

Pipeline Management

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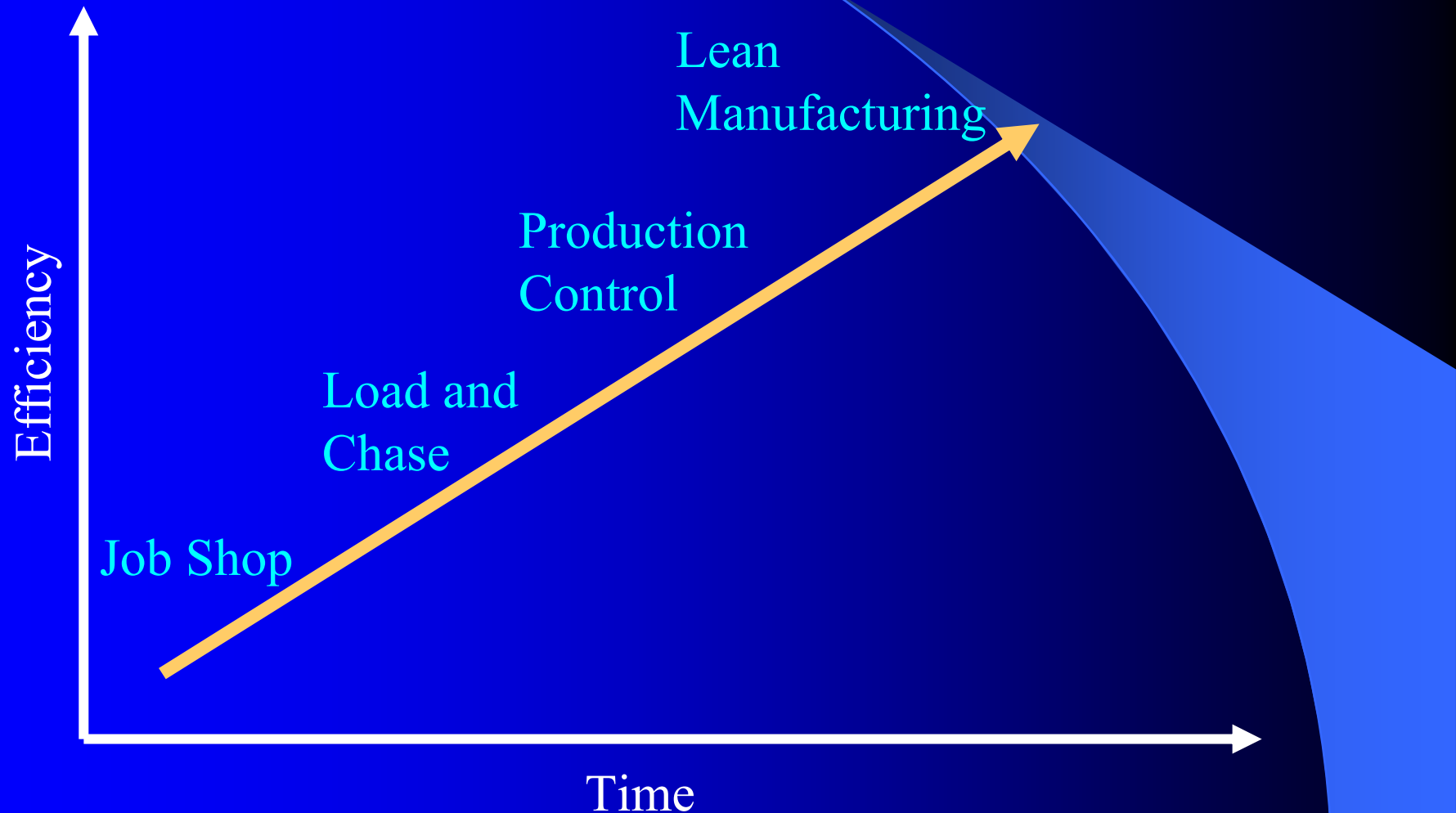
Focus

- How can a development engineering organization
- Increase the flow of new products
- By taking the perspective of operating a development pipeline?

Pipeline Thinking

- Common for operations/manufacturing (and chemical engineers!)
 - Processes and workflow are visible, and explicit
 - Work flowing through the pipe is routine and repeatable
 - Capacity, throughput, bottlenecks are designed in and managed
 - The pipeline is managed for continuous improvement
- But it hasn't always been that way...

