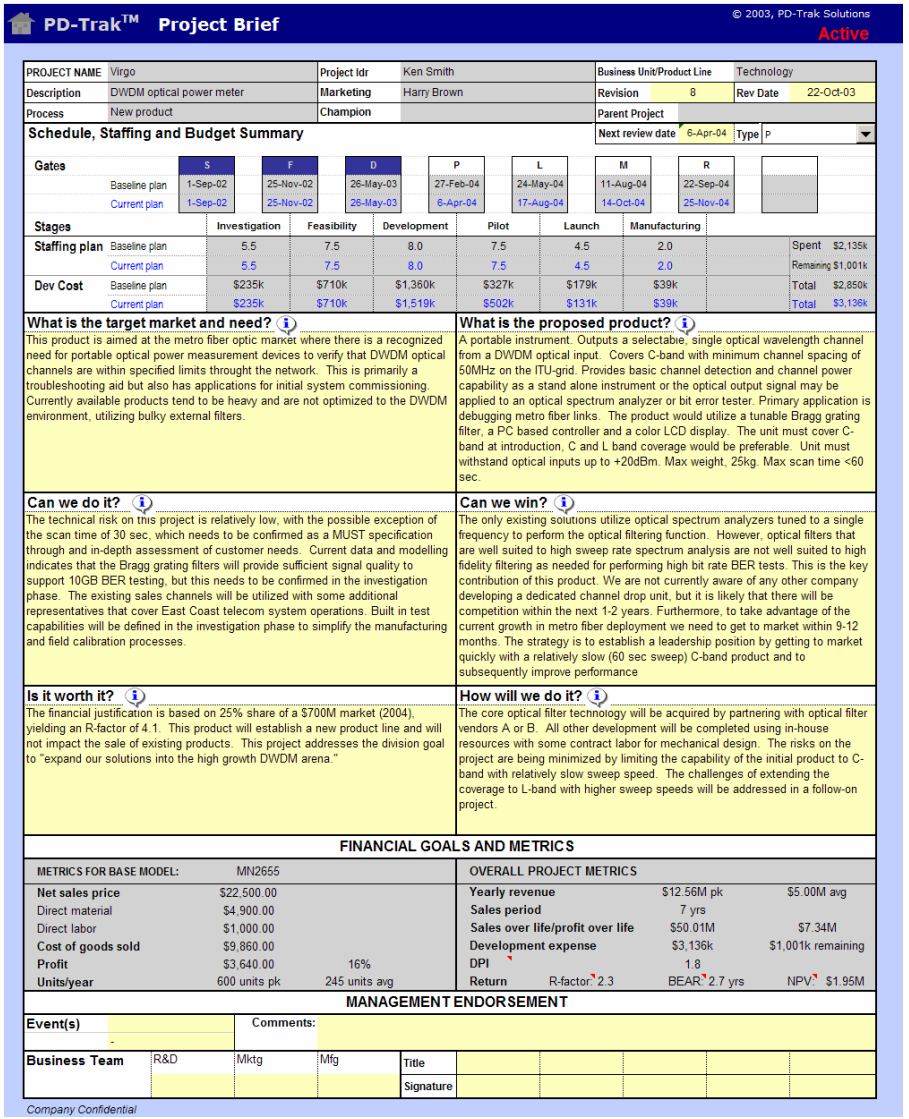
Project information →

Schedule, staffing & budget →

The "six questions" →

What is the target market & need?
What is it? (product definition)
Can we do it? (risks)
Can we win? (competitive advantage)
Is it worth it? (business case)
How will we do it? (plan & resources)

Business case / financial justification →



PD-Trak™ Project Brief — © 2003, PD-Trak Solutions — Active

PROJECT NAME	Virgo	Project ldr	Ken Smith	Business Unit/Product Line	Technology	
Description	DWDM optical power meter	Marketing	Harry Brown	Revision	8	Rev Date 22-Oct-03
Process	New product	Champion		Parent Project		

Schedule, Staffing and Budget Summary — Next review date 6-Apr-04 — Type P

Gates		S	F	D	P	L	M	R	
	Baseline plan	1-Sep-02	25-Nov-02	26-May-03	27-Feb-04	24-May-04	11-Aug-04	22-Sep-04	
	Current plan	1-Sep-02	25-Nov-02	26-May-03	6-Apr-04	17-Aug-04	14-Oct-04	25-Nov-04	

