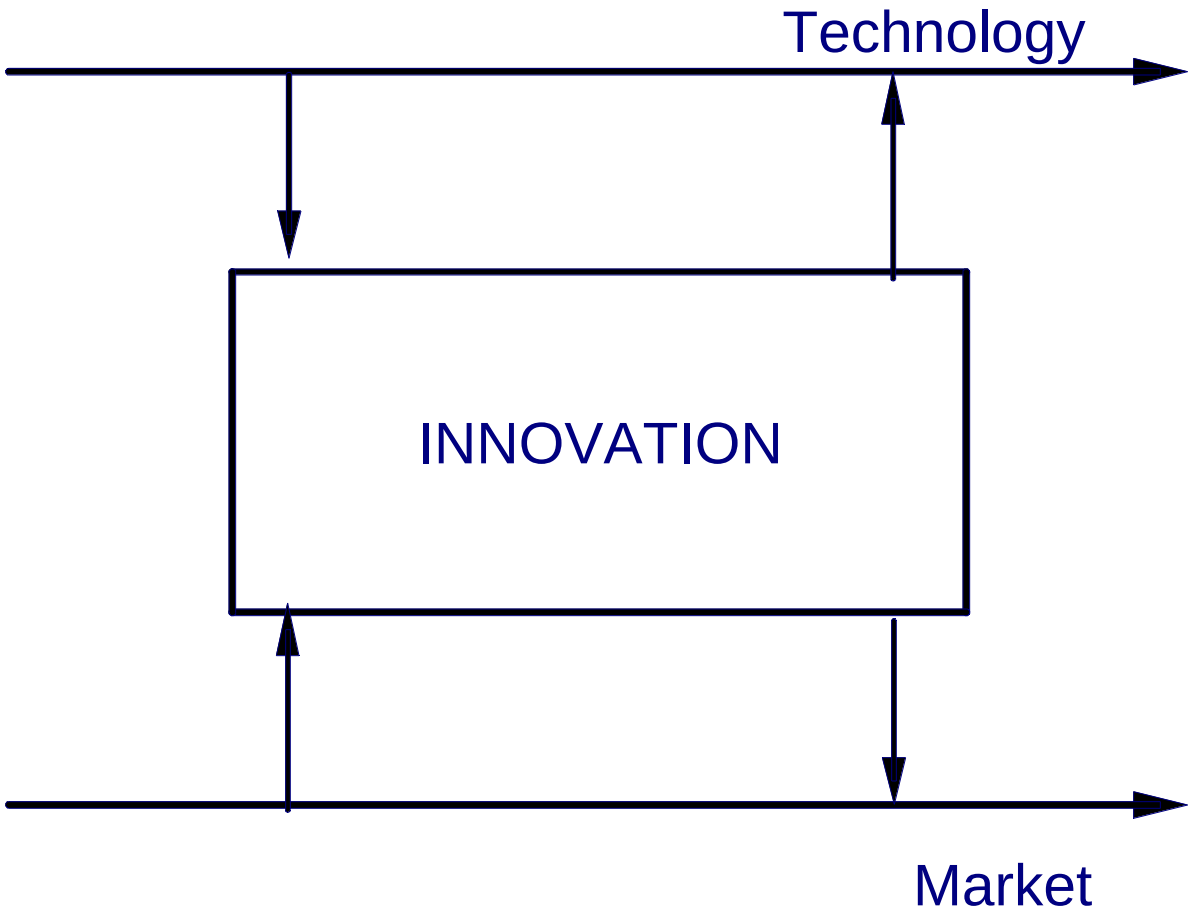
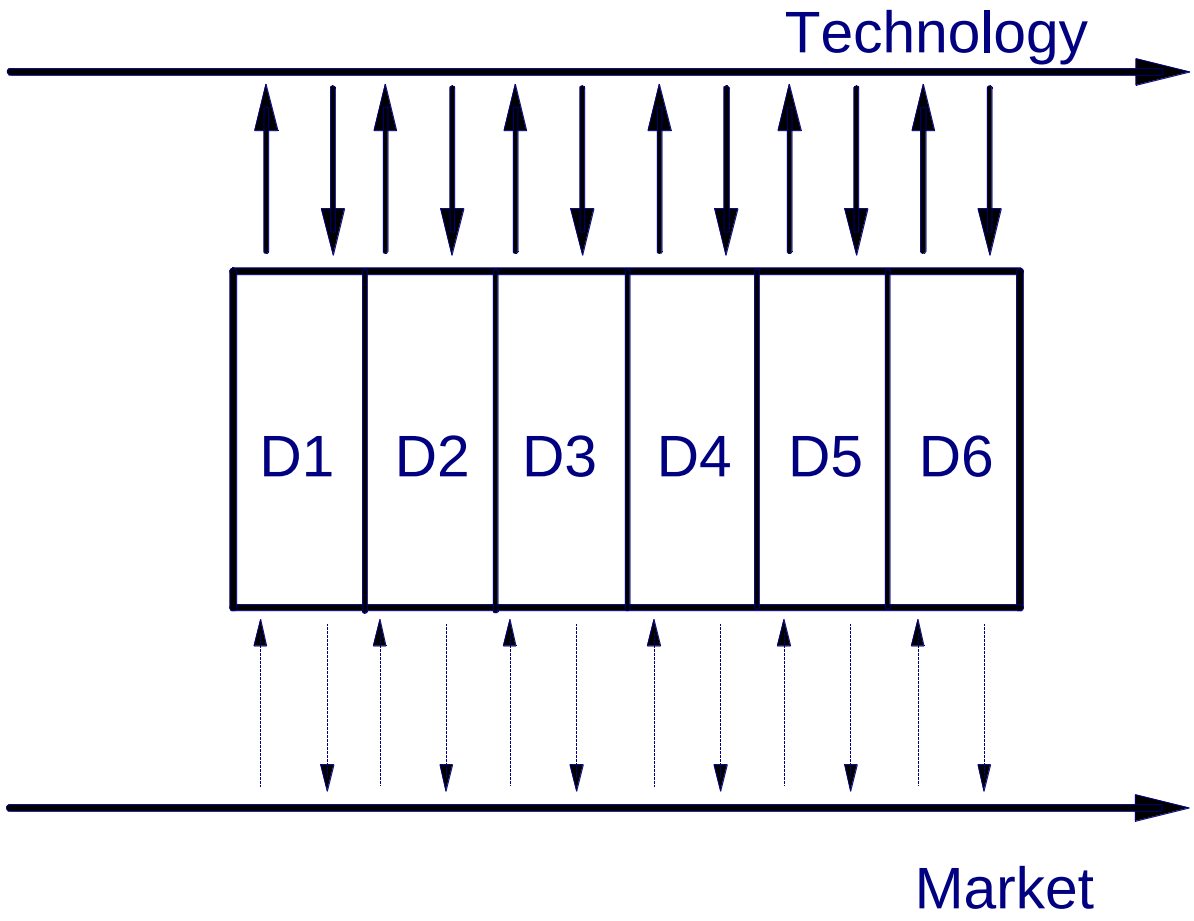
Organizing for Product Development and Transfer to Manufacturing

