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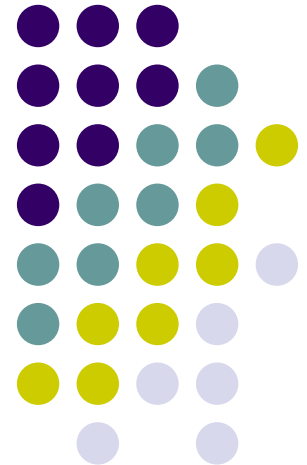
15.351 Managing Innovation and Entrepreneurship
Spring 2008

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15. 351 Managing Innovation & Entrepreneurship

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Spring 2008

Class Eighteen – R&D Portfolios



Module Three:

Exploiting innovations



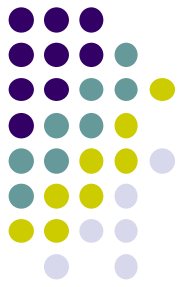
Four Classes - insights into the most effective exploitation strategies & processes

Exploiting Innovations

**Key strategies
& processes**

- IP & Complementary Assets framework – commercialization strategies
- Le Petit Chef – portfolios & portfolio management processes
- Leveraging platforms – Electronic Arts & video gaming – Cyrus Beagly from McKinsey
- Leveraging portfolios – A123 – Ric Fulop, founder & VP Biz Dev

Interaction between Appropriability & Complementary Assets critical when determining who makes \$ exploiting innovation



		Controlling the Assets	
		No, free or don't yet exist	Yes by powerful incumbents
Controlling the Ideas	Weak	Innovators can profit	Hard position for innovators to profit – need to move!
	Strong	Innovators in strong position to profit	Innovators & Asset holders share profits

Effective Commercialization Strategy Depends on Assessing Two Key Questions



Do incumbents control assets that you need to create value from your innovation?

How well do you control the ideas behind your innovation?

Weak

Strong

No, free or don't yet exist

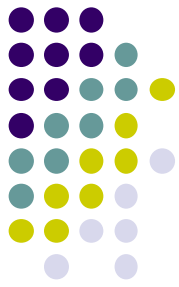
Yes by powerful incumbents

Innovators can profit if they are fast or stealthy—otherwise risk “catch-up” e.g. Disney, fashion

Ensure partners have a reputation & prove your value early e.g. A123, semiconductors

Profit opportunities but need to build a value chain – hard to do, need \$\$\$ e.g. eInk, Nintendo

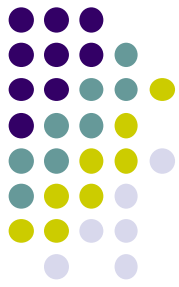
Licensing, partnerships, key is where on value chain to contract e.g. biotech



Attackers' Advantage

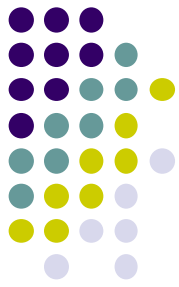
- If there is weak IP protection, and there are relatively few or widespread CAs, then this is basically a level playing field for competition. The start-up does not need to make duplicative investment in CAs, the technology can be imitated.
- The advantage that the entrepreneur has is to be fast – there are few other ways of protecting your innovation. Entrepreneurs can often win this by “stealth,” i.e. starting in small markets where the incumbent is not paying attention and then moving into the larger markets, once performance is developed.
- What about the other diagonal, when there is IP and there are relevant CAs? This is what we have dubbed the Idea Factory: entrepreneurs do not need to build CAs, instead, with IP they have the bargaining power to engage in partnerships for CAs. The determinants of the return on innovation will be bargaining power:
 - need high quality technology that you can signal its quality with results
 - if there are more incumbents with the assets, you can create a bidding war and so you can raise the price.
 - if you have the cash you can build the CAs and then gain more of the pie, but this is difficult to raise the cash to do (e.g. Celera has the cash to build CAs for biophar immediately because of their ownership).
 - might want to try and do this gradually

OFF DIAGONALS

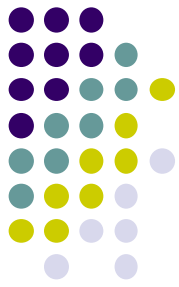


- If there is limited IP but there are relevant CAs, (might think of Sycamore as a case like this), then you might prefer to partner for the CAs, but the deal can be difficult to strike because of the bargaining problems of expropriation.
- The choices are:
 - try and go it alone: this is costly and it can be difficult to prevent imitation and head-to-head competition
 - try and bargain: the large firms try and build a reputation for being a good partner e.g. Intel, CISCO
- If there is IP and there are limited relevant assets from the incumbent, then this is greenfield competition – this is a good position because imitation is difficult and returns in the product market will be high, but this is difficult and quite unusual.
- Examples might be Genzyme in Ceregen (orphan drug with a well defined market and no interested competition). You can also try and set the industry standard and build CAs to protect your position.
- Recall that the flip side is to determine what to do to deter entry and increase gains to innovation
 - Build up intellectual property
 - Build up relevant and increasingly specialized complementary assets

Strategy & position in the IP/Assets matrix



- Different positions in the matrix imply different commercialization strategies.
- Not fixed over time or verticals – may want to move or expand
- Implications for the portfolio of R&D projects that you need to develop i.e. how you spend your first US\$1-5M!!



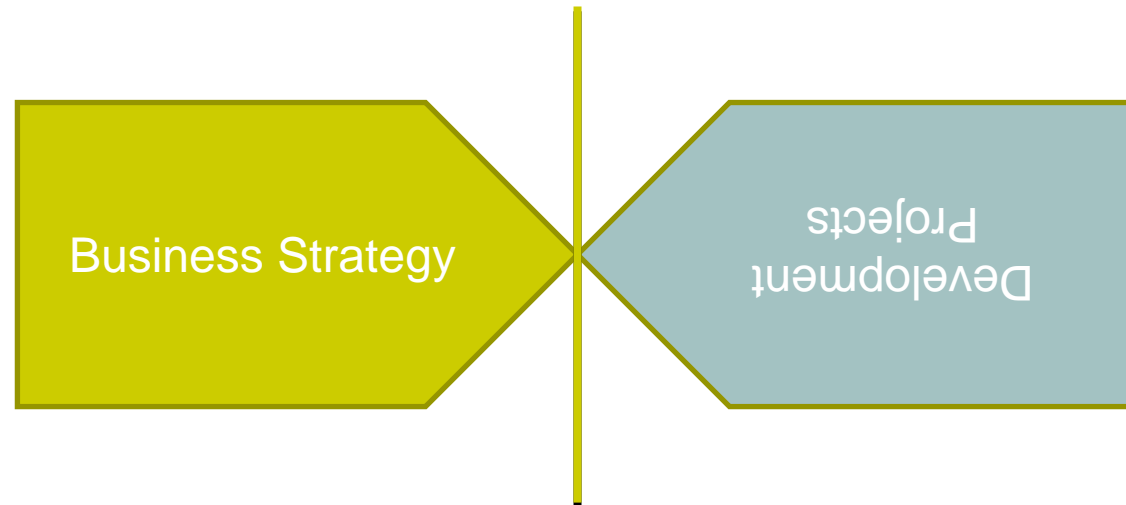
In Class Assignment

- Imagine you are Brigitte Gagne, newly promoted Director of R&D for Le Petit Chef
- Prepare your presentation to the executive meeting
 - Teams of 4
 - Four slides only
 - Consider analysis of problem, future portfolio & future processes
 - Try & be clear without pointing the finger too much!

