15.351 Managing Innovation and Entrepreneurship
Spring 2008

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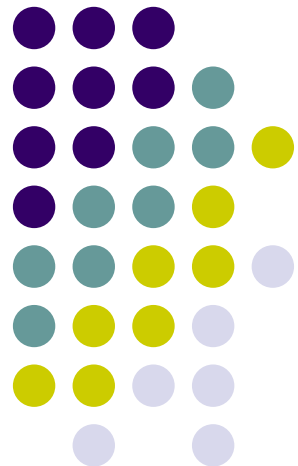
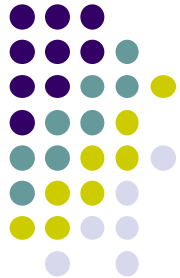
MODULE 2
Class Eleven



Module Two:
Building Organizations for Executing Innovations



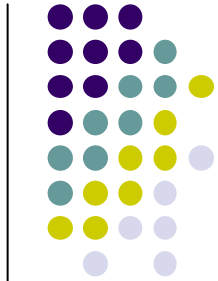
Five classes – insights into organization design choices such as structure & incentives

Executing Innovations

Key structures & incentives

- The Bake-Off – structuring innovation methods
- Managing on Internet Time – structuring & experiencing flexible structures
- GSK – shifting from rigid to flexible structures, incentives
- D-Wave – structures incorporating external actors, incentives
- One Laptop per Child – structuring around communities

Executing Innovation
Key Design Choices



Innovation architecture

- Organization of tasks for concept (opportunity) development
- Organization of tasks for implementation

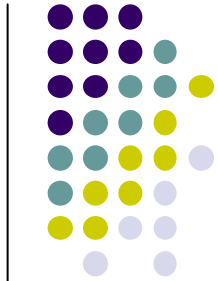
Governance & control

- Who allocates functional resources?
- Who controls projects & how are key decisions made?

Incentives

- How do you motivate people to participate fully?
- What types of rewards do they need?

Reflecting on the Bake-Off

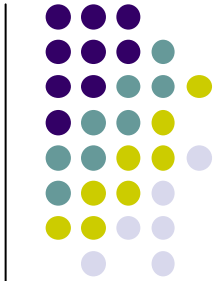


- Difficult innovation challenge – a tasty healthy cookie that "travels well"!

KEY CHARACTERISTICS/ASSUMPTIONS

- Defined challenge – no unpredictability in the environment, no competition etc. => no need to keep concept "open"
- Ill-defined technical system – hard to predict which recipe variant will map to a good outcome => can't model
- Integrated product => no opportunity for modular work in parallel
- Improvement critical => likely to find local optimum via incremental search from a good starting point

Difficulties with the Three Approaches



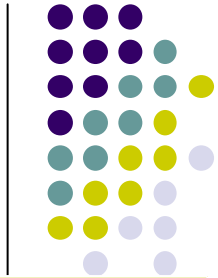
- Not clear whether XP and “Open Source” are innovation process architectures or specific methods
- XP – process architecture for implementation & iterations on a GIVEN concept
- Open Source – also a process architecture for implementation on a GIVEN overall product vision…
- Dream Team – might consider this as a concept generating “process” – wisdom of expert crowds
- Traditional – only architecture with specific process for concept development

Nonetheless, still possible to compare architecture “pre” & “post” concept freeze…

Comparing the Three Approaches

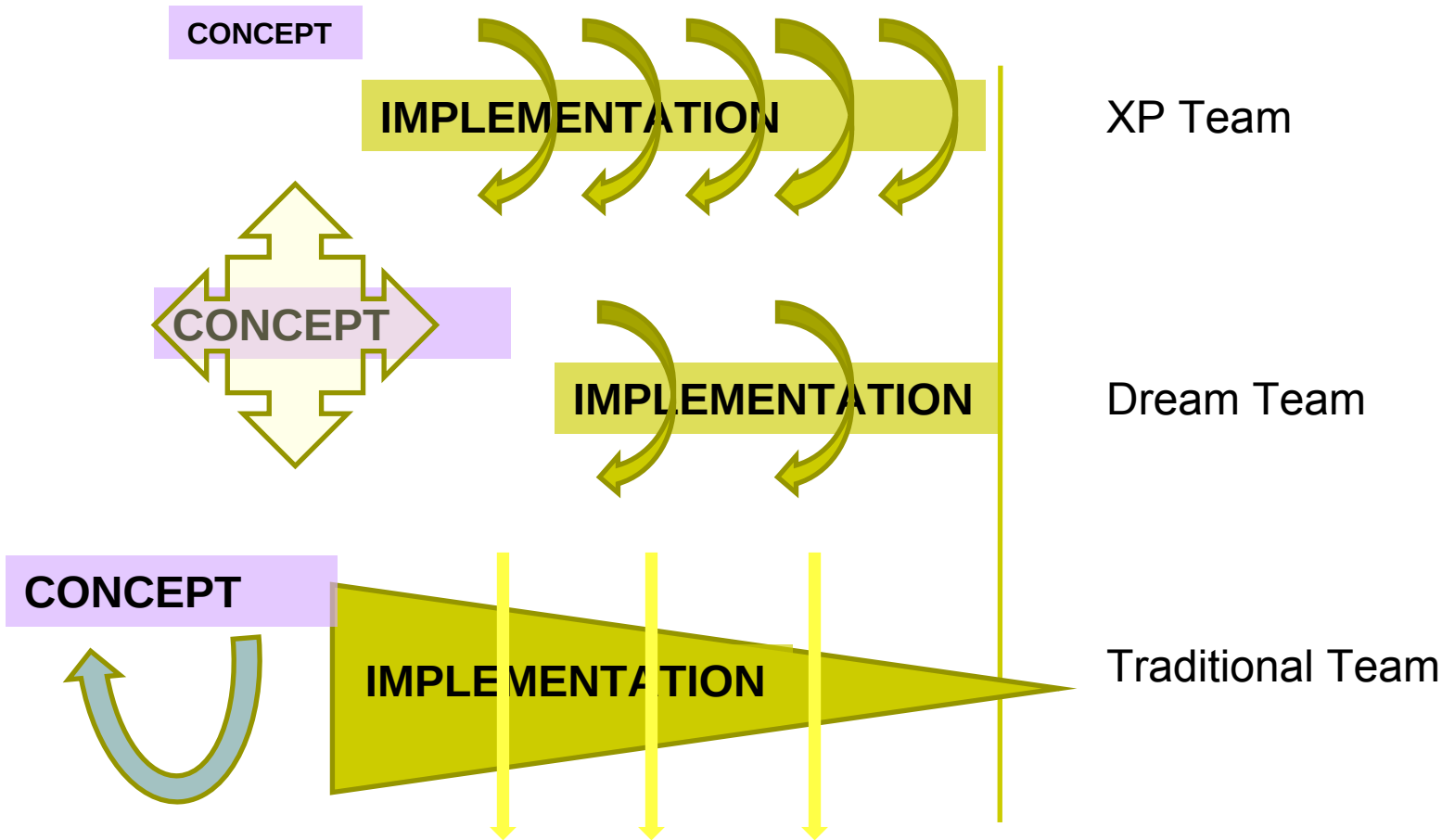
		Traditional	Wisdom of Crowds	Open Source	XP
CONCEPT PHASE	Who?	Team	Experts	Visionary	Management
	Decision?	Leader	Consensus	Individual	Leader
	Motivation?	Employment career	Interest voluntary	Interest career (?)	Employment
IMPLEMEN-TATION	Staged?	Yes		No	Not explicitly
	Who?	Team		Anyone	Pairs
	Motivation?	Employment		Interest community	Employment competition
	Quality?	Testing, reviews		Community gatekeeper	Pair
	Iterations	Moderate/ serial		Multiplex	Rapid/ serial

