

Assessing the performance of the CREWES Project: 1989-2005

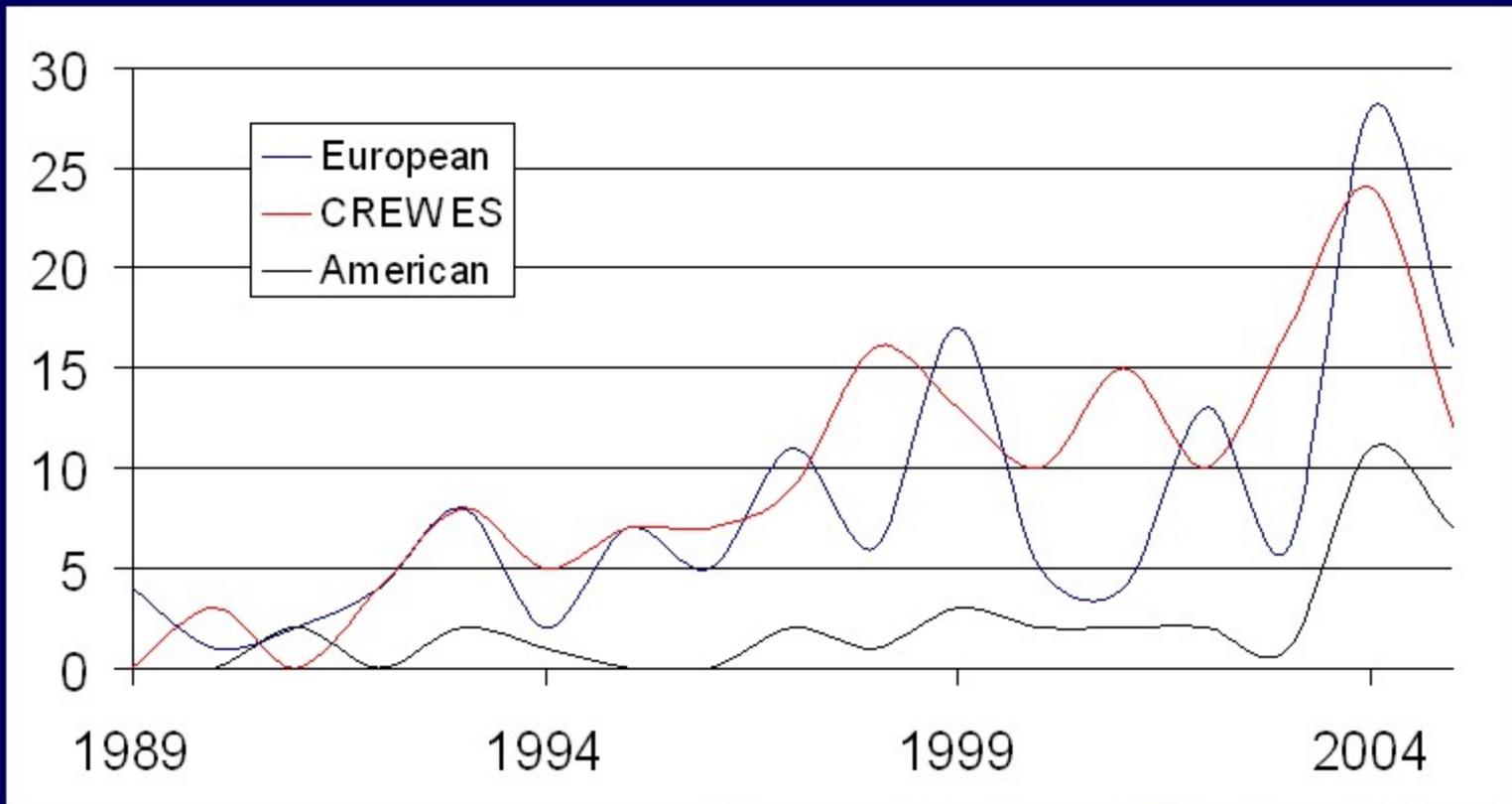
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I. Louise Forgues



