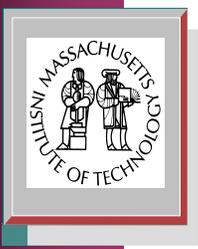


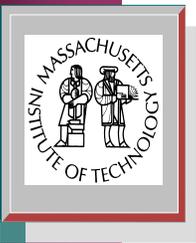
Relations Between Science & Technology

April 10, 2007

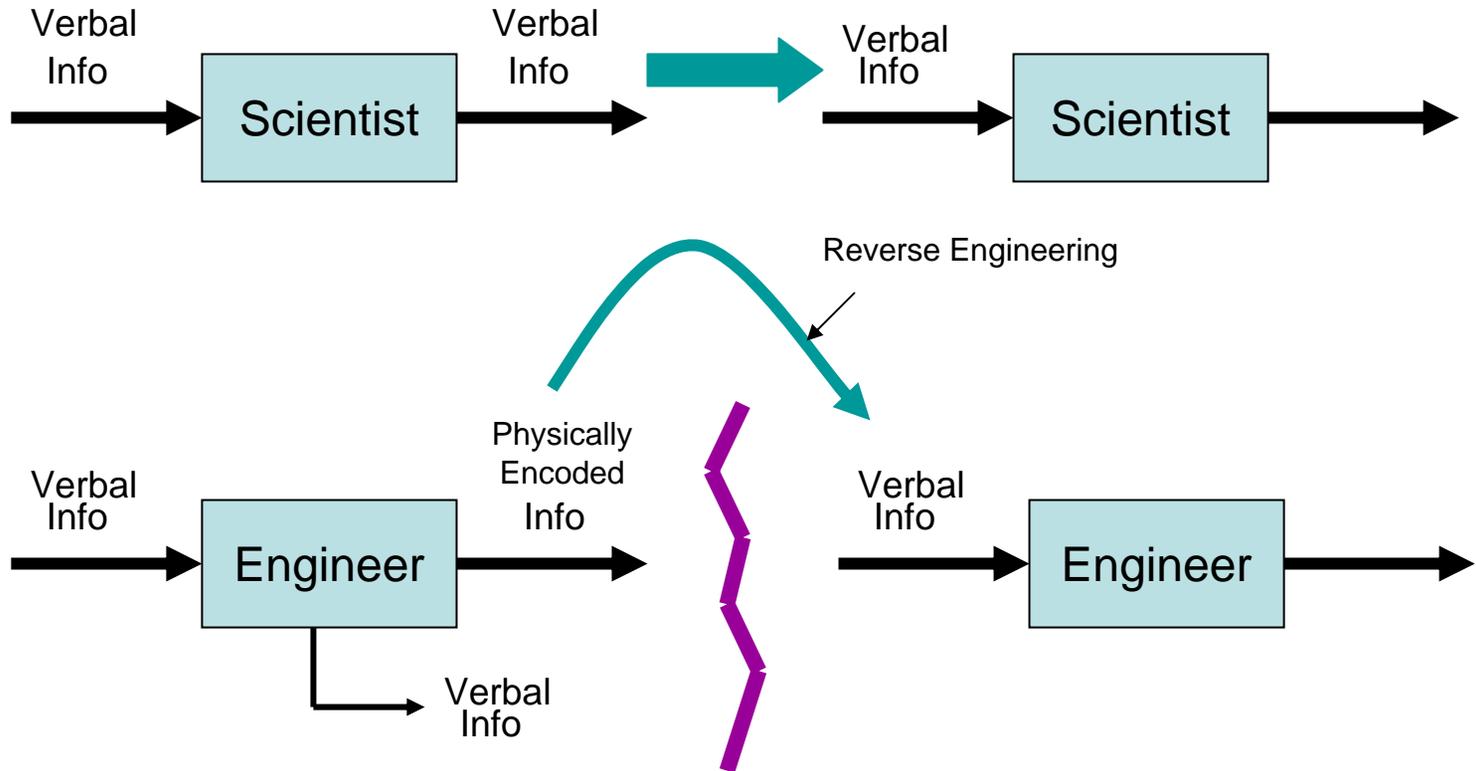


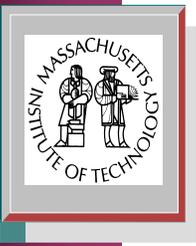
What have we learned?

- So far, no answers but three questions.
 - Why don't those outside the organizations supply better ideas?
 - Why aren't those inside the organization consulted more?
 - How do the 'internal consultants' acquire their information?