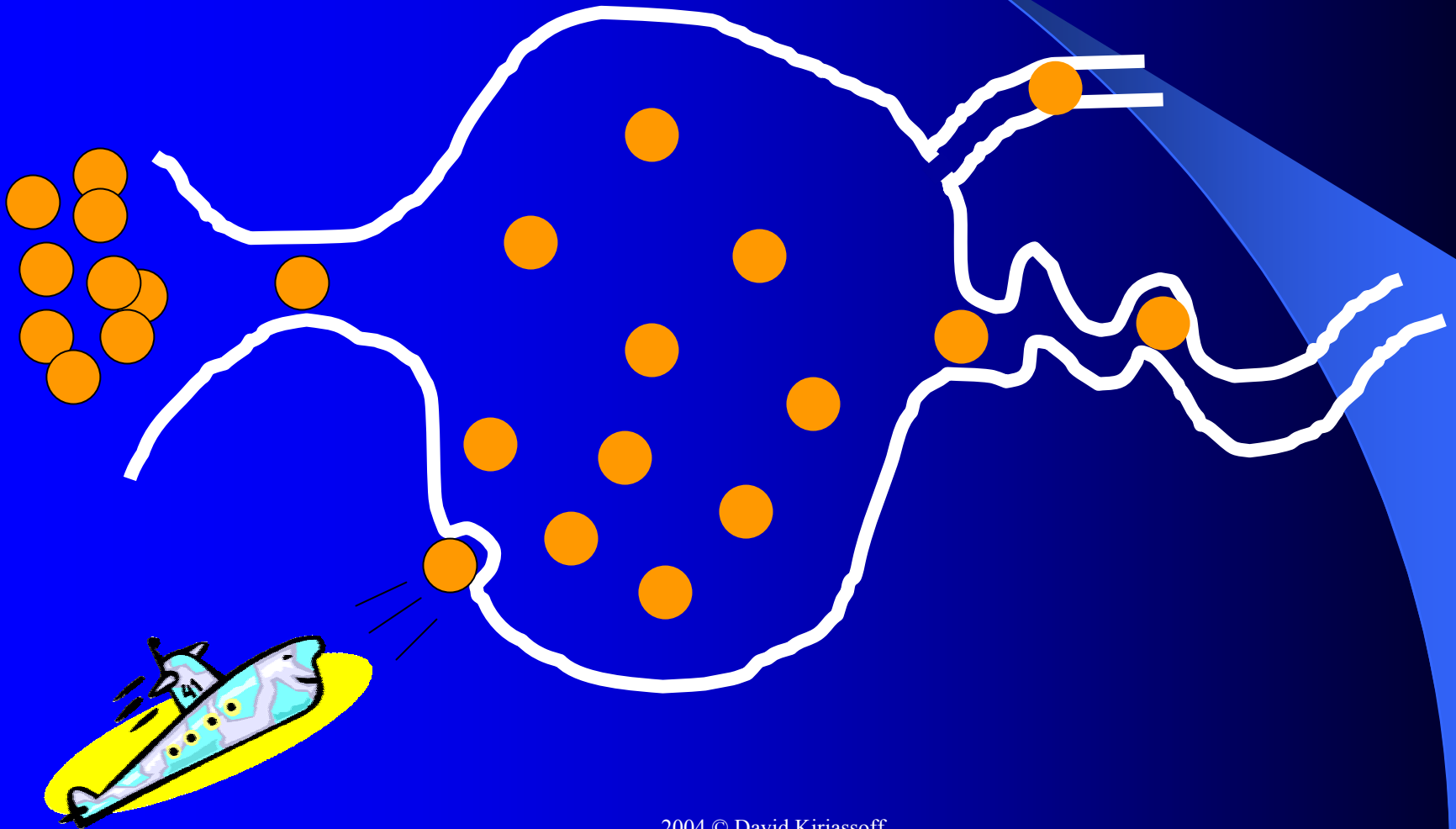
Pipeline Evolution in Operations



Pipeline Thinking

- Less common for design/development
 - Process and workflow is invisible, and in a constant state of flux
 - Work flowing in the pipe is highly variable, often indeterminate
 - Capacity, throughput are often secondary considerations
 - Projects are managed for improvement, often the pipeline is not

A Sample Development Pipeline



Common Development Pipeline Problems

- Good new ideas spoil; waiting for someone to start working on them
- Too many projects for too few resources
- Constantly shifting priorities
- New work slips in unannounced
- Half-baked work is rushed to completion
- Lots of work is sort of on hold, but nothing ever goes away

Pipeline Management

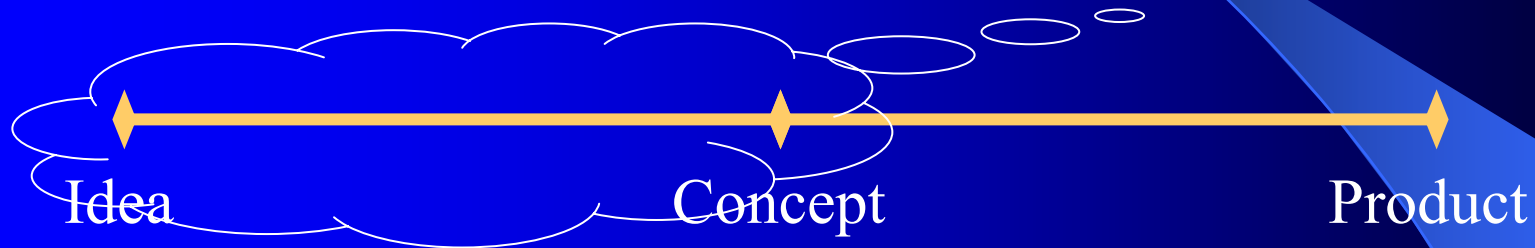
- Definition:
 - The process of managing a portfolio of separate development projects across a common group of resources (people, processes, tools)
- Three main focus areas:
 - Pipeline Design
 - What do we want our development process to look like, and what capacity do we want to establish?
 - Pipeline Operation
 - How do we best operate the pipeline we have, and how do we know how well its working?
 - Pipeline Improvement
 - How do we take what we are learning during pipeline operation, and translate it into improvements in pipeline design?

Pipeline Design Considerations

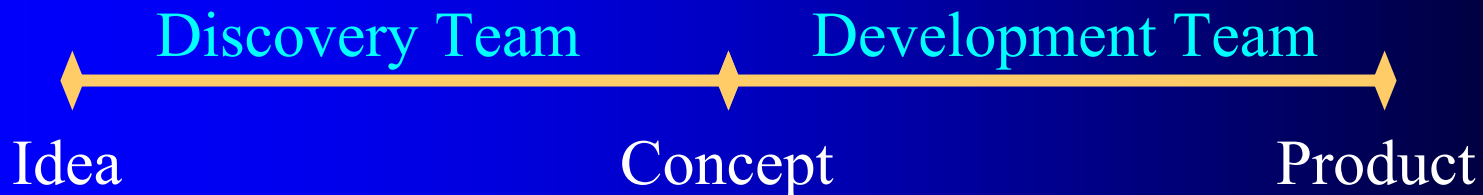
- Length
 - Where does the development pipeline start and end?
- Width
 - How many projects do we want to work on at once?
How much capacity do we need to provide?
- Shape
 - What should the pipeline look like?
 - One pipeline for all, or special purpose pipes?