Performance Measurement

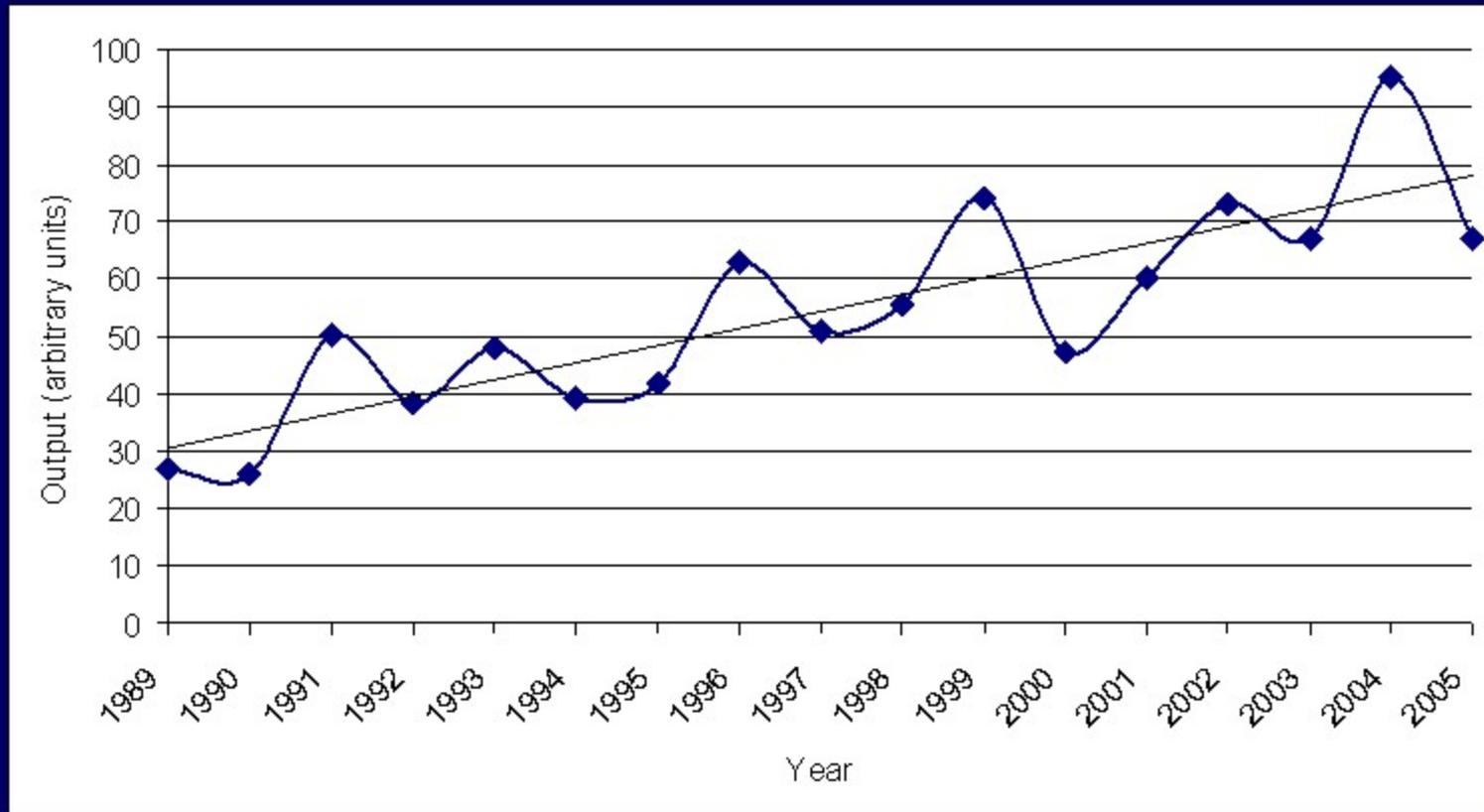
$$\begin{aligned} \text{Output} = & 1.5 \times (N_{\text{surveys shot}} + N_{\text{awards}}) \\ & + 1 \times (N_{\text{refereed publications}} + \\ & \quad N_{\text{patents}}) \\ & + 3 \times N_{\text{students graduated}} \\ & + 1/3 \times (N_{\text{non-refereed publications}} + \\ & \quad N_{\text{conference presentations}} + \\ & \quad N_{\text{programs released}}) \\ & + N_{\text{citations}}/5. \end{aligned}$$

Citations



Source: Science Citation Index Expanded (SCI-EXPANDED), 1975-present (self references excluded)

CREWES Project output (1989-2005)