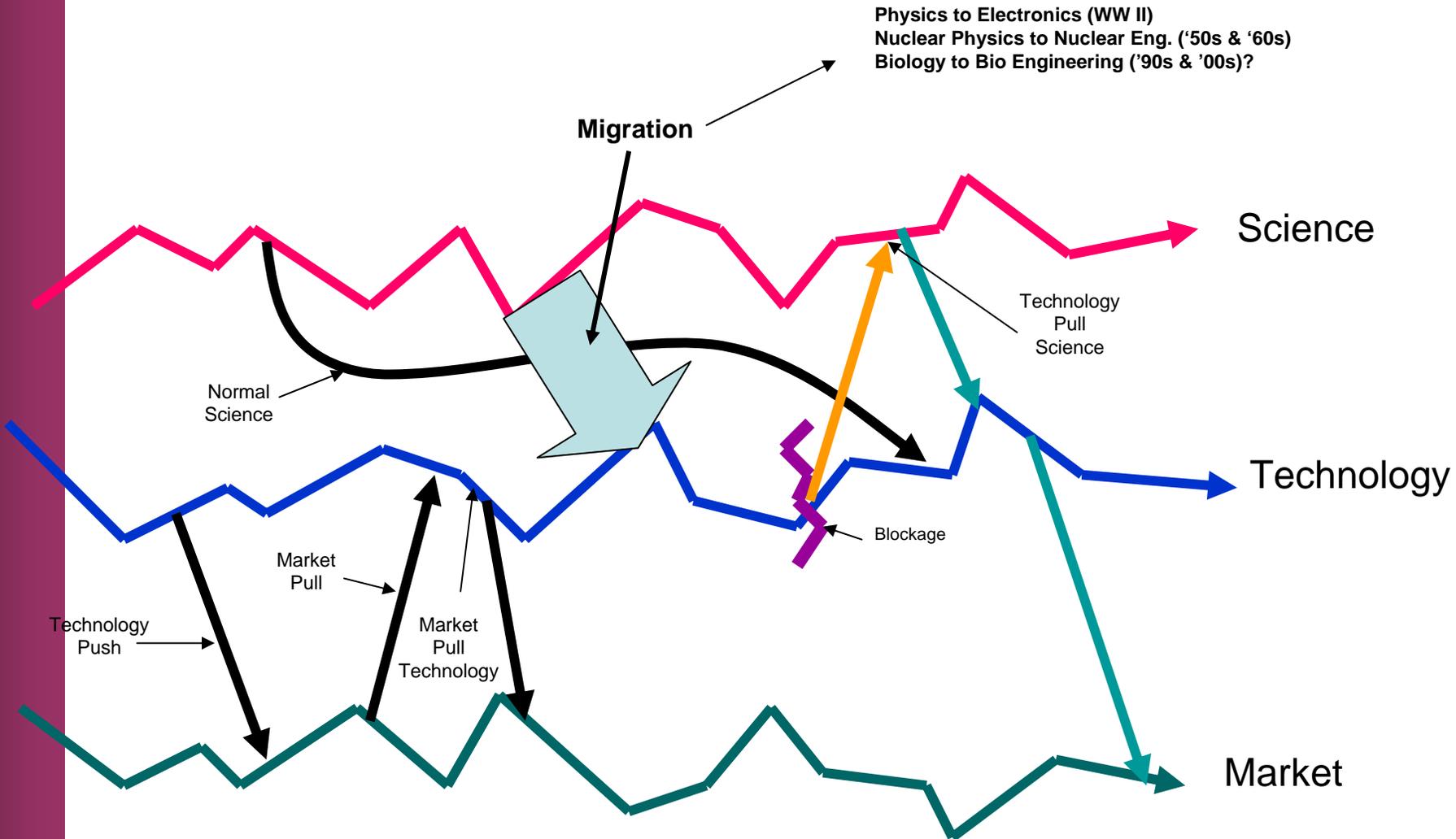


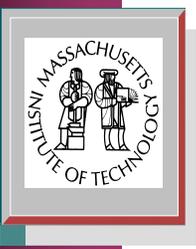
Science and Technology





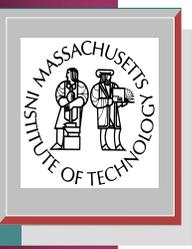
Science, Technology and Market



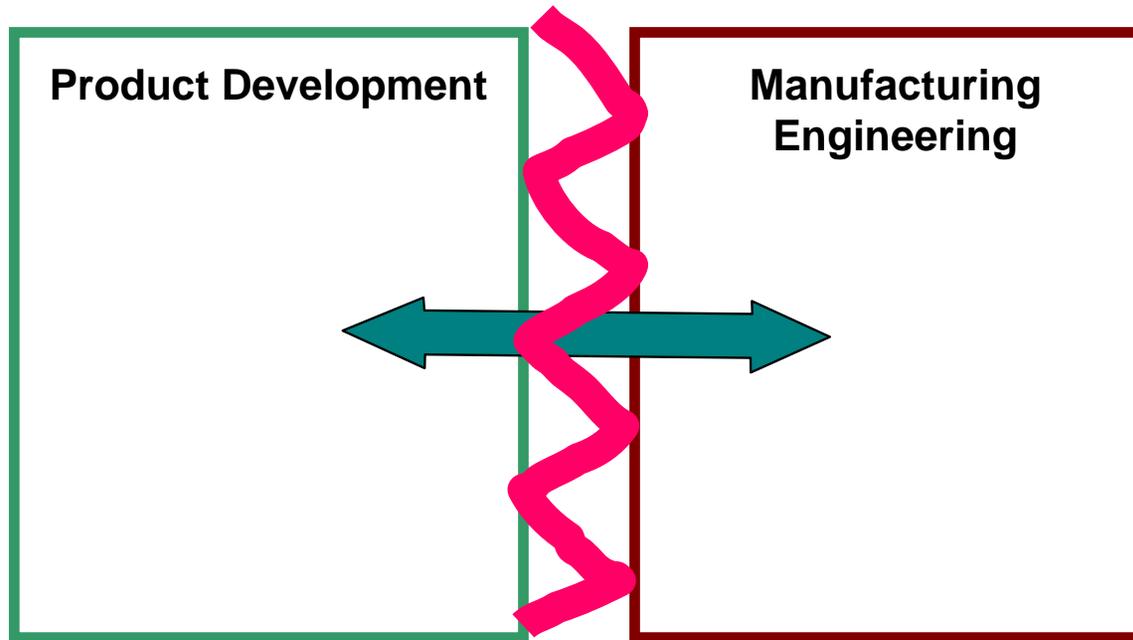


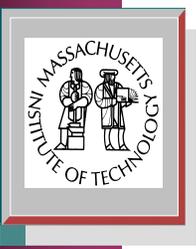
Internal Problems

- There are boundaries inside the organization that can cause as much difficulty (sometimes more) as the external boundary:
 - Product Development ↔ Marketing.
 - Product Development ↔ Manufacturing Engineering.
 - Etc.



Interfunctional Communication





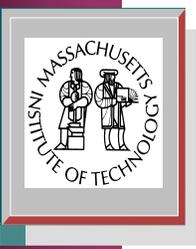
An Experiment

- Recorded CAD functions used by gas turbine designers.
 - Sampled on random days about once per week for several months.
- Outcome Measure:
 - Number of Engineering Changes (ECs) processed following transfer of design to manufacturing.



Computer Aided Design and Inter-functional Communication

- CAD can be implemented on at least three levels:
 - An investment in ***physical*** capital.
 - An automation of the traditional drafting process.
 - As an investment in ***human*** capital.
 - Extending the ability of the designer.
 - As an investment in ***social*** capital.
 - As a means for communication and other exchange.