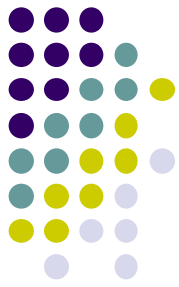
Creating R&D Portfolios: Aggregate Project Planning



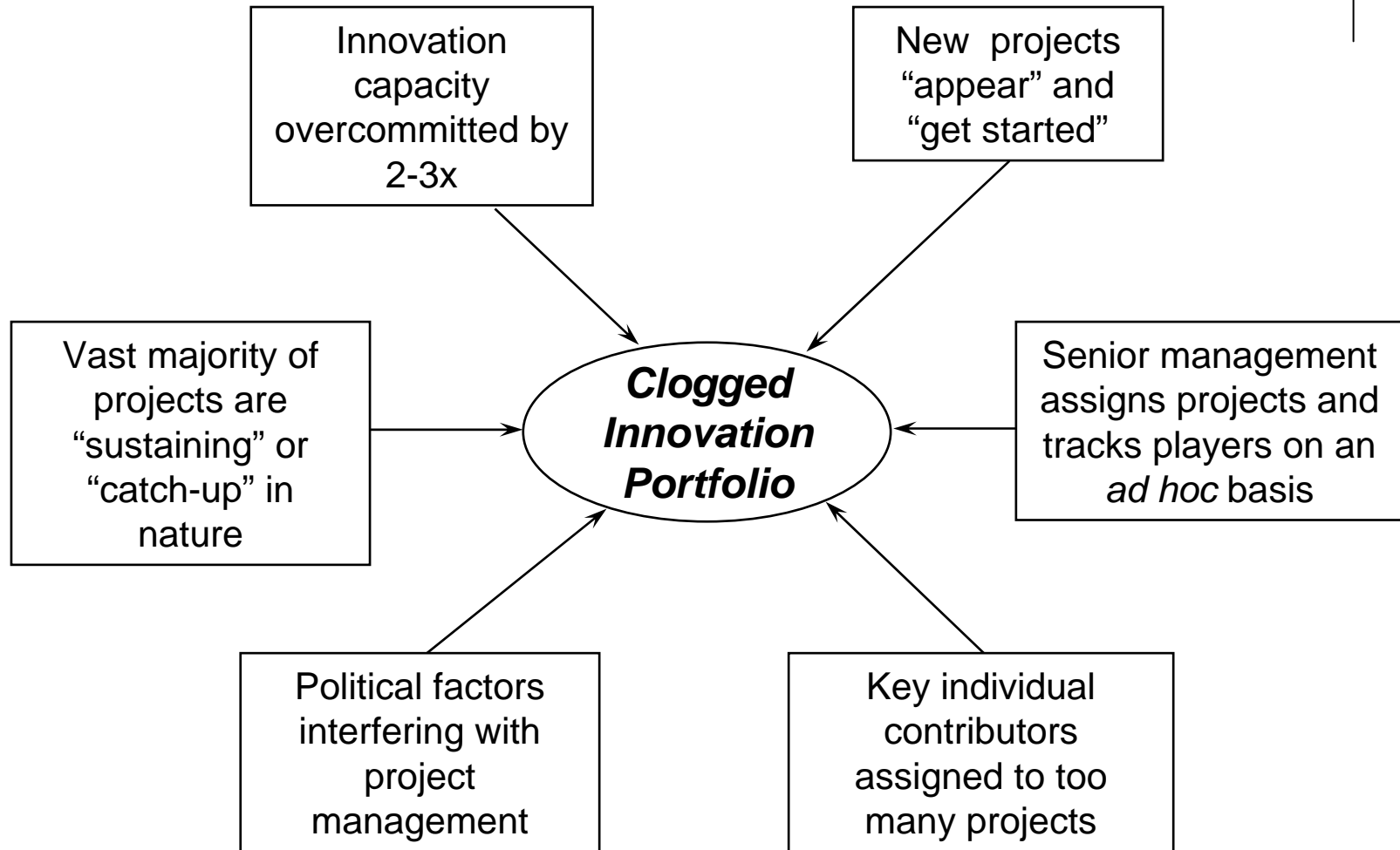
Development projects should be vehicles for executing strategy



Your strategy and your project portfolio should mirror one another – a strategy built around repeated innovation cannot be sustained by derivative projects alone!!