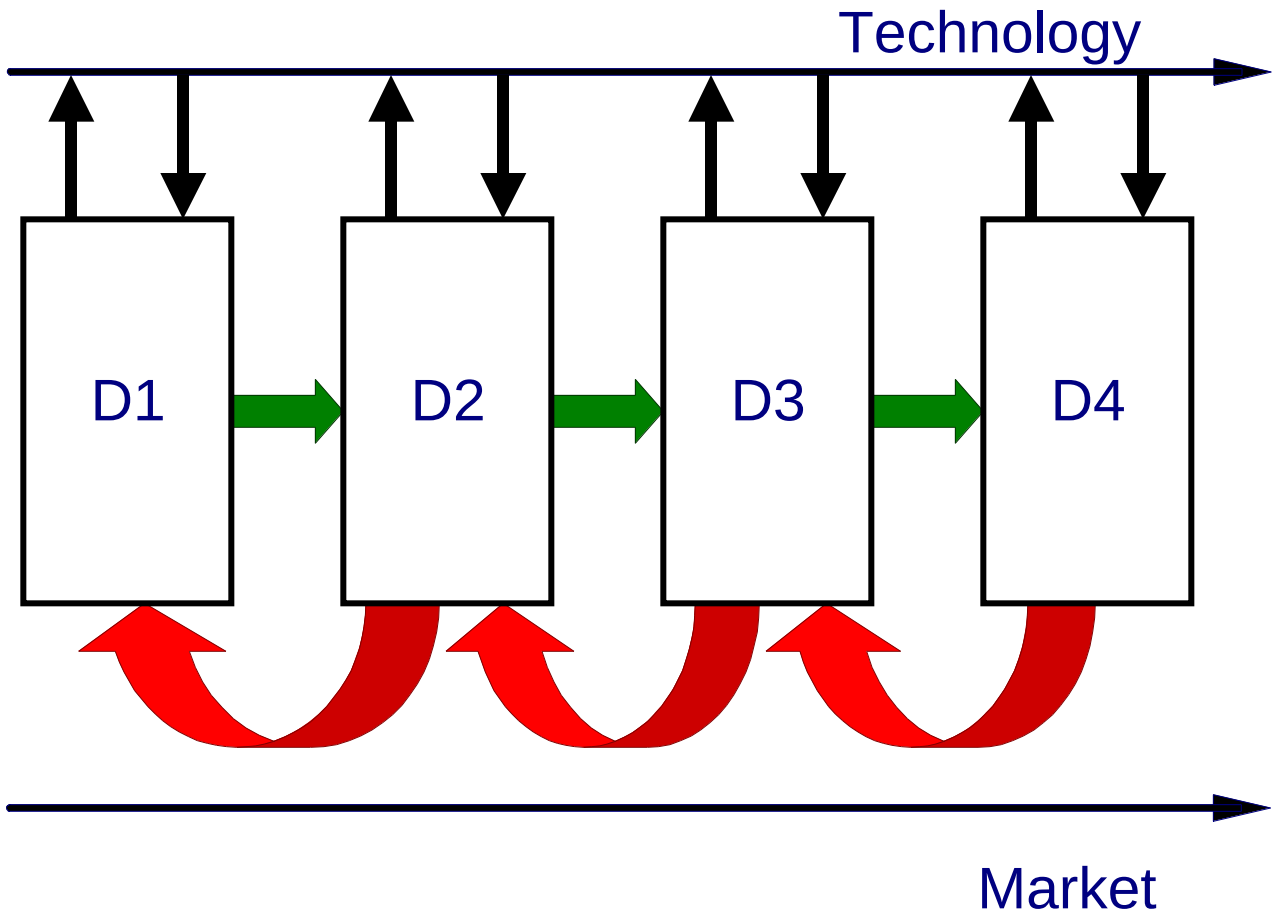
The Process of Innovation



Departmental Organization



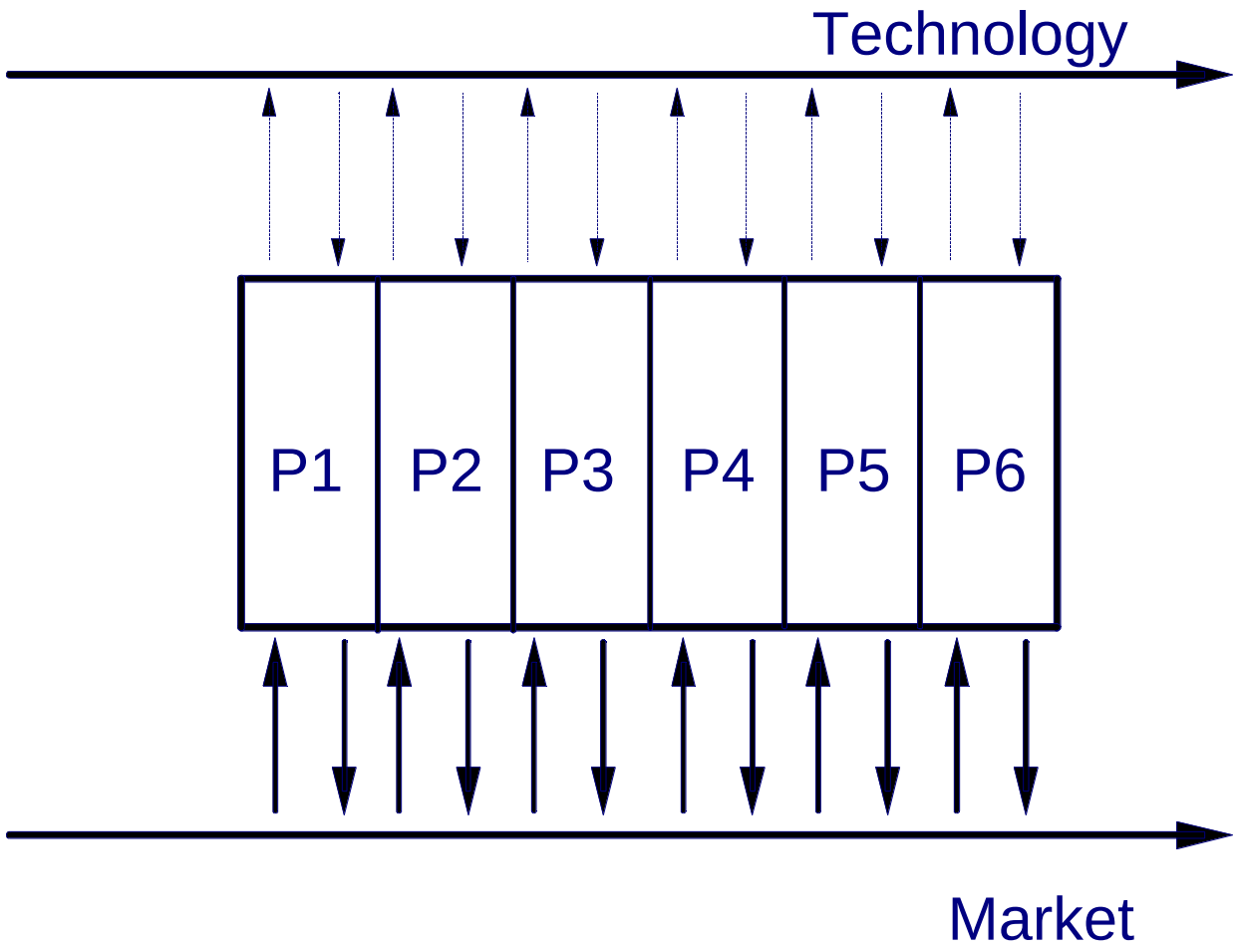
Departmental Organization



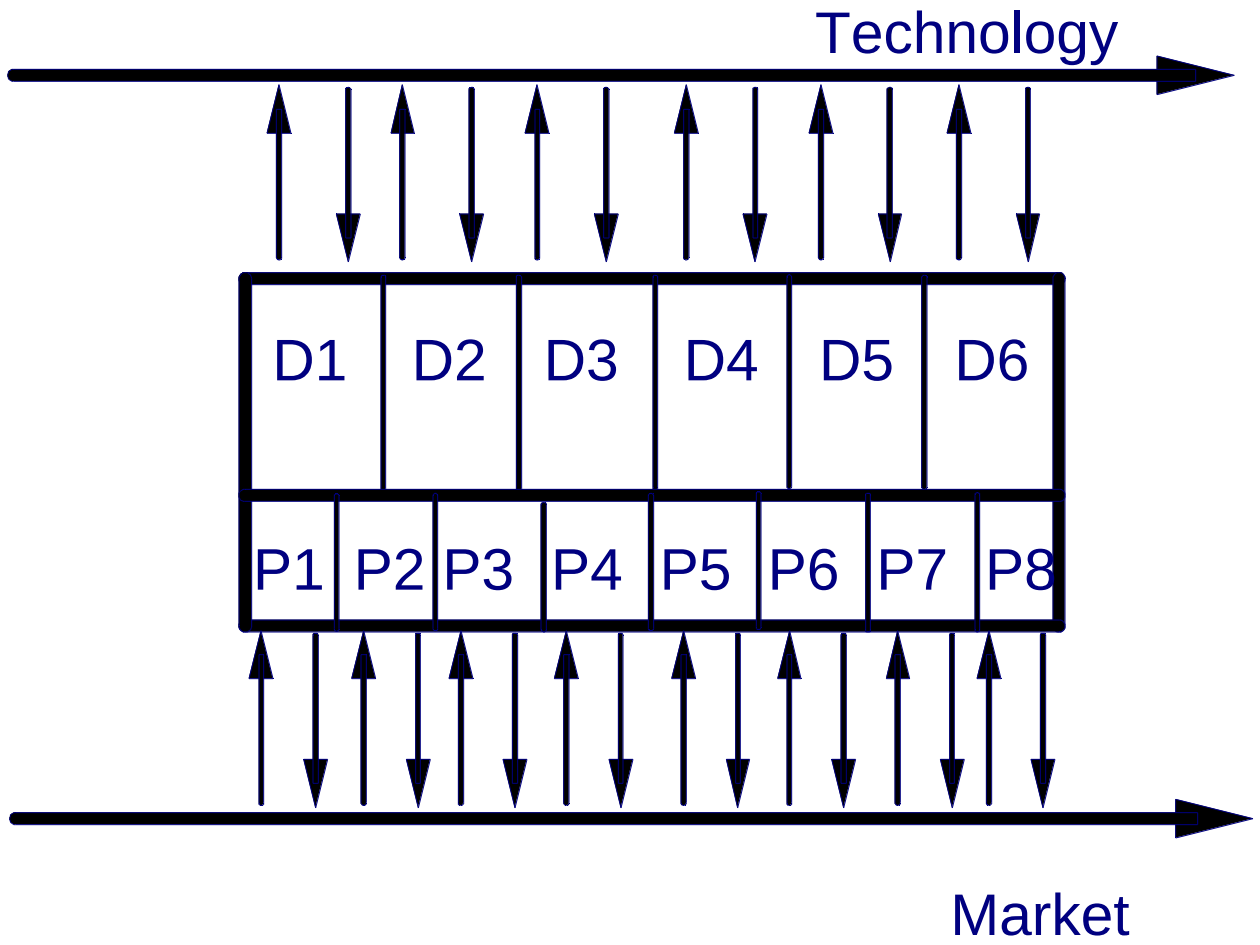
Time and Coordination

- Time can always be substituted for coordination.
  - And the converse:
- Improved coordination can reduce development time.