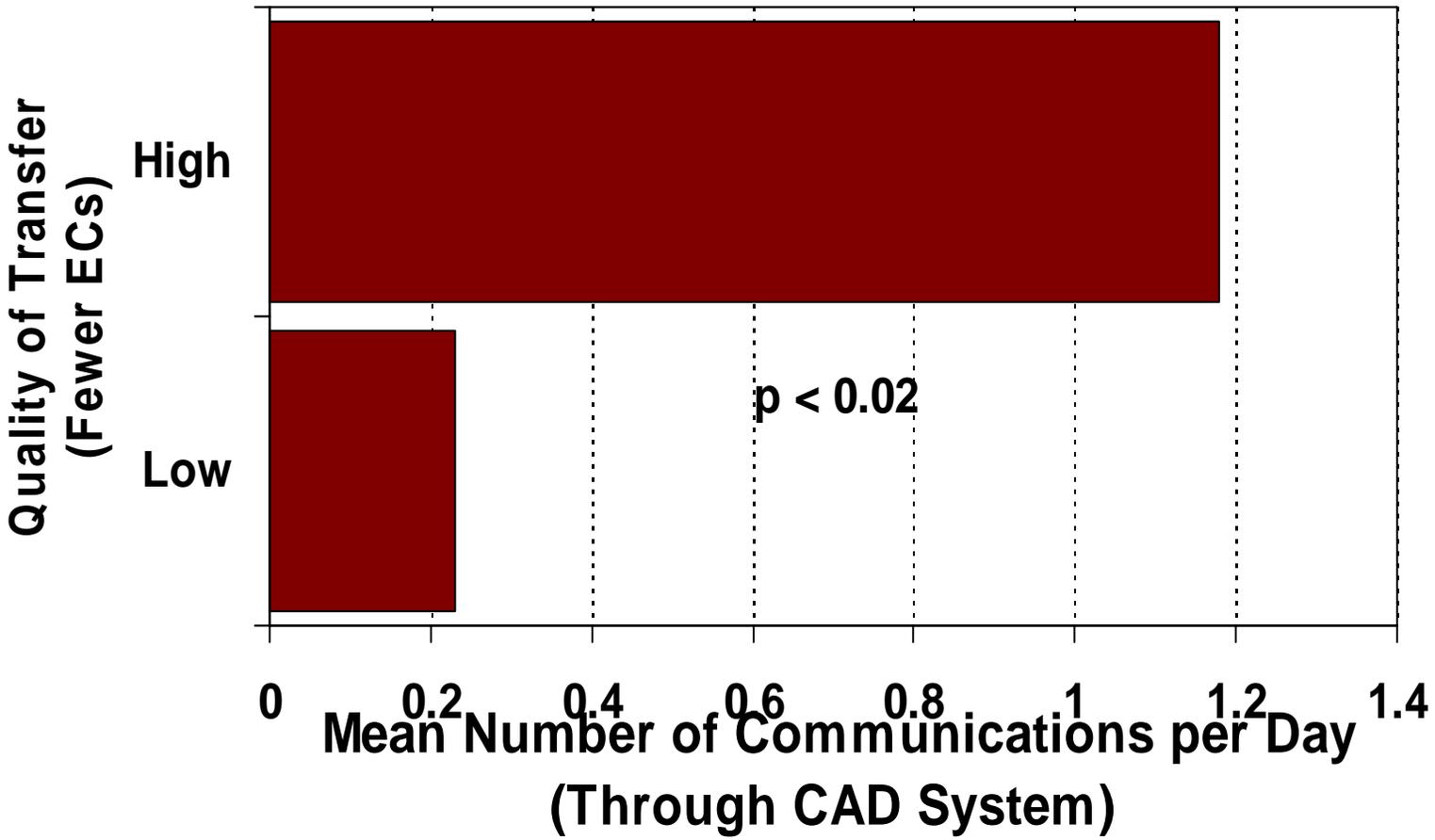


An Experiment

- Instrumented the terminals of gas turbine blade designers.
 - On randomly chosen days, recorded all of the functions used that day.
 - Functions categorized according to categories listed on preceding slide.
 - Output measure
 - Number of Engineering Changes that had to be processed following transfer to Manufacturing.



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





Using a Common Reference to Reduce Ambiguity in Communication

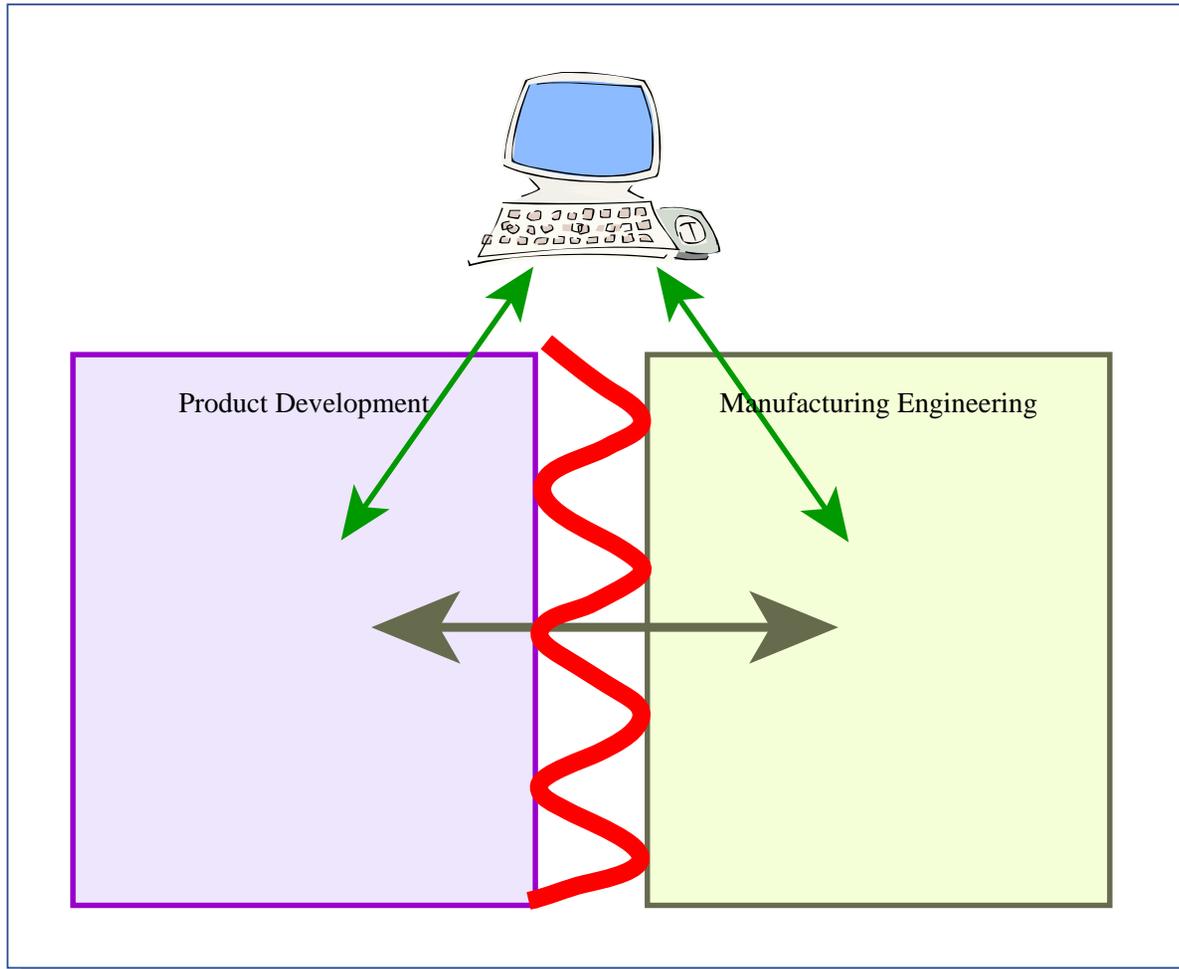
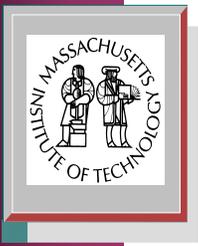
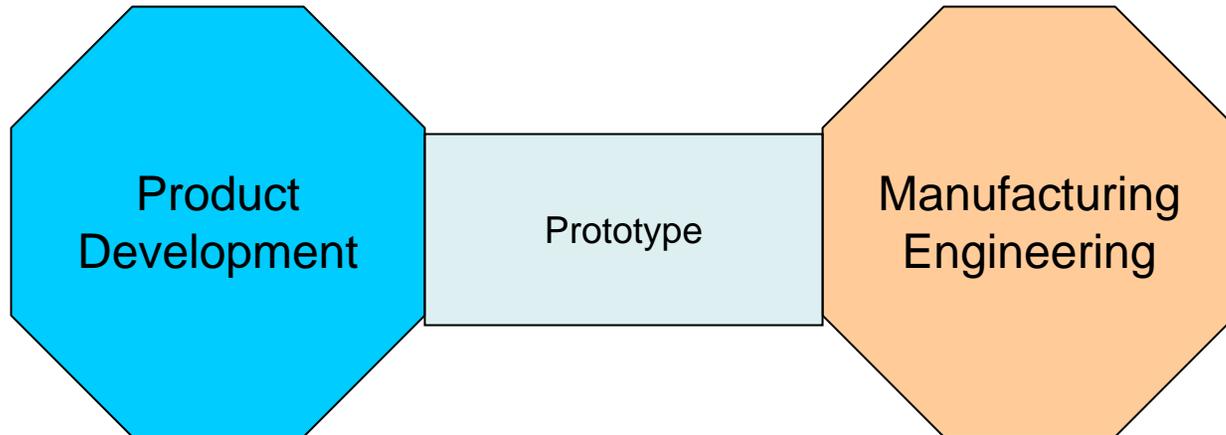
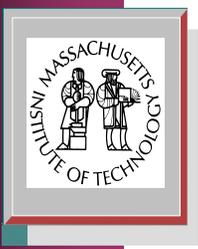


