



RICE

An Academic Perspective of Collaboration

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The Archetypal Success Story in Knowledge Transfer

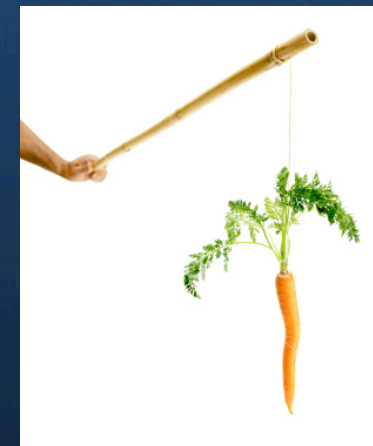


Why was Silicon Valley a success?

- Smart people
- Culture of entrepreneurship
- \$\$

Others have tried to repeat this...
but it has resulted in mainly
manufacturing industry

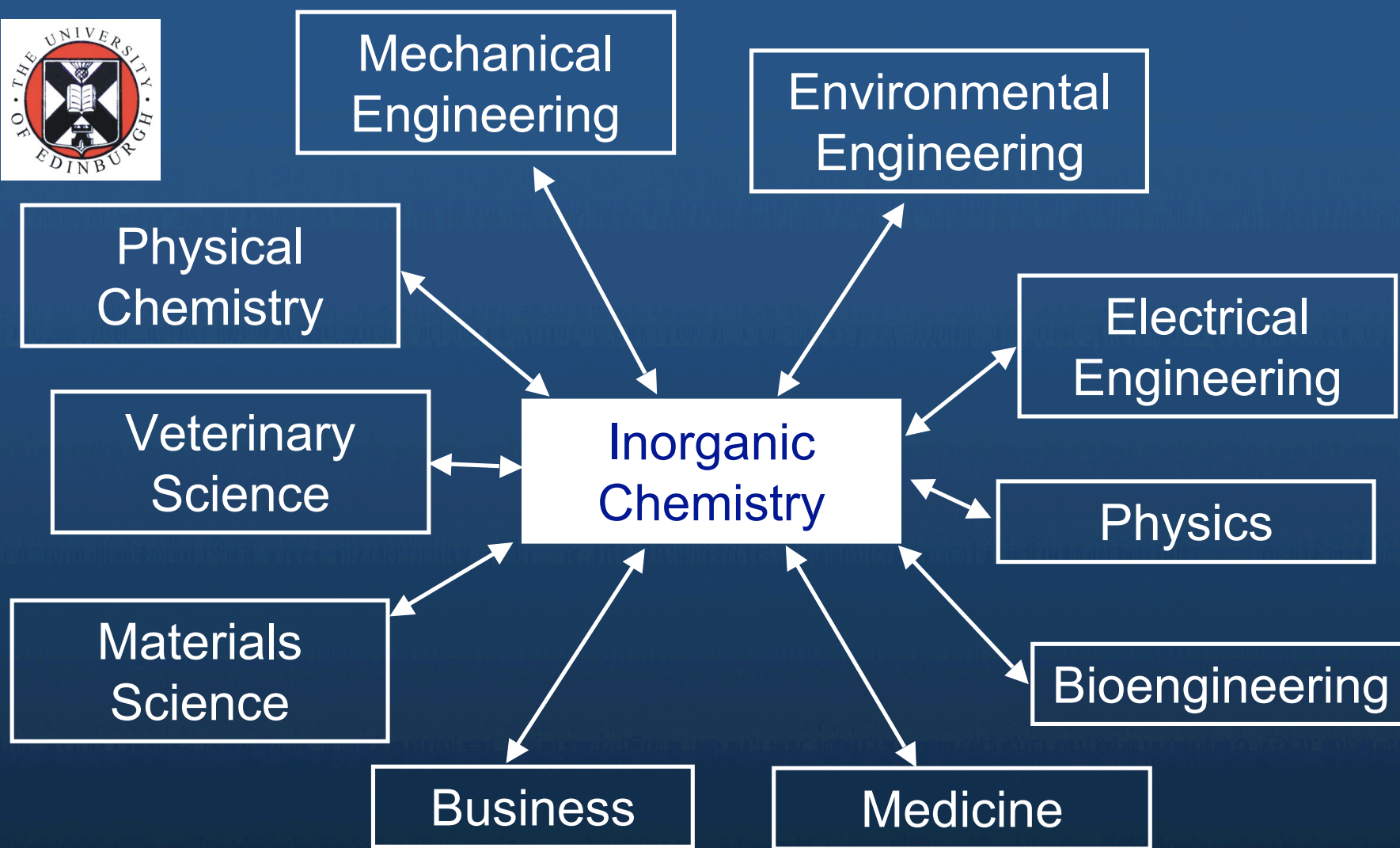
What drives invention
and development?