Stages		Investigation	Feasibility	Development	Pilot	Launch	Manufacturing		
Staffing plan	Baseline plan	5.5	7.5	8.0	7.5	4.5	2.0	Spent	$2,135k
	Current plan	5.5	7.5	8.0	7.5	4.5	2.0	Remaining	$1,001k
Dev Cost	Baseline plan	$235k	$710k	$1,360k	$327k	$179k	$39k	Total	$2,850k
	Current plan	$235k	$710k	$1,519k	$502k	$131k	$39k	Total	$3,136k

What is the target market and need?
This product is aimed at the metro fiber optic market where there is a recognized need for portable optical power measurement devices to verify that DWDM optical channels are within specified limits throught the network. This is primarily a troubleshooting aid but also has applications for initial system commissioning. Currently available products tend to be heavy and are not optimized to the DWDM environment, utilizing bulky external filters.

What is the proposed product?
A portable instrument. Outputs a selectable, single optical wavelength channel from a DWDM optical input. Covers C-band with minimum channel spacing of 50MHz on the ITU-grid. Provides basic channel detection and channel power capability as a stand alone instrument or the optical output signal may be applied to an optical spectrum analyzer or bit error tester. Primary application is debugging metro fiber links. The product would utilize a tunable Bragg grating filter, a PC based controller and a color LCD display. The unit must cover C-band at introduction, C and L band coverage would be preferable. Unit must withstand optical inputs up to +20dBm. Max weight, 25kg. Max scan time <60 sec.

Can we do it?
The technical risk on this project is relatively low, with the possible exception of the scan time of 30 sec, which needs to be confirmed as a MUST specification through and in-depth assessment of customer needs. Current data and modelling indicates that the Bragg grating filters will provide sufficient signal quality to support 10GB BER testing, but this needs to be confirmed in the investigation phase. The existing sales channels will be utilized with some additional representatives that cover East Coast telecom system operations. Built in test capabilities will be defined in the investigation phase to simplify the manufacturing and field calibration processes.

Can we win?
The only existing solutions utilize optical spectrum analyzers tuned to a single frequency to perform the optical filtering function. However, optical filters that are well suited to high sweep rate spectrum analysis are not well suited to high fidelity filtering as needed for performing high bit rate BER tests. This is the key contribution of this product. We are not currently aware of any other company developing a dedicated channel drop unit, but it is likely that there will be competition within the next 1-2 years. Furthermore, to take advantage of the current growth in metro fiber deployment we need to get to market within 9-12 months. The strategy is to establish a leadership position by getting to market quickly with a relatively slow (60 sec sweep) C-band product and to subsequently improve performance

Is it worth it?
The financial justification is based on 25% share of a $700M market (2004), yielding an R-factor of 4.1. This product will establish a new product line and will not impact the sale of existing products. This project addresses the division goal to "expand our solutions into the high growth DWDM arena."

How will we do it?
The core optical filter technology will be acquired by partnering with optical filter vendors A or B. All other development will be completed using in-house resources with some contract labor for mechanical design. The risks on the project are being minimized by limiting the capability of the initial product to C-band with relatively slow sweep speed. The challenges of extending the coverage to L-band with higher sweep speeds will be addressed in a follow-on project.

FINANCIAL GOALS AND METRICS

METRICS FOR BASE MODEL:	MN2655		OVERALL PROJECT METRICS		
Net sales price	$22,500.00		Yearly revenue	$12.56M pk	$5.00M avg
Direct material	$4,900.00		Sales period	7 yrs	
Direct labor	$1,000.00		Sales over life/profit over life	$50.01M	$7.34M
Cost of goods sold	$9,860.00		Development expense	$3,136k	$1,001k remaining
Profit	$3,640.00	16%	DPI	1.8	
Units/year	600 units pk	245 units avg	Return R-factor 2.3	BEAR 2.7 yrs	NPV $1.95M

MANAGEMENT ENDORSEMENT

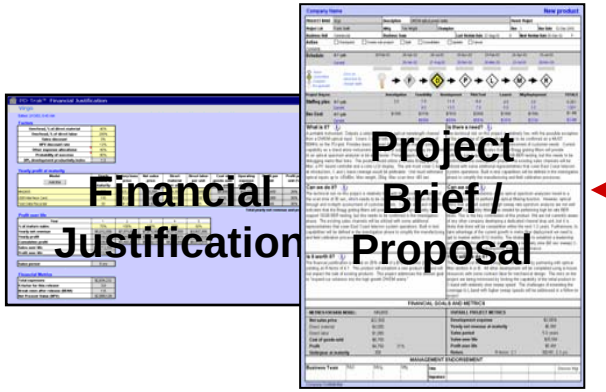
Event(s)		Comments:			
Business Team	R&D	Mktg	Mfg	Title	
				Signature	