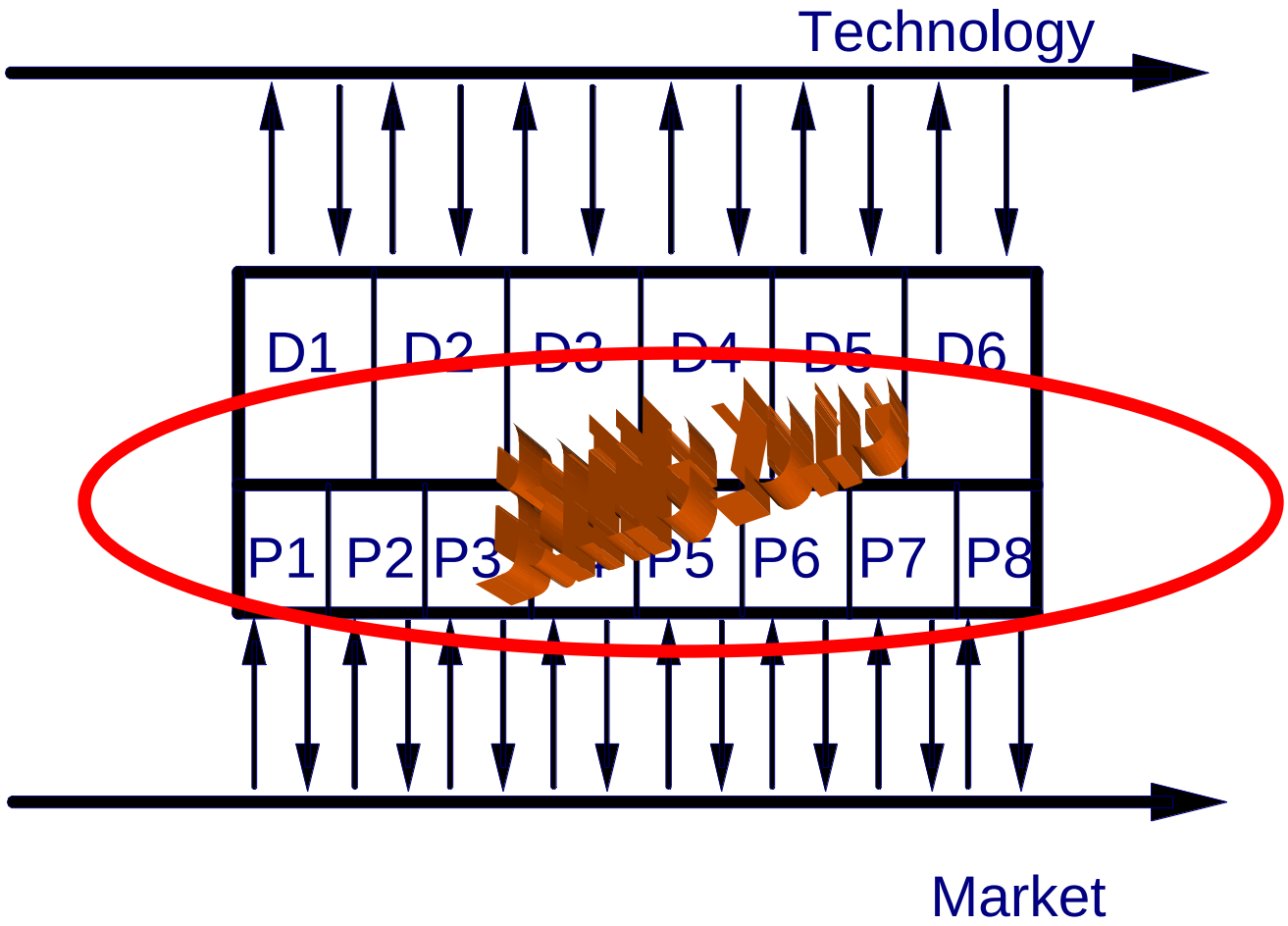
Project Team Organization



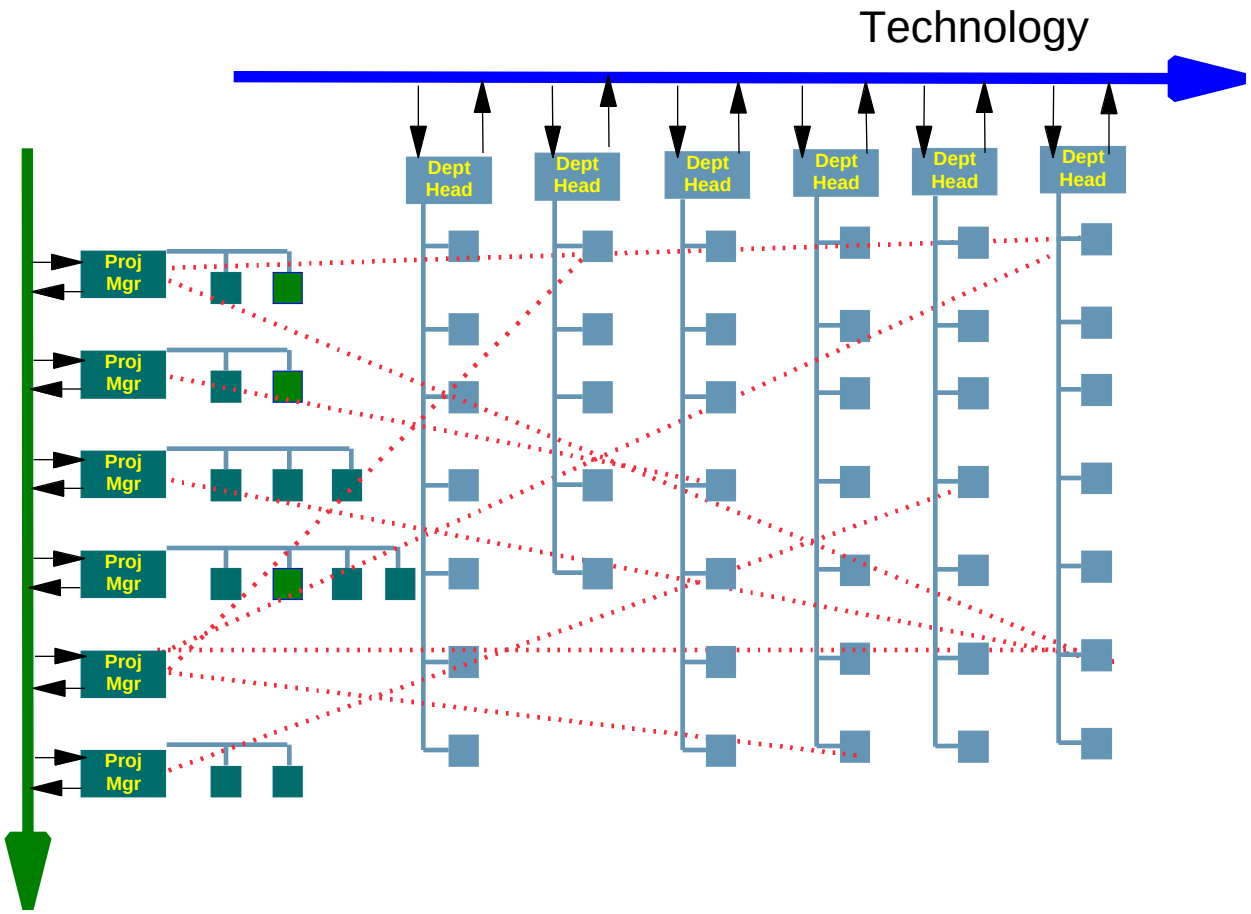
Matrix Organization



Matrix Organization



Matrix Connections to Market and Technology



The Basic Tradeoff and Dilemma in Product Development Organization

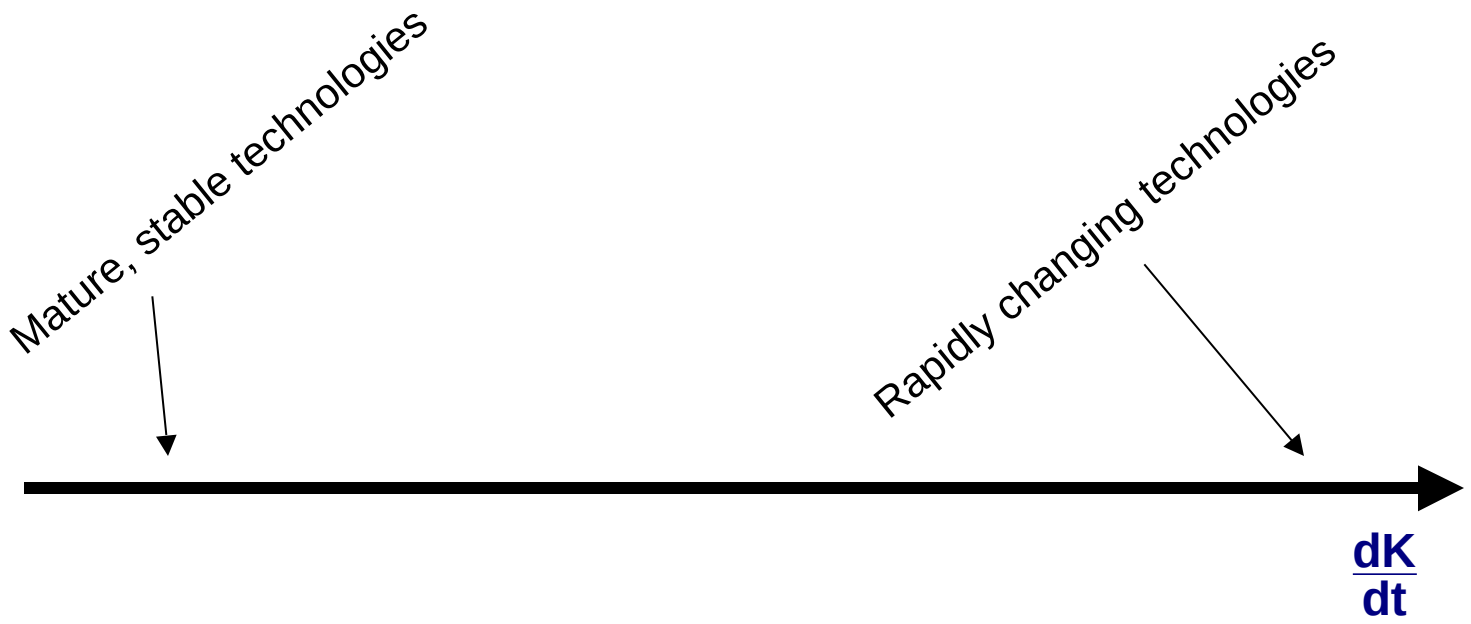
- **Departmental Organization**
  - Departmental structure is more closely mapped to the structure of the supporting technologies
  - It thereby provides a better connection to those technologies and better ongoing technical support to the project effort.
  - This is, however, accomplished at the cost of much greater difficulty in coordination of the project tasks and less responsiveness to market change.

- **Project Team Organization**
  - Project Team structure groups people from different disciplines together in a single team all reporting to a common manager.
  - It thereby provides better coordination of the project tasks and increased sensitivity to market dynamics.
  - This is, however, accomplished at the cost of a separation from the disciplinary knowledge underlying the project effort. When this is carried to an extreme, it will gradually erode the technology base of the organization.

Contact with Technology

- If Departmental Organization provides better connection to technology, are all technologies equal in the degree to which this necessary?
  - The answer, of course is no.
- What then is it about different technologies, that determines the degree to which close contact is necessary?
  - The answer is, **the rate at which new knowledge is being generated**.