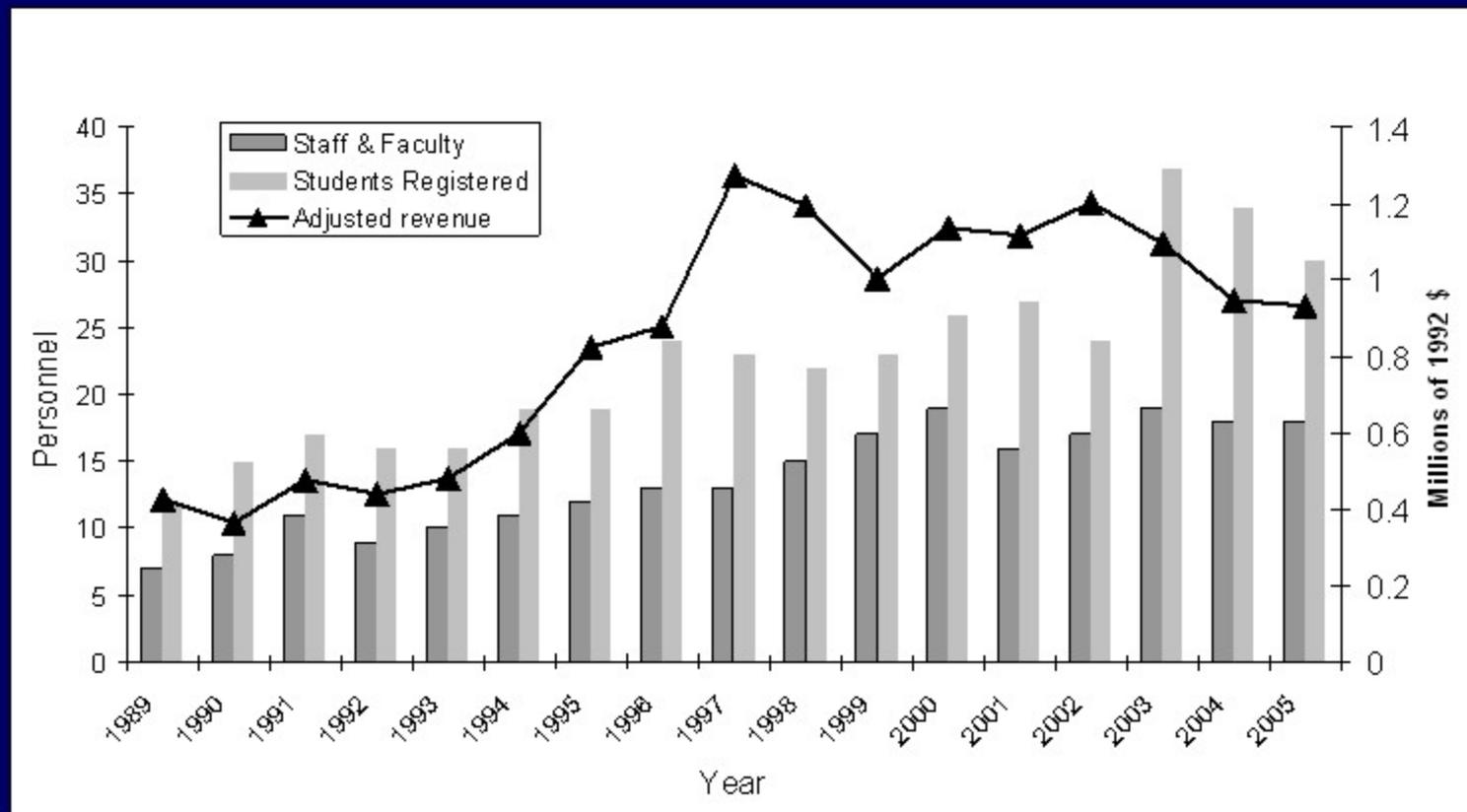


CREWES Project Personnel

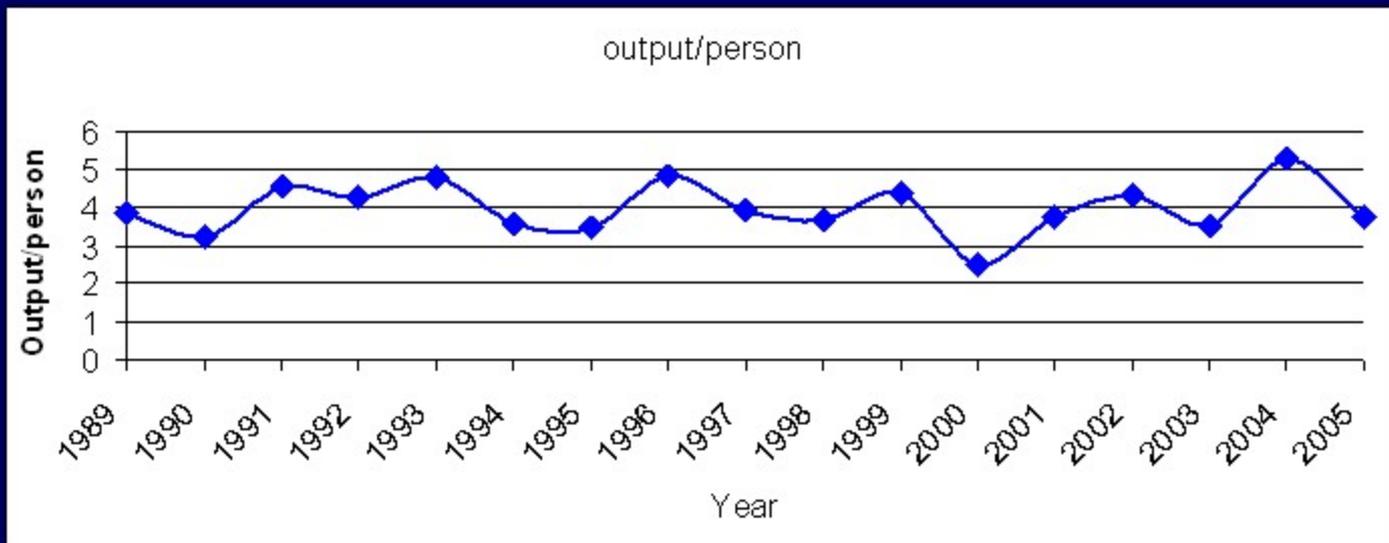
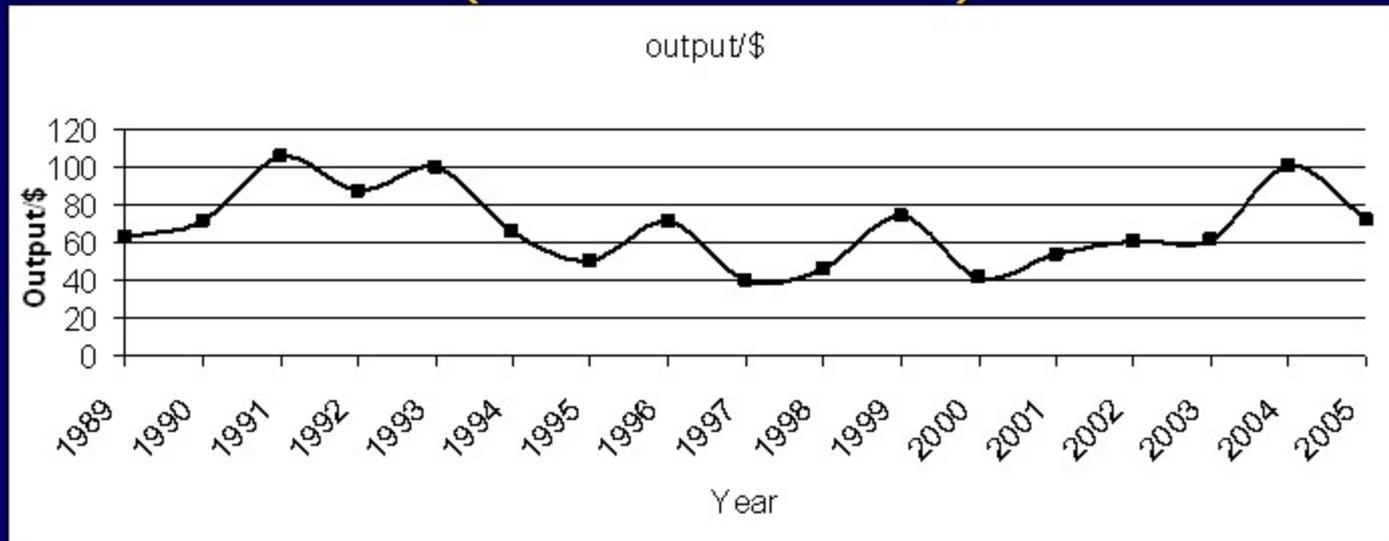