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Barron Research Approach





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Why a Collaboration at the University Scale?

- **The Rice Consortium Approach**

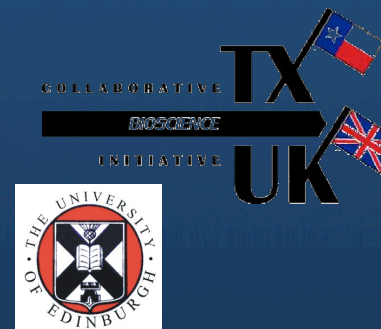
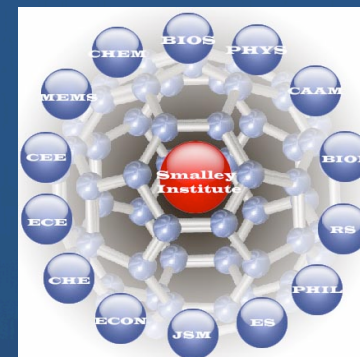
- Scale and complexity
- Strengths of multiple centers & universities

- **Why this is the Best Approach?**

- Synergistic expertise
- *Shared risk, shared load, and shared reward*

- **Why Rice is a Good Consortium Member - “No borders”**

- Collaboration is an intrinsic part of Rice University
- Rice’s small size (low student to faculty ratio = 5-to-1)
- Leverage our resources and deliver significant results



Texas/UK Collaborative

Consortium for Nanomaterials for Aerospace Commerce and Technology (CONTACT)

Gulf Coast Consortia (GCC) - Rice acts as a focus for competing medical institutions.

US Center for Environmental Remediation and Sustainable Development





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A Thematic Shift @ Rice





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Why Research @ University?

Oil
producers



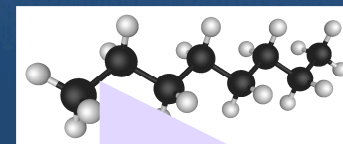
Service
companies



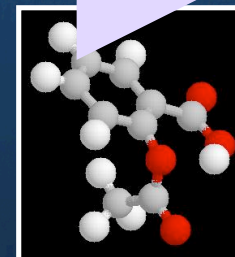
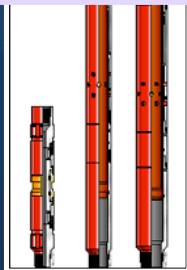
Downstream



Chemicals



Interdisciplinary and Integrated

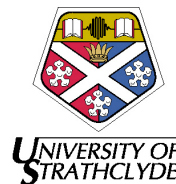
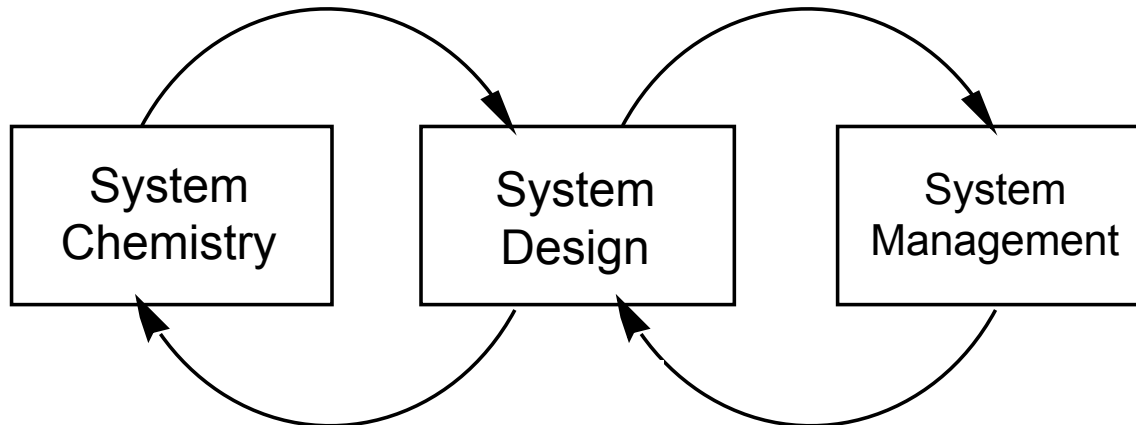




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Future Energy Systems

How do we know the effects of new technology?