Comparing the Three Approaches

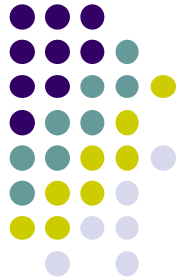


		Traditional	Wisdom of Crowds	Open Source	XP
CONCEPT PHASE	Effective?	Understood problem in static environment	Hard problem to solve		
	Caveats	Only as good as team unless combined	Engaging experts avoid group think		
IMPLEMEN-TATION	Effective?	Complex product but where overall perf. matters		Product is modular & changing - interfaces don't matter	When quality is key but project small
	Who?	Good for training, different levels of individuals		Allows for different levels but careers?	Compatible experts
	Caveats	Rigid		Interest community?	Employment competition

In Practice


CONCEPT
IMPLEMENTATION
XP Team
CONCEPT
IMPLEMENTATION
Dream Team
CONCEPT
IMPLEMENTATION
Traditional Team

Comparing the Three Approaches



XP TEAM

- Little effective action at the concept phase but not really appropriate here.
- In the implementation phase, did many iterations but failed to engage in a more rigorous testing program. They could have done this repeatedly with “users” or with Gundrum.

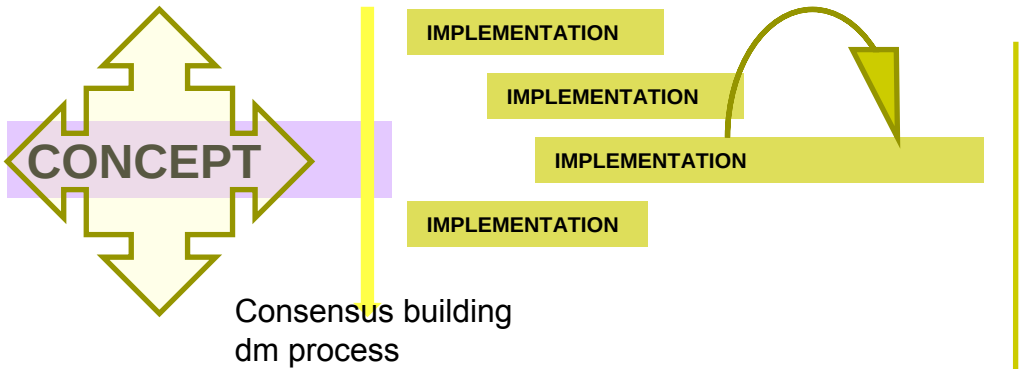
Dream Team

- In concept phase, limited use of the experts, no really ability to work to consensus. Either need a strong leader or a clear process to come to decision, e.g. Delphi Methods, hone in on a few scenarios….
- In implementation could switch to Open Source. People can check in and out….iterate on their own if they want BUT need a way to test.

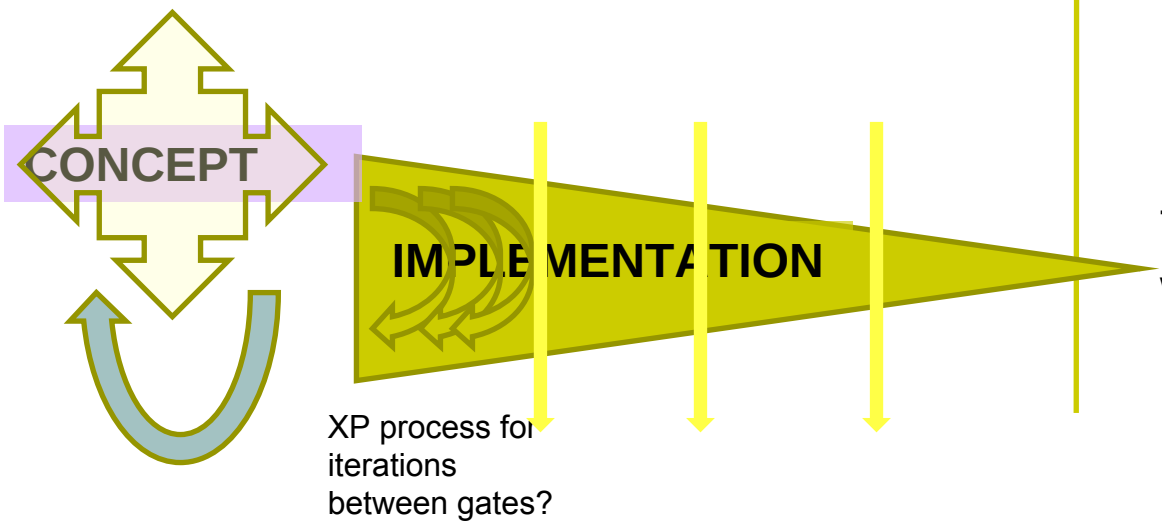
Traditional

- In concept had a gate and a decision maker but little thoughtful input.
- In implementation, set of gates: from overall recipe, to refining the sugars to selecting the crystals, etc. Think of this as more and more detail in design: review panels, experts etc. Results: slow iterations…

Ideal Model?