Pipeline Length – Start Point

- Beware the fuzzy front end

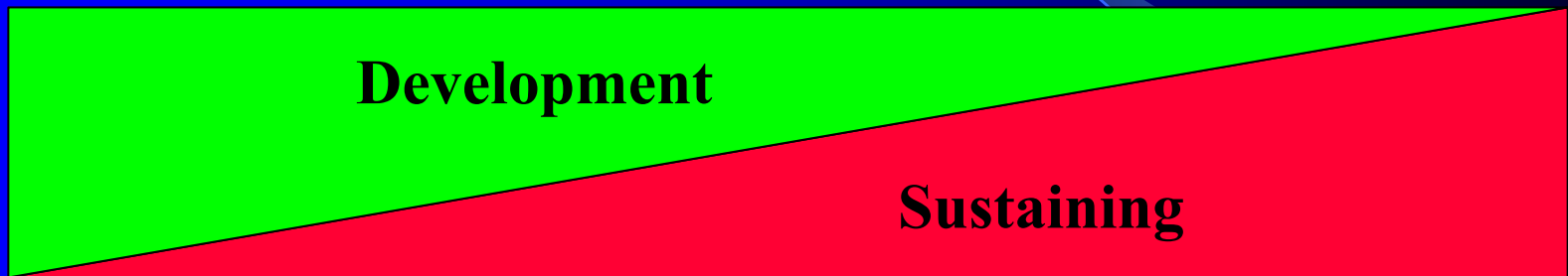


- Consider separating discovery from development



Pipeline Length – End Point

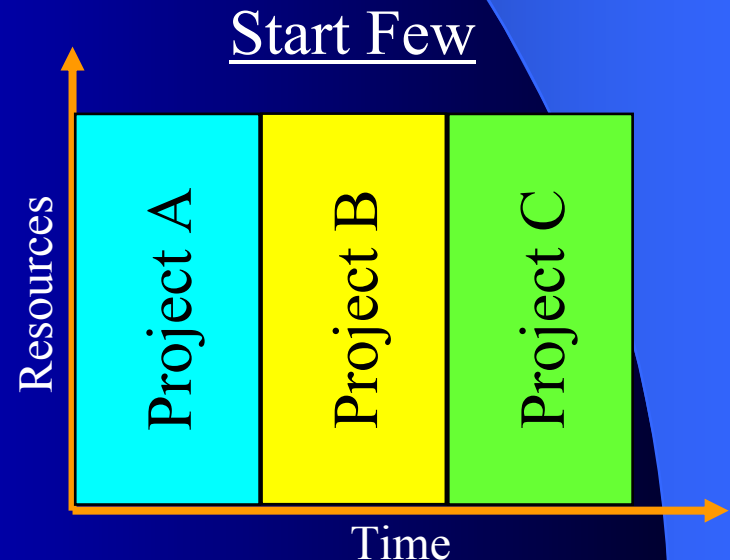
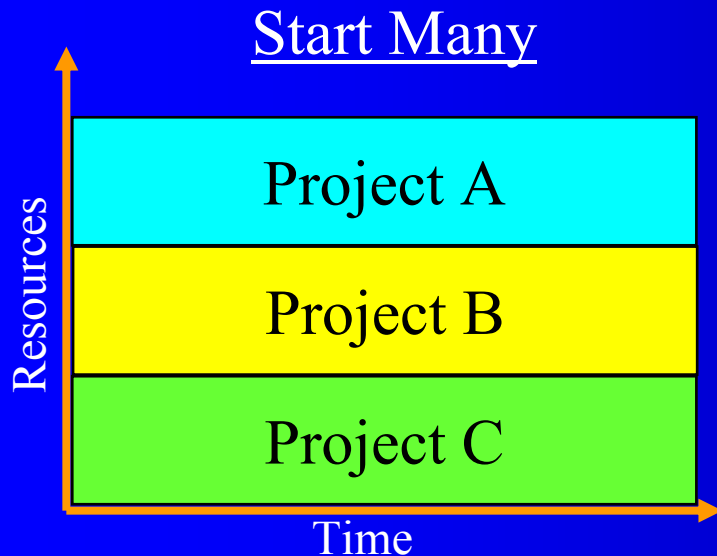
- Avoid the sustaining engineering black hole



- Separate design resources from sustaining resources
- Clearly define the handoff from development to sustaining

Pipeline Width

- How many projects do we want to work on at once?
- Consider two extremes:



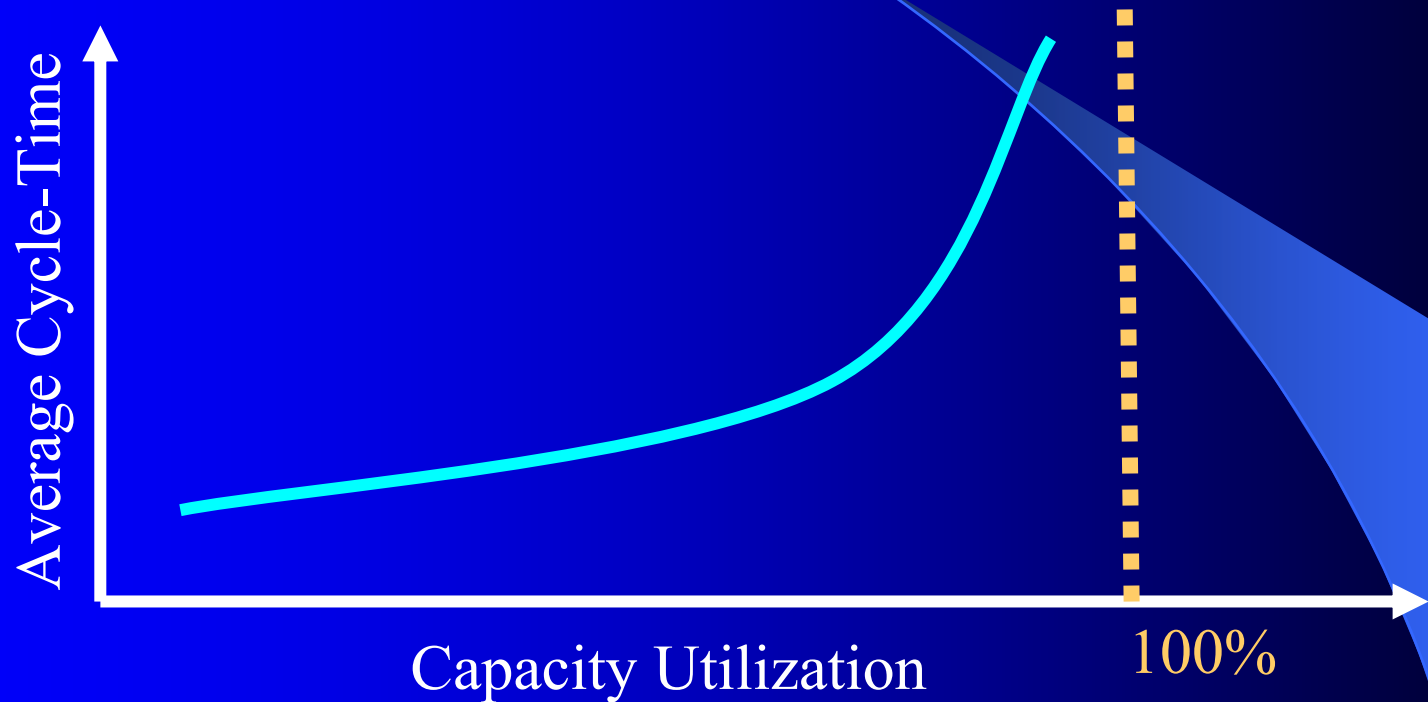
Advantages:

Start Fewer, Finish Quicker

- Multiple resources involved, easier to deal with resource disruption
- Smaller window to introduce changes or deal with reprioritization
- Easier to forecast customer needs over shorter time horizon
- Cycles of learning for both team development and project content
- Benefits of completed work begin accruing earlier

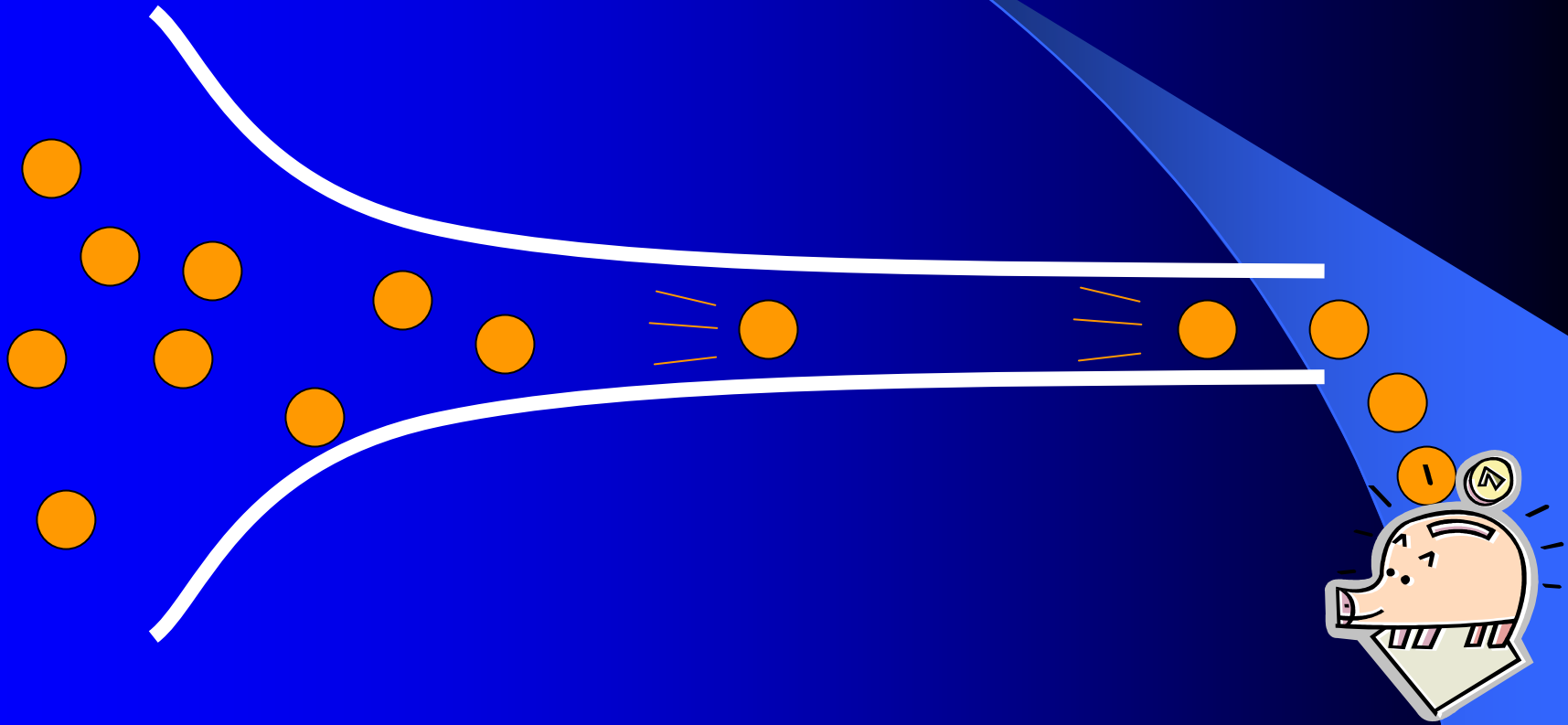
Pipeline Width

- How much capacity do we need to provide?