Company Confidential

Examples courtesy PD-Trak Solutions, www.pd-trak.com

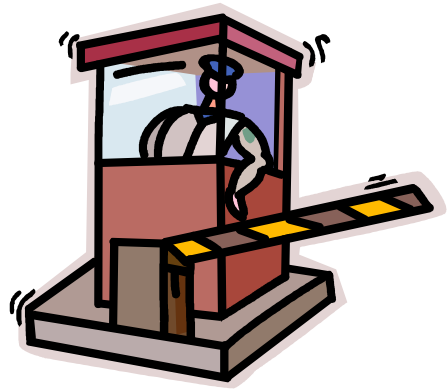
EVALUATE & REFINE BUSINESS CASE

5. Team / sponsor refine product, strategy, project approach, and business case until viable; otherwise dropped



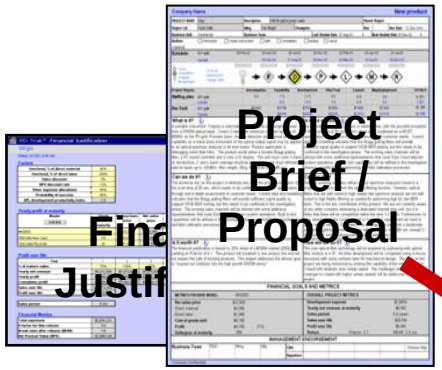
DECISIONS TO DEFINE GATE REVIEW PROCESS

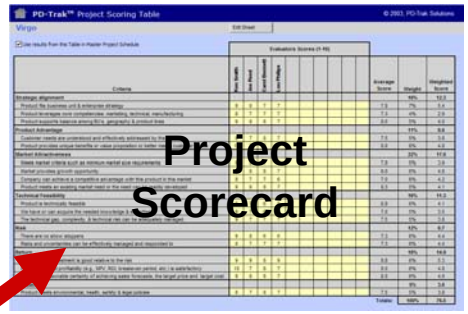
- Where and when in the process should gate reviews occur?
- What information is needed for the gate review?
- **Who makes the gate review decisions?**
- What is the process for conducting gate reviews?
- How do we make gate reviews more effective?



GATE / PORTFOLIO REVIEW

Product Committee (gatekeepers) reviews project proposal and business case, evaluates project (scorecard), and reviews project priority relative to project portfolio

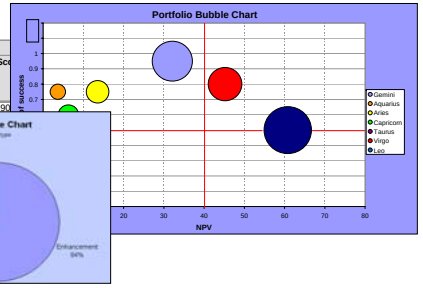




Project Scorecard

Product Portfolio

PROJECT NAME	BU/Prod Line	Project mgr	Status	PORTFOLIO INFORMATION				
				Project cost	Sales over life	NPV	DPI	Sc
Description	Process	Marketing lead	Next review	Remaining cost	Profit over life	R-Factor	Prob. Of Success	
Virgo	Technology	Ken Smith	Active	$2,331k	$23.5M	$45.2M	92.6	90
DWDM optical power meter	Standard	Harry Brown	7-Nov-03 L Gate	$391k	$23.2M			
Leo	Technology	Ken Smith	Active	$2,331k	$58.5M			
3GHz signal generator	Standard	Harry Brown	22-Sep-03 P Gate	$861k	$30.5M			
Aries	Industrial	Frank Smith	Closed	$1,200k	$13.3M			
High speed compressor	Standard	Tom Wright	26-Jan-03 Review	-$1k	$6.9M			
Capricorn	Industrial	Ken Smith	Proposed	$2,331k	$10.5M			
High power compressor	Standard	Harry Brown	6-Sep-03 M Gate	$51k	$4.0M			
Cancer	Technology	Ken Smith	Closed	$2,331k	$5.9M			
8GHz spectrum analyzer	Standard	Harry Brown	7-Nov-02 L Gate	$1k	$2.2M			
Aquarius	Industrial	Mike Brown	Active	$600k	$6.1M			
High power compressor	Standard	Tom Wright	27-Sep-03 P Gate	$143k	$2.2M			
Gemini	Industrial	Ken Smith	Active	$2,331k	$42.1M			
Micro compressor	Standard	Harry Brown	7-Nov-03 L Gate	$401k	$16.1M			
Taurus	Industrial	Mike Brown	Proposed	$400k	$6.6M			
High efficiency compressor	Standard	Tom Wright	1-Nov-03 Start	$403k	$1.8M			