Dream Team benefitting from parallel cumulative efforts



Traditional Team with a twist in methods

But…

- What about situations that are not like the X-Prize or the Bake-Off or the America's Cup?
- What about when the situation is more like Iridium – there is a lot of uncertainty and novelty emerging in the environment
- Need ability to either:
  - Execute given concept very fast (autos) OR
  - Continually update the concept & still execute

Alternative Innovation Architectures

Two critical phases to the innovation process:

- Concept development
- Implementation

Both require experience, experimentation – all the methods that we examined in Module One.

Key question is how they are organized and work together.

- **CONCEPT TIME** - - window of opportunity to include new information & optimize match between technology & market
- **RESPONSE TIME** – period with architecture frozen – not able to react to new information

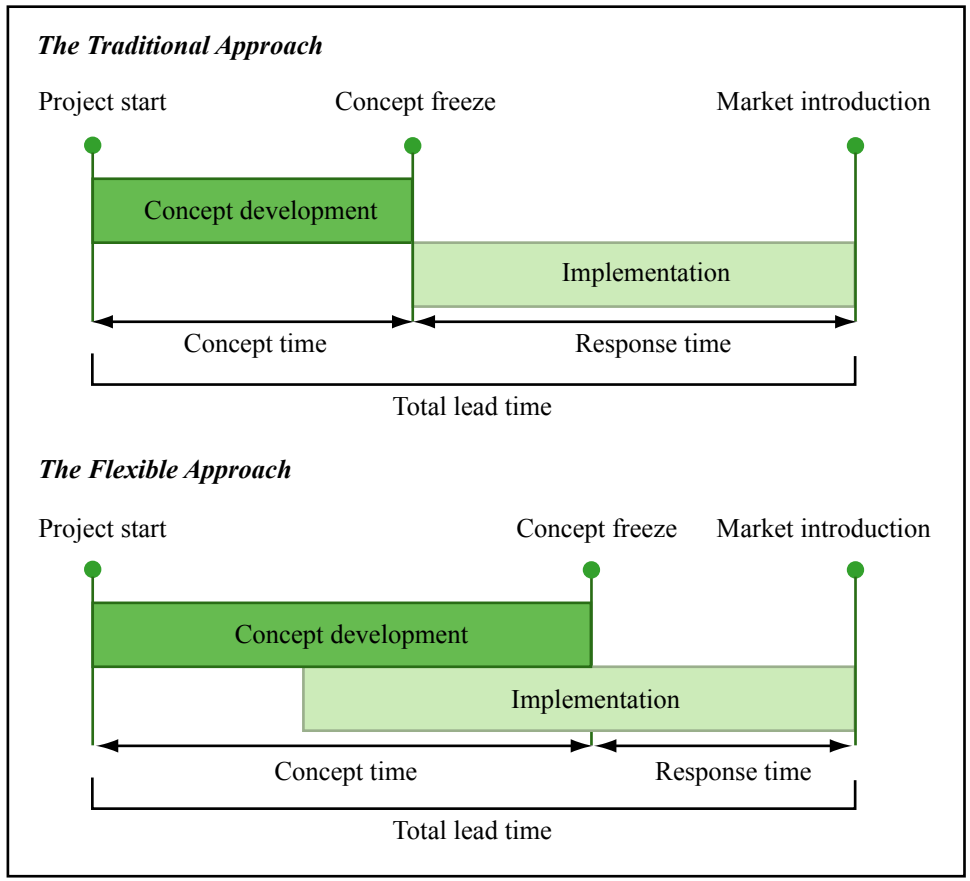
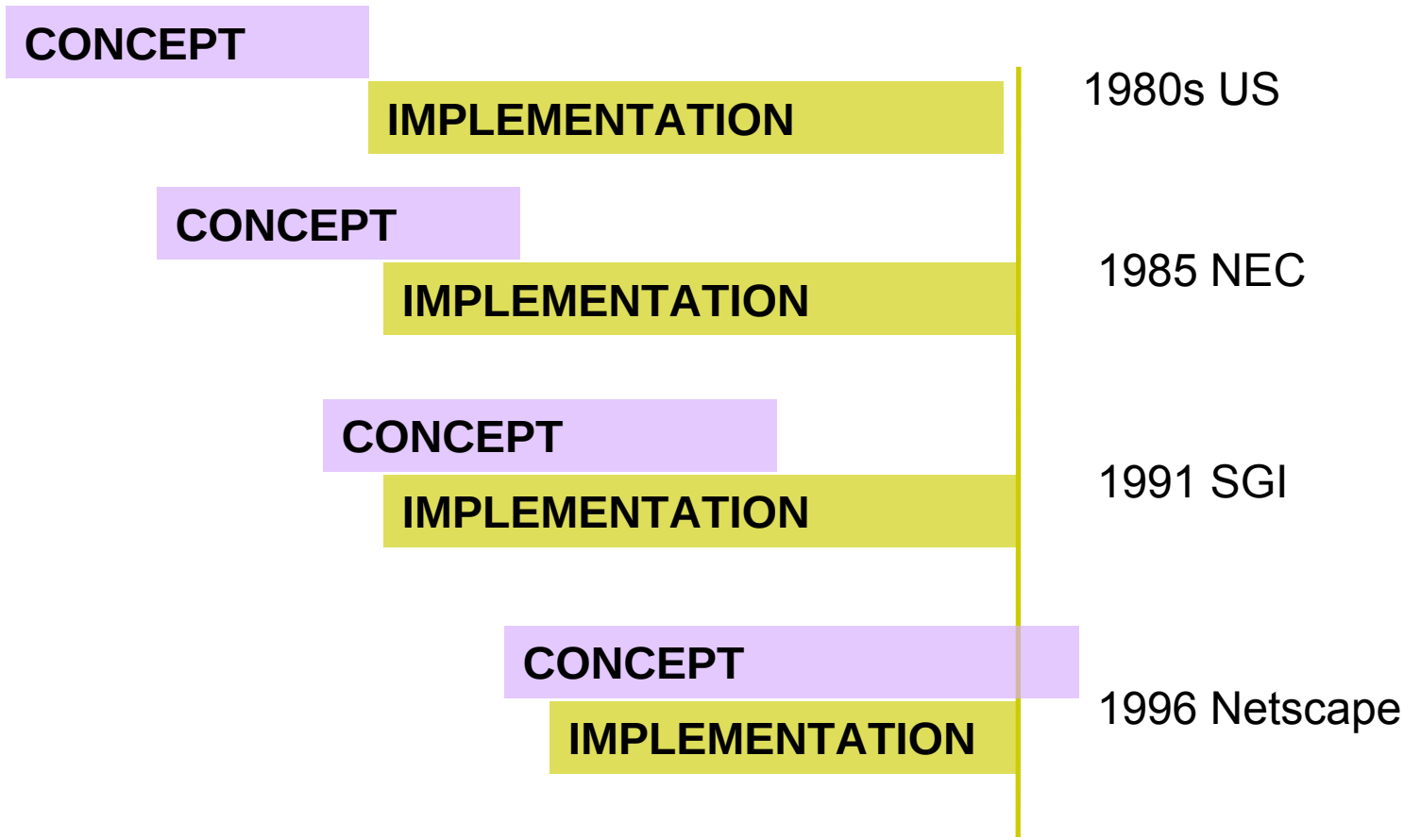