Rate of Change of Knowledge

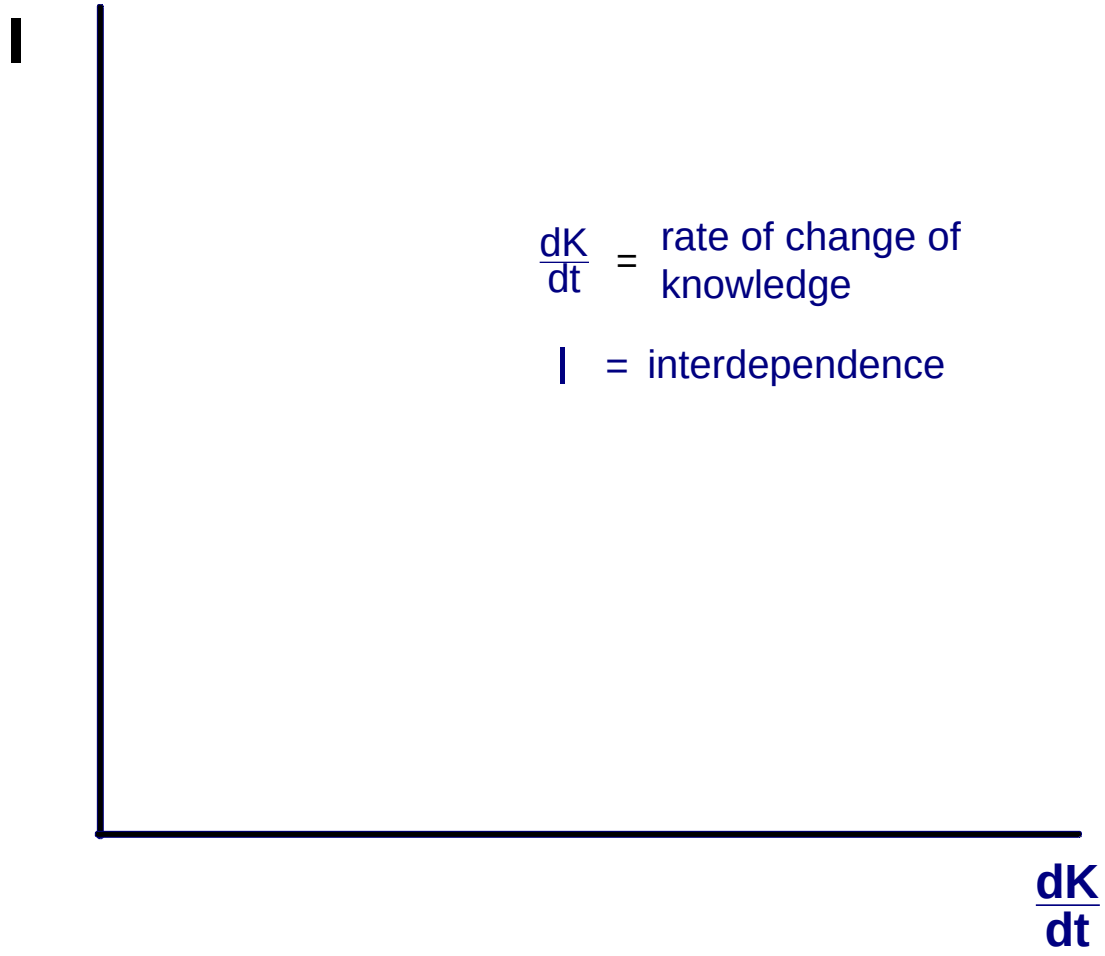


Coordination

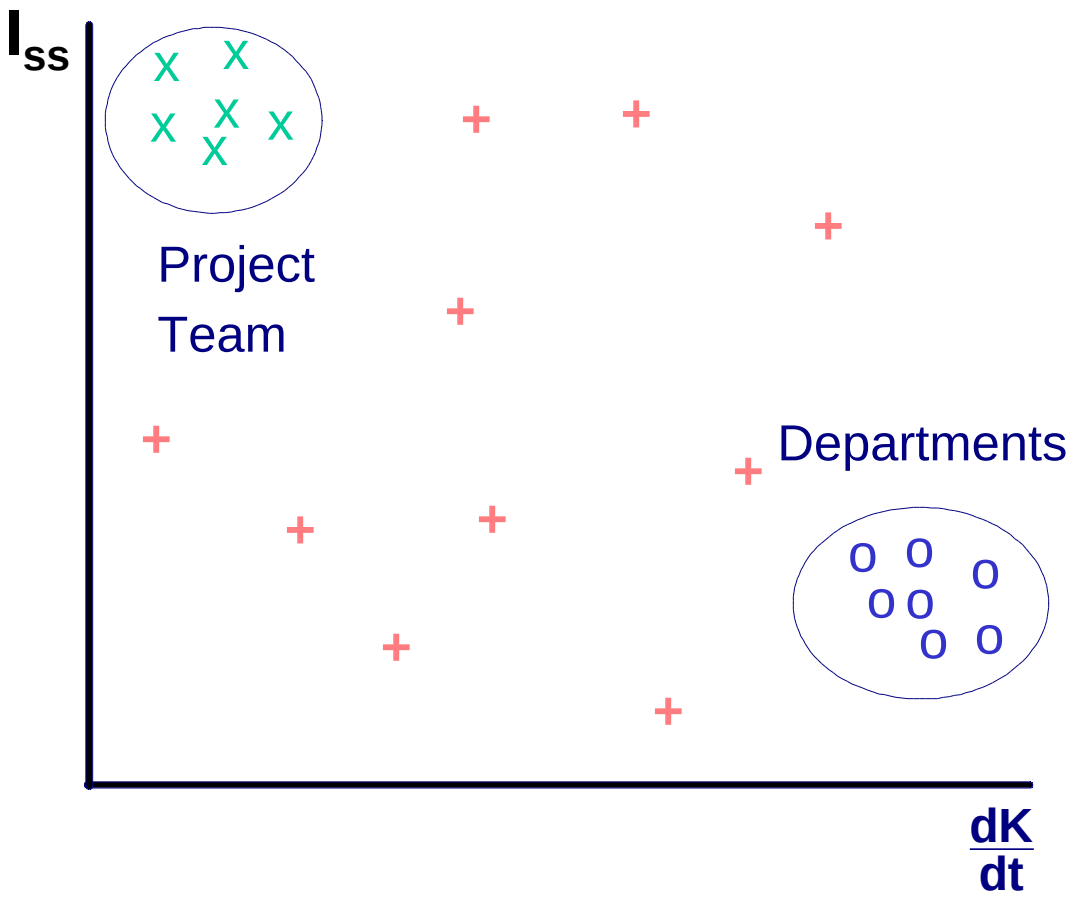
- Turning to Project Team Organization, if this form of organization provides better coordination, the question follows, are all projects equal in the amount of coordination needed?
  - The answer is no.
- What then is it about different projects that determines the amount of coordination that is needed?
  - The answer is the degree of interdependence that exists in either the product architecture or among the tasks that must be performed in product development.

Interdependence of the Architecture or of the Tasks to be Performed

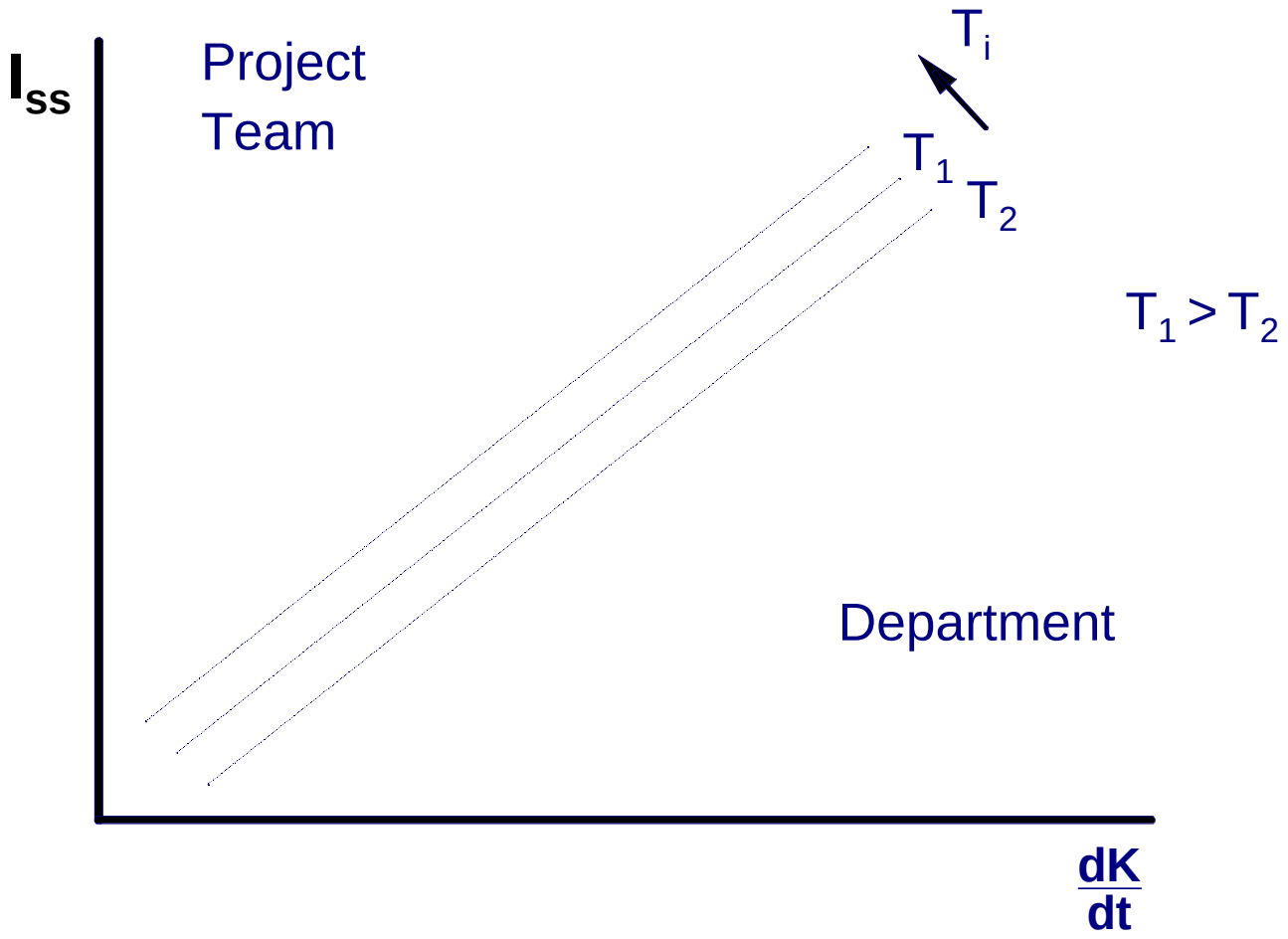
Organizational Structure Space



Three Possible Situations:



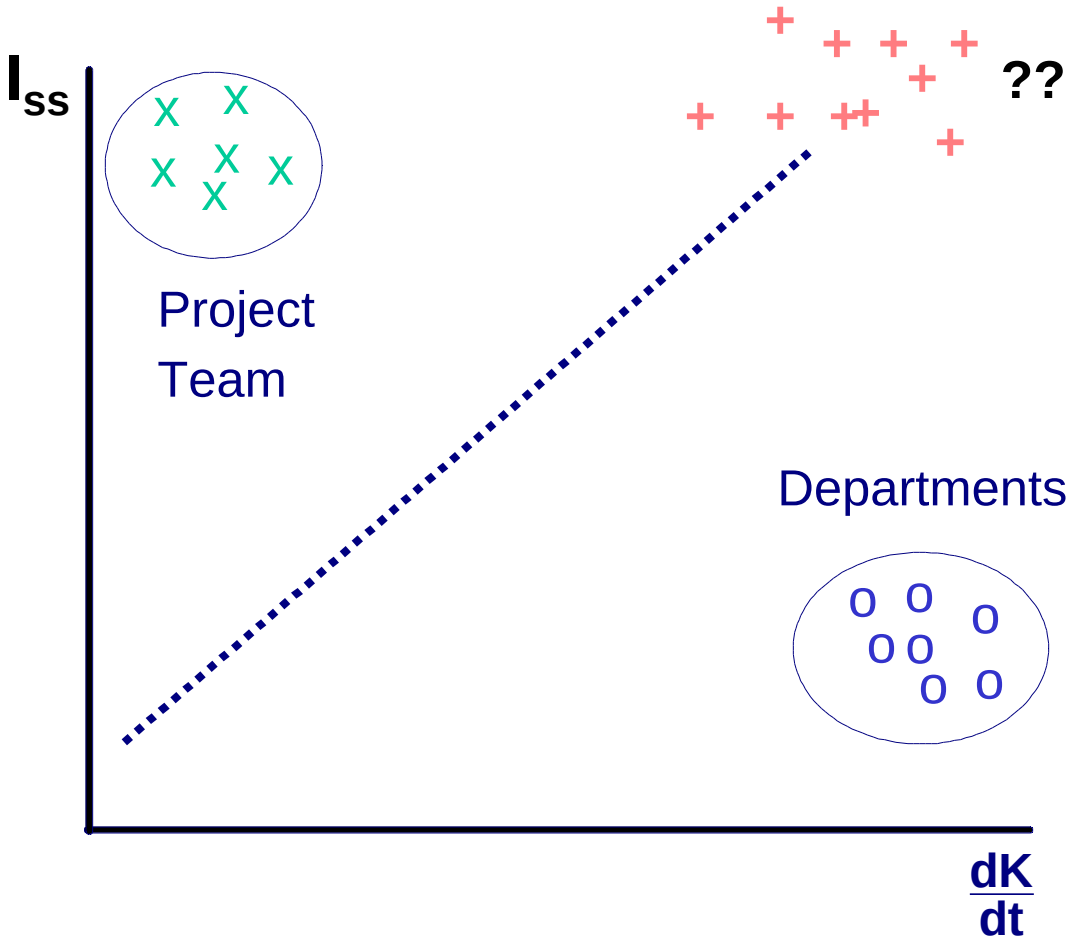
Duration of Project Assignment



Structuring the Organization

- **Standard Industrial Practice**
  - Ignores the rate at which technologies are developing (despite the fact that this can often be measured).
  - Usually ignores the interdependencies in project work (seasoned project managers are an exception).
  - Focuses on project duration (and usually makes the wrong decision on this parameter).