Figure by MIT OCW.



Partial Layout of the BMW Forschung und Ingenieurung Zentrum





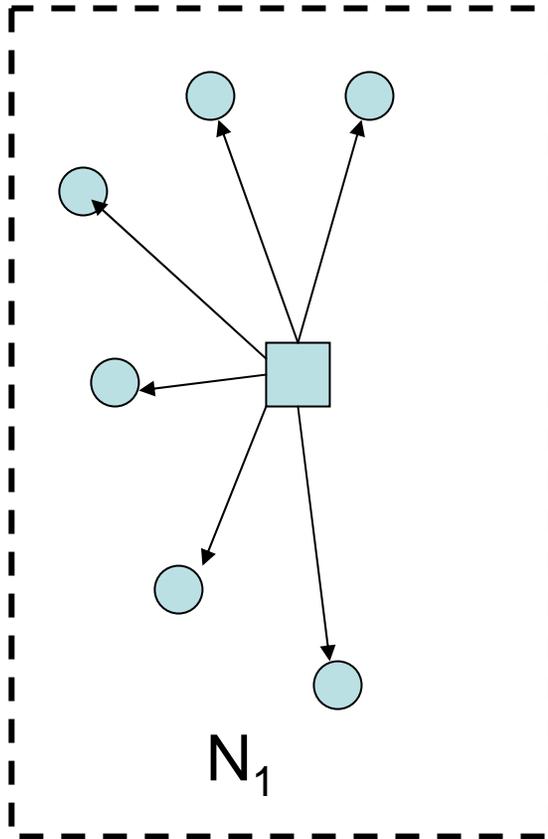
Movement of People

- More may happen as a result of a transfer than is immediately obvious.