Figure by MIT OpenCourseWare.

Example:
Evolution of the Computer Industry



Flexible-Integrated Model

Ongoing flow of technology & market information into the project

Product Specifications maintained as fluid to allow for benefits to this information to be accrued.

Does NOT mean that there are no reviews – there is STRUCTURE!

KEY DECISION – When to freeze what element of the concept….easier for modular products

E.g. Team New Zealand – this is a flexible approach – BUT with some elements fixed at certain points in the process e.g. Hull (versus the keel)

Diagram of workflow removed due to copyright restrictions.

Another Flexible Process – for Concept Stage

Flexible process that incorporates cross-phase iteration:

Emphasis on comprehensive iteration- series of planned iterations that span several phases of development.

Requires managers to evaluate risk early in the project, when costs are still relatively low.

Allows glimpse into the future, which is not allowed by the stage gate process - yields information from later stages that can be incorporated in early concepts, requirement specifications, and architectures, thus reducing risk.

Can be followed by STAGE GATE

Image removed due to copyright restrictions.

Limitations

Flexible processes are hard!!

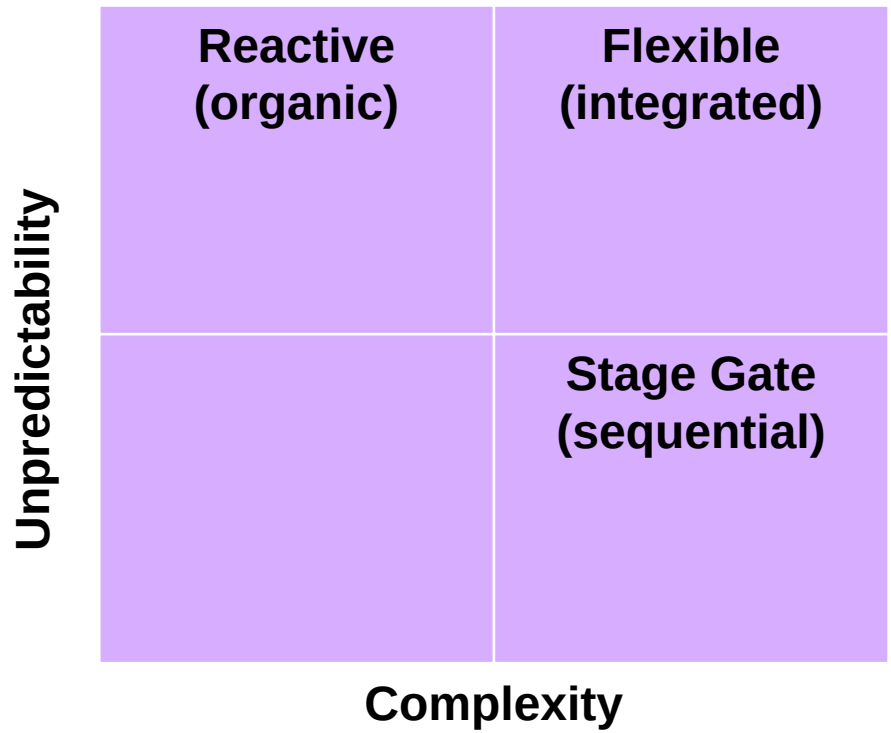
- **Leadership:** puts a lot of emphasis on the project leader – easy to lose control
- **Governance:** Need to have strong leadership & empowerment – **won't work in functional organizations**
- **People:** May get meeting "burnout" – time & efficiency issues
- **Size**: Really difficult to do very flexible projects e.g. Agile etc. in large scale projects
- **Documentation:** can be really poor unless project is well executed
- **Corporate implications:** Limited learning x projects so loss of functional expertise

Link Innovation Process to Environment

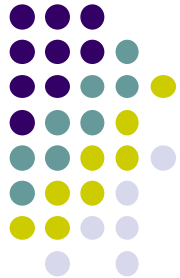
- Novelty – degree to which technology or market is unpredictable
- Complexity – time required to complete a project

BUT also consider

- What type of people?
- What incentives?
- What governance



Innovation Process Architecture & Type of Innovation



VERY DIFFICULT TO PREDICT….

