



Connect, collaborate, innovate

Collaboration has always been at the heart of innovation, but meeting the economic and social challenges of the 21st Century will require more extreme partnerships – ones that cross previously sacrosanct organisational, geographical and disciplinary boundaries. Already, organisations around the world are doing this: experimenting with open source software development, agreeing universal technical standards, and using technology to build previously impossible en masse collaborations that create entirely new products and services.

This new world of collaborative innovation brings with it substantial challenges. Intellectual property regimes were designed primarily to protect the lone inventor and to enable commercialisation by single large corporations. Collaboration also creates problems for organisations used to 'looking in' rather than 'looking out' and challenges decades-old practices in education and even older social conventions around trust, sharing and attribution.

Innovation requires collaboration

Collaboration provides the opportunity to learn from others, share resources and create new opportunities.¹ Consequently, it is at the heart of most innovations.

Consider a seemingly simple innovation like the Swiss wristwatch: this single product is the culmination of significant development activities in microelectronics, micromechanics, new materials, process technologies, product design and manufacturing.² This is equally the case with more traditional scientific inventions: the Bell Labs team that developed the transistor was part of a multi-disciplinary group comprising electrical engineer and physicist John Bardeen, physicists William Shockley and Walter Brattain and chemist Stanley Morgan.

New theories of innovation through collaboration

New forms of collaboration that cross traditional organisational, geographic or disciplinary boundaries are gaining prominence, particularly with relation to how they stimulate innovation.

Open innovation means innovating by sharing knowledge with external partners like universities, suppliers and small firms rather than relying on knowledge generated in-house.³ It reflects the new innovation strategies

being implemented by firms such as Procter & Gamble.

User-led innovation describes how in many fields including surgical equipment, machine tools and mountain bikes, the user is frequently more innovative than the manufacturer. 'Lead users' have needs that foreshadow those of the general market and are more likely to innovate for themselves.⁴ Among others, user-led innovation strategies have been implemented by STATA, LEGO, Coloplast and the Danish Government.

Collective innovation refers to processes where no single organisation or agent is responsible for the development of the innovation, but rather multiple agents independently create different pieces. Examples include online encyclopaedia Wikipedia and the open source software movement, most famously the operating system, Linux.⁵

How open is open?

Organisations may collaborate in an entirely open form, where all knowledge developed is shared with the rest of the world, or they may control the degree of 'openness' through licensing, joint ventures, and strategic alliances.⁶ Toyota, for instance, encourages knowledge sharing among its suppliers through controlled networks,⁷ whereas Linux practises a completely open innovation model in which its products are freely available for anyone to use, modify, and redistribute.⁸

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12. Huston, L. & Sakkab, N. (2006), Connect and Develop: Inside Procter & Gamble's New Model for Innovation, Harvard Business Review, Vol. 84 No. 3.

13. For more information see <http://www.wikipedia.org/>

14. For more information see <http://www.ebi.uniprot.org/index.shtml>

15. Also known as computational biology, which is the application of computer science to help solve problems at the molecular level.

16. Nanotechnology involves many different disciplines but is based primarily on chemistry, physics, and materials sciences.

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20. A digital video sharing website available at <http://www.youtube.com/>

21. A social networking site available at <http://www.facebook.com/>

22. Saveri, A., Rheingold, H. & Vian, K. (2005), Technologies of Cooperation, (Institute for the Future, California).

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Collaborative innovation is leading to new ways of working

Industry has identified that collaborative activity can create economic value

Procter & Gamble, BT, Philips and IBM have developed new innovation strategies that no longer rely on in-house research and development (R&D) – Procter & Gamble has said that in future it expects 50 per cent of new products to originate outside of the company.⁹ This approach is being mirrored more widely across the UK as businesses increasingly collaborate with clients, suppliers, and universities to develop innovations.¹⁰

These new collaborative approaches can generate considerable economic returns: Toyota's networked approach to innovation has resulted in suppliers having 14 per cent higher output per worker, 25 per cent lower inventories and 50 per cent fewer defects.¹¹ Procter & Gamble's 'Connect and Develop' strategy now produces 35 per cent of the company's innovations and billions of dollars in revenue. Significantly, since 2000, its own spend on formal R&D as a percentage of sales has declined from 5-6 per cent to 3-4 per cent.¹²

Small individual efforts can add up to create significant public value

Wikipedia, the open encyclopaedia, represents an extreme form of collaboration that produces significant public value.¹³ It enables users to freely create content and then offers public access to that content without any expectation of private return. UniProt Knowledgebase is a cross-country multi-organisational collaboration that seeks to establish the world's largest public protein database through the independent contributions of scientists from different organisations in different countries.¹⁴

Collaboration is leading to the development of new disciplines

Over time, repeated collaboration changes the way academic and industrial research is practised. This may lead to the convergence of some existing disciplines such as bioinformatics¹⁵ and the emergence of new ones like nanotechnology.¹⁶ These new disciplines need not be in fields traditionally thought of as hi-tech: *Molecular Gastronomy*¹⁷ applies modern science to culinary problems. Even in bastions of pure science, interdisciplinary research is making inroads. For example, the 2006 Nobel Prize in Chemistry was awarded to Roger Kornberg for his work on genetic information which drew on research done in biology, medicine and physics.¹⁸

New technology allows en masse collaboration

MySpace,¹⁹ *YouTube*²⁰ and *Facebook*²¹ all depend fundamentally upon en masse collaboration. Using web-based technology, they acquire communities of 'co-creators' by providing them with free tools to collectively develop and share information. Without collaboration they simply would not exist.²²

Intermediary agencies are becoming increasingly important

The increasing importance of collaboration has given rise to a new breed of intermediary agencies, such as *Big Idea Group*²³ and *Eureka Medical*.²⁴ These organisations rely on groups of practitioners and users submitting ideas before screening them and marketing the best ones to large developers.