The Reality in most firms



Demands Typically Exceed Resources

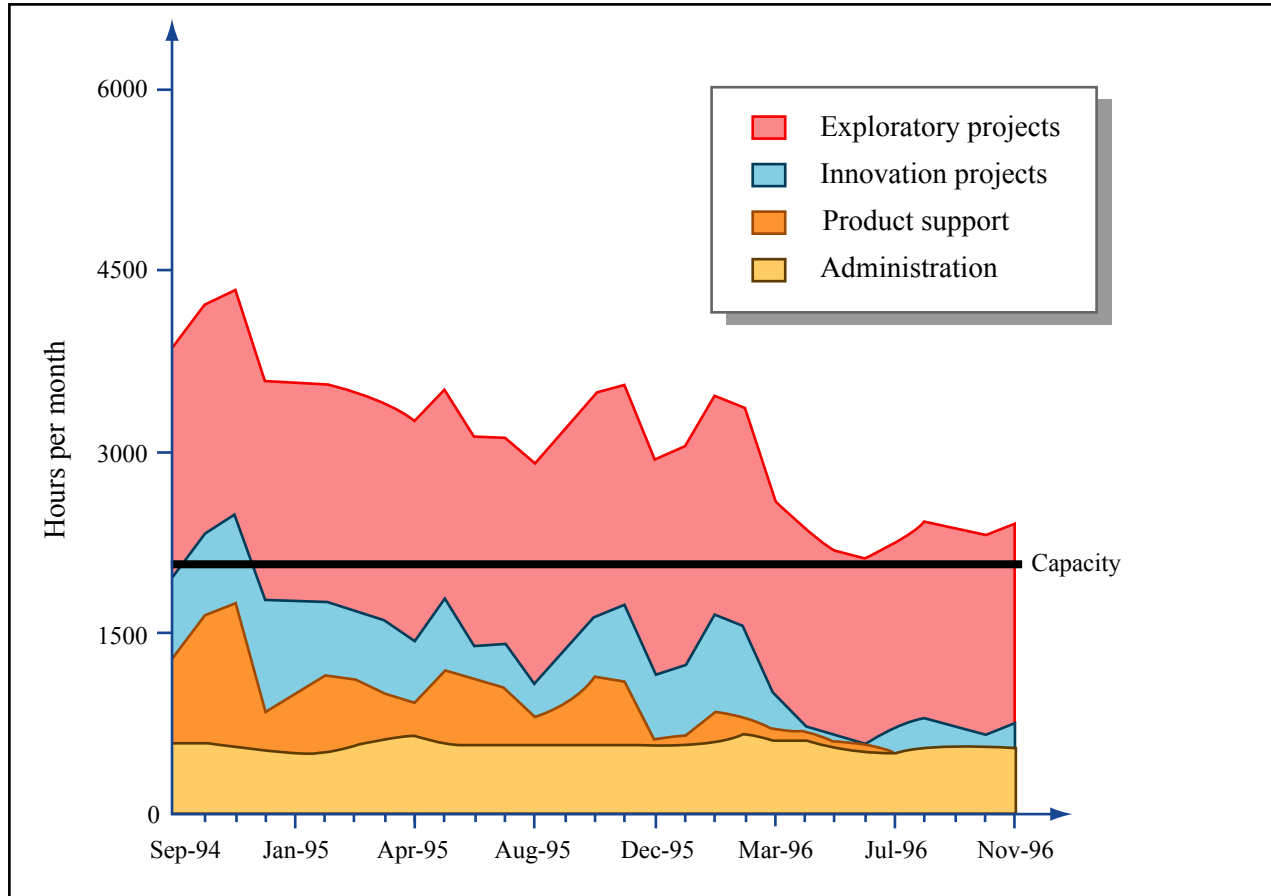
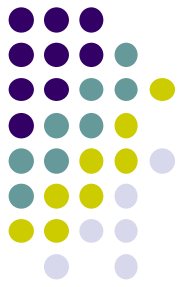


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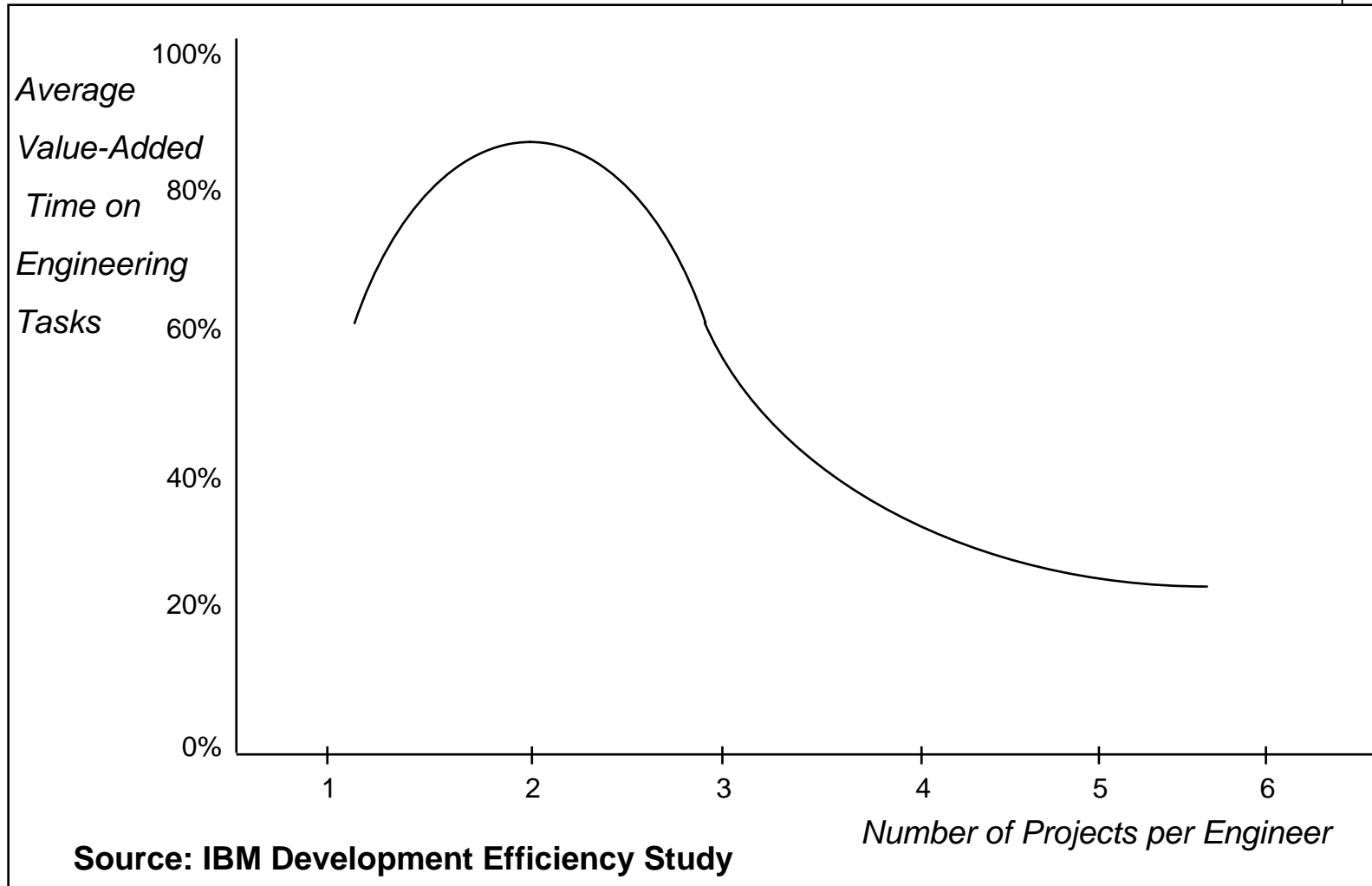
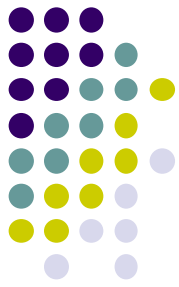
NOTES: This represents a sample resource demand projection rather than an actual scenario.
Capacity is defined as the number of FTEs working 40h/wk each, in this case 20 FTE's.