Examples courtesy PD-Trak Solutions, www.pd-trak.com

GATEKEEPERS

- This is the team of senior leaders who make Go/Kill decisions at gates
- Are from different functional areas and can commit resources
- Use a pre-set list of criteria and rules — they can't play favorites

SENIOR MANAGEMENT TEAM

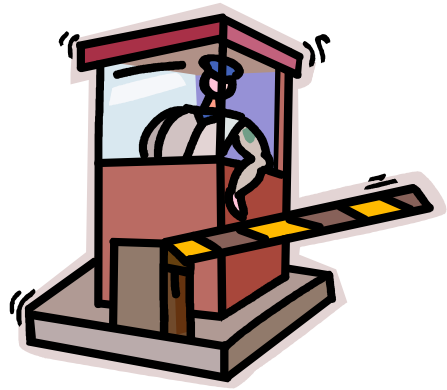
- Different Terms & Roles for the Senior Management Team
- Business Team
- Product Steering Team
- Product Steering Committee
- Management Steering Team
- Product Committee
- Product Approval Committee

SENIOR MANAGEMENT TEAM ROLES

- Develop product strategy
- Manage product portfolio
- Manage overall product development resources
- Conduct phase/stage-gate reviews
- Monitor overall performance
- Address critical issues with development programs

DECISIONS TO DEFINE GATE REVIEW PROCESS

1. Where and when in the process should gate reviews occur?
2. What information is needed for the gate review?
3. Who makes the gate review decisions?
4. **What is the process for conducting gate reviews?**
5. How do we make gate reviews more effective?