October, 2005

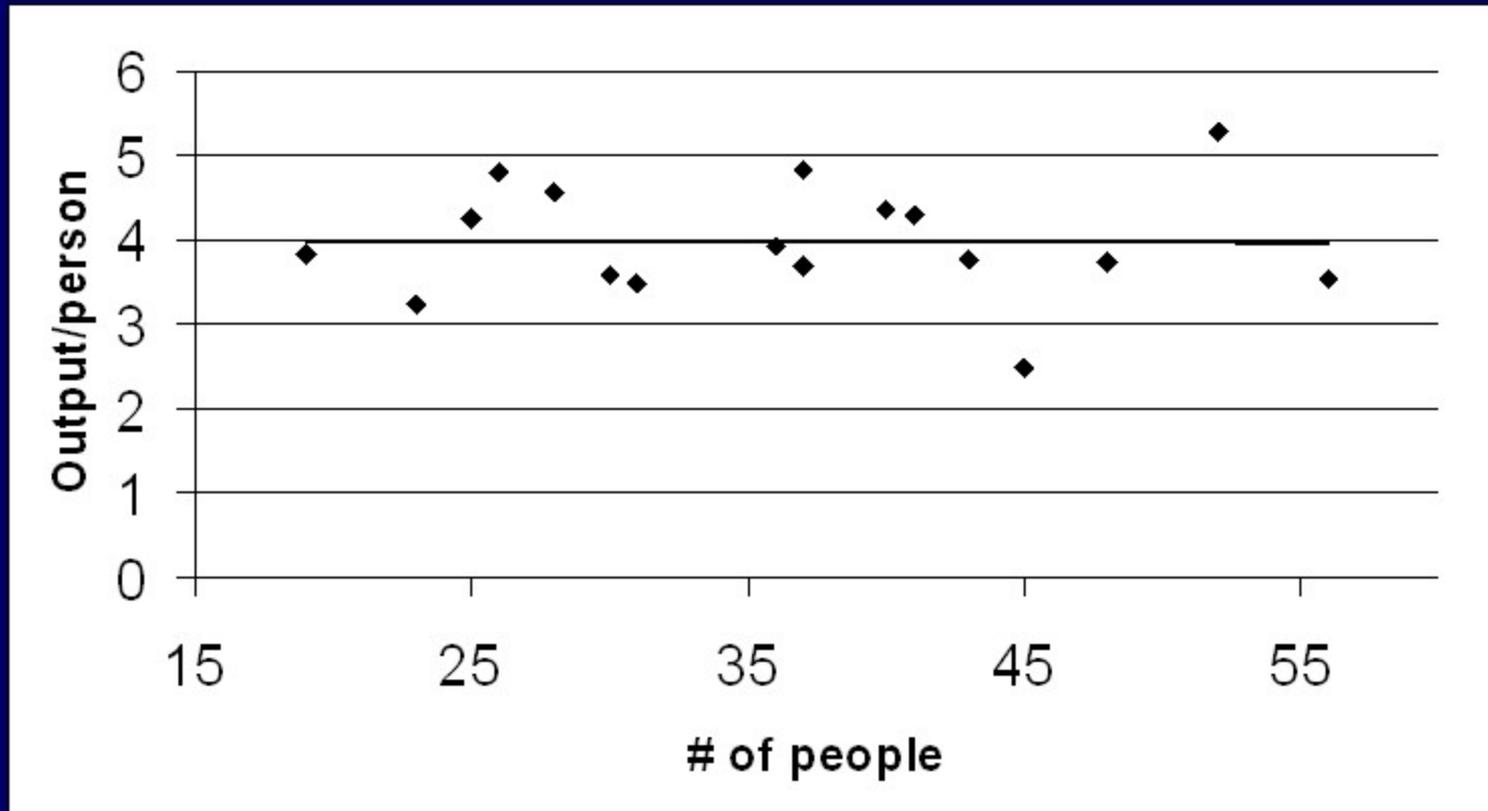
Project Inputs: Faculty, Staff, Students and Revenue



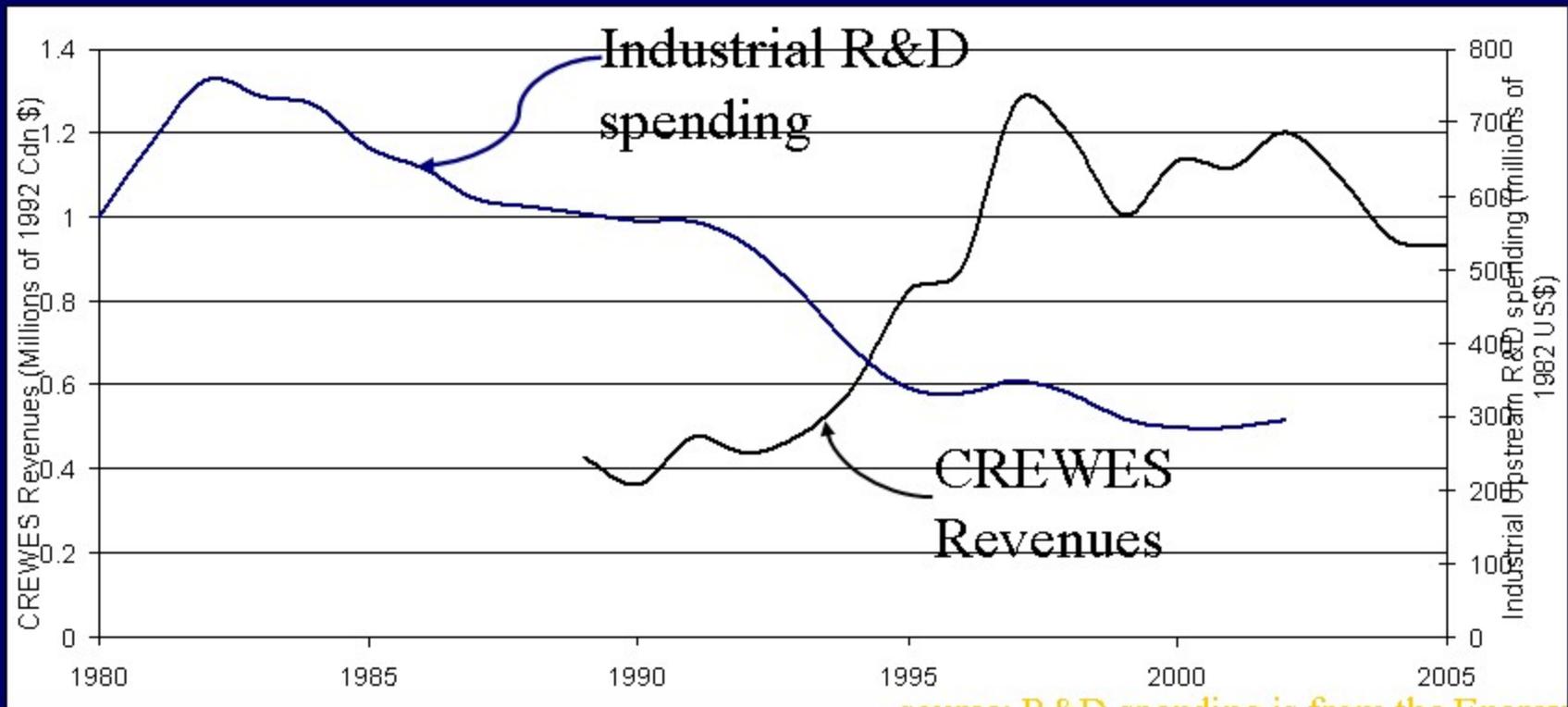
CREWES Project productivity (1989-2005)



Is bigger better (manageable)?