- Much more useful to think about the environment, the complexity of the task (i.e. number of elements, interdependencies etc.)
- And, to consider the types of people – their quality and the types of motivations that they have…

Take Aways

- Key organizational decision for all innovation projects – concept versus implementation phases
  - Degree of overlap
  - Concept freeze?
- Choose structure that maps to the context – what are the key risks
  - complexity & implementation (Challenger)
  - changing context (Netscape)
  - problem in Iridium was both!

Several other elements

- Ability to take greatest advantage of novel experimentation techniques
- Consider the type of people that you have in your team & the appropriate incentives & governance
- Take advantage of product design – modularity, minimize interdependencies etc.

APPENDIX

More details on stage gate

Traditional Approach – *How it Works*

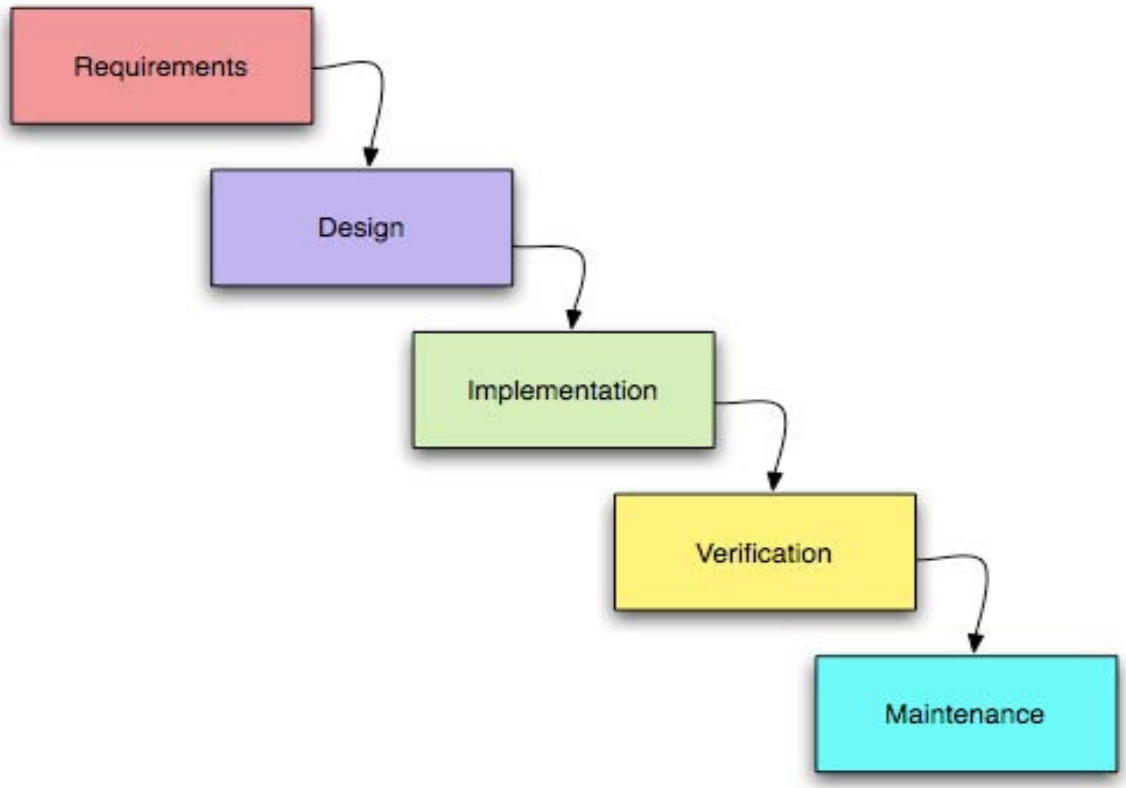
Often referred to as the "stage gate process"

First introduced by Cooper in the IEEE 1983

Consists of phases and gates:

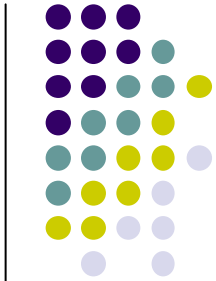
Start with a phase, meet gate requirements, move on to next phase