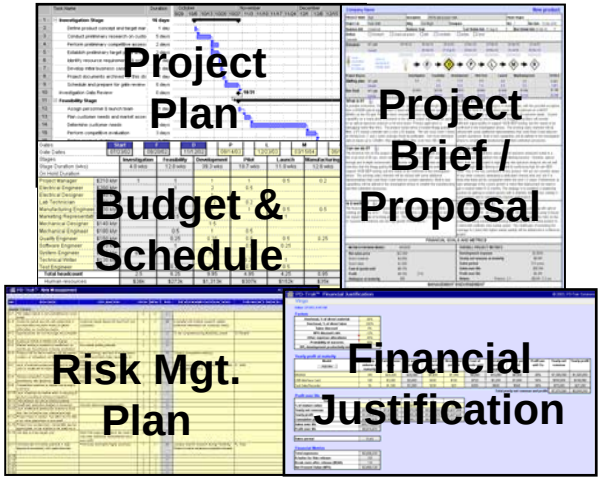
GATE REVIEW PROCESS

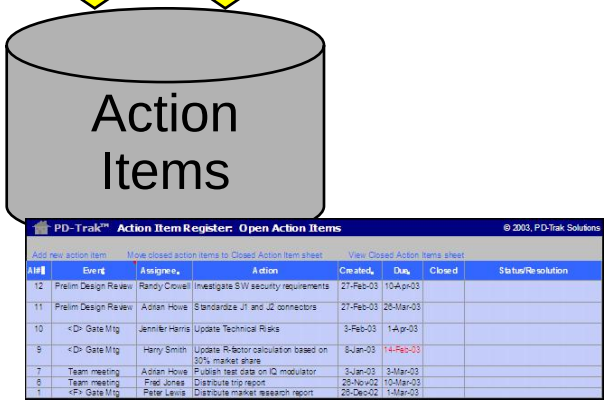
Prepare for Gate Review

Schedule; Distribute & Review Gate Package

Conduct Gate Review; Evaluate Project Prepare Minutes

Resolve Action Items; Continue Next

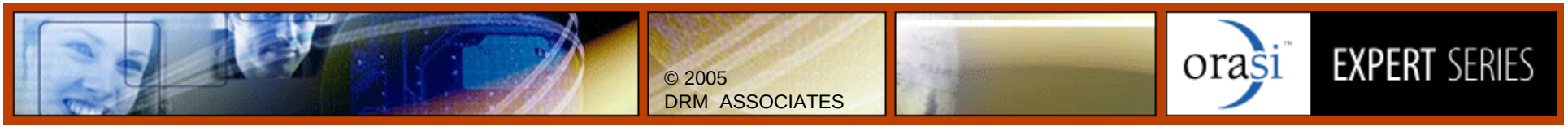




Source: PD-Trak Solution

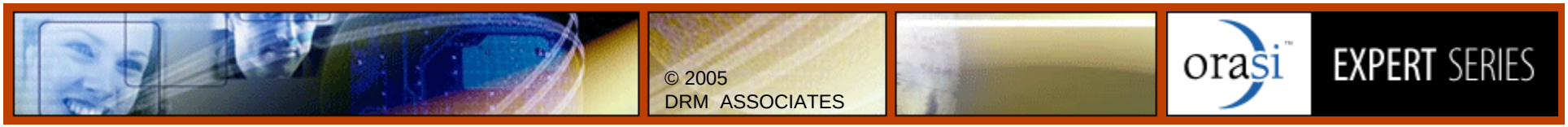
GATE CRITERIA

- Gates must have clear criteria so that senior managers can make Go/Kill & prioritization decisions objectively
- Criteria must be:
  - Easy to use
  - Realistic (make use of available information)
  - Discriminating (differentiate the good projects from the mediocre ones)
- Ideally, criteria are scored and summarized into an overall rating
- Project killed if it falls below minimum acceptable level
- Scoring also supports project prioritization for portfolio management



TYPICAL GATE CRITERIA

- **Strategic Alignment:** fit, leverages competencies, supports balance
- **Product Advantage:** unique benefits, customer needs met
- **Market Attractiveness:** market size, market growth
- **Technical Feasibility:** technical gap, complexity, technical risk
- **Risk:** no show stoppers, risks managed
- **Return:** profitability, return vs. risk, sales forecasts & cost targets met
- **Regulatory:** meets legal requirements & policies



WEIGHTING & SCORING CRITERIA

PD-Trak™ Project Scoring Table

Virgo

Edit Sheet

Use results from this Table in Master Project Schedule

Criteria	Evaluators Scores (1-10)							Average Score	Weight	Weighted Score
	Greg Smith	Evan Randall	Gil Metz	Bill McDonell	Tom Arnold	Evaluator 6	Evaluator 7			
Strategic alignment									**16%**	**11.5**
Product fits business unit & enterprise strategy	6	7	8	8	7			7.2	7%	5.0
Product leverages core competencies: marketing, technical, manufacturing	9	7	8	7	6			7.4	4%	3.0
Product supports balance among BU's, geography & product lines	8	6	7	6	8			7.0	5%	3.5
Product Advantage									**11%**	**7.4**
Customer needs are understood and effectively addressed by the product	6	8	6	7	6			6.6	5%	3.3
Product provides unique benefits or value proposition or better meets customer needs	6	7	6	7	8			6.8	6%	4.1
Market Attractiveness									**22%**	**14.3**
Meets market criteria such as minimum market size requirements	6	8	8	7	8			7.4	5%	3.7
Market provides growth opportunity	7	5	6	5	5			5.6	6%	3.4
Company can achieve a competitive advantage with this product in this market	8	7	7	8	7			7.4	6%	4.4
Product meets an existing market need or the need can be readily developed	7	5	5	6	5			5.6	5%	2.8
Technical Feasibility									**16%**	**11.6**
Product is technically feasible	6	6	7	6	7			6.4	6%	3.8
We have or can acquire the needed knowledge & expertise	7	8	8	9	8			8.0	5%	4.0
The technical gap, complexity, & technical risk can be adequately managed	6	7	9	7	9			7.6	5%	3.8
Risk									**12%**	**8.3**
There are no show stoppers	7	8	9	8	8			8.0	6%	4.8
Risks and uncertainties can be effectively managed and responded to	6	5	6	5	7			5.8	6%	3.5
Return									**18%**	**12.4**
The return on investment is good relative to the risk	7	6	7	8	7			7.0	6%	4.2
Product's overall profitability (e.g., NPV, ROI, breakeven period, etc.) is satisfactory	8	7	7	8	7			7.4	6%	4.4
There is a reasonable certainty of achieving sales forecasts, the target price and target cost	5	6	6	8	6			6.2	6%	3.7
Regulatory									**5%**	**4.8**
Product meets environmental, health, safety & legal policies	8	10	10	10	10			9.6	5%	4.8
								Totals:	**100%**	**70.3**

Source: PD-Trak Solutions, www.pd-trak.com

GATE CRITERIA

Same criteria or different criteria for each gate?