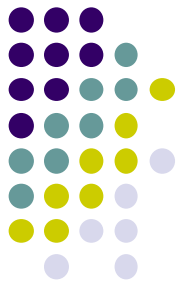
Resource utilization



- An understanding of resource utilization impacts both portfolio planning and project gate keeping.
- Use of funnels and matrices on their own can bring forth an optimized project portfolio. But without adequate attention to innovation capacity, the portfolio's promise will remain unrealized. In addition to overall resource requirements for the portfolio, it is also important to factor in individual resource constraints. Studies show that the overall productivity for individuals peaks at 2 to 3 projects, and declines rapidly thereafter. For example, when key managers are shown as contributing materially to five or more projects, many of the projects are not happening and the remainder are adversely affected.

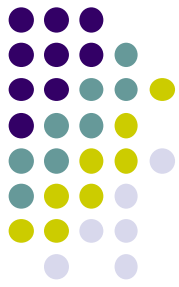
Over-commitment destroys productivity





Problems at Le Petit Chef

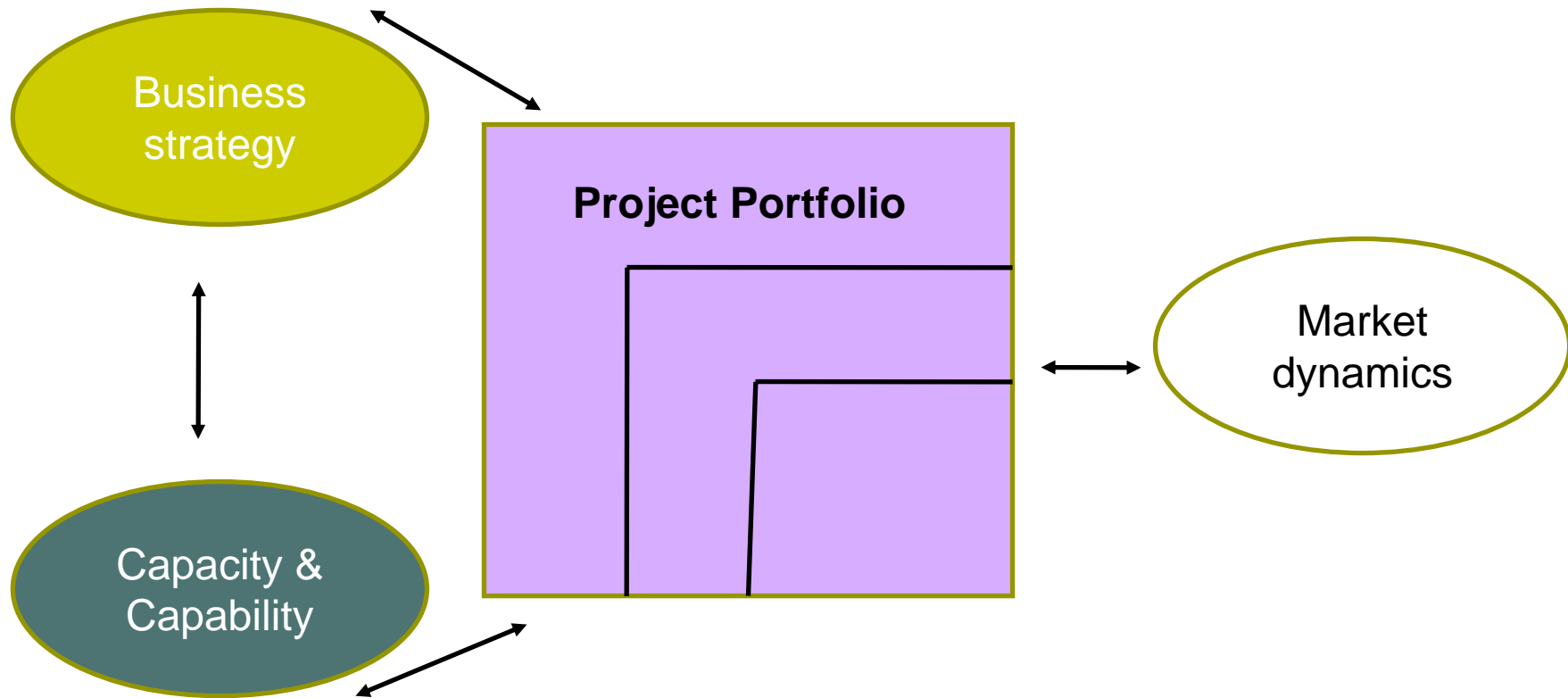
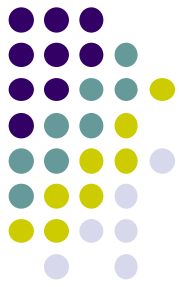
- Development Strategy & Portfolio
 - No platform – too many derivative projects
 - Increasing manu costs due to complexity of line
 - Increased shipping delays due to >> projects
 - Burn-out of individuals – ignore 10% “support work”
- Portfolio Selection Process
 - Bottom up – no top down input
 - NPV used for all projects – apples & oranges, platform never selected
 - Departmental fragmentation
 - Lack of recognition of platform opportunities



What is the challenge?

- In most firms, number of new ideas for projects far exceeds company's capacity to execute those projects effectively
- Every day new ideas come in from R&D, marketing, customers (& you want this to happen!)
 - Development is a moving target
- What process do you use to ensure you align your projects with your capacity & strategy?