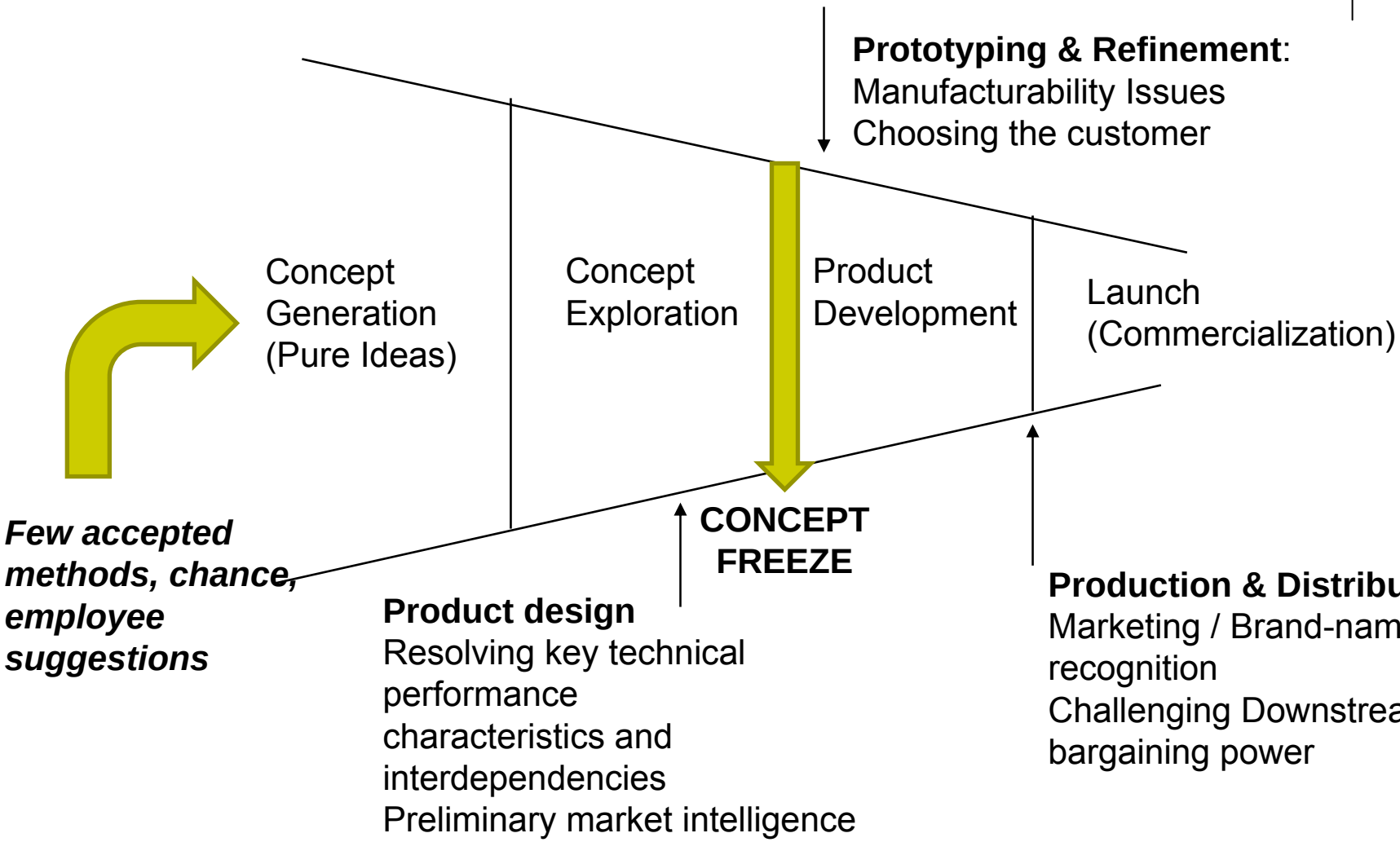
Involves significant upfront design



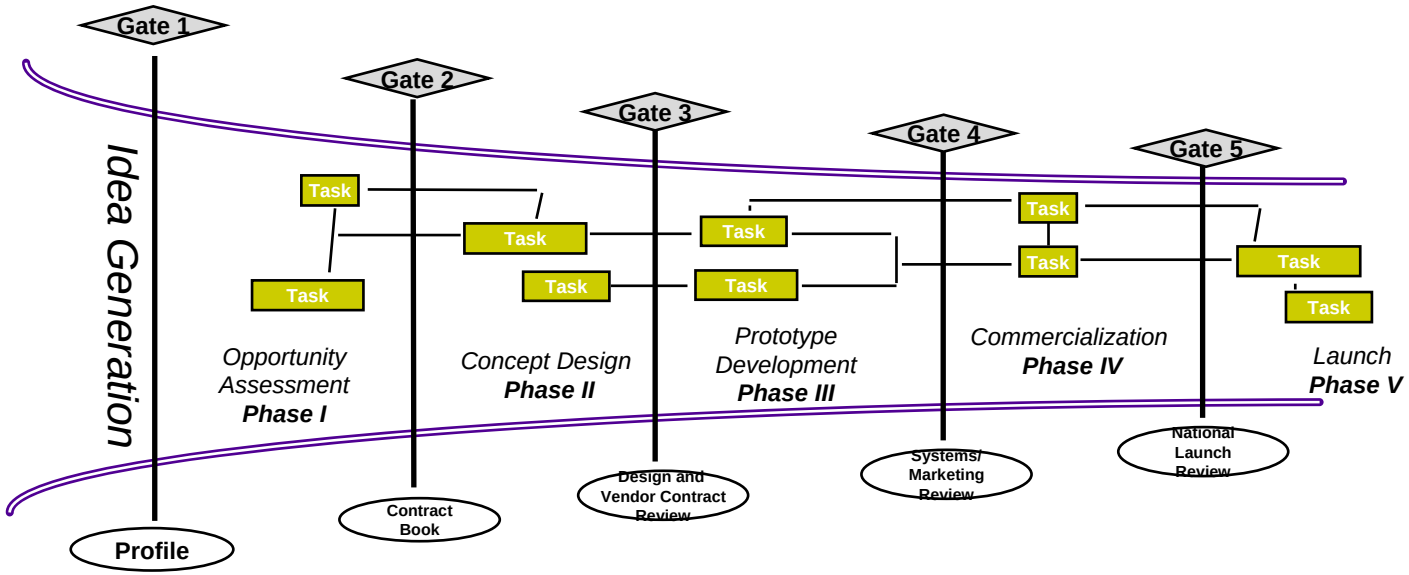
Source: Wikipedia

Traditional Innovation Process Architecture





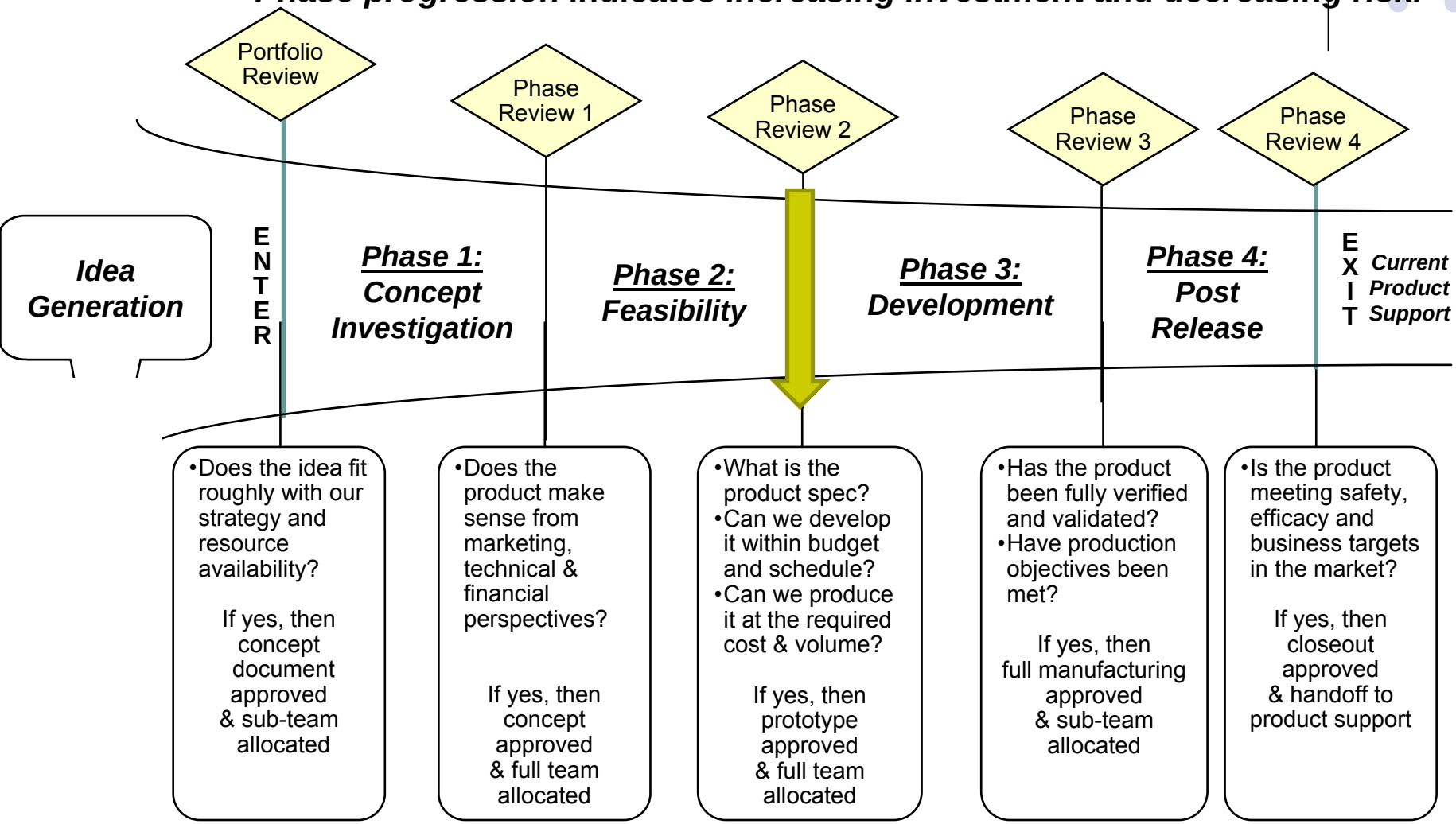
Phase Gate Model Allows for Structure, Clarity & Common Understanding of Project Progress



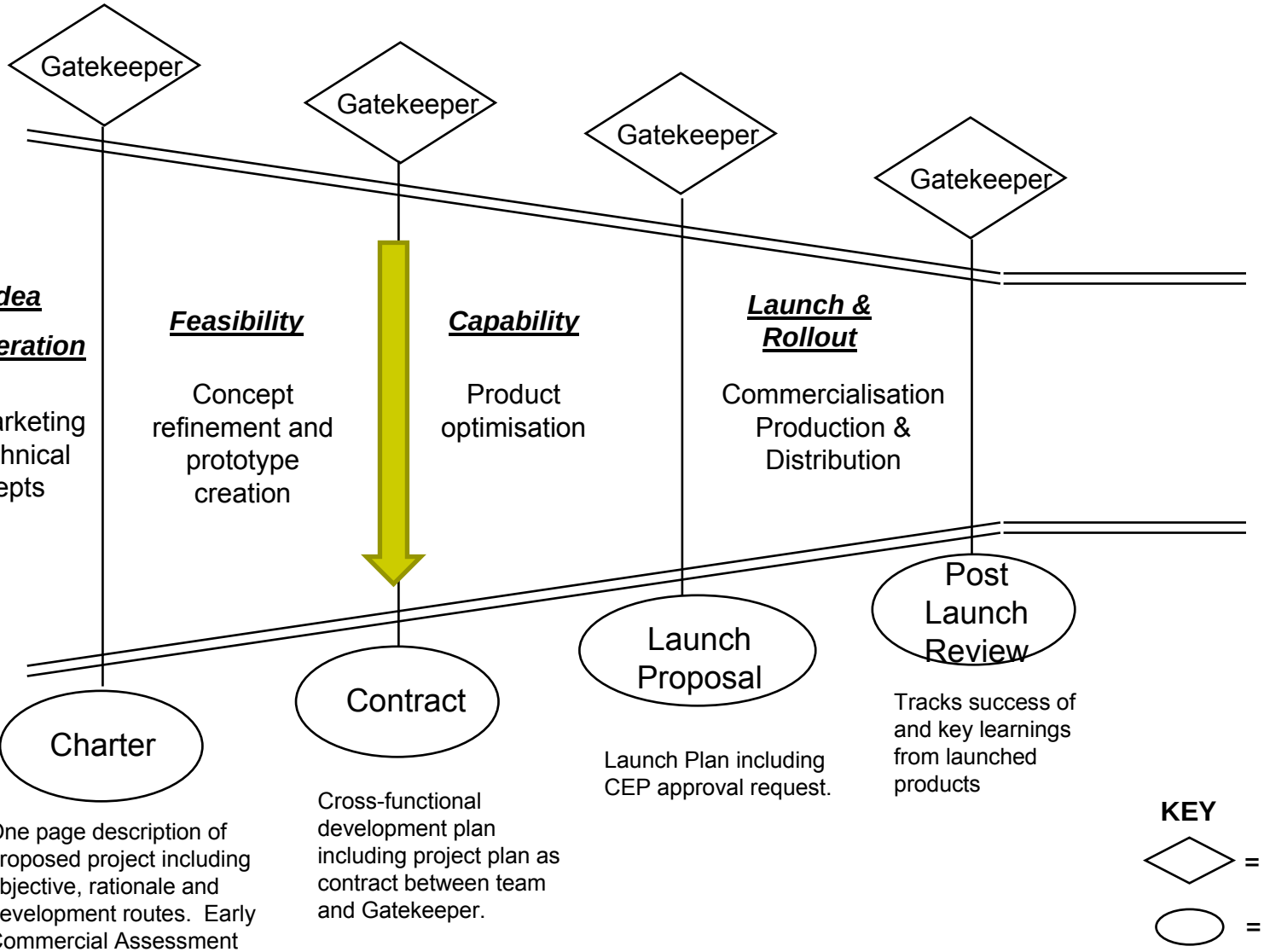
- ✓ is a formalized, project management process that can overlay over more detailed existing divisional product development processes
- ✓ allows a project to be defined, tracked and reviewed according to predetermined decision criteria and a series of key business decisions
- ✓ enables project visibility across divisions and corporate with standard terminology and simplified reporting
- ✓ anticipates that some projects will be terminated or shelved if they do not meet expectations
- ✓ integrates the enterprise, spanning the business functions