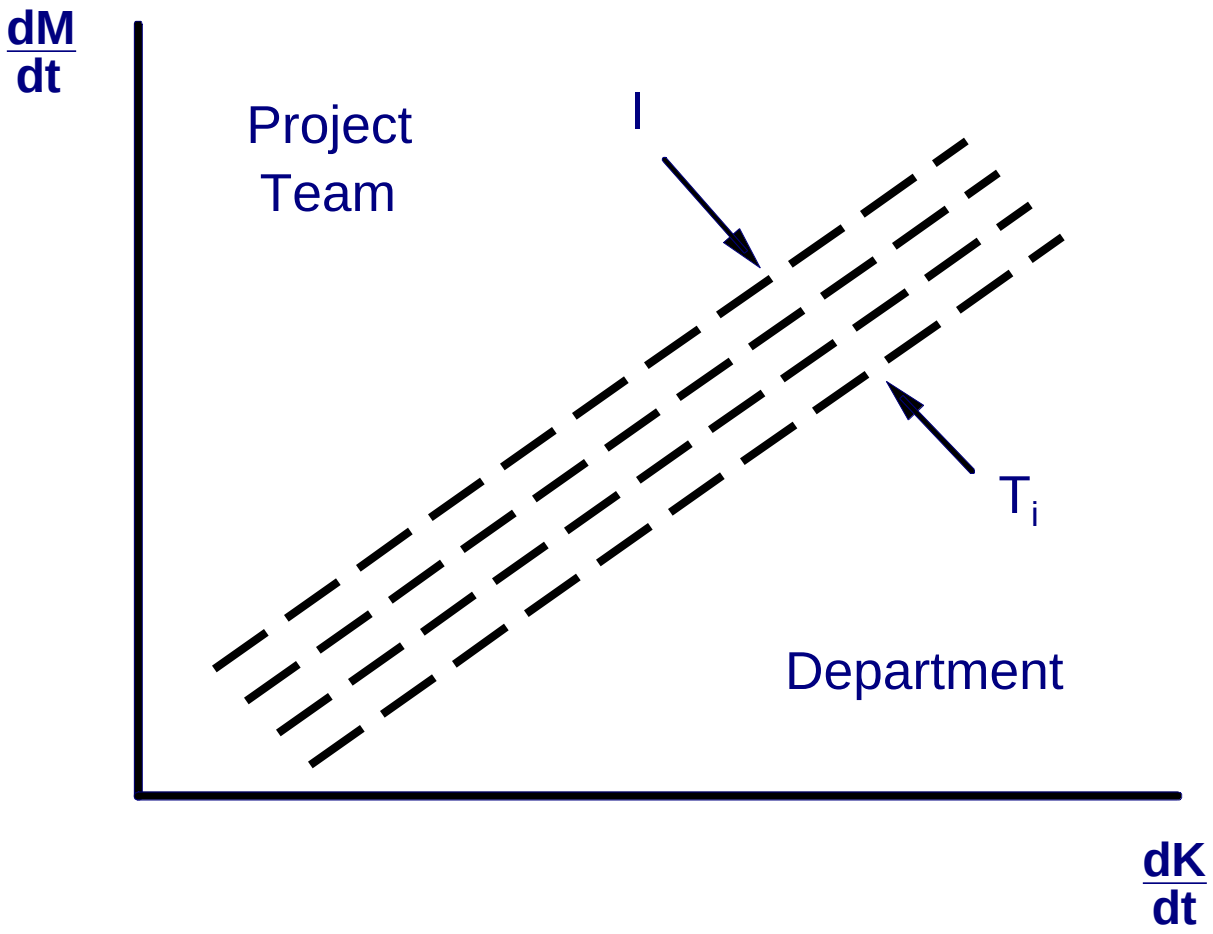
How to Handle this Situation?



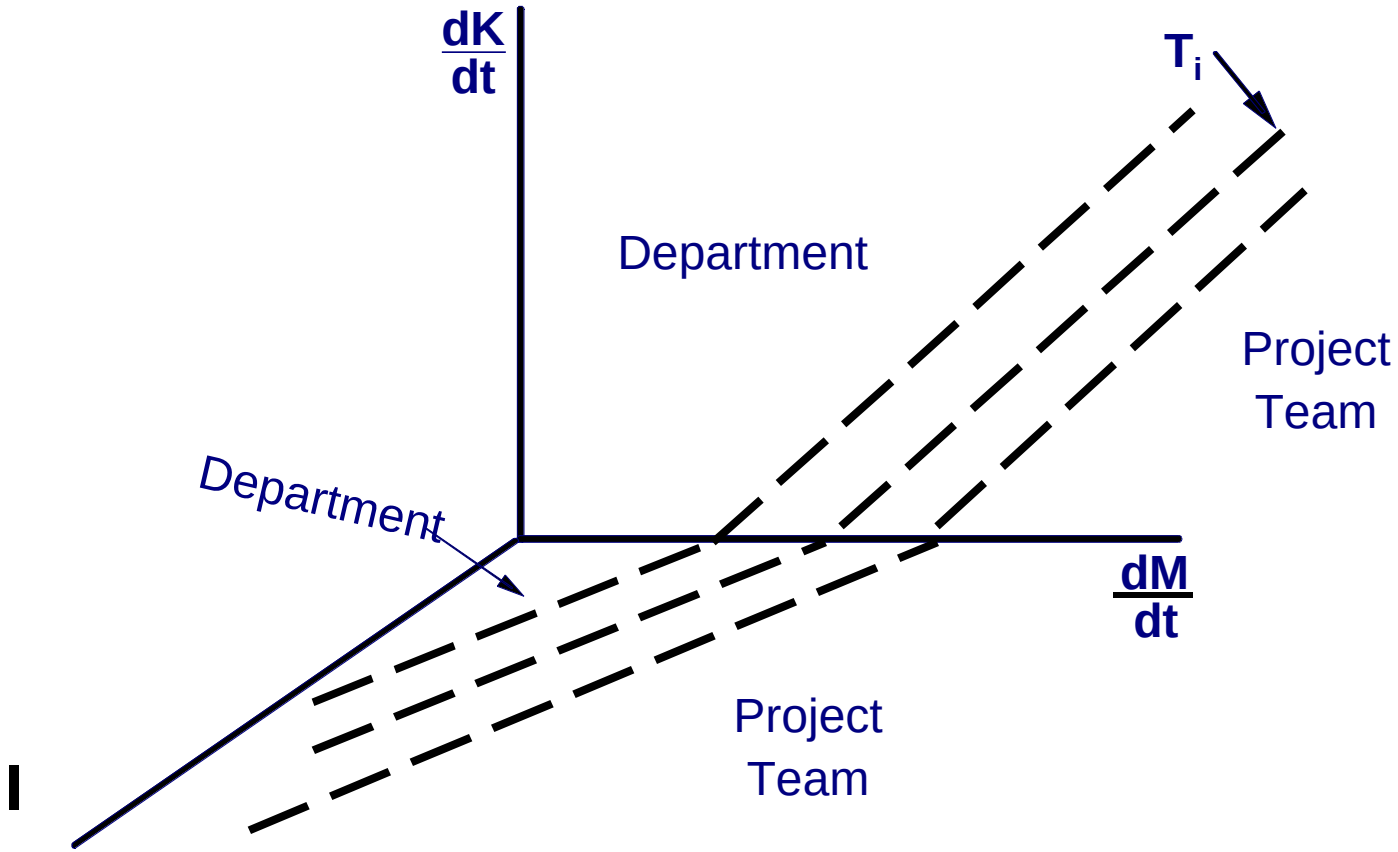
Two Possibilities:

- Re-partition the overall problem to reduce interdependencies.
- Form a project team but rotate personnel between the project team and the departments for time periods that are related to the rate of change of their disciplines.

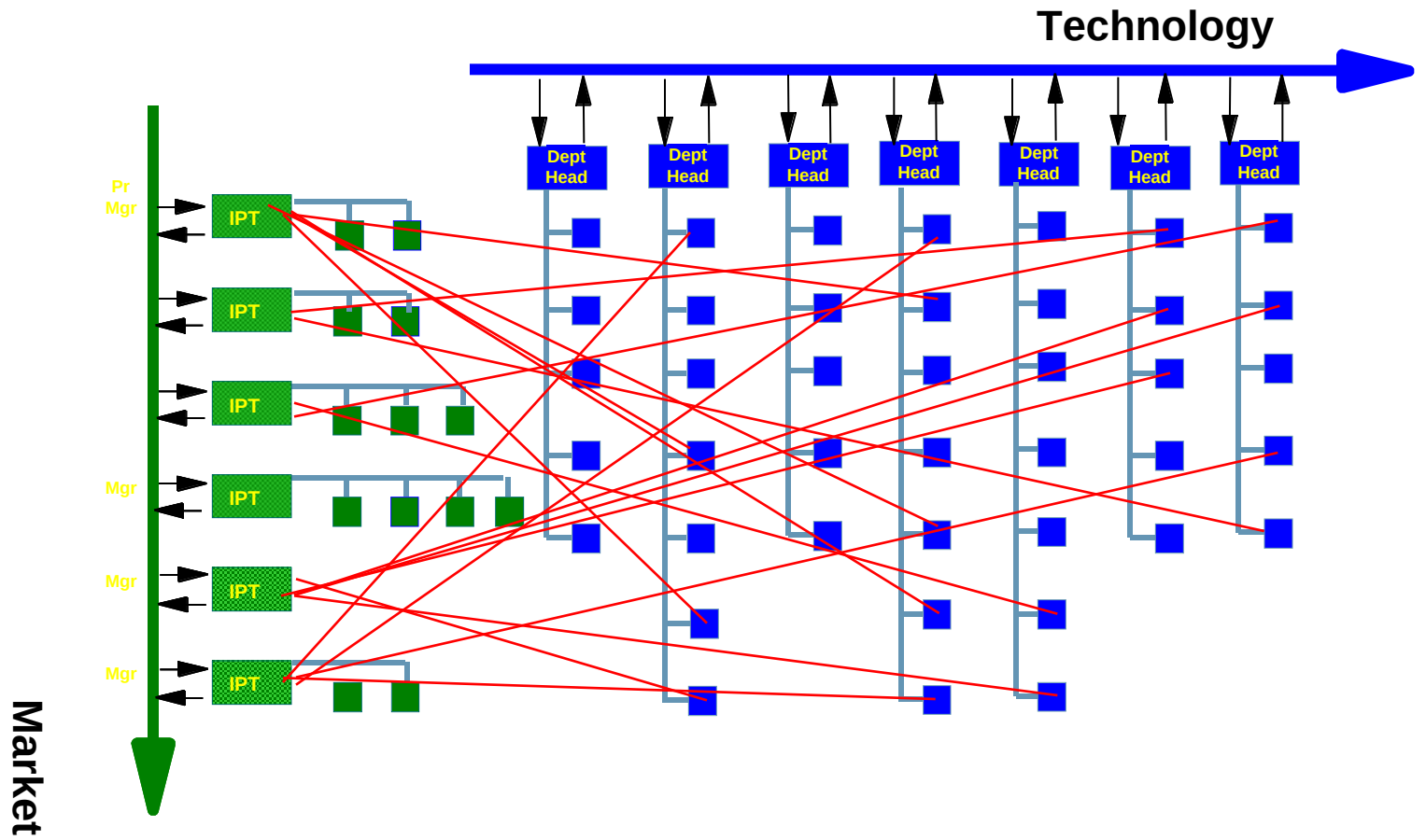
What about the Dynamics of the Market?



