



# Research Methodology Research Environment

Lecture, 8. October, 2007



# Research in many places

- Universities
- Government research institutions
- Non-profit private research institutions
- For-profit research institutions
- Company research institutions
- Inside company research



# Research objectives

- Add to human knowledge
- Improve quality of life
- Foundation for advanced knowledge
- Foundation for competitiveness
- Competitive technology
- Military advantage



# Research funding

- Government research funds
  - US: National Science Foundation
  - Iceland: Rannís
- Government institution research funds
  - US: Defence Advanced Research Project Agency (DARPA)
  - Iceland: Framleiðnisjóður Landbúnaðarins (Agriculture productivity fund)



# Research funding

- Direct institution funding
  - US: NASA
  - Iceland: Háskóli Íslands (Univ. of Iceland)
- Direct government funding
  - US: Lawrence-Livermore Laboratory
  - Iceland: Hafrannsóknarstofnun (Ocean Research Institute)



# Research funding

- Open private research funding
  - US: Carnegie Corporation
- Funding from companies
  - Either collaborative or supportive research
- Company research institutions
  - US: Xerox PARC
- Company research efforts
  - US: Google



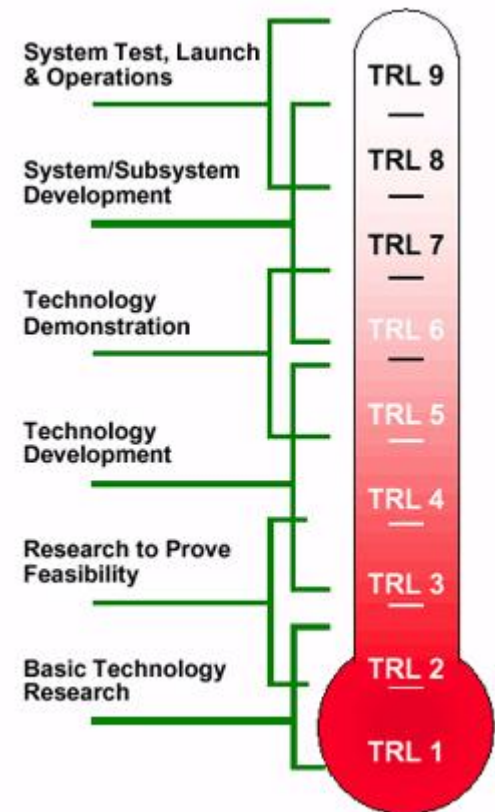
# Categories of research

- Basic vs. applied
  - Basic: Advance human knowledge
  - Applied: Solve given problem
- Push vs. pull in goal-oriented research
  - Push: Technology first
  - Pull: Application need first
- From exploration to validation
  - Exploratory, Constructive, Empirical



# NASA: Technology Readiness Levels

1. Basic principles
2. Formulation
3. Proof of concept
4. Component validation in laboratory
5. Component valid. in relevant env.
6. Prototype validation in rel. env.
7. Prototype demo in operations env.
8. Complete system “flight qualified”
9. System in mission operations







# Research results

- Shared knowledge base
  - Articles, books, etc.
- Technology development
  - Public and private
- Technology “ownership”
  - Patents and copyrights
  - Trade secrets
- Not exclusive categories



# Example: Google

- 1996: Research project at Stanford
  - [google.stanford.edu](http://google.stanford.edu)
- 1998: Garage company
  - [google.com](http://google.com)
  - Startup funds: \$1.1M
- Today: Huge!
  - Very active internal research



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