INVESTIGATION GATE	
Strategic Fit	What are the scope and objectives of the project? What is the product/project strategy to maximize cuatomer value and minimize development resources and schedule? How does the proposed project fit our overall strategy? Is it a priority we want to undertake now?
Customer Need & Market Opportunity	For which customer(s) is this proposed product targeted? Why would they be interested in this product solution? How would it fit with customer plans? What are the options for entering this market? How will our competitors react?
Product Advantage	What customer problem/need is solved? How is the customer problem/need solved? Who are our competitors? What is our advantage? Is intellectual property likely to be critical in securing market position? If so, can it be protected?
Financial Attractiveness	What is the needed target price to be successful? Can we make money at this target price? Can we afford the investment to do it?
Supply Chain	What other products are affected by this project? Do we have the manufacturing capabilities and capacity required? Are any significant investments in plant & equipment likely required?
Technical Success	Do we have the technical capabilities to undertake this project?
Safety & Environmental	Are there any significant safety or environmental issues?
External Considerations	Will it remain legal over the expected life of the product? Does it need regulatory approval? Are there safeguards or security issues? What are the political issues with this project here and overseas?
Project Management	What are the personnel requirements? Are needed personnel available? Will this affect other projects? What is the schedule for the Conceptual Design Phase? Should this next phase be approved?
Risk Management	What could cause this project to fail? How risky is this project? Will it create additional liabilities for us in the future? Do we have a plan to mitigate these risks?

PILOT GATE	
Strategic Fit	Does the project still fit our strategy? Does it still fit into our business plans?
Customer Need & Market Opportunity	Do we still have customer interest or commitment? Are there any significant changes to customer needs?
Product Advantage	Does the product design still offer a competitive advantage?
Financial Attractiveness	What is the current product cost estimate vs. the target cost? Is the project still commercially viable?
Supply Chain	Are there any significant uncertainties or risks with the manufacturing process or required process capabilities? Is the supply chain in place? Are there any critical bottlenecks with one of our supplier's facilities? Should the plant and tooling investment requirements be approved? Are they budgeted? Have all shipping and logistics issues been resolved?
Technical Success	Are there any significant changes to the product requirements? Will the product meet its requirements? Has testing proved the design? Have uncertainties in product performance been addressed? What are the test requirements and plan?
Safety and Environmental	Are we confident that we have a safe design? Are we confident that there is no significant impact to the environment?
External Influence	Do we have confirmation that all regulatory or licensing issues have been resolved? Are all export issues resolved? Are safeguards or security issues resolved?
Project Management	Are the project objectives still feasible? Are we still within the boundaries of the development cost and schedule? If not, what changes to cost and schedule are required? Are resources still available to support this project? If not, how can this project be executed? Are any changes to the Core Team required? What open issues still must be addressed? What are the current boundary conditions/parameters for a viable project? Should the next phase be approved?
Risk Management	What are the major risks with the product and process design, its commercial viability and the project itself? Are the risks acceptable given the potential return? What actions are we taking to mitigate these risks?

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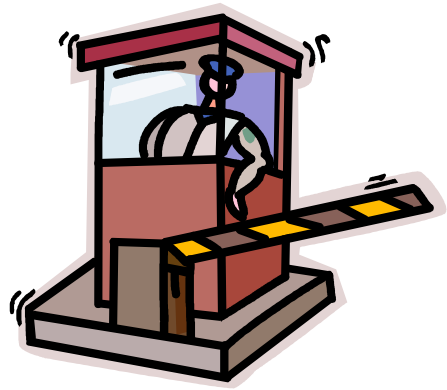
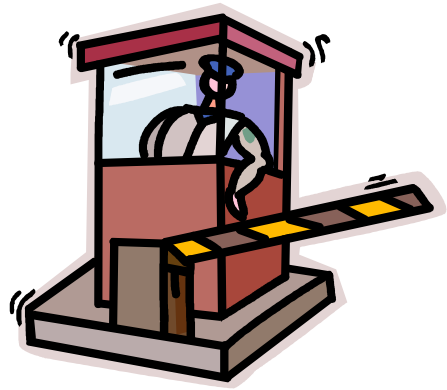


