

The Knowledge Triangle: Shaping the Future of Europe

“Is there a need for national and European strategies to achieve the Knowledge Triangle?”

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After this meeting, we recognise what we have to do

- ▶ This has been an exciting and energising meeting
- ▶ We are agreed that we know that we have to do
- ▶ We recognise the importance of leadership in achieving the changes needed
- ▶ And we are a conference of leaders
- ▶ So why are we all still sitting here?
- ▶ We need to be out taking action!

A history lesson: the Industrial Revolution

- ▶ ***My first point is about the speed of change we need:***
- ▶ ***The UK:*** farming nation to world industrial power - in two generations: 1730 – 1810
- ▶ rapid innovation: the conditions for the complete innovation ecosystem were in place: from scientific discovery through to societal and economic impact,
- ▶ achieved through interdisciplinary collaboration in application, not just of new science, but also of new manufacturing and new management skills to societal and industrial problems
- ▶ ***The world:*** fossil fuel dependence to ultra low carbon economy – in one generation: 2010 – 2050
- ▶ urgently seeking rapid innovation...

Birmingham's hero: Matthew Boulton

- ▶ The Lunar Society: an 18th Century society in Birmingham where interested people gathered to discuss new scientific discoveries and how they could be applied: disciplines without boundaries
- ▶ Chemists; instrument makers; mathematicians; engineers; manufacturers and business entrepreneurs; doctors, philosophers...
- ▶ These discussions encouraged the manufacturer and entrepreneur, Matthew Boulton, to bring James Watt to Birmingham
- ▶ Achieving co-location of the complete innovation chain at the Soho Manufactory in Birmingham: from Watt's conceptual design and new technology, to working prototype, to manufactured product, to waiting customers...
- ▶ to a societal impact which still shapes the world today - *Power*
I shall never forget Mr Boulton's expression to me
'I sell here, Sir, what all the world desires to have – Power'

Samuel Boswell 1774

2020: the secret of Europe's economic success

In 2020, I want to be able to say:

'We sell here, Sir, what all the world desires to have –

.....'

Zero emissions power
Ultra-low-carbon vehicles
Zero emissions buildings
Low energy electronics
Energy storage

Lessons from history: then → now

1. Interdisciplinarity and the status of craft

- ▶ Disciplines without boundaries → defined academic subjects
- ▶ Mathematics and instrument-making seen as one → classical education valued over apprenticeships
- ▶ Status of craft Guilds → status of Universities and professions
- ▶ A continuum between learning and working → higher education with limited business involvement

2. Public enthusiasm

- ▶ Fashion and fascination for new scientific discoveries → modest public interest and sometimes fear: 'Frankenstein foods'

3. Attitudes to investment and risk

- ▶ Patient investors → short term/high return strategies
- ▶ Entrepreneurial risk takers → graduates seeking jobs in large companies

Lessons

1. We must break down barriers that have developed

1. Between the worlds of academia and business
2. Between science and craft
3. Between professional disciplines

2. We must regain public support and interest

1. Science and technology as relevant, exciting and a public good
2. Careers for the best and most ambitious

3. We must change attitudes to investment and risk

1. Change attitudes to business failure
2. Develop entrepreneurial graduates
3. Support small companies and enable their links with graduate employees, research and investment
4. Encourage high risk investment

Why does this need national and European strategies? Because...

1. The challenges of the low carbon industrial revolution are HUGE and URGENT

- ▶ 50% reduction in CO₂ emissions globally and 80% in developed countries
- ▶ whilst world population grows by around 30% to 9 billion
- ▶ in one generation - by 2050
- ▶ demanding new products, processes and ways of living and working

2. Europe is lagging the US and Asia in innovation

- ▶ so will miss out unless we move fast

3. Governments hold many of the levers to catalyze action

- ▶ significant influence on the operation of Universities
- ▶ direct investment in high risk R and D in universities and business
- ▶ support for risk-taking and investment in business and by the financial sector
- ▶ stimulation of innovation through legislation and regulatory targets

Why Europe?

- ▶ Together Europe is a significant market in world terms
- ▶ so European regulation and legislation can drive innovation and new solutions
- ▶ and must be used to do so...

- ▶ The mix of cultures and experience adds diversity and drives new ideas

- ▶ We have some excellent examples of success between us to build on - areas of existing best practice across Europe can be shared, for example:
 - ▶ the voucher scheme in the Netherlands to link SMEs to Universities and form clusters
 - ▶ the Rolls-Royce plc international network of University Technology Centres and the Volvo university collaborations described at this meeting
 - ▶ the UK university/business collaboration schemes described by Adrian Smith from the Department of Business, Innovation and Skills
 - ▶ the EIT and the Knowledge and Innovation Communities, to be announced in December, described in Martin Schuumans' presentation

So I have four requests

1. For reform in universities: to recognise that we are businesses – special businesses, yes, (but actually all businesses are special) with customers: students, business, government, society, who need to be listened responded to, businesses able to move fast to adapt to changing environments and opportunities. Is the governance of a ‘democratic community of scholars’ really fit for purpose for the agile university of the 21st Century?
2. For our legislators and policy makers to focus on enabling the mobility of people between industry and academia. How many of our engineering academics have worked in an engineering company? How many of our Business School professors have developed and delivered a company strategy? The inhibitors are difficult – pensions, salary differentials, if we are not careful research metrics will become one too – but they must be addressed so the two cultures can really learn to work together and we can ensure relevance and employability for our graduates.
3. For governments and funders to focus more strongly, and value more highly, helping small companies to develop links with universities and research centres (big companies are good at using the available schemes – and value them.)
4. To do this with energy, speed and a sense of urgency!

Potential background material



Value of universities to Rolls-Royce

- ▶ Rolls-Royce has 20 University Technology Centres in the UK, 4 more in Europe, and several developing in US and Asia
- ▶ A significant part of the RR research budget is now spent in Universities
- ▶ *Benefits to RR*
 - ▶ *Specialised skills*
 - ▶ *'Time to think'*
 - ▶ *escape from short term problems*
 - ▶ *Challenge and dialogue*
 - ▶ *multi-sectoral perspective*
 - ▶ *Long term capability development*
 - ▶ *recruitment and training of skilled personnel*
 - ▶ *staff exchanges*
 - ▶ *UTC staff involved in RR training courses and staff development*
 - ▶ *Own/secure IPR and confidentiality*
 - ▶ *Exploitation: effective technology transfer*
 - ▶ *Gearing through Government funding*
 - ▶ *Access to expensive facilities and scarce resources*
 - ▶ **Competitive lead**



Value of universities to industry

Personal observations

- ▶ Large companies need a strong corporate culture and sense of belonging
- ▶ Corporate ‘think’ and corporate ‘speak’
- ▶ Manufacturing companies have been driving ‘lean’:
 - ▶ ‘reuse’, ‘do once, use many times’, ‘eliminate waste’....
- ▶ In asset-intensive companies change is expensive
- ▶ With safety-critical products change is expensive
- ▶ In these environments mavericks and innovators are uncomfortable

But the challenge, change and competitive advantage they bring is essential!

Assessing impacts

NESTA: 4 roles for Universities as economic actors (2009)

- ▶ Generate local employment & purchases from local suppliers
- ▶ Produce skilled workforces & transfer knowledge through graduates
- ▶ Leading sources of knowledge
- ▶ Powerful network builders