Project portfolios link strategy & development



Step 1: Strategic Goals & Objectives

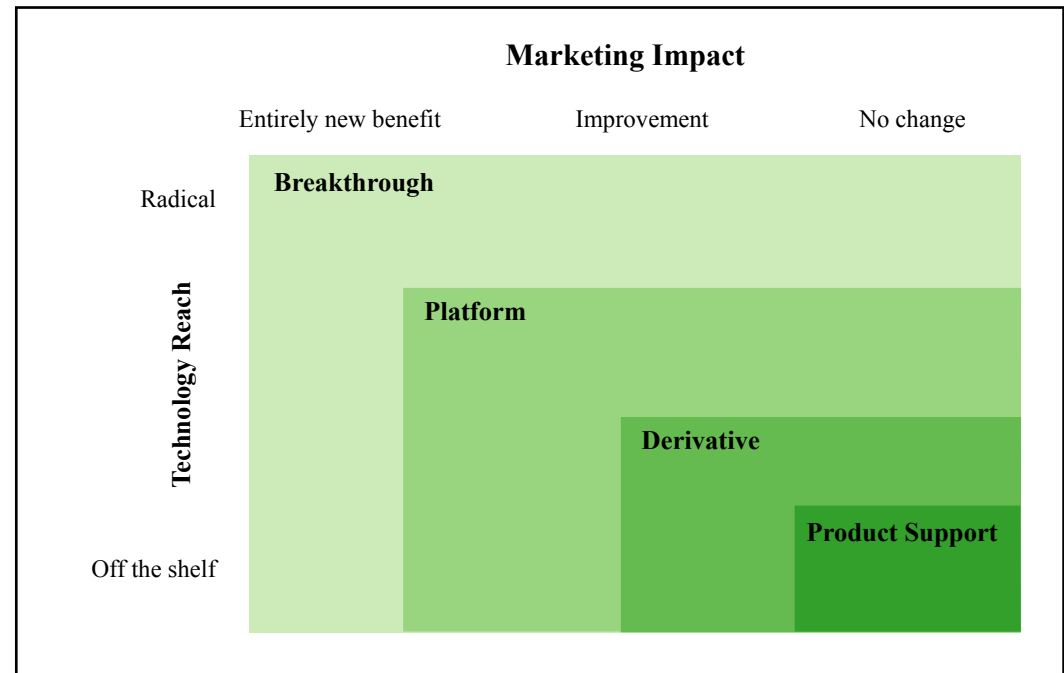


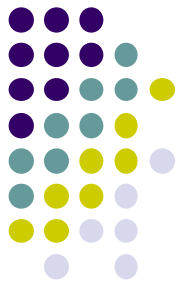
- The R&D portfolio creation process must start with a clear articulation of the company's overall strategy
 - What customer/market segments
 - What distinctive advantage do you seek
- The strategy should also inform you about the overall investments in R&D
 - Typically set as % of sales
 - Or, other industry benchmarks
 - May evolve over life of firm (especially for start-ups)
 - Highly variable by industry & market goals

Step 2: Classification of Project Types



- Often the most difficult & controversial
- But allows you to think about project opportunities in a strategic manner

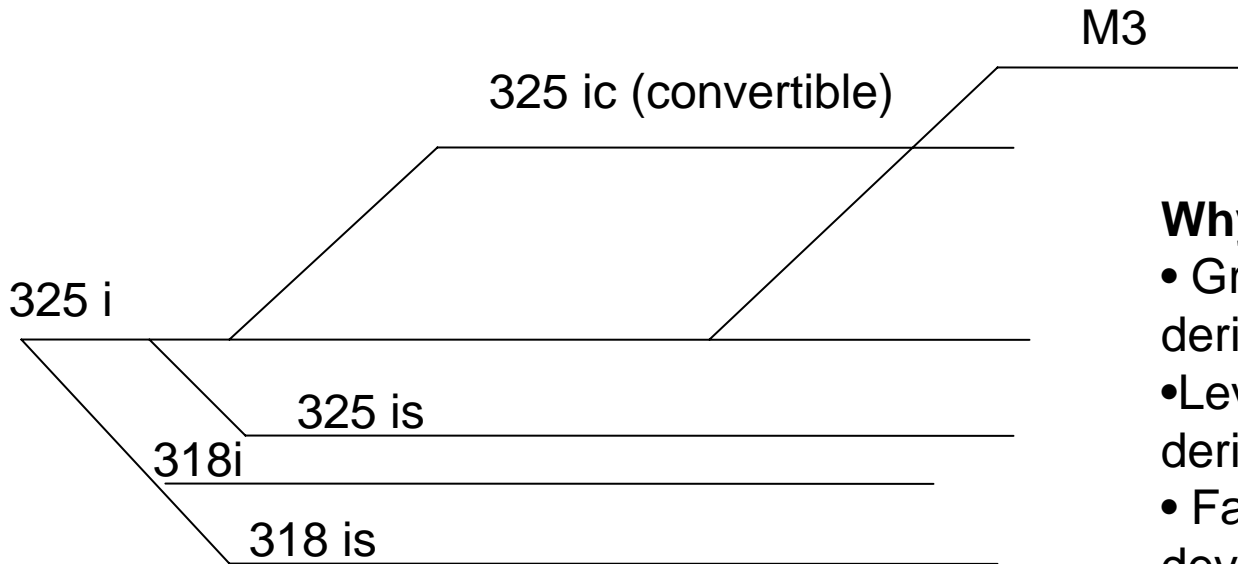




Defining Platforms

- “Next generation” project or service: a significant improvement in performance, cost or other attributes
 - Platforms represent new “system” solution
 - Often based on new technology or systems configuration
- Establishes design architecture that can be efficiently leveraged across subsequent derivatives, enhancements or add-ons
 - Creates a new product or service family
- Defined by certain design elements that stay constant over time

BMW 3 Series Platform (1992-1996)



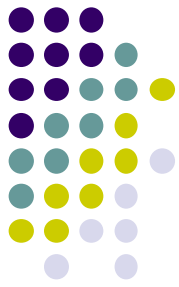
Why platforms?

- Groundwork for future derivatives
- Leverage resources – derivatives are less costly
- Fast/responsive development

Only platforms if they are designed to be leveraged!