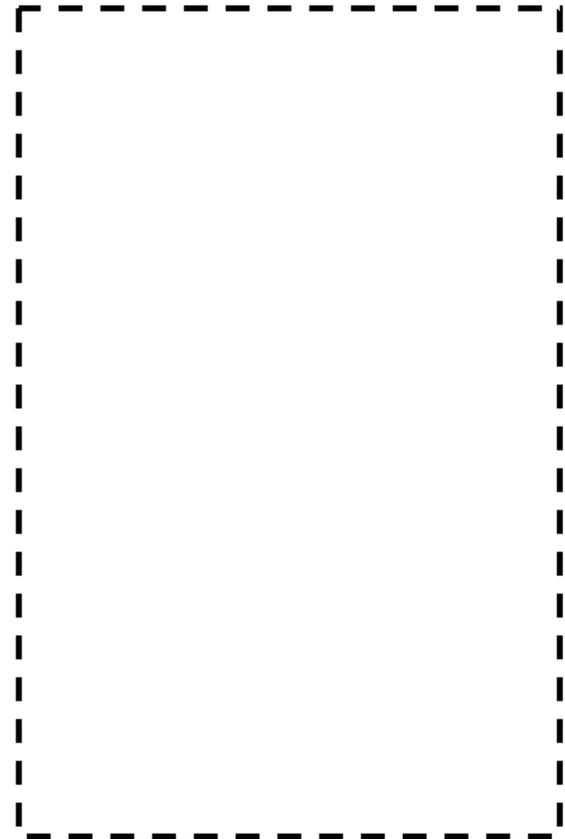


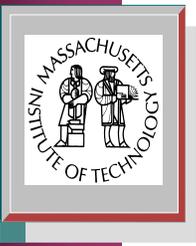
The Effect of Transfers

A

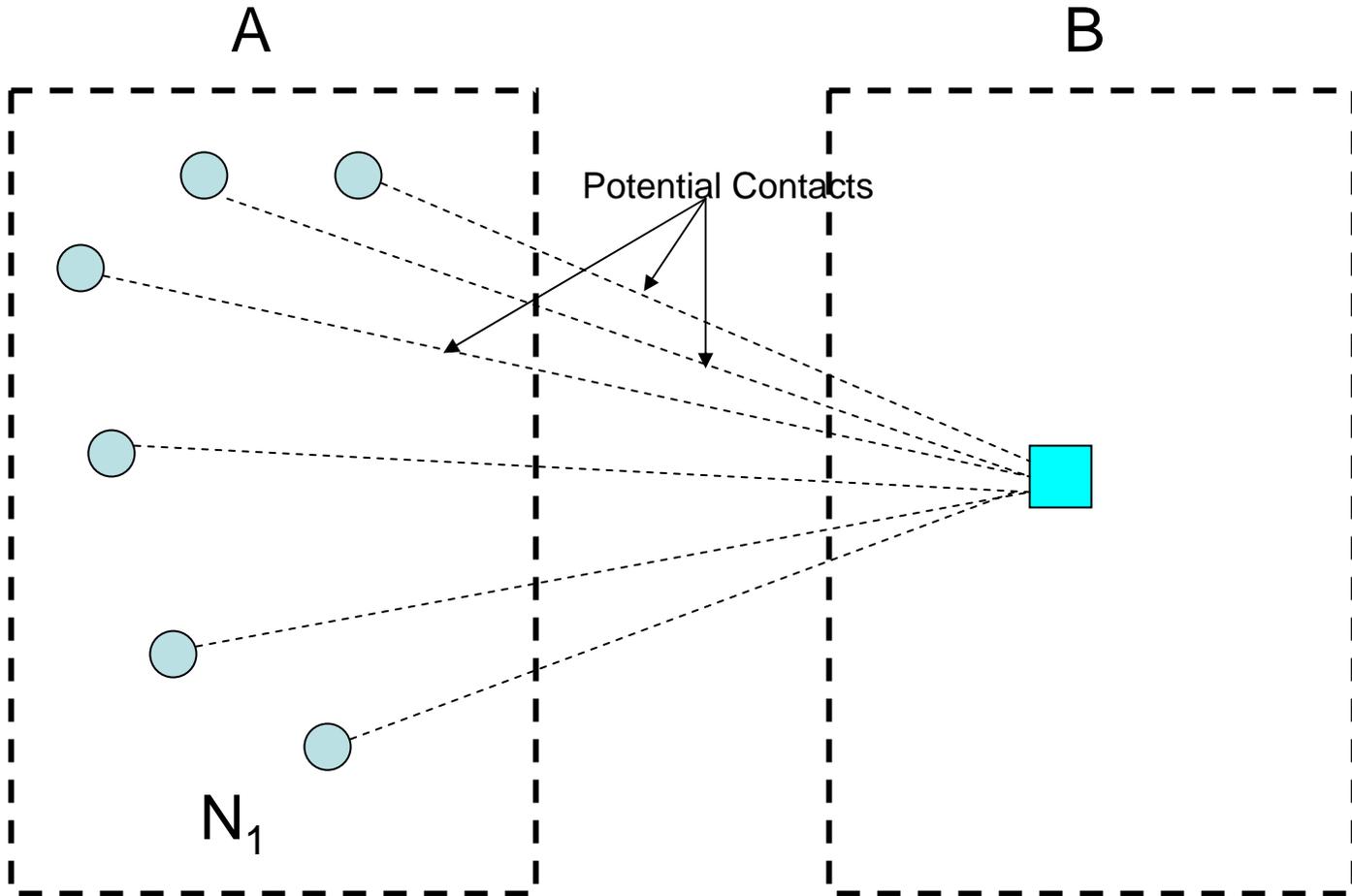


B



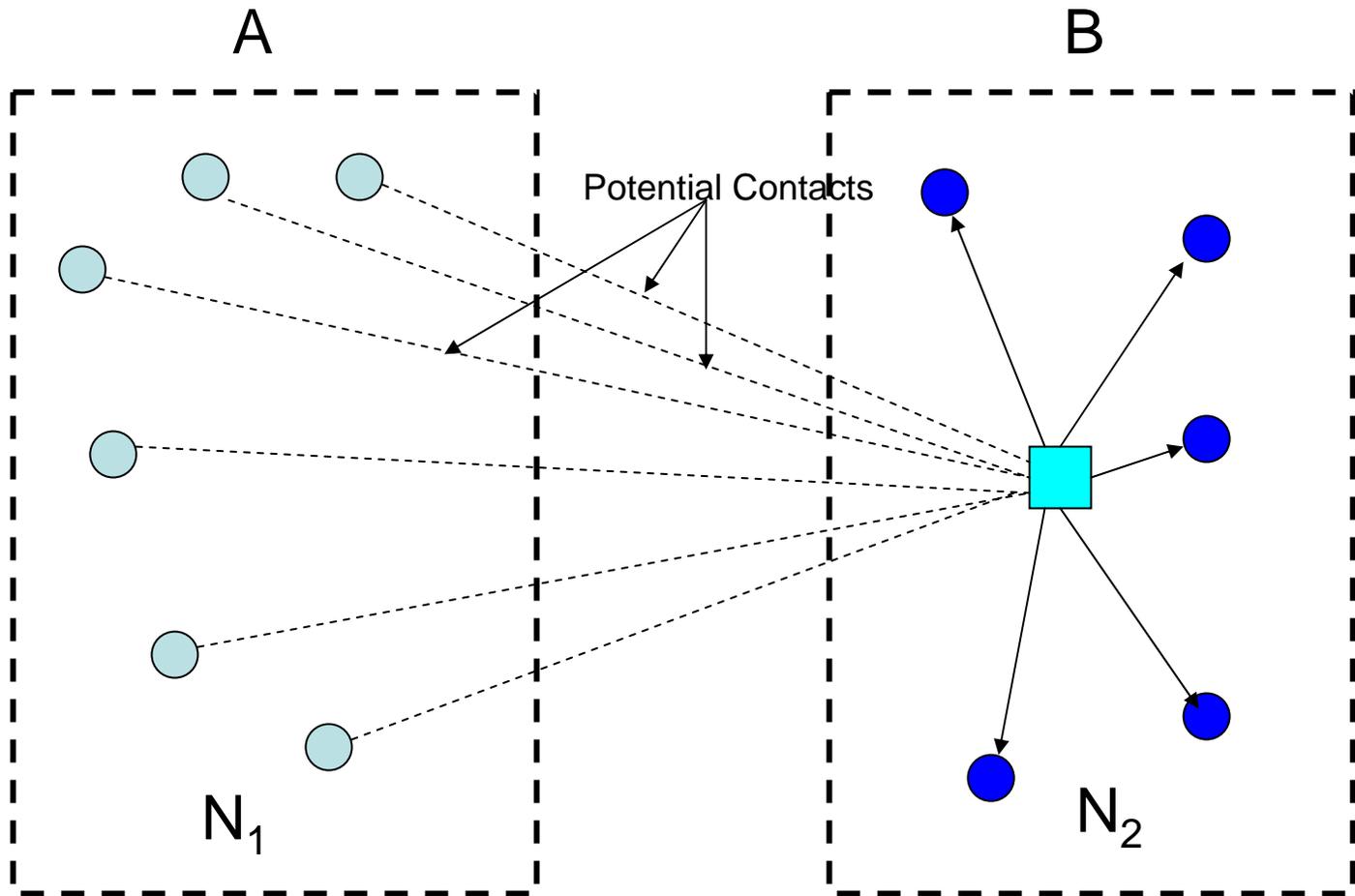