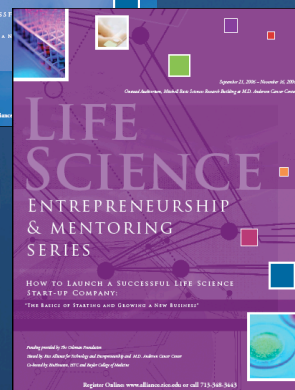
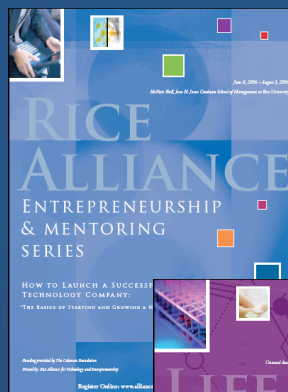


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Rice Alliance



- Focused events:
 - Energy Forum
 - IT Forum
 - Nano Forum
 - Life Sciences



The largest and richest university-run intercollegiate business plan competitions in the world !!

- Over **180 companies** have presented at past Rice Alliance forum events, and have raised over **\$302 million**
- Since these Forums began in 1999, **over 75%** of the companies are still on a path to success



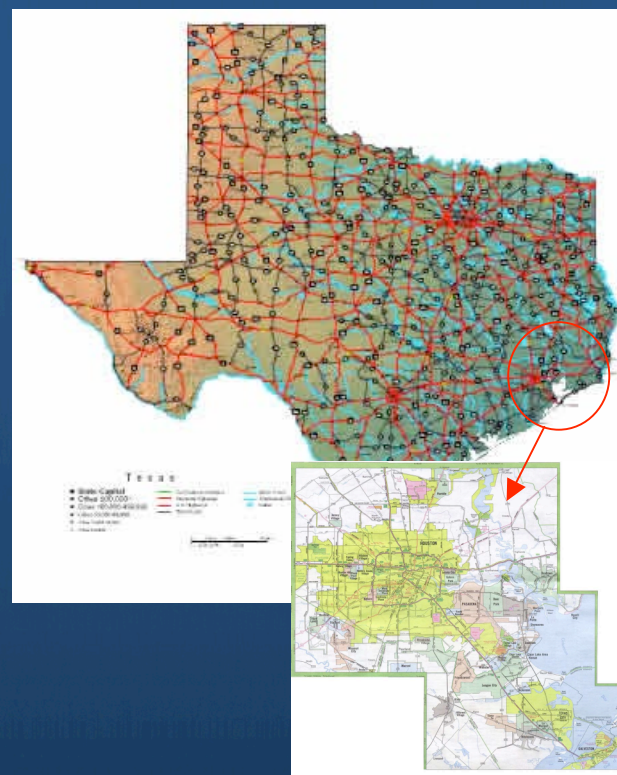
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How is Rice's Experience Relevant to Scotland?



Pop. 5.1 million
78,782 sq. km.

200,000 students



Pop. 5.3 million
26,060 sq. km

120,000 students

Houston - moving from traditional manufacturing (oil, gas, chemicals, agriculture) to entrepreneurship and innovation (energy, health, nano).

Scotland - moving from traditional manufacturing (oil, tech manufacturing, agriculture) to entrepreneurship and technology innovation.



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How do we Promote Knowledge Transfer?

Create a collaborative environment

- no egos

- bring down the walls

- shared risk, shared effort, shared reward*

- infrastructure for entrepreneurship

Industry support

- not contract labour

- not fund and forget

- partnership (RD³)

Government support

- facilitate don't lead

- provide the big challenge



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The Challenge

We choose to go to the moon in this decade and do the other things, not because they are easy, but because they are hard, because that goal will serve to organize and measure the best of our energies and skills, because that challenge is one that we are willing to accept, one we are unwilling to postpone, and one which we intend to win.

J.F.K @ Rice University



George Mallory was asked why he wanted to climb Mount Everest. He said, "Because it is there."