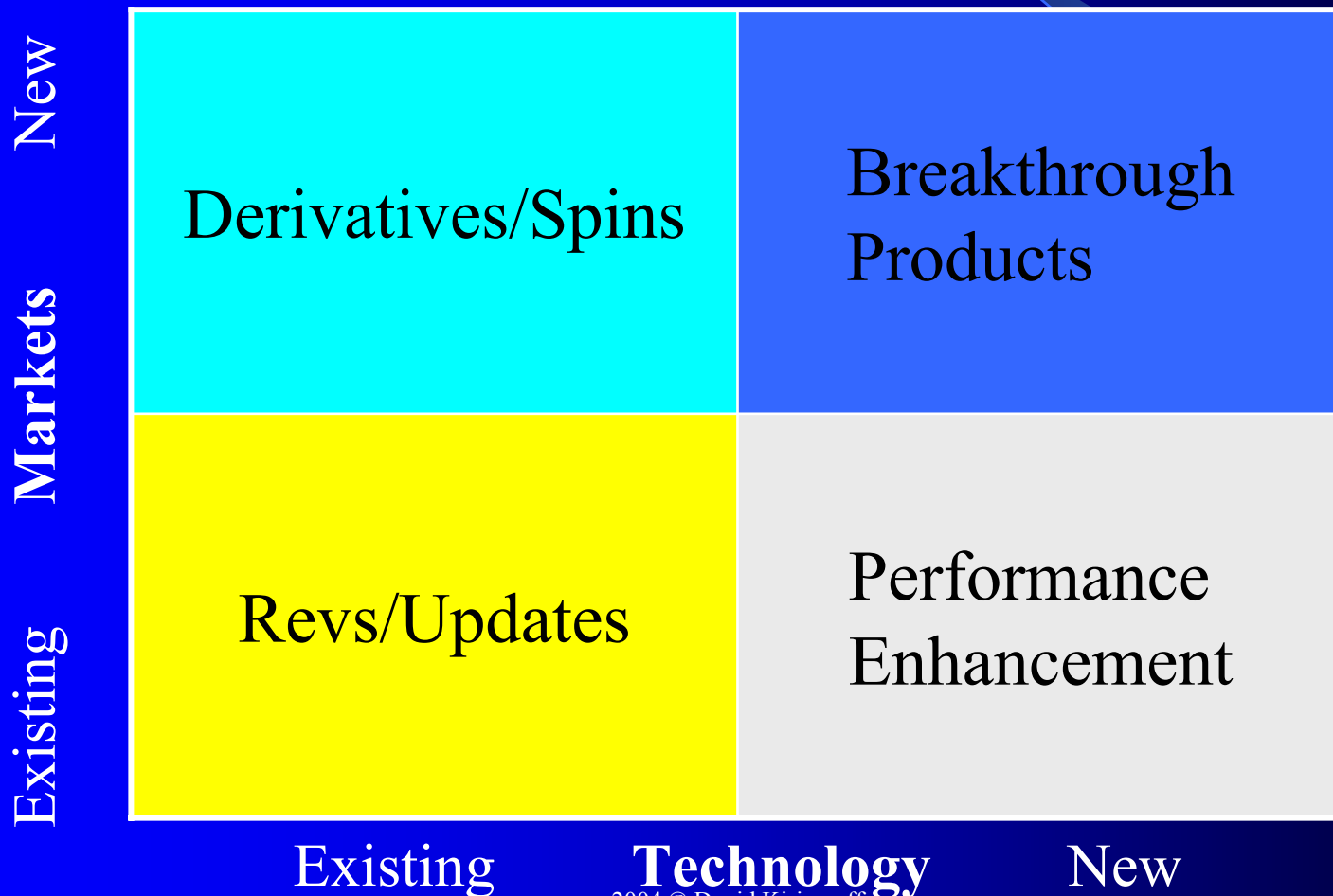


- What has the greater impact your profitability
 - Time-to-market or
 - Productivity

Pipeline Shape



The Pipeline(s) have to Supply the Product Portfolio



Pipeline Operational Considerations

- How do projects get defined and initiated?
- How are priorities established and maintained across pending and active projects?
- How are resources allocated to projects on an initial and ongoing basis?
- How is forward progress tracked and maintained for active projects?

Let's look at these from both a “getting started” and a best practices perspective

Getting Started

- Inventory current projects
- Drain the swamp
- Prioritize what's left
- Get some control on the input

Inventory Current Projects

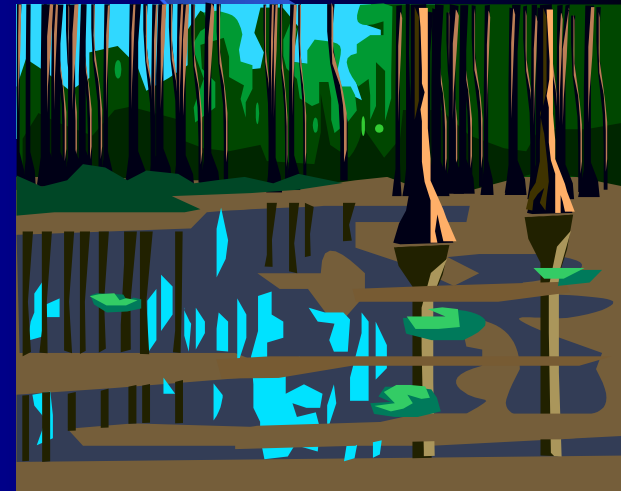
- Generate a list of all active and on-hold projects
- Identify (or assign) an “owner” for each project
- Ask owners to estimate:
 - Effort remaining (man-hours, calendar time, \$\$)
 - Business benefit (\$\$, H/M/L, etc.)
 - Team members involved (and time %)
 - Current status (active, on-hold, stalled)
 - Obstacles to completion
- Tabulate and circulate summary for review/comment

Inventory Format

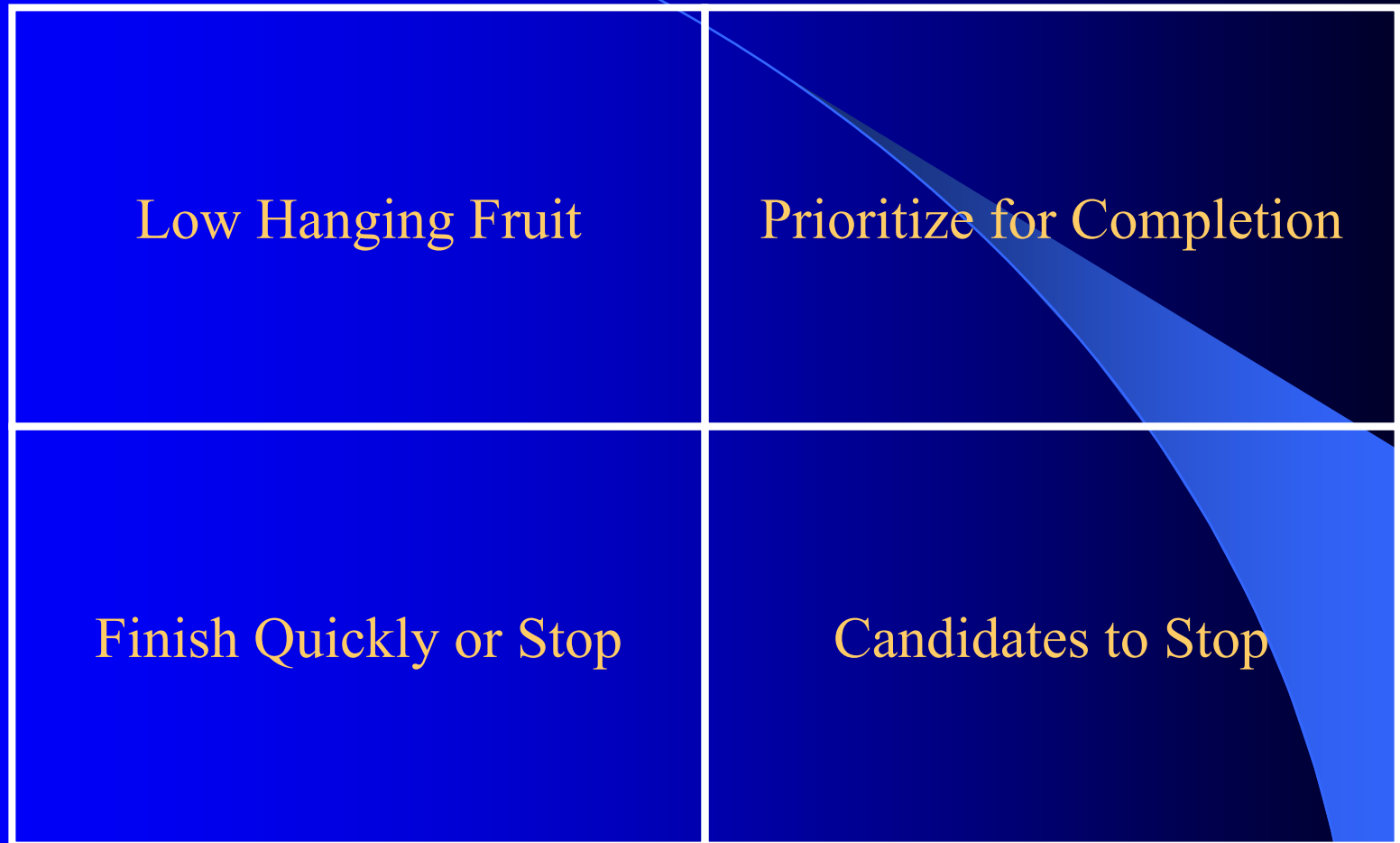
Project Name	Description	Status	Effort Remaining	Business Benefit	People Involved	Completion Obstacles
System Upgrade	New call center script system	On-hold	6 man-weeks, \$12,000	High, allows growth with current staffing	System analyst, IT	Pending resources from IT