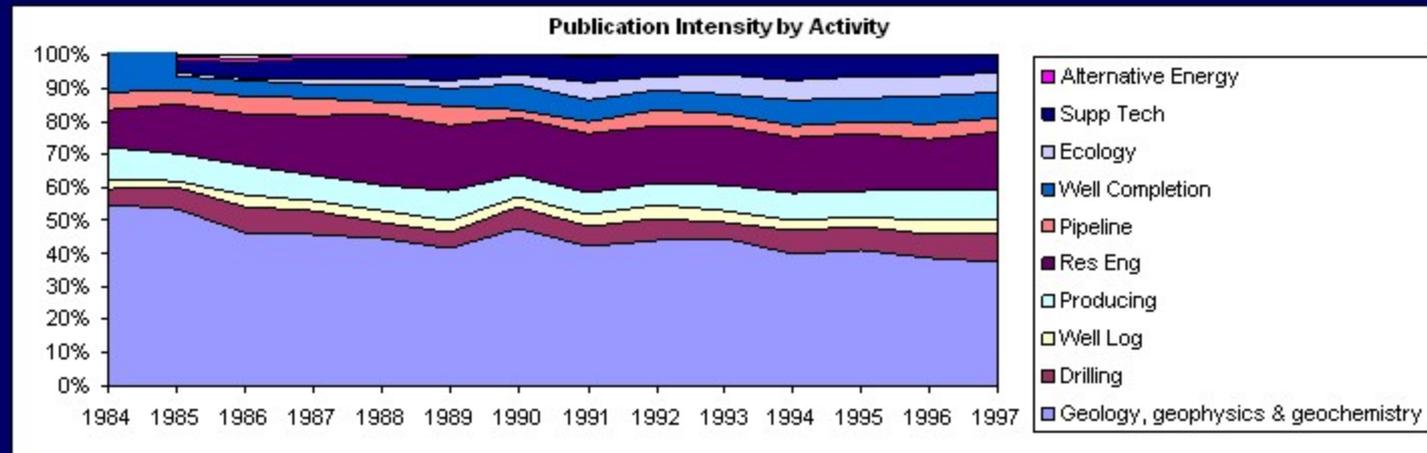
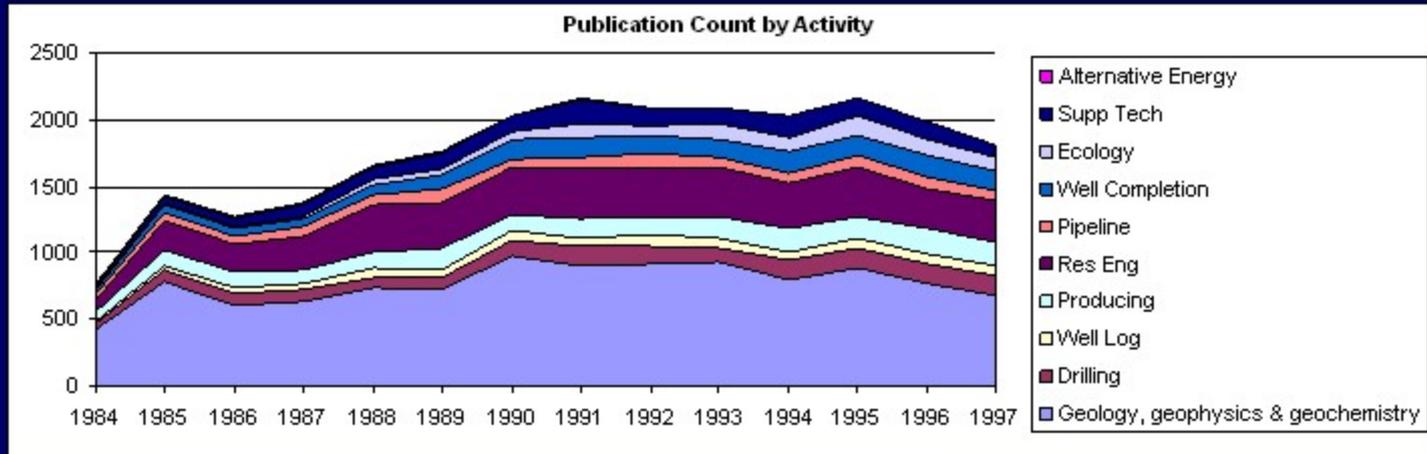