Continuing Relations



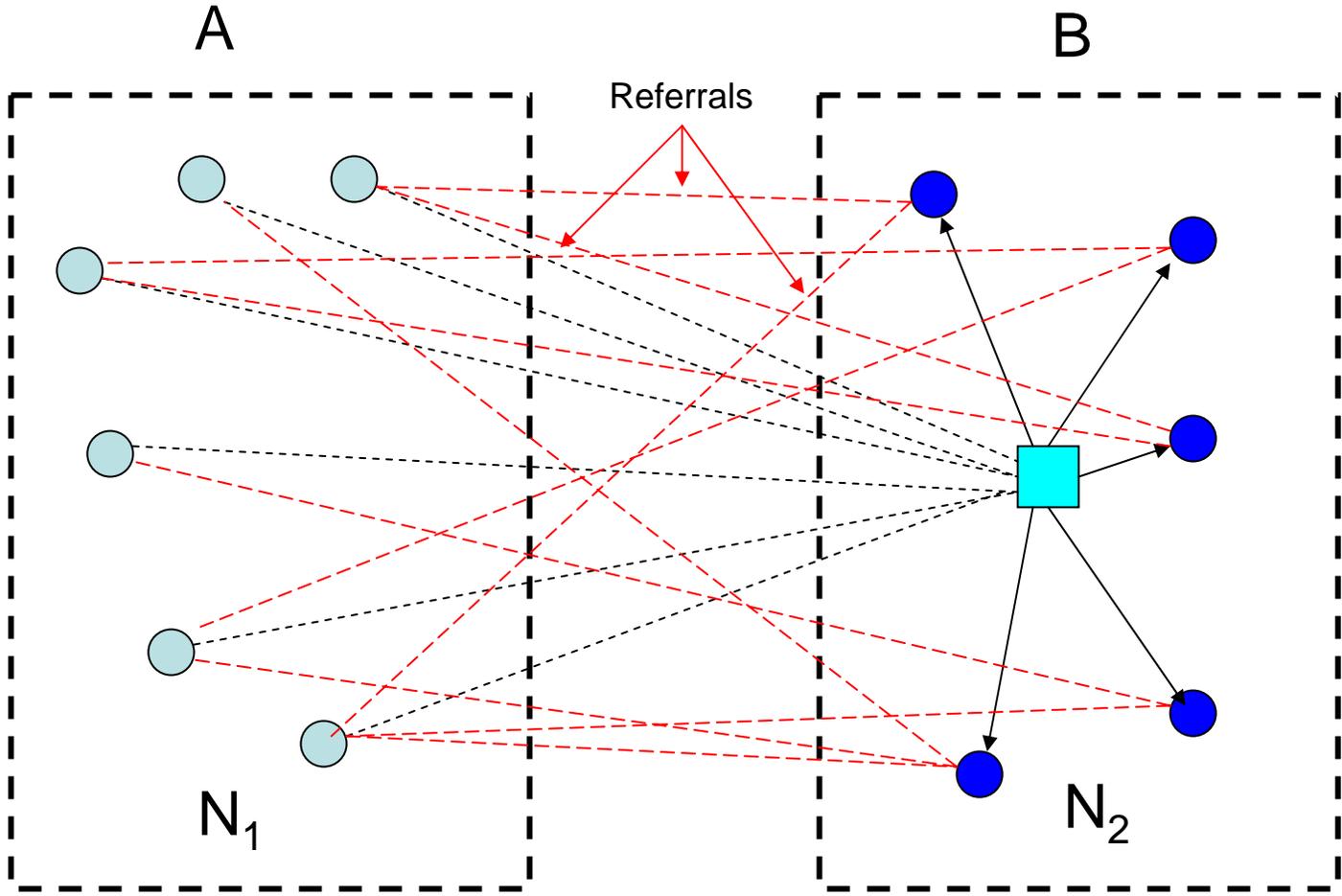


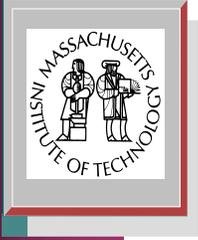
More Continuing Relations





Referrals





A Typical Technical Communication Network