Drain the Swamp

- Schedule a meeting to review the inventory
 - Evaluate the work
 - Expedite the easy wins
 - Identify what to stop doing



Evaluation Matrix



Impact	High	Low Hanging Fruit	Prioritize for Completion
	Low	Finish Quickly or Stop	Candidates to Stop

Low

High

Effort

Prioritize what's left

- Rank order remaining significant projects
- Assign resources in priority order
- Communicate priority across the team
- Establish ground rules for priority:
 - Queues are handled in priority order
 - In case of resource constraints, assign to higher priority projects first

Get control of the pipeline inputs

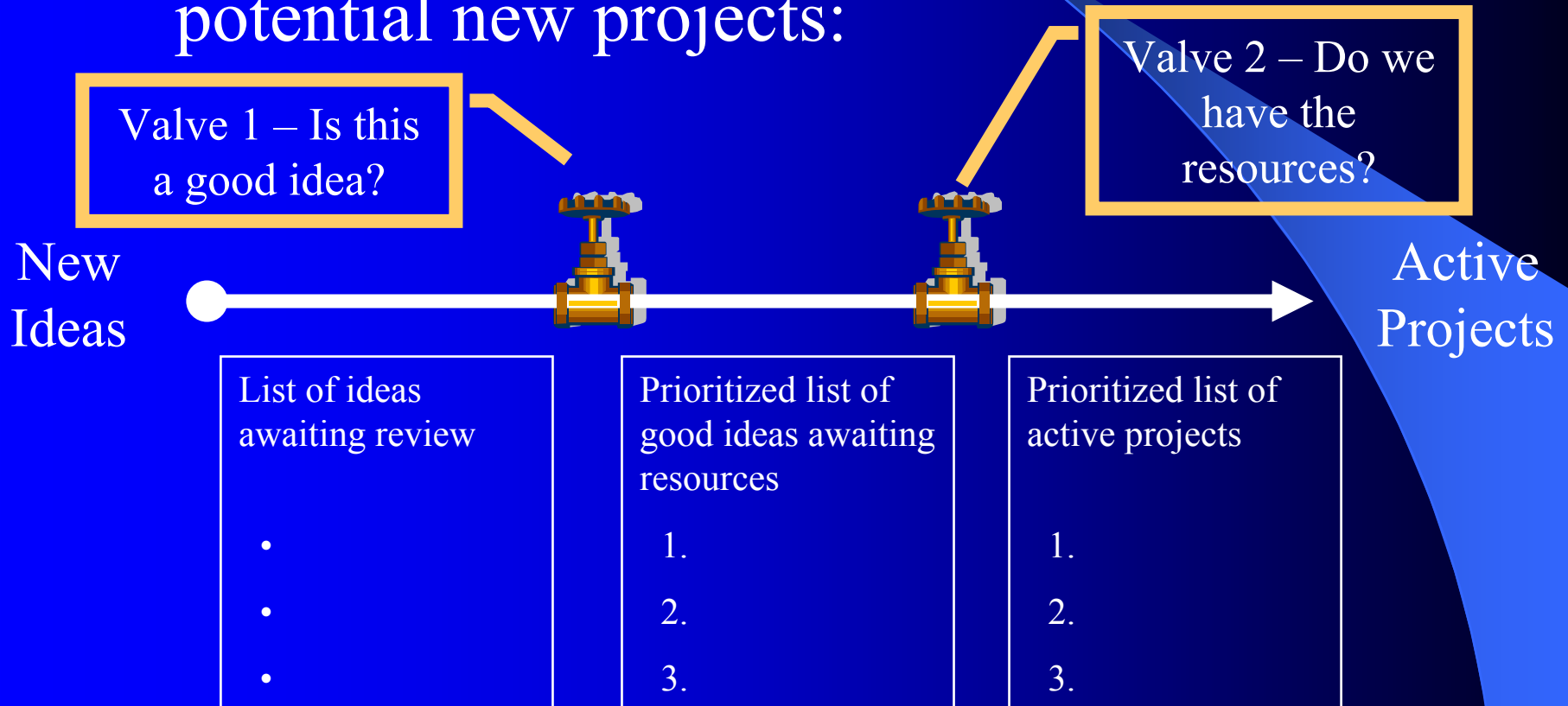
- Declare a temporary moratorium on initiating new work until inventory process is completed
- Dedicate separate resources to sustaining tasks and projects

Best Practices

- Input control
- Phase gate review process
- Pipeline control room

Input Control Methodology

- Establish a sequence of two queues for potential new projects:



Valve 1 – Good Idea Test

- Establish a process for submitting and collecting ideas for projects
 - Minimize bureaucracy, keep it simple
 - Review ideas frequently, avoid spoilage
- Rank ideas for fit with team strategy, business impact
- Select ideas to pass through the valve
- Estimate resource requirements