Upstream Research Spending & CREWES Revenues



source: R&D spending is from the Energy Information Administration

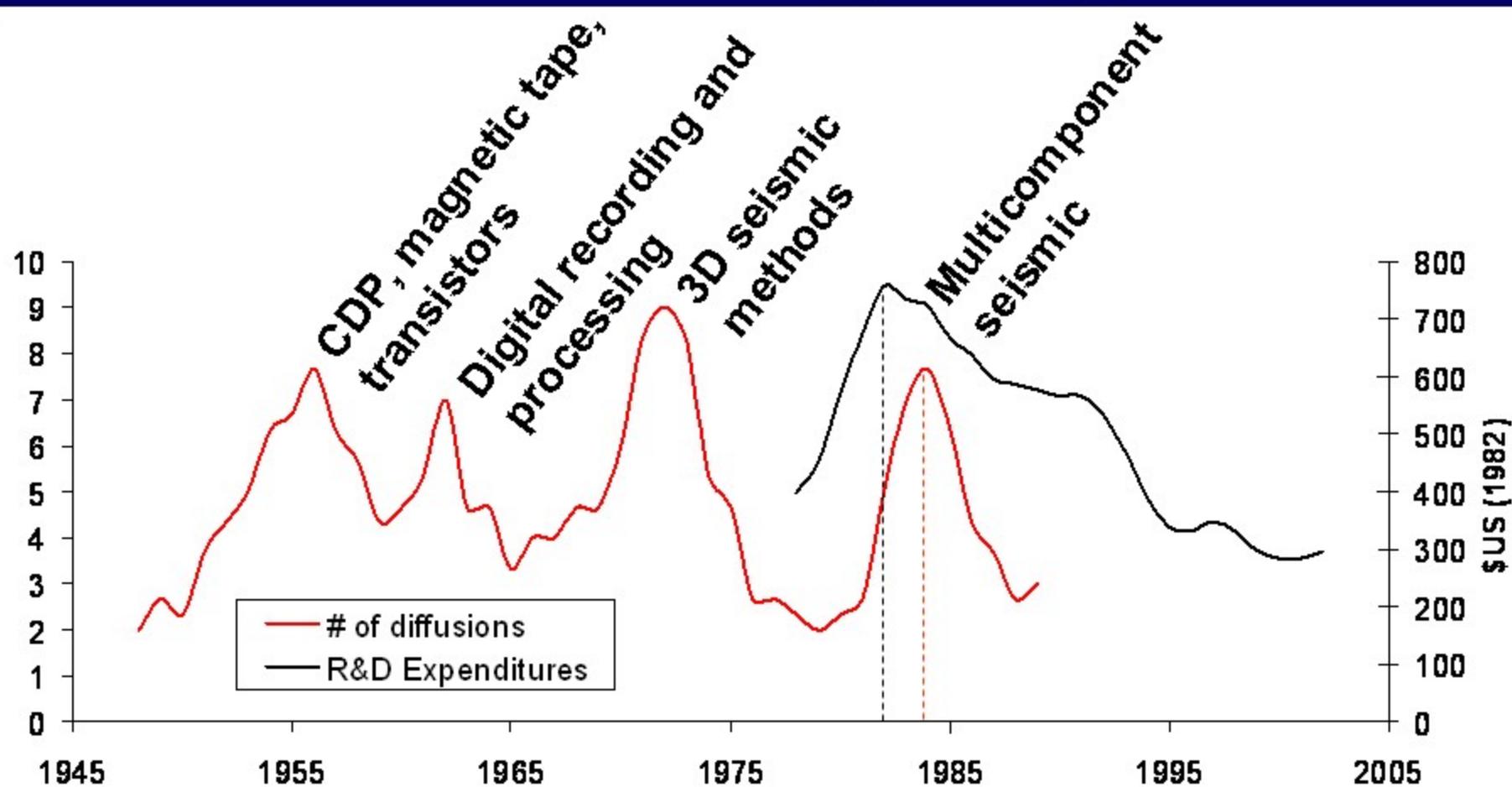
Upstream Publication Record



Graebner's four geophysical “revolutions” (SPE, 1999)

- 1955 CDP, magnetic tape, transistors
- 1962 Digital recording and processing
- 1972 3D seismic methods
- 1986 Multicomponent seismic imaging

E&D Technology Progress



The sources of innovation

“...innovation most consistently flourishes in jurisdictions that already have high productivity and associated economic success.”

“...societies and business organizations invest in new ideas when they can afford to and when they see opportunity.”

“...our industry has learned to use its global connections and highly educated workforce to rapidly adopt and adapt the best ideas from around the world. We think this accounts, in part, for the strong productivity performance of our sector.”

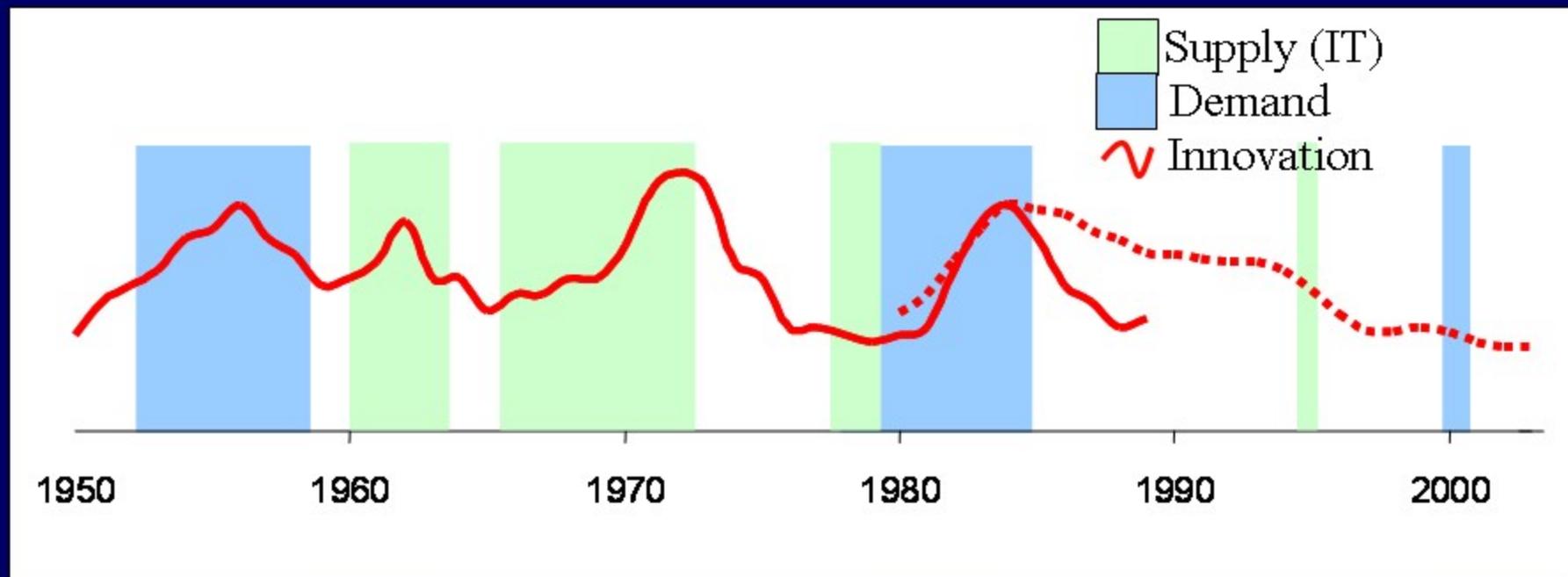
(Innovation in Canada – Can.Assn.Petrol.Prod. & Industry Canada, 2003)