Example:
The Key Questions Answered by Each Phase

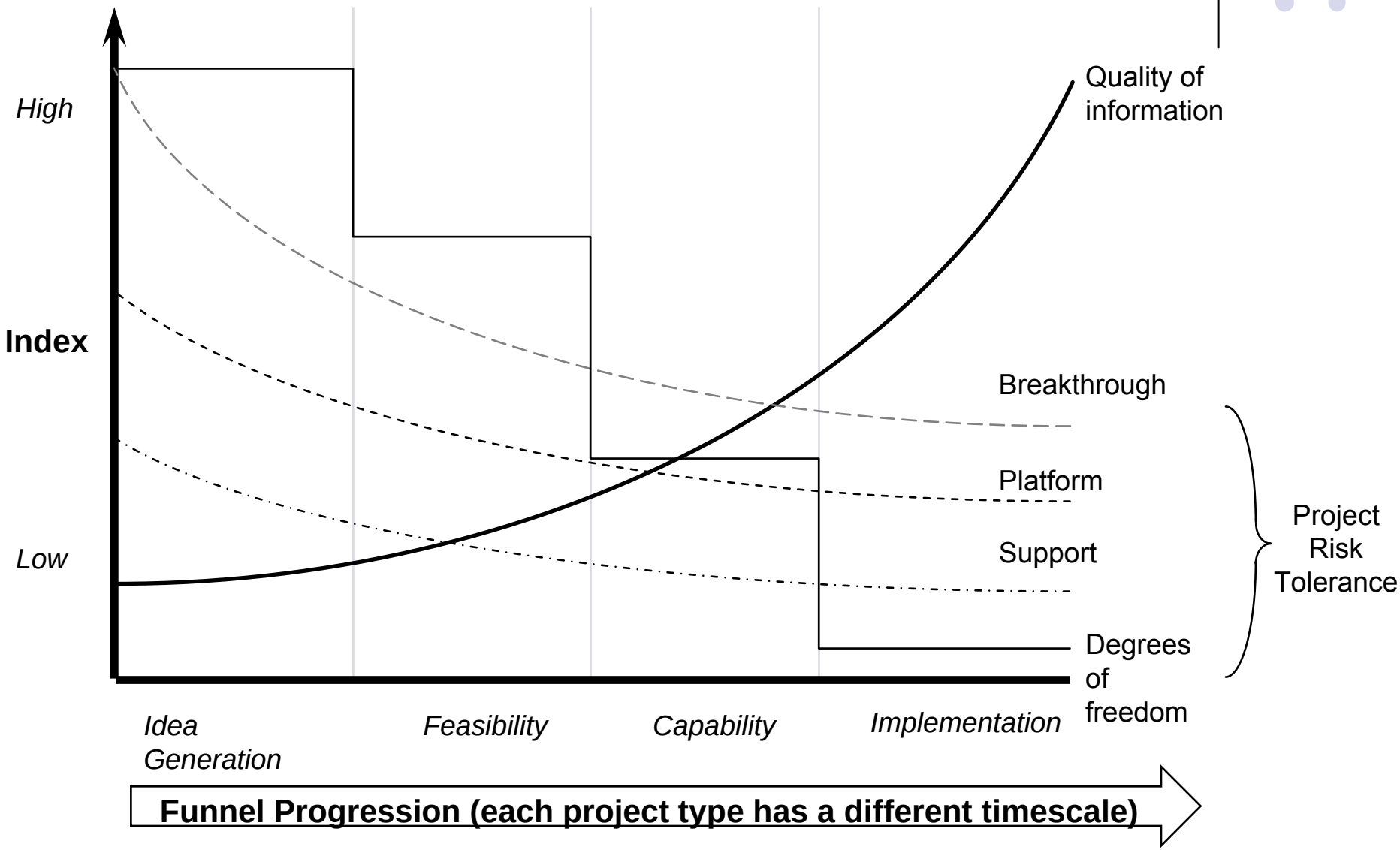
Phase progression indicates increasing investment and decreasing risk.



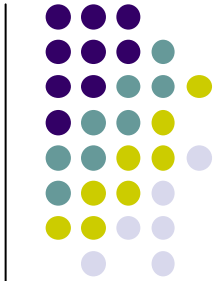
Key Gates & Documents (Milestones)



Innovation Structure, Milestones & Risks



Strengths/Weaknesses



Strengths

- **Costs:** minimizes need to costly last minute changes – if up-front work is well done
- **Estimates:** Great for funding and time estimates
- **Focused requirements:** minimal scope creep
- **Documentation:** Good documentation & knowledge management/ transfer
- **Structured approach:** generally how people are trained

Weaknesses

- **Rebuilds costly:** Costly to rebuild product at end of phase, if necessary
- **Hard to change req's:** Requirements take significant upfront time and are difficult to change midstream
- **Ramp-up time:** Original author most knowledgeable – takes time for new people to ramp up
- **Response to change:** Does not respond well to changing market conditions, stuck in cycle