Demonstrating Results
Showing the Bang for the Basic Research Buck

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Classic Example - Polio

Stresses uncertainty of basic research
You never know where it will lead
Lots of these examples exist
Quantum Mechanics  
(\textit{theory})  
\downarrow  
Atomic nuclei have “spin”  
(\textit{theory} \rightarrow \textit{practice})  
\downarrow  
\textbf{Nuclear Magnetic Resonance (NMR)}  
(better magnets, algorithms, computers)  
\downarrow  
\textbf{Magnetic Resonance Imaging (MRI)}
Gaps in knowledge will constrain breakthroughs

1961 – Nothing technically precluded sending a man to the moon.

Goal could be reached by 1969

1968 – War on Cancer

Ill-fated because we did not know enough about the (genetic) nature of the disease.
10-15 Years Later

**Restriction enzymes** – found studying how bacteria fight infecting viruses.

**Plasmids** – studying nature of antibiotic resistance in bacteria

→ Understanding the genetic basis of cancer

→ Led directly to the modern biotechnology industry
• Pressures of basic versus applied research are not new (and many examples of past successes exist)

• Universities are more focused on applied research than in the past (Bayh-Dole, end of Cold War, general push for faster translation, DHS)

• Looking forward - academic scientists need to think more in terms of the potential societal impact of their basic research

• Changes are taking place in academic research
Biomedical Research - NIH Roadmap

Three Themes

- New Pathways to Discovery
  - Technology development

- Research Teams of the Future
  - Interdisciplinarity/Inter-institutional

- Re-engineering Clinical Research
  - Inter-institutional integration