R&D and Commercialization

- **Recognize that innovation is driven by market pull (global) *and* smart capital combined with technology push**

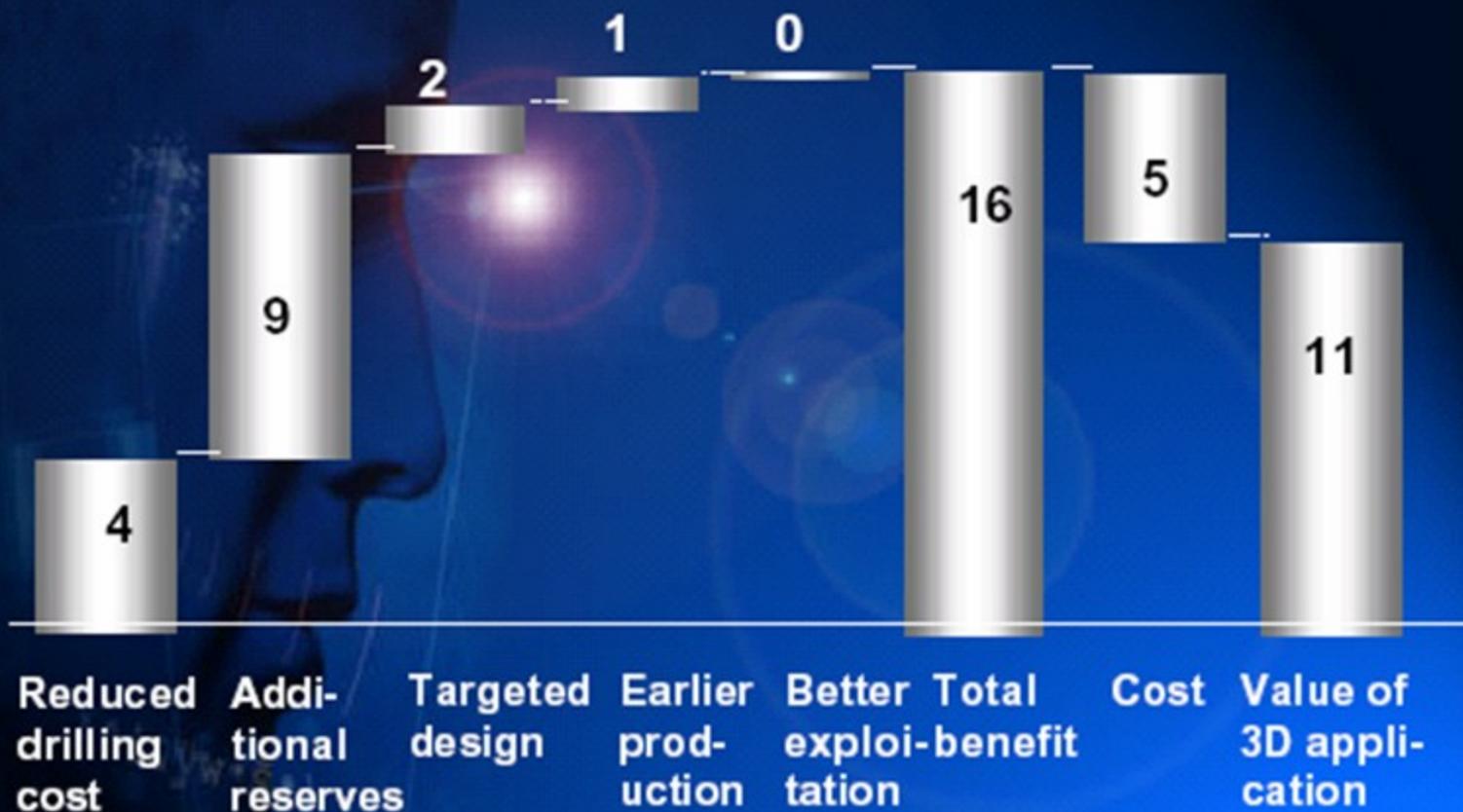
(from National Summit on Innovation & Learning - Toronto, November, 2002)