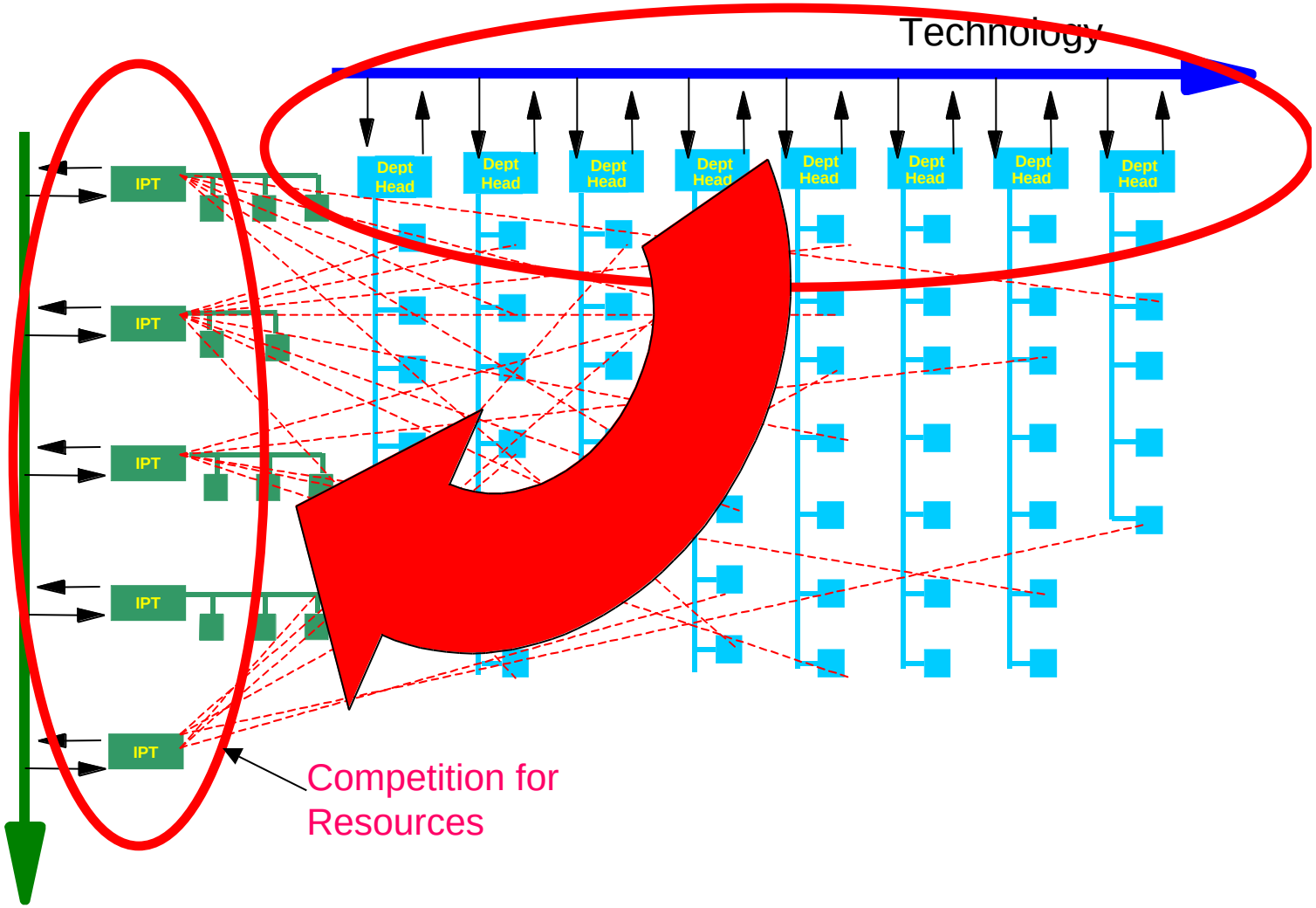
All Four Parameters Together



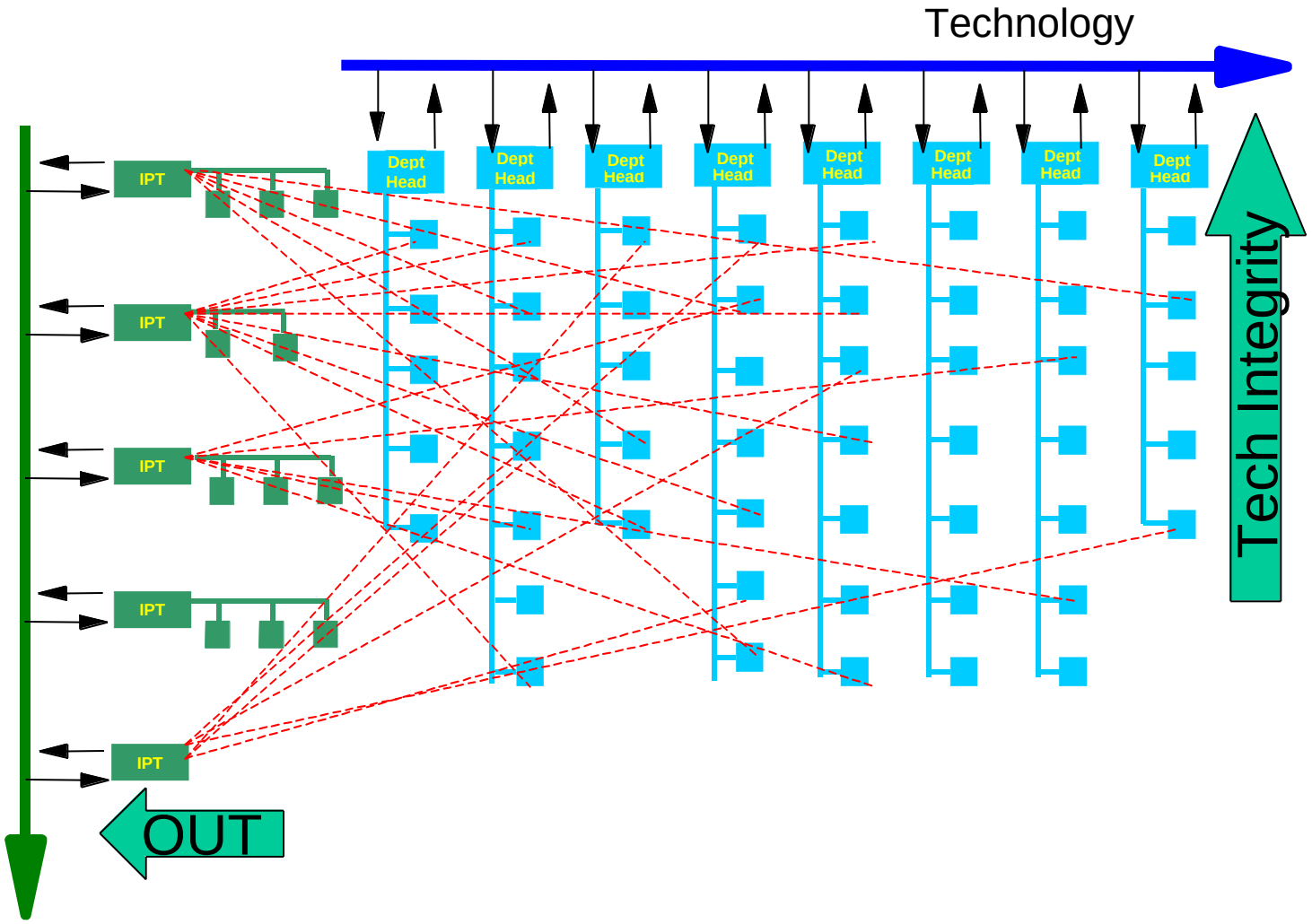
Matrix Connections to Market and Technology