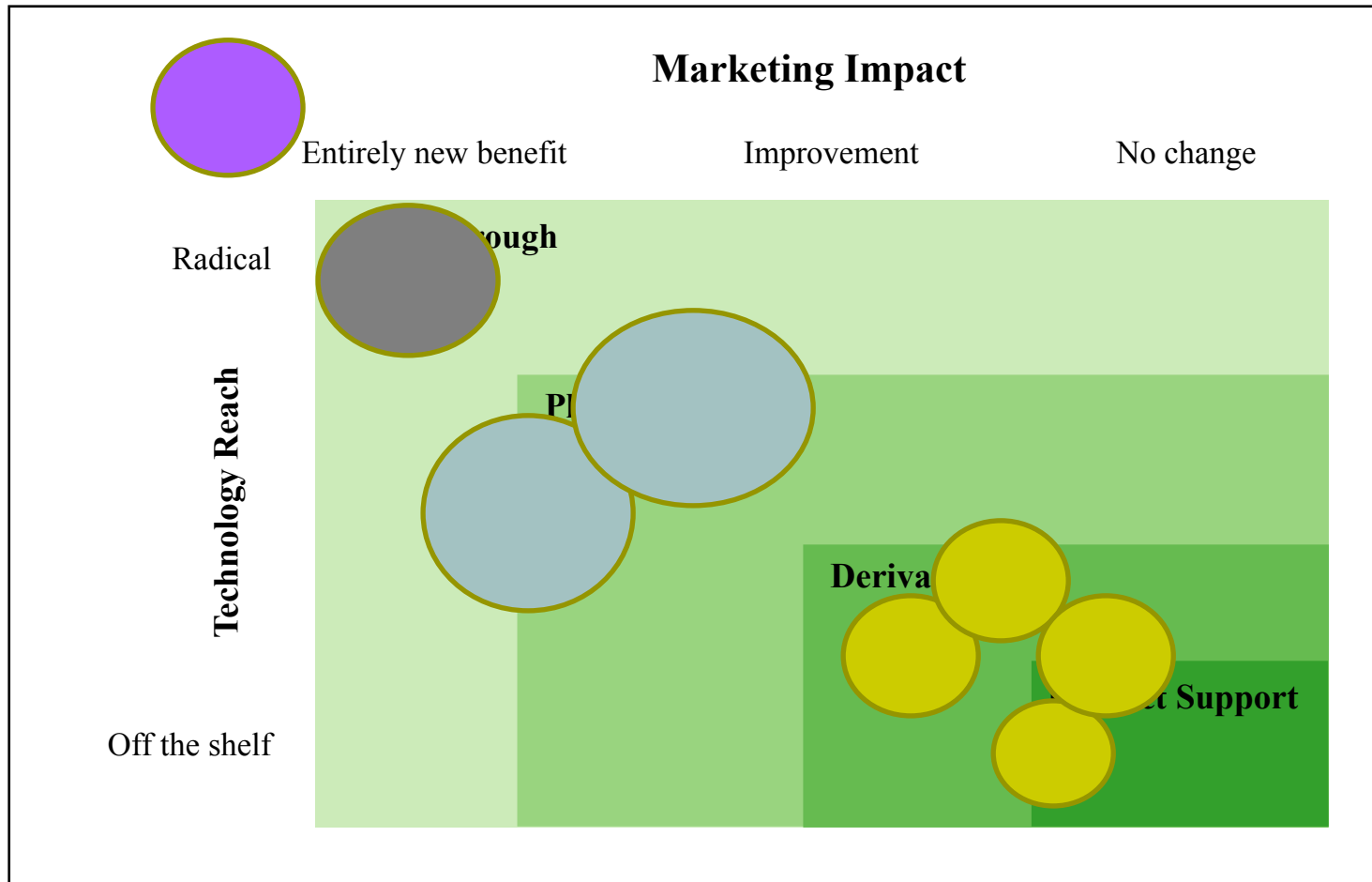
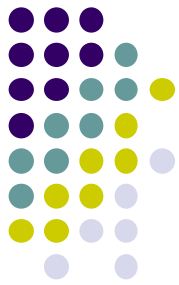
Step 3:

Create an Aggregate Project Plan

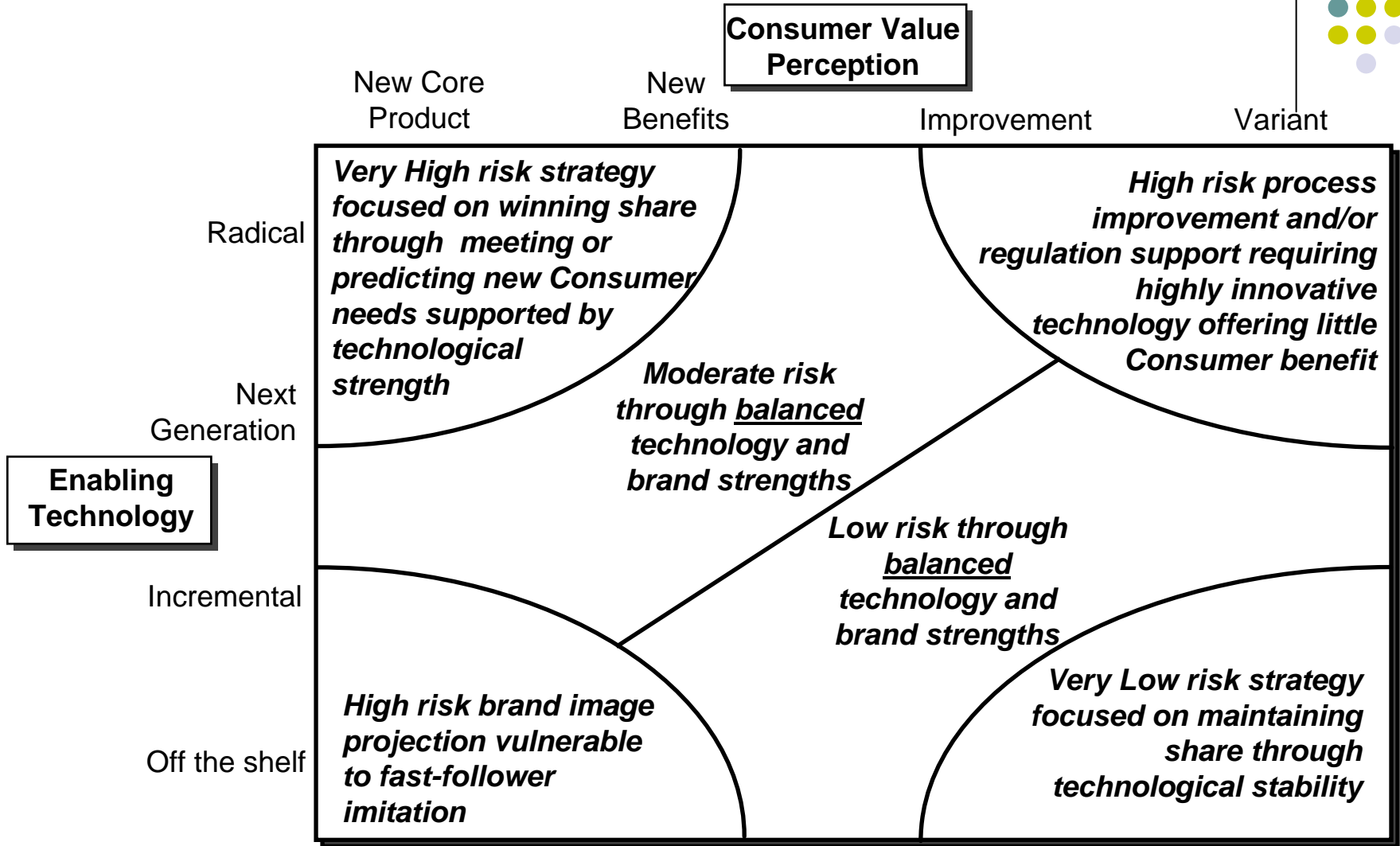
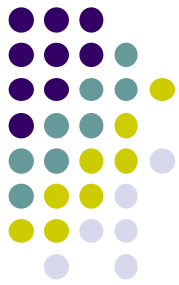


- Using your strategy as a guide, determine % resource allocation across project types
 - Breakthroughs: _____%
 - Platforms: _____%
 - Derivatives: _____%
 - Adv technology: _____%
- Given total R&D budget, estimate max number of projects within each category – need to have a sense of resource requirements for each type of project

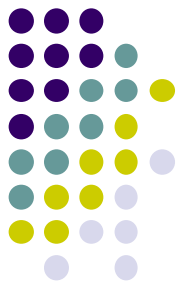
Determine how many of each project type can be pursued