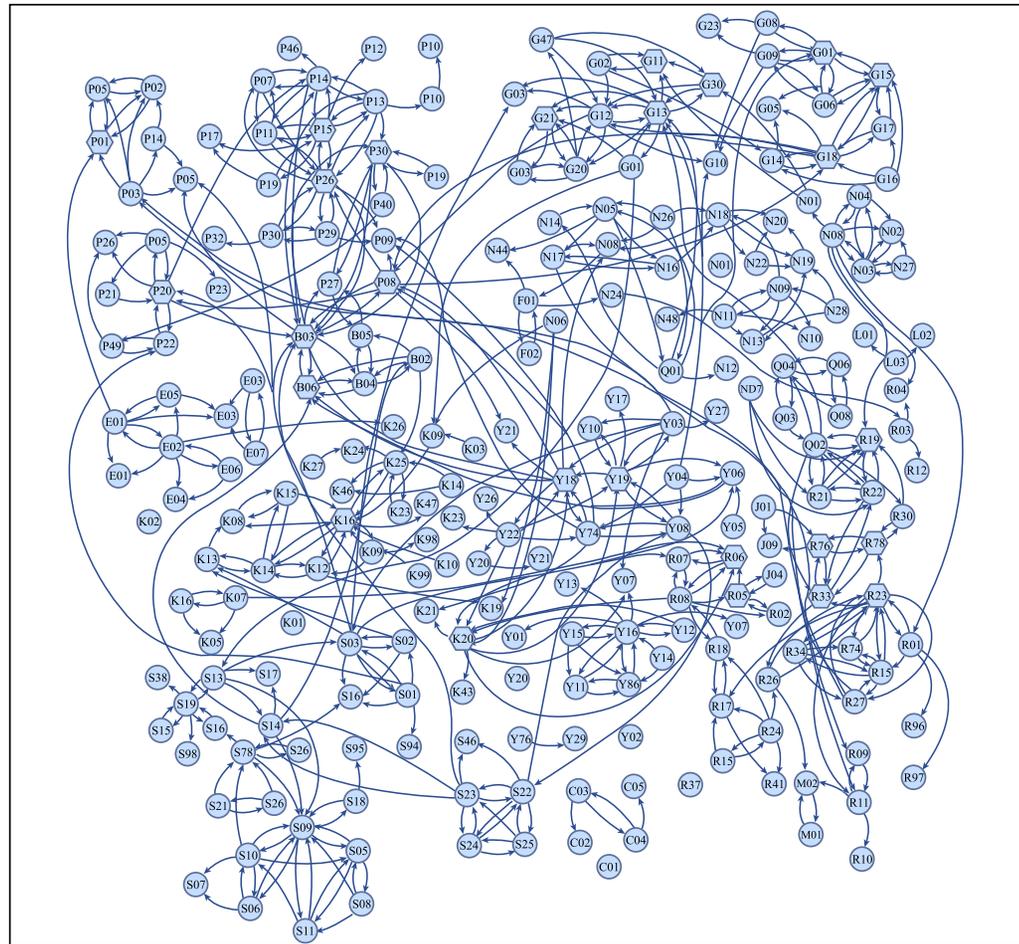


Figure by MIT OCW.



Communication Network in a Small Laboratory

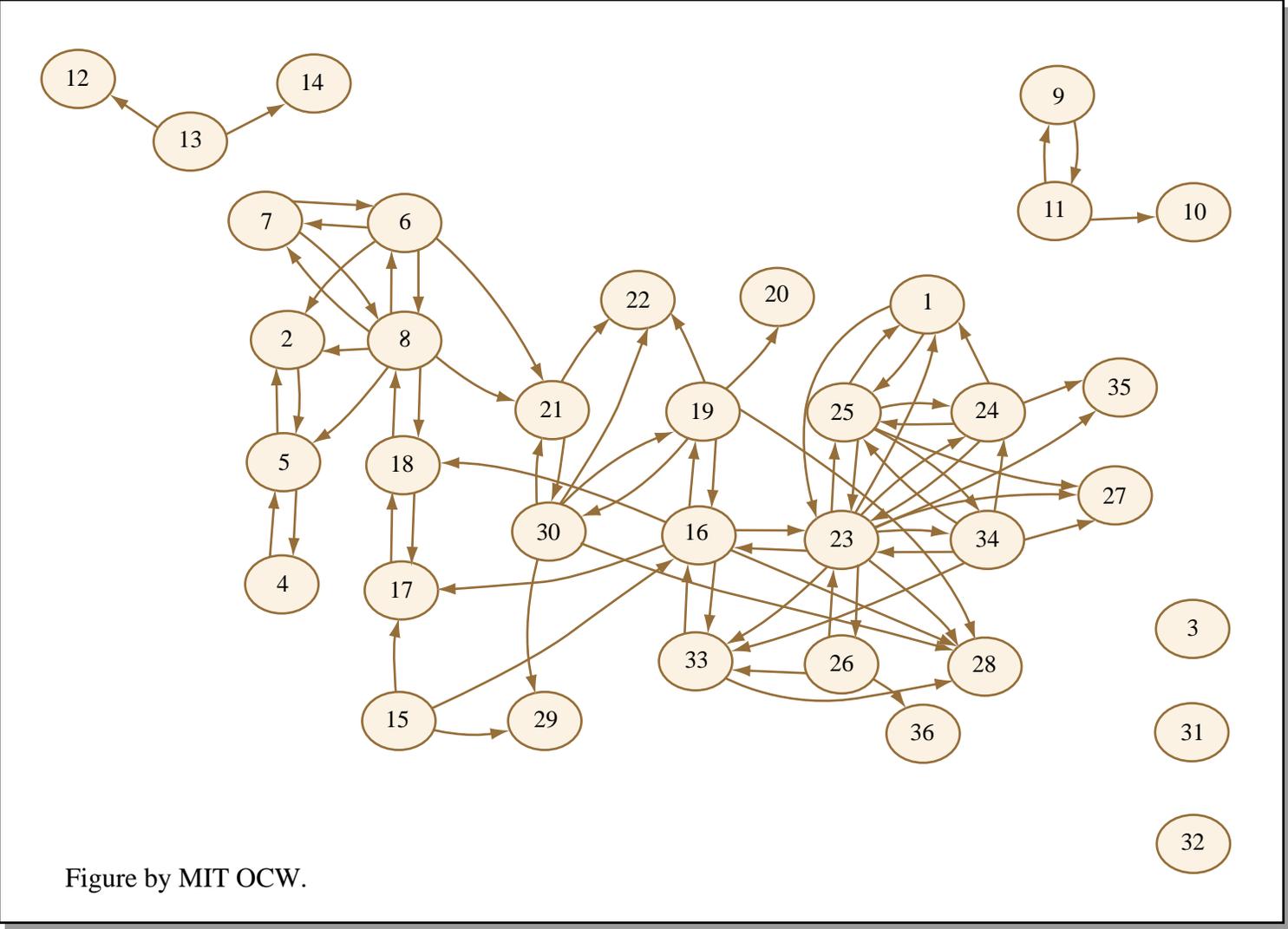
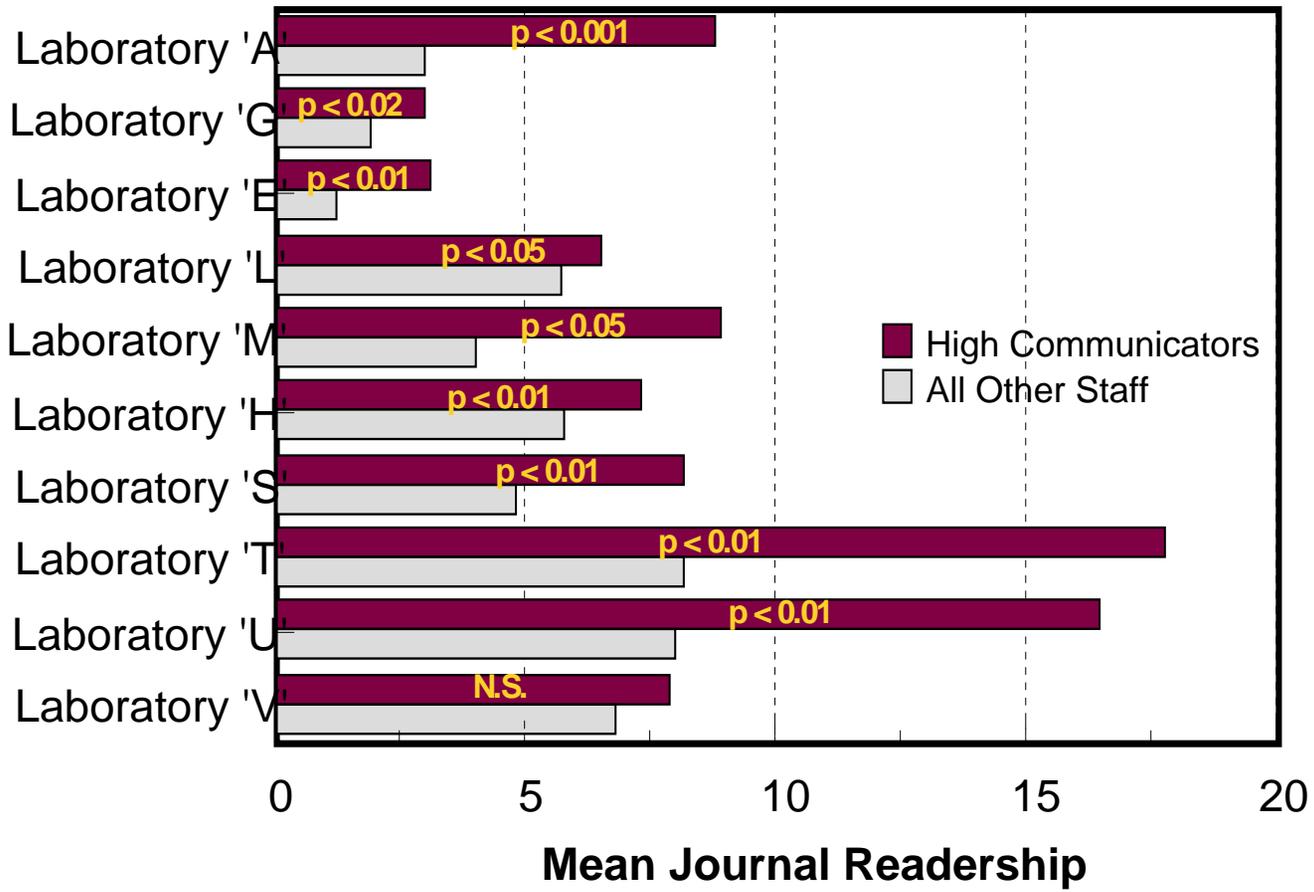