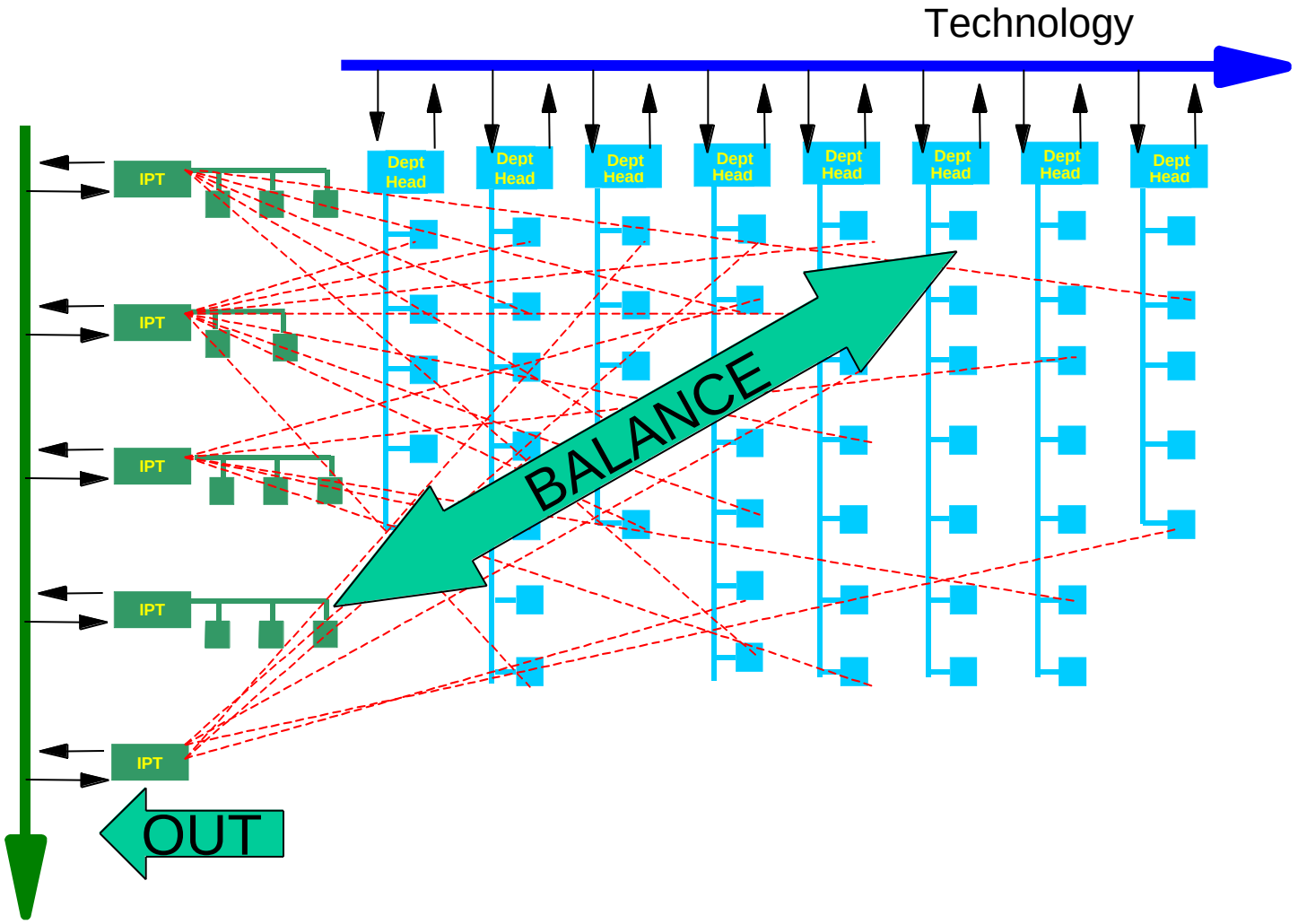
Some Problems



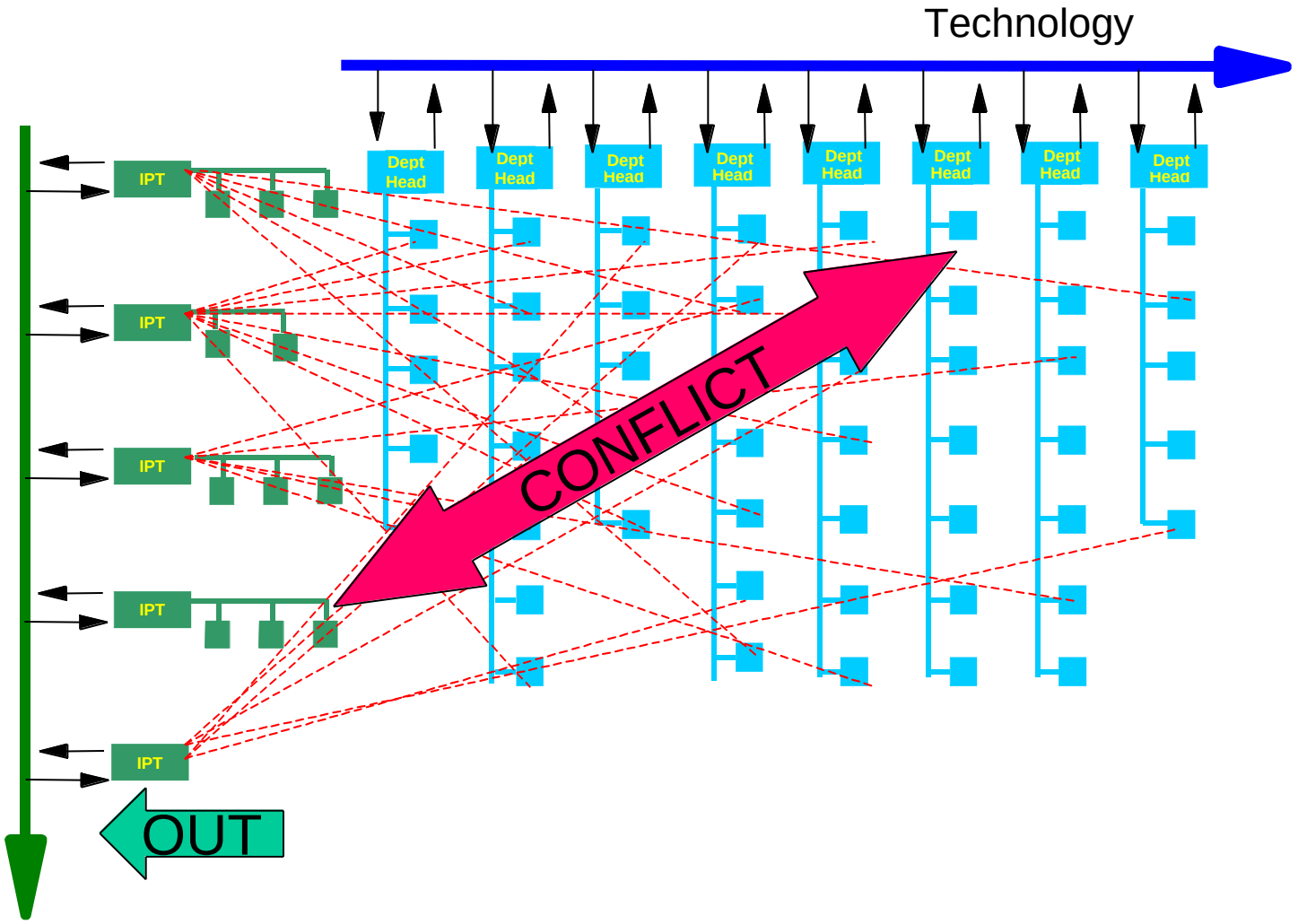
Problems with Imbalance



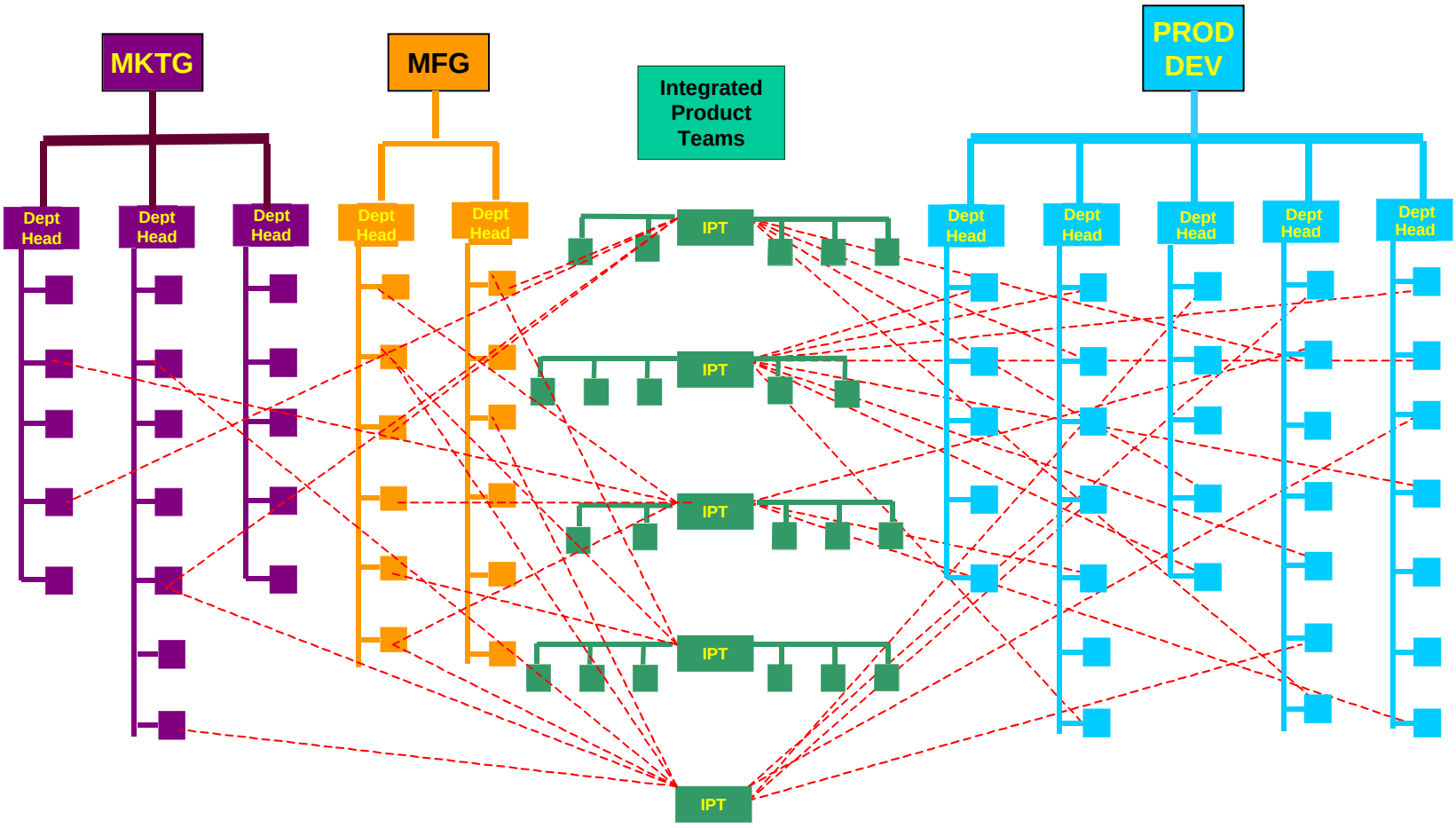
The Need for Balance



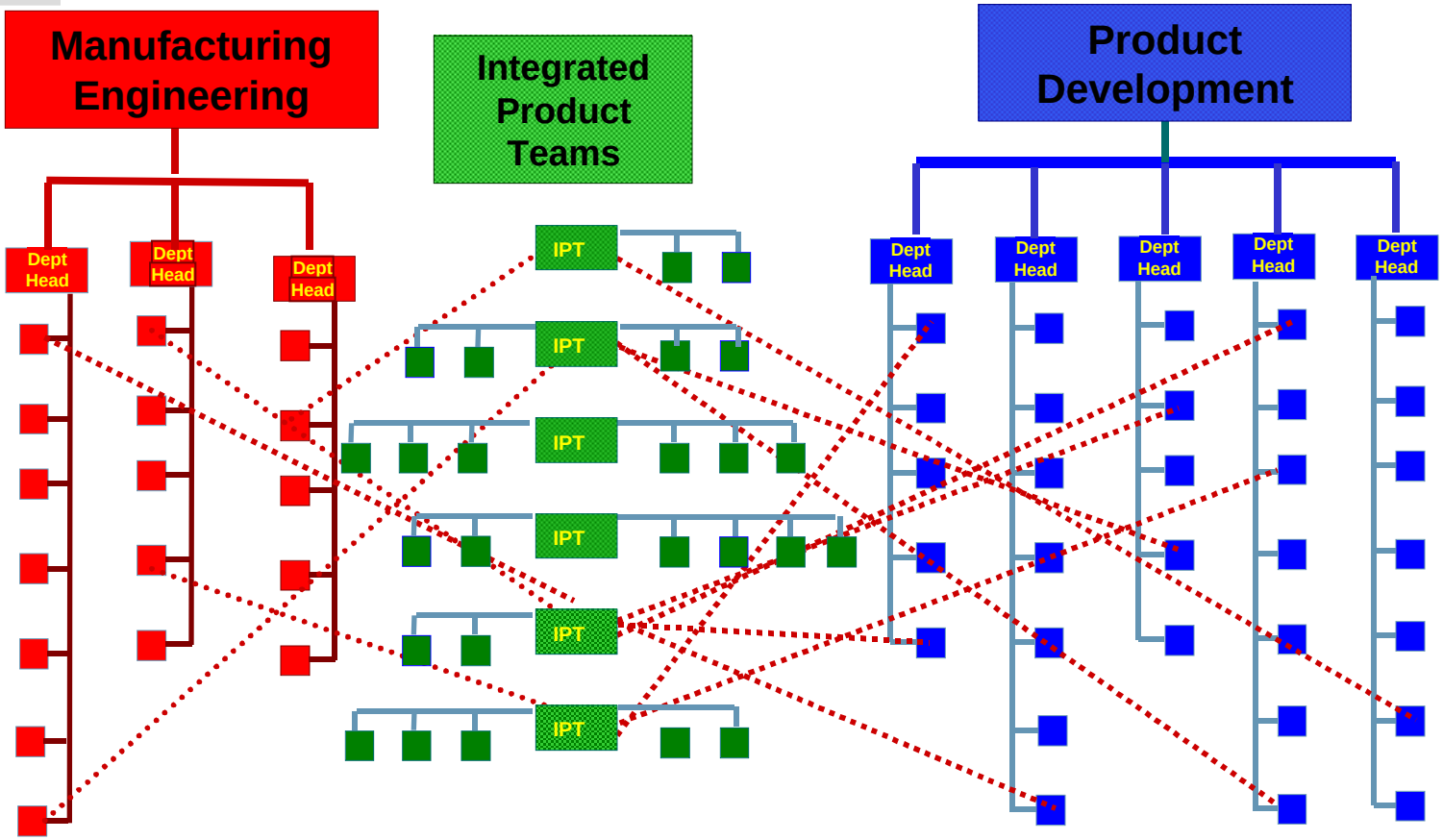
The Inescapable Conflict



A More Complete Matrix Using Integrated Product Teams



Matrix Connections to Product Development and Manufacturing Engineering



Management of Transitions

- The critical points of vulnerability in the life of a project are the points of transition.
  - Transitions can involve many parameters, for example:
    - People
    - Management
    - Leadership & leadership style.
    - Primary organizational responsibility and reporting relationships.
    - Nature of the work.
    - Types of knowledge required.
    - Physical location.
- To change all of these simultaneously is to court disaster.