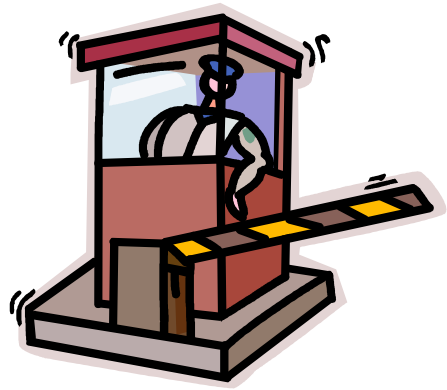
GATE REVIEW GROUNDRULES

1. **Gatekeepers must hold the meeting & be there**
   - Postponed or cancelled meetings are not an option
   - If you cannot attend, your vote is “Yes”
2. **Gatekeepers must have received, read & prepared for the meeting**
   - Contact the gate facilitator or team if there are show-stoppers
   - No “last minute reading” at the meeting



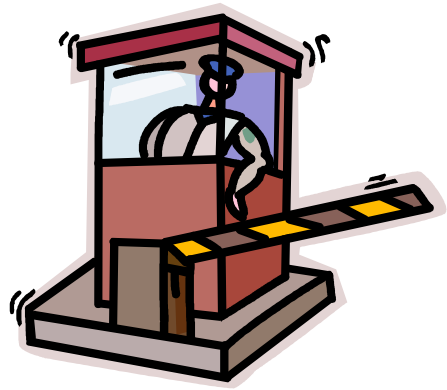
GATE REVIEW GROUNDRULES

3. **Gatekeepers cannot request information beyond that specified in the deliverables**
   - No playing “I got you”
   - Not a forum to demonstrate your political clout or intellectual prowess
4. **Gatekeepers must make their decision based on the criteria for that gate**
   - Gatekeepers must review each criterion and reach a conclusion
   - A scoring sheet or “scorecard” for each gatekeeper



GATE REVIEW GROUNDRULES

5. **Gatekeepers must be disciplined**
   - No hidden agendas nor invisible criteria
   - Decisions based on facts and criteria – not emotion & gut feel
6. **All projects must be treated fairly & consistently**
   - Must pass through the gate – no special treatment for executive sponsored or "pet" projects
   - Subjected to the same criteria & same rigor

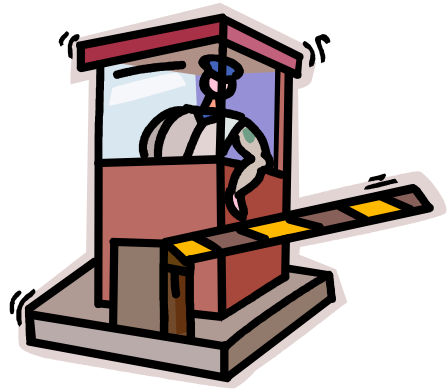


GATE REVIEW GROUNDRULES

7. A decision must be made

- Within that working day
- If deliverables are there, cannot defer the decision
- Decision only deferred if deliverables not there or not complete

8. The Project Team must be informed of the gate decision immediately



COMMON GATE REVIEW ISSUES

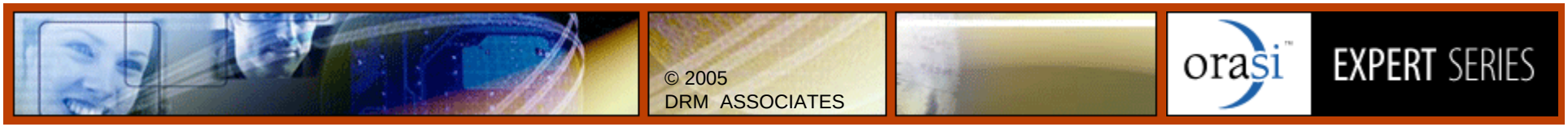
- Management has had a tough time killing projects - “sacred cows” and personal commitment
- Management places low priority on gate reviews and gate reviews are not performed or often rescheduled/ delayed affecting project schedules
- The function of gate reviews and design reviews are confused; management dives too deeply into technical details

