



# Academic Research Vs Industrial R &D: A Comparison

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■ 2004

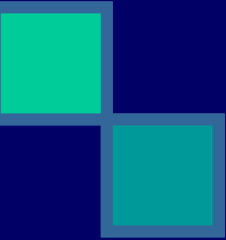



# Outline

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- Goals of academic research
  - A suitable model for academic engineering research
  - Goals of industrial R&D
  - A comparison of assessment techniques
  - Closing remarks
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# Goals of Academic research

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- Advance frontiers of knowledge through generation of research results and free dissemination
  - Train highly qualified researchers for industry, government, academia
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## A Model for Academic Research in Engineering- Some Do's and Don'ts

- Do produce new research results, but more importantly produce excellent researchers. ( Give fish vs teach fishing to the impoverished)
  - Academic research in academia for academics and by academics is a poor model; has little potential for impact
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# Model for Academic Research in Engineering

- Interact and interface with industry- identify jointly areas of potential interest
  - Must focus on generic research- if academics don't then no body will do this!
  - Focus on developing new ideas, concepts to stretch current boundaries of knowledge
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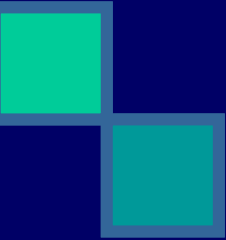



## Model for Academic research- contd.

- Integrate with science to give strong fundamental basis
  - Develop and nurture critical thinking skills
  - Develop spirit of innovation, entrepreneurship
  - Develop networks worldwide for free sharing and exchange
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# Assessment of success of A.R.

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- Training of highly trained, motivated researchers
  - Generation and dissemination of new research results
  - Focus on impact and not impact factor
  - Focus on real application rather than citations
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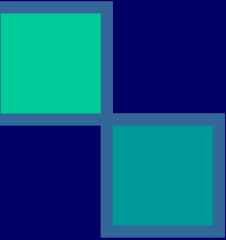

# Industrial R&D

- Understandably applied research/development designed to “destroy” competition- no free sharing of results
  - R&D devoted to areas of current or short term future interest of company
  - Few can afford basic, publishable research- more as PR
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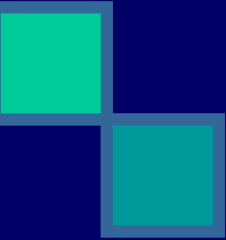



# Assessment of Industrial R&D

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- Does it contribute to company bottom-line every quarter?
  - Designed to out-do competition
  - Promote innovation
  - Keep up with scientific breakthroughs in public domain- also available to competition
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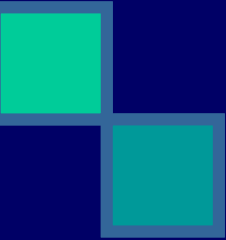



# Model for Industrial R&D

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- Depends on size of operation, half-life of the products/processes/services sold
  - Shorter life cycle requires greater outlay of R&D funds to survive
  - Balance of basic, exploratory and applied R&D required .
  - Depending on nature of industry- sunrise, sunset or sunshine, a proper balance between basic, and applied R&D is required
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# Classification of industries

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- Sunset: No innovation, mature products/services, thin margins (outsourcing may be the only innovation)
  - Sunrise: Fast paced changes, high R&D spending; rapid innovations
  - Sunshine: New technologies at affordable pace with modest innovations
  - Ref: H L Beckers, Chem Eng Sci 1993
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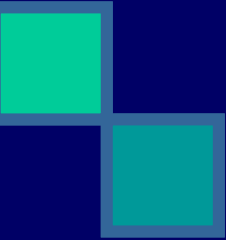



## Assessment criteria for Industrial vs Academic Research

- Originality, scientific quality are criteria for academic but not industrial research
  - Academia train researchers- industry employs them with some incremental training if needed
  - Publication is required in academia, but undesirable in industrial R&D
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# Academic Vs Industrial R&D

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- Use similar methods of research with different goals and objectives
  - Academic research expected to increase global knowledge reservoir ,while industry must be able to tap into it
  - Academics interested in know-why, industry in knowhow.
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# Closure

- Must not discriminate between academic and industrial R&D- each is equally important and difficult
  - Time scales ,objectives and assessment criteria are necessarily different
  - Each can benefit from superiority of the other in certain aspects of conduct of research
  - Close collaboration is ideal model for R&D
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## Closure (contd)

- Publication is key to success of academic research ,while confidentiality is key to success of industrial R&D
  - Technologies may mature in one region but flourish in another- due to phase lag between industrial development cycles of different countries
  - Mature areas maybe revamped or re-directed with new R&D effort.
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