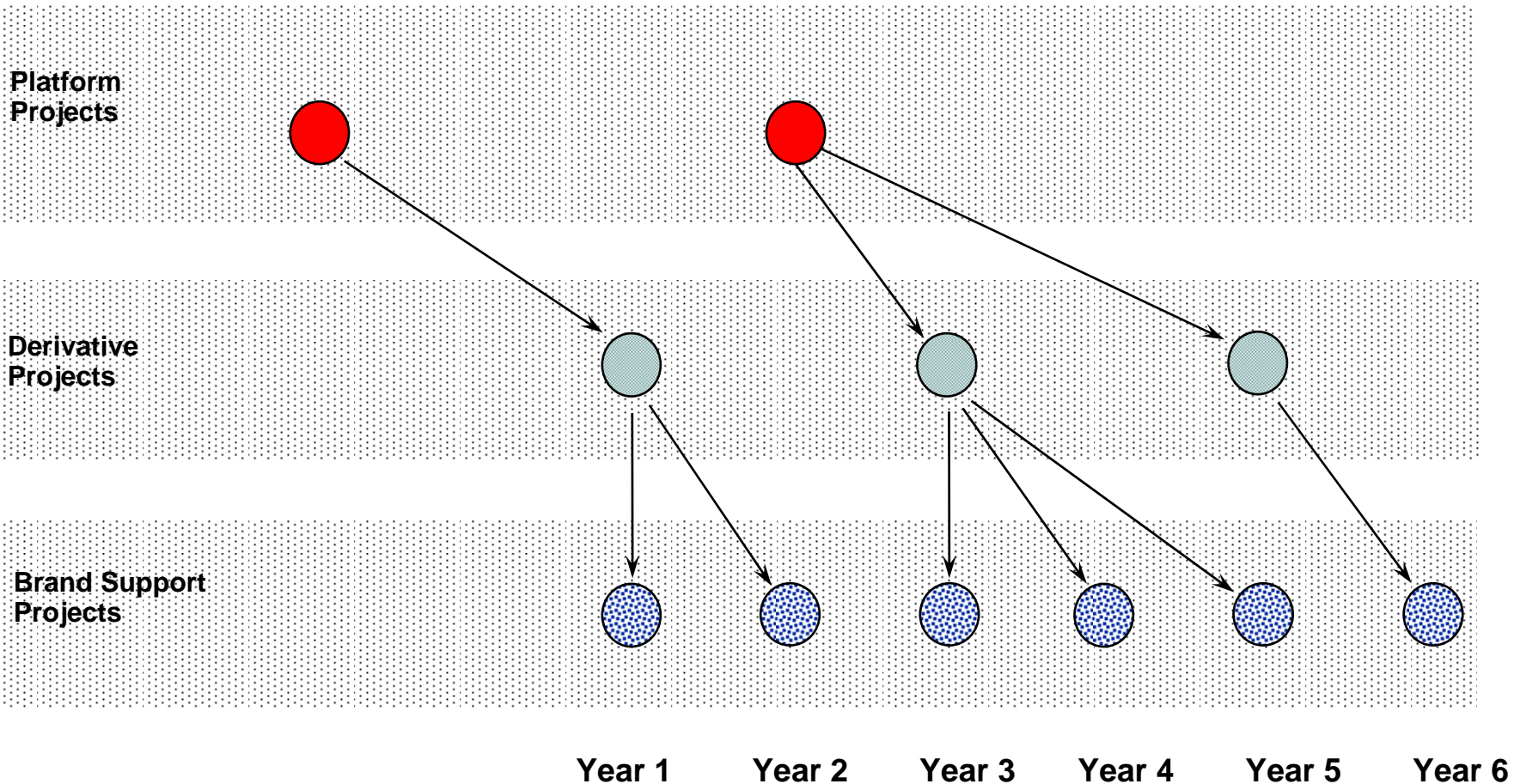
Balance Overall Risk



Product Generation Maps



The product generation map allows the organization to plan future generations of derivatives based on an original high-level project. This allows findings to be used from generation to generation, and often substantially increases the strategic and financial value of the first project. This potential should be taken into account when assessing a project's value.



Step 4: Commitment to Specific Projects



- Compare across project proposals within categories not across
 - Platforms with other platforms
 - Derivative projects compete with one another
- Use different criteria across categories as and when necessary
 - Derivate: ROI or NPV
 - Platform: impact on future options in market
 - Breakthru/Advanced: long term capabilities
- Senior management must *actively* manage process – shape menu of choices not simply select

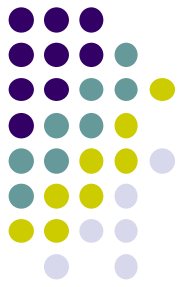
Medical Products Co.



- Company makes an automated diagnostic system that contains three components
 - electro optical hardware, software and a disposable panel for bio material.
- A lot of derivatives, all small, on all three system components.
- Derivatives character was aimed at increased functionality and features, which was counter to what the customer wanted. They were giving them “more bells and whistles”.
- Not a single new platform in 7 to 8 years.
- Had four very small efforts designed to explore “next generation” 21st Century technologies, while competitors were investing 100s of millions of dollars.

Within one year of implementing, the company’s product development restructuring process had the following effects...

Medical Products Co.



- Eliminated all but one of the breakthrough projects, and subsequently eliminated all breakthroughs.
- Joint ventures between corporate parent to share development resources.
- Part of a joint corporate effort to think about next generation technologies.
- Eliminated a lot of derivatives and feature enhancements that weren't adding value to customers.
- New partnered platform project:
 - Outside companies are doing the hardware and software components.
 - The client company is doing the bio components.
 - Sufficient amount of resources have been allocated to ensure that the project is adequately staffed to meet all project requirements.
- Focus Development efforts to be in line with core competencies and establish alliances to do all other tasks outside their own business.

Results:

- Cut R&D spending from \$65mm to \$35mm.

Less is more!