COMMON GATE REVIEW ISSUES

- Lack needed information because of ill-defined project deliverable requirements and gate review package content as a basis for decision-making
- Lack of clear, understandable & effective gate criteria
- Projects get a life of there own
- Teams tweak the project business case until acceptable

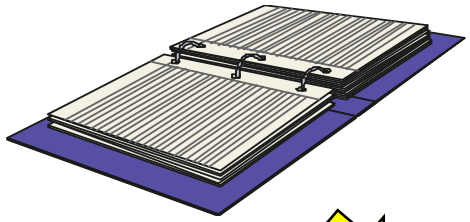
IMPLEMENTATION STEPS

- Define roles and responsibilities of business team
- Determine membership
- Establish gate criteria, weighting, scoring criteria and decision-making process
- Develop gate review process and embed in NPD process
- Develop policies, procedures and guidelines/ groundrules

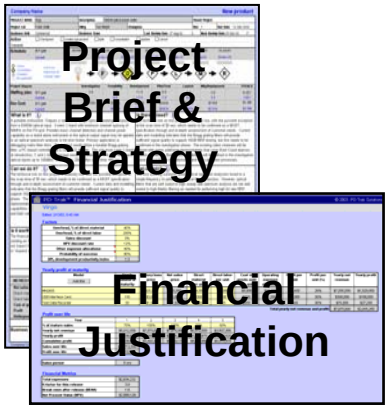


A TOTAL MANAGEMENT SYSTEM

Business Plan

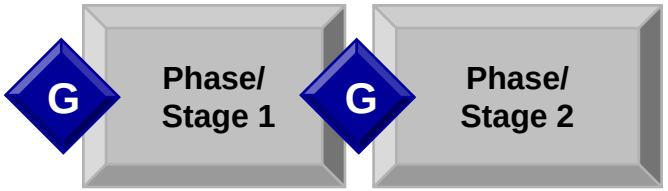


1. Decision on the overall level of investment in R&D and our general product development strategy



2. A solid business case and product strategy for each proposed development project

3. A Phase/Stage-Gate process to rigorously evaluate projects at critical points and approve or kill projects



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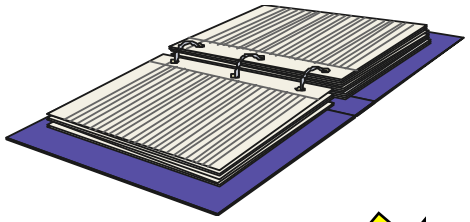
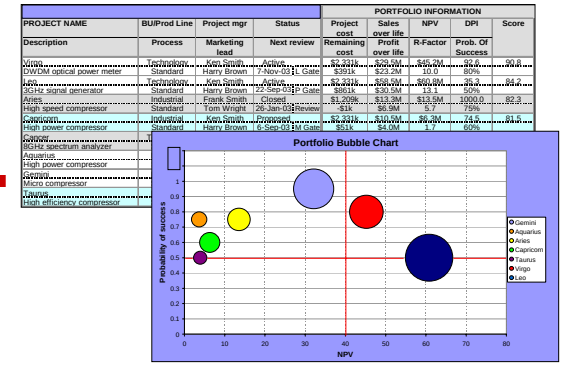


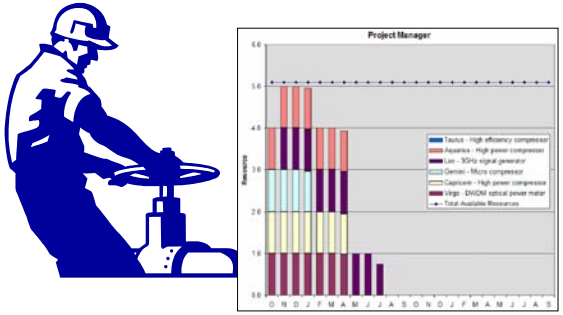
	2004	2005	2006	2007	2008
New Product Sales	$15.4M	$28.5M	$36.8M	$37.2M	$31.2M
New Product Profit	$4.1M	$7.1M	$8.8M	$9.0M	$7.6M
Dev. Expense-Committed	$12.6M	$12.7M	$6.5M	$0.0M	$0.0M
Dev. Expense-Planned			$6.3M	$13.4M	$13.7M
Development Headcount	72	72	74	74	76



6. An integrated business planning process that shows the result of portfolio decisions on the plan

4. A portfolio management process to select an optimum mix of projects that will meet business objectives

5. A pipeline management process to plan resource requirements and control the release of development projects



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