Idea Evaluation Matrix

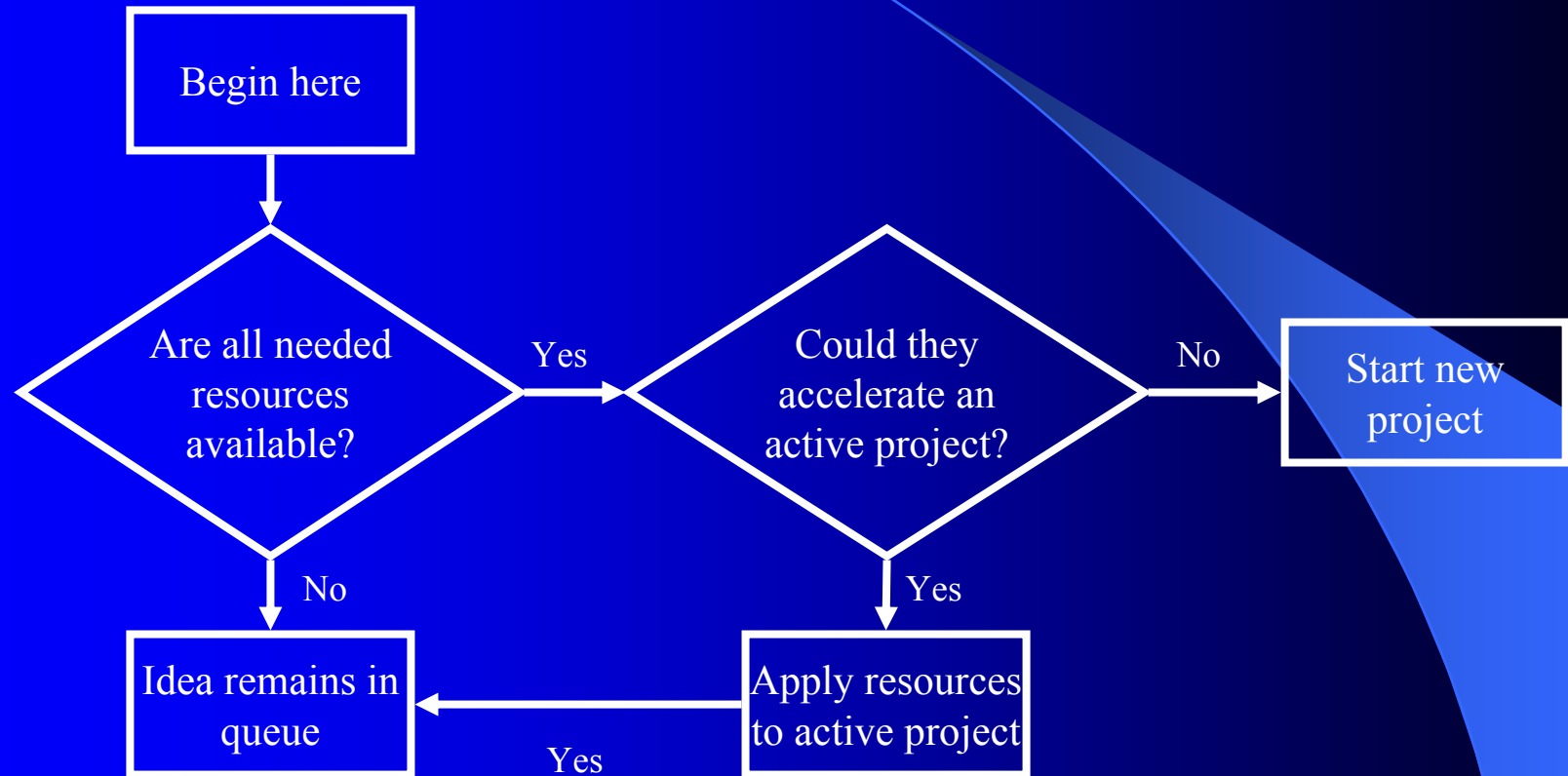
Fits our Charter	High	Just say no	Prioritize and pass to second valve
	Low	Just say no	Refer elsewhere
		Low	High

Good ROI

Valve 2 - Resources Test

- Note: Periodically review the “good ideas” queue, priorities often shift
- Starting with the top idea, apply the following process

Valve 2 – Decision Process Flow



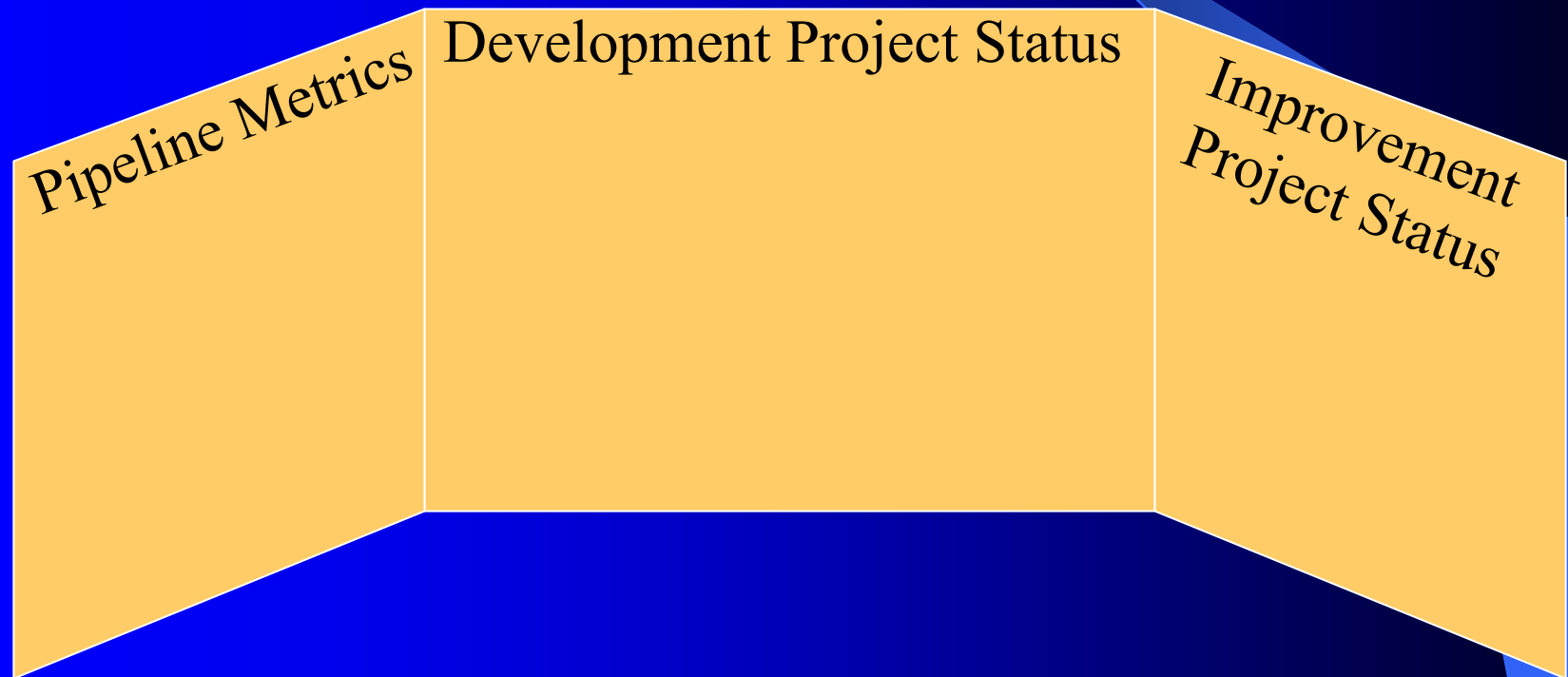
Phase Gate Review Process

- Establish a standard set of phases that fit your types of projects
- Maintain a virtual status board showing where each project is in the pipeline
- Conduct reviews of every project in the pipeline as it passes a phase milestone (next slide)
- Allow for “emergency” review any time a project is in jeopardy