E&D Innovation Process

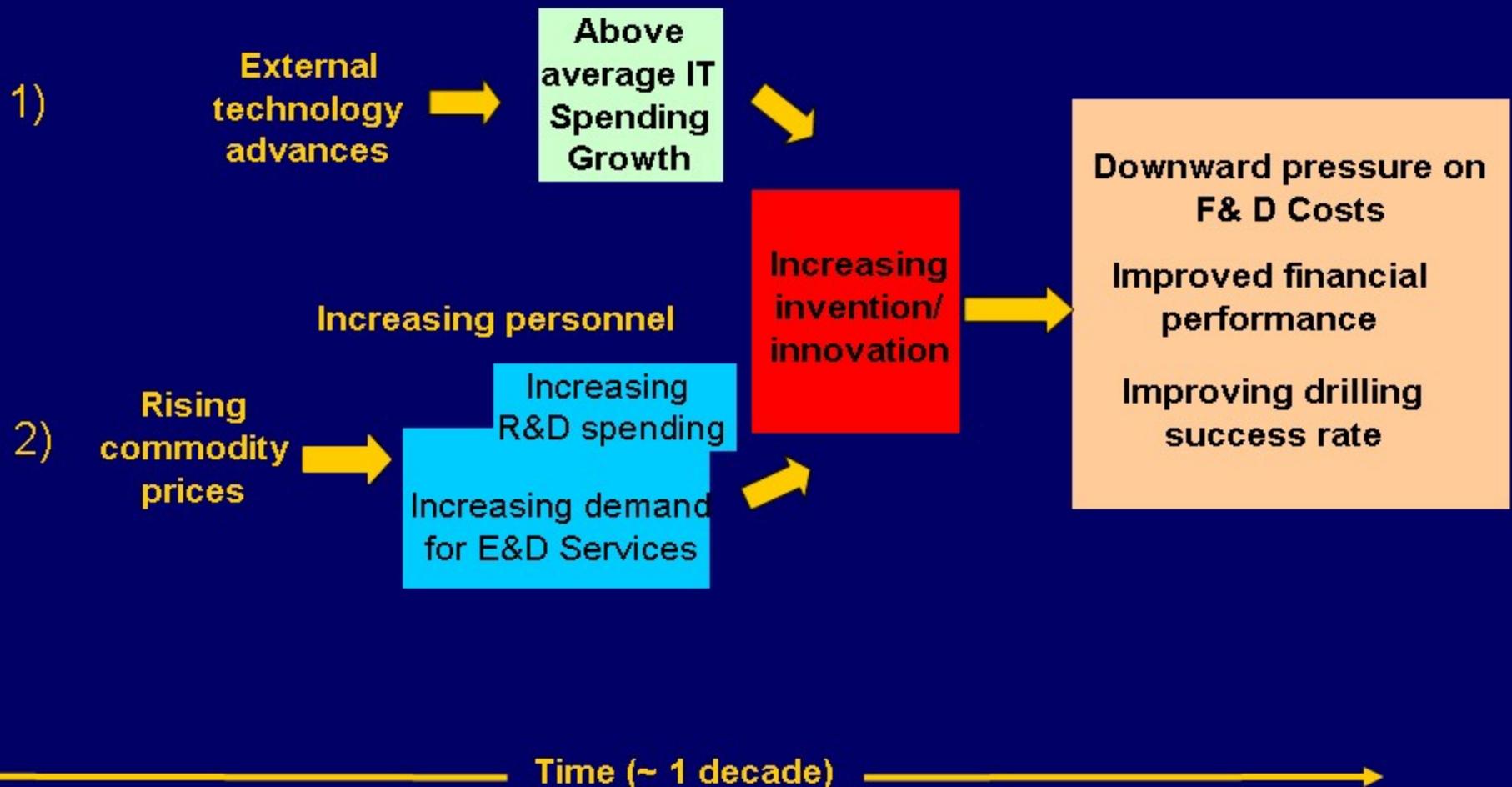


Value created from 3D seismic

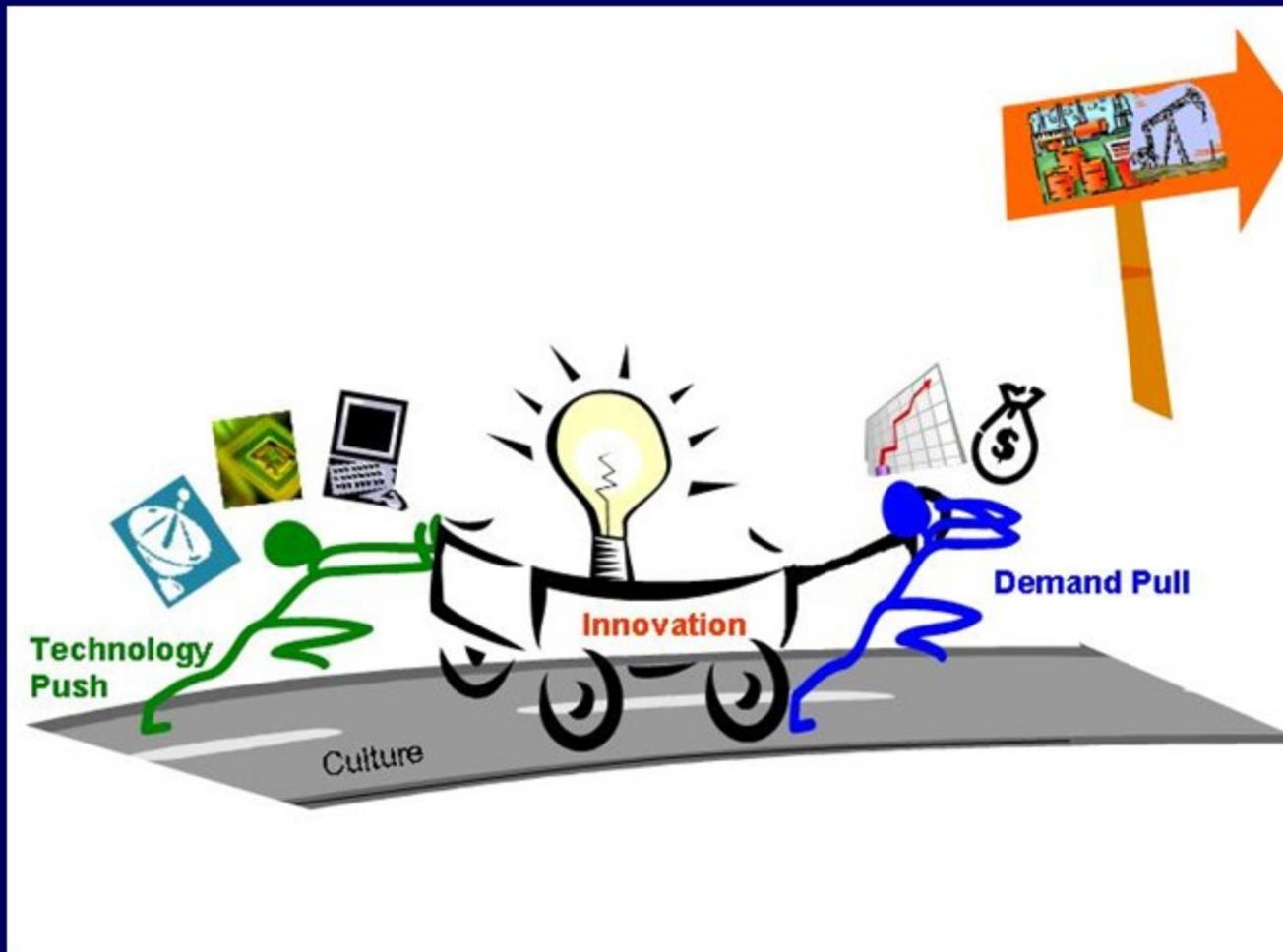
USD billion p.a.



The Process of Innovation & its Effects



E&D Innovation Model



Summary

- CREWES Project output continues steady growth (output proportional to revenue)
- Productivity has been sustained while project inputs and outputs have grown
- External factors influence finances
 - economics of E&P industry affects revenues
 - university funding affects costs