Figure by MIT OCW.

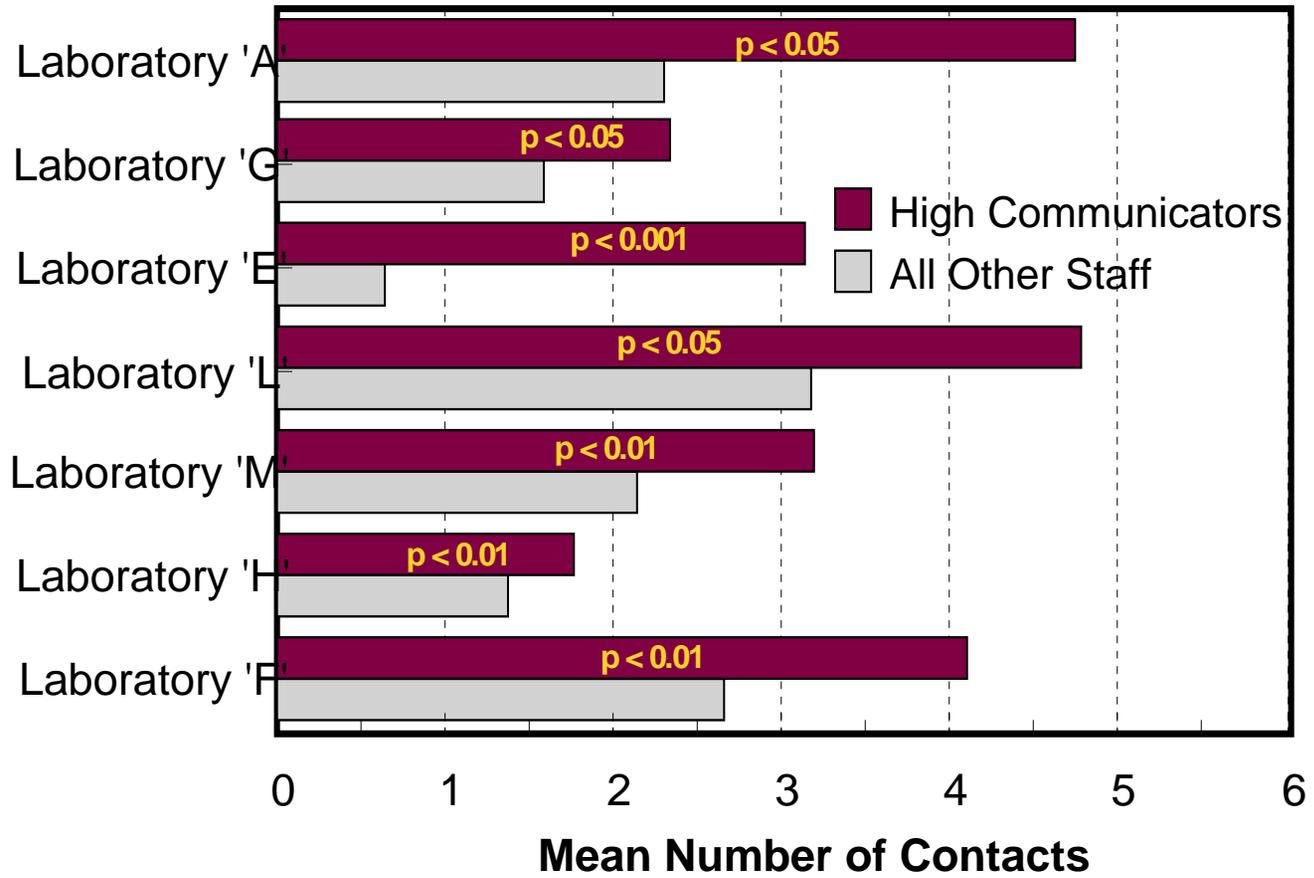


High Communicators Compared with Colleagues in Readership of Refereed Journals





High Communicators Compared with Colleagues in Terms of Regular Informal Contact Outside of the Organization





The Gatekeeper as a Link to Outside Technology