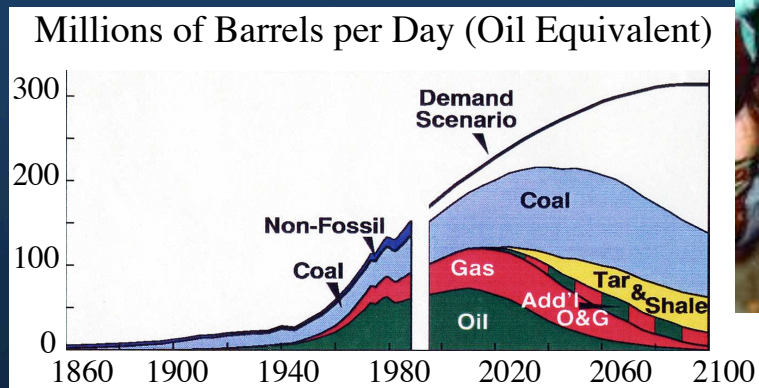
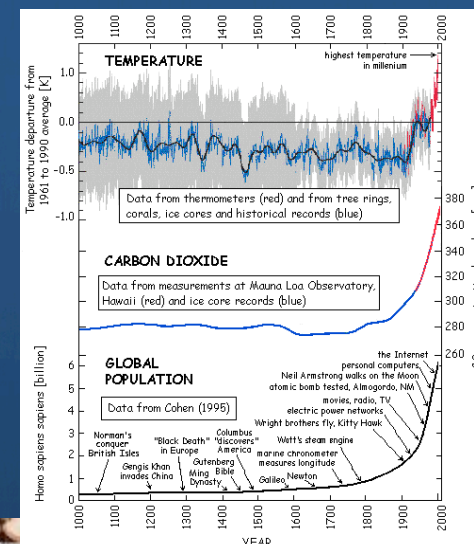
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Humanity's Top Ten Problems for next 50 years

1. ENERGY
2. WATER
3. FOOD
4. ENVIRONMENT
5. POVERTY
6. WAR
7. DISEASE
8. EDUCATION
9. DEMOCRACY
10. POPULATION

2004	6.5	billion people
2050	~ 10	billion people

2 Billion Poor – No Electricity
2 Billion Poor – Biomass Heating





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Vision of a Global Energy Network

THE RICHARD E. SMALLEY INSTITUTE FOR NANOSCALE SCIENCE AND TECHNOLOGY – ENERGY VISION

The Distributed Storage-Generation Grid: One World Energy Scheme for 2050



Energy will be transported as electricity over wire, rather than by transport of mass (coal, oil, gas)



Single Walled Carbon Nanotube (SWNT) fibres are spun into **quantum wires**, to re-wire the grid.

Vast electrical power grid

- Continental scale
- Interconnect asynchronous "local" storage and generation sites
- System continually innovated by free enterprise

"Local"

- house, block, community, business, town, ...
- Local storage: batteries, flywheels, hydrogen fuel cells, supercapacitors, etc.

- Local optimization: days of storage capacity, quality of local power

Local generation

- Solar, geothermal, wind, etc.
- "Buy low, sell high" to electrical power grid

THE BENEFITS OF THE QUANTUM WIRE:

Expected Features

- 10x Copper Conductivity
- 6x Lighter
- Stronger Than Steel
- Zero Thermal Expansion

Key Grid Benefits

- Reduced Power Loss
- Low-to-No Sag
- Lightweight
- Higher Current-Carrying Capacity

SWNT Technology Benefits

- Type Specific
- High Purity
- Low Cost
- Scalable Processing

THE WORLD OF THE GRID:

Global grid

- Robust
- Massive primary power input to grid via HV DC lines.
- New input from vast solar farms in deserts,

wind, NIMBY nuclear, clean coal, stranded gas, wave, hydro, biomass, space-based solar... "Everybody Plays"

- Ethanol / Methanol / Hydrogen are transportation fuels
- Transition technology – Plug-in Hybrids

Rick Smalley's vision of a global energy network.



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UNIVERSITY



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A photograph of the Earth from space, showing the Western Hemisphere with North and South America visible. The image is set against a dark background and is framed by a blue border.

**Be a scientist (or engineer)
and save the world**

Jim Clark (1936–1968)



Colin McRae (1968–2007)