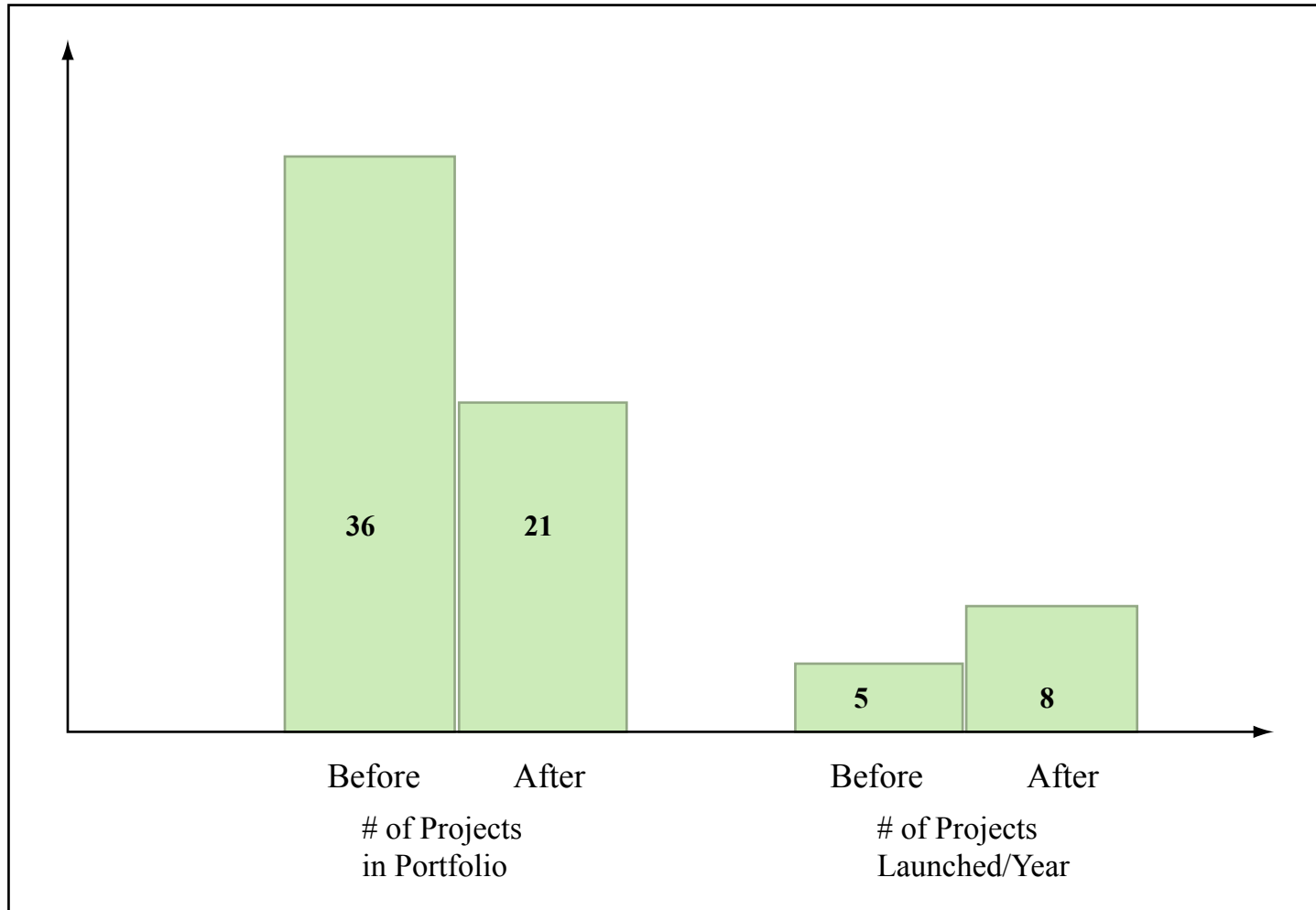


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- By focusing their innovation efforts they saw more product launches in 1993 than 1992, even though they had fewer projects and fewer dollars.

Balancing the portfolio

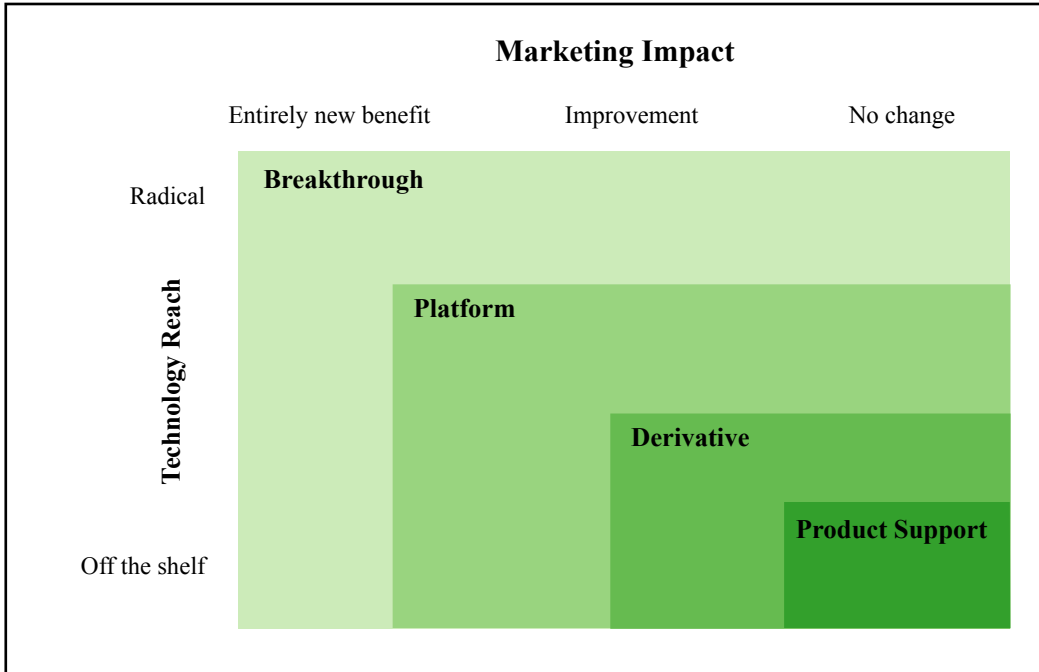
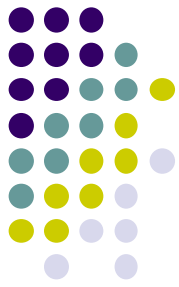


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Portfolio clustered top left

This portfolio contains a significantly high proportion of projects in the high-risk upper left hand area of the matrix. This does not fit well with a strategy for an existing business as it exposes the business to the risk of potential launch failures and, at the same time, fails to support existing brands through less ambitious brand support projects.

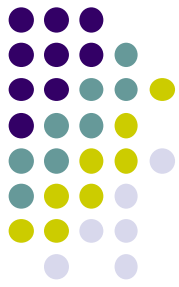
Portfolio clustered bottom right

This portfolio could potentially illustrate a scenario in which a business follows, rather than leads, the market and/or does not invest adequately in support of its brand through technology or product innovation.

Balanced portfolio

There is no ideal but, generally a well balanced portfolio will tend to be distributed along the diagonal top left - bottom right.

Aggregate Project Portfolio



- Creates discipline in the project selection & creation process
- Helps define the scope of what any individual project must achieve in terms of business objectives
- Focuses attention on long term expansion of critical capabilities not just short-term reactive-ness