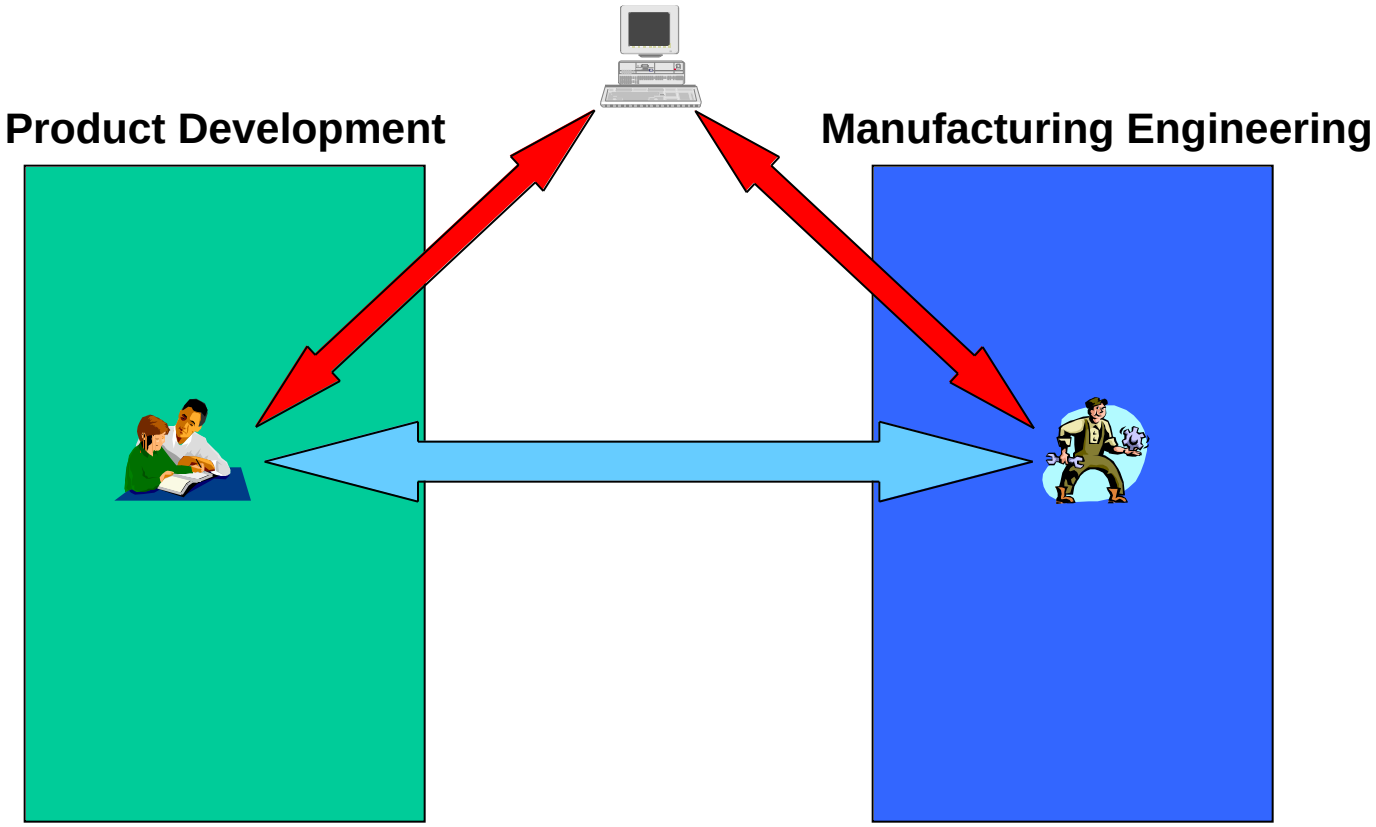
Management of Transitions

- Transfer is often between differing cultures, making the issues even more difficult.
  - Product Development and Manufacturing Engineering live in very different worlds and develop different languages.
  - Strategies must be developed to increase understanding cultural differences and dealing with them.
  - Frequently a common reference point will help.

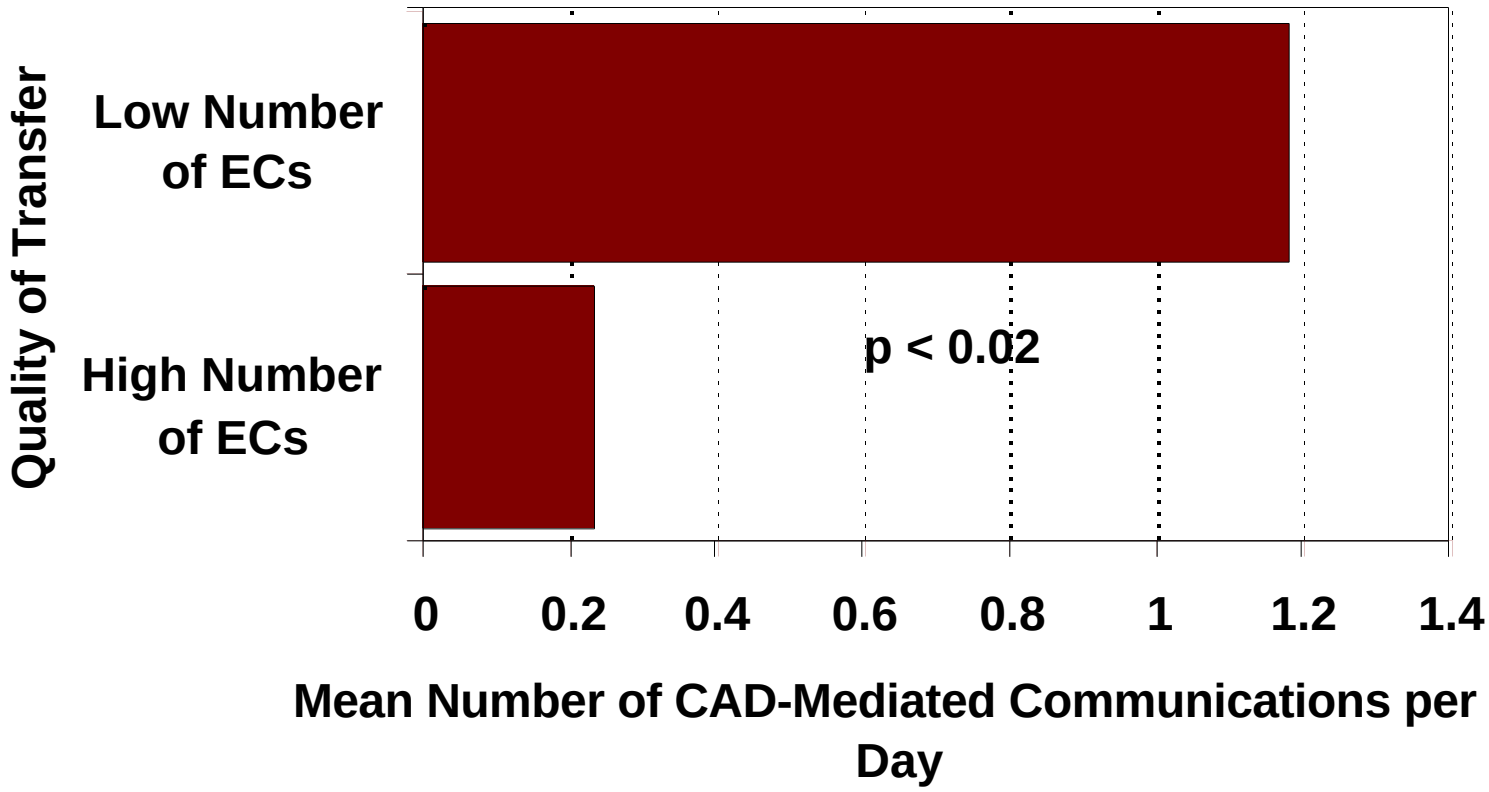
A Field Experiment

- To test whether CAD files would serve this function:
  - We instrumented the terminals of designers of gas turbine blades and, on randomly chosen days, recorded the number of communications with manufacturing engineers through the CAD terminal.
  - This monitoring went on for several months.
  - As a performance measure we used the number of Engineering Changes (Ecs) that had to be processed after the product was transferred to Manufacturing.

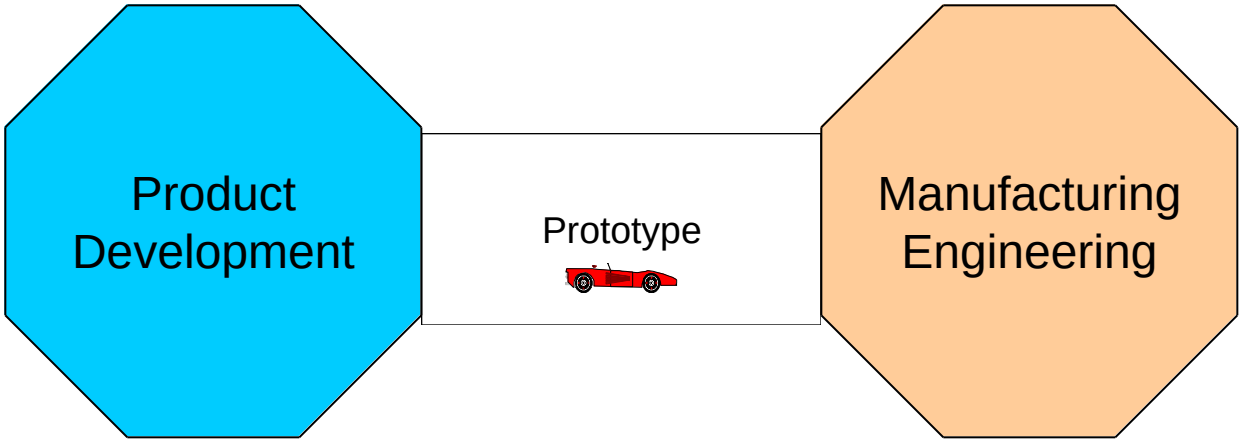
Using a Common Reference to Reduce Ambiguity in Communication



Performance in Transferring Designs to Manufacturing as a Function of CAD System Use for Communication



Partial Layout of the BMW Forschung und Ingenieurung Zentrum



Conclusions

- Positioning your situation along four dimensions will provide a guide for determining organization for product development.
- Reference points can be used to reduce the ambiguity in cross-functional communication.