Phase Review Questions

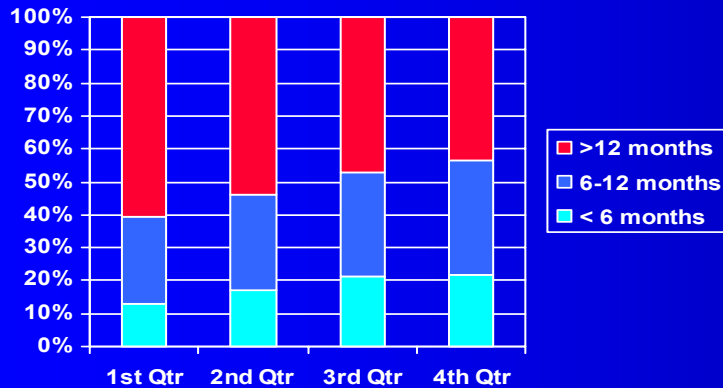
- Is this project still worth doing?
 - Market/customer needs
 - Opportunity cost
- Are the planned resource requirements on track?
- Are there any anticipated obstacles to completion?

Pipeline Control Room

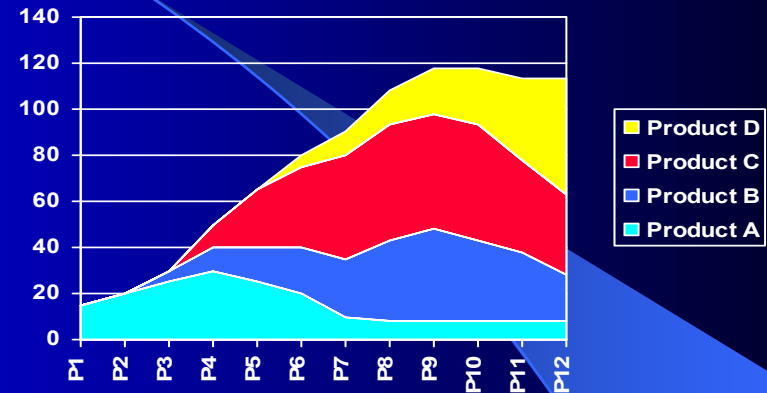


Metrics Wall- Example

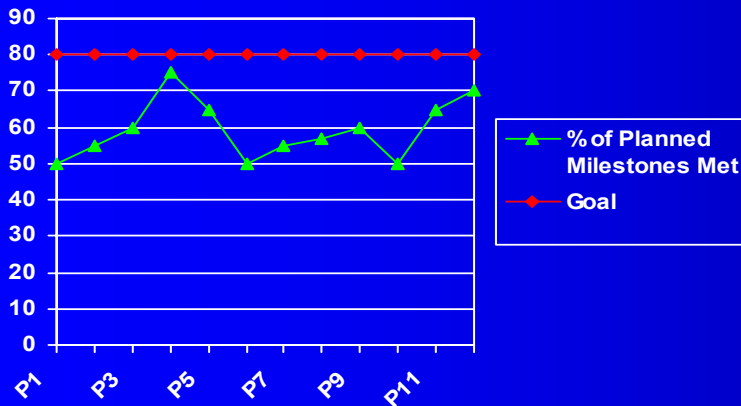
%Of Sales from New Products



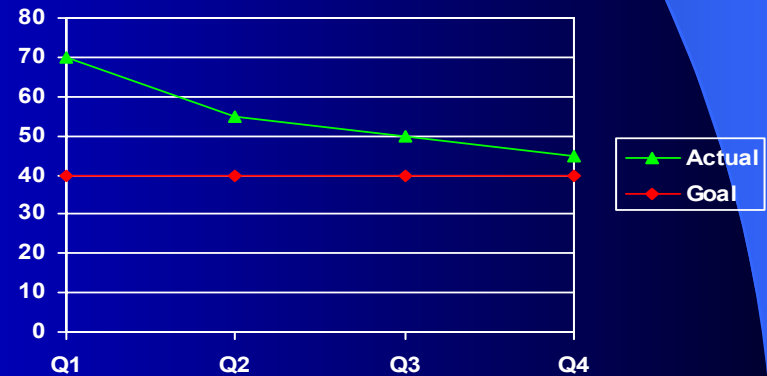
New Product Revenue Growth



Aggregate Schedule Performance



Normalized Development Cycle Time
(Days/1000 gates)



Development Project Status Wall

Idea Queue	Input Queue	Project Priority
•	1.	1. A
•	2.	2. C
•	3.	3. E
•	4.	4. B
	5.	5. D

Project C

Project B

Project A

- Schedule Performance
- Resource Utilization
 - By Name
 - Hours/month, planned vs. actual
- Development Spending
- Forecast Revenue Plan

Pipeline Improvement Considerations

- How do we identify potential improvements in our pipeline design?
- How do we plan and implement desired improvements?
- How do we allocate resources to improvement work?

Pipeline Improvement Wall

Improvement Project C

Improvement Project B

Improvement Project A

- Charter/Goals
- Schedule Performance
- Resource Utilization
 - By Name
 - Hours/month, planned vs. actual

Idea Queue

-
-
-
-

Input Queue

- 1.
- 2.
- 3.
- 4.
- 5.

Active Improvement Project Priority

1. A
2. C
3. B

In Summary

- Teams that manage a portfolio of projects often don't view themselves as managing a production pipeline
- We have a natural tendency to “bite off more than we can chew” which has unintended consequences to productivity
- Controlling the front end of the process generally results in a faster flow of completed work at the back end
- Maintaining a clear and common set of priorities for project queues and active projects can help ensure that at least the high priority work gets through