*InnoCentive*²⁵ operates as an online marketplace where problem 'seekers' find problem 'solvers'. Currently, it features a 'solver' database of over 120,000 scientists from 175 countries who consider problems posted by companies including Dow AgroSciences and Eli Lilly and Company. A recent study found 240 people, on average, examined each problem, 10 offered answers and 29.5 per cent were solved. Interestingly, the further the problem was from a solver's traditional area of expertise, the more likely they were to solve it.²⁶

The UK has high potential for collaboration

UK businesses are less protective of their intellectual property

UK businesses are less likely to use legal methods to protect their innovations than the majority of their European counterparts.²⁷ This is normally seen as a problem for innovation – with businesses potentially creating knowledge that is then commercially exploited by others. But given that fear of loss of intellectual property can be paralyzing in the early stages of a partnership, it may perversely be a benefit in a world that increasingly relies on collaborative innovation.

The UK is well-positioned to collaborate

Internationally, the UK is in a strong position to engage in collaboration. It enjoys an open science and technology base, an export-oriented economy, a highly globalised financial sector and strong historic, cultural and ethnic links with the rest of the world. The universality of the English language represents an important channel of knowledge exchange and forms a strong basis for collaboration.

The UK also benefits from being a nexus for flows of talented people from across the world. Foreign students and scholars flock to UK universities²⁸ and large numbers of highly skilled workers are attracted to the City of London,²⁹ creating important links between the UK and their home countries.³⁰

Collaboration poses a number of challenges

Many businesses don't realise the importance of collaboration and lack the resources to pursue it

Identifying areas that would benefit from collaboration and then making the relevant connections are not activities that smaller businesses normally have the resources to undertake. More established businesses also rarely have the necessary connections, mechanisms or infrastructure to fully benefit from collaborative activity.

Managing collaboration is complex

Different motivations, objectives, and approaches to management make managing collaboration difficult.³¹ Decisions need to be taken about who leads projects, who has the authority to make decisions, and how ideas are prioritised. These problems are further complicated by the increasing importance of users and other stakeholders in the innovation process³² – the bigger the community, the more extensive their demands and expectations and the more difficult it is to establish a common objective.³³

Intellectual property rights are necessary, but the current system can discourage collaborative activity

Patents force disclosure in return for guaranteeing protection. As such, they are intended to facilitate follow-on innovation. In reality, however, opaque patent applications and large numbers of small patents that combine to form unnavigable 'patent thickets' can make collaboration difficult and expensive, particularly for small businesses.³⁴ It took EMI two years and a clearance process 'of biblical proportions' to produce the 'Mashed' album featuring spliced-together tracks by Franz Ferdinand, Madonna, David Bowie, Blondie and Mylo – something that had been happening illegally for several years.³⁵

The high legal costs associated with engaging with IPR are cited as preventing 15 per cent of UK patents being licensed.³⁶ Moreover, IPR systems, although adhering to basic international norms, differ between countries and effective protection across borders requires

multiple applications in multiple languages. After forty years of trying, there still exists no Europe-wide patent.

The existing IPR system has responded to these problems by creating patent pools and cross licensing agreements.³⁷ However, these can themselves create new problems, such as creating new forms of market power by excluding firms (particularly smaller firms) from collaborative agreements and not providing flexibility for later entry.³⁸

Building trust is essential but difficult

Trust forms the basis of any collaboration and greater levels of trust facilitate more efficient exchange of knowledge and resources between collaborators.³⁹ However, establishing trust takes time⁴⁰ and is dependent on a number of factors including perceived equity between the partners and parity in expected benefits from the collaboration. It may be particularly challenging in cases of more extreme collaboration – when parties have significant 'cognitive distance' from each other created by different organisational or subject backgrounds.⁴¹

Policy has started to recognise the value of collaboration

Encouraging interdisciplinary research in universities

Most research funding allocated to universities and research institutes continues to support research undertaken in institutional or disciplinary silos. However, recently the Research Councils have established several initiatives such as interdisciplinary research collaborations and discipline-hopping grants, and are increasingly promoting international collaboration.⁴² There has also been a move towards problem-centred research programmes such as the multidisciplinary UK Energy Research Centre which is funded jointly by three Research Councils.⁴³

Making intellectual property easier to navigate

The Lambert Review recommended that universities and business should work together to produce a small set of model collaborative research agreements for voluntary use by industry and universities.⁴⁴ Following the production of these agreements, and to address problems with licensing agreements between businesses, the Gowers Review recommended that "the Patent Office should develop 'Business-to-Business' model IP licences through industry consultation."⁴⁵

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Facilitating networks and collaboration

The UK Government has established 22 Knowledge Transfer Networks to support knowledge exchange between universities and businesses from across the UK. A number of Innovation Platforms have also been set up to build cross-sector interdisciplinary groups around specific challenges such as those presented by intelligent transport systems and network security. In addition, over 600 collaborative R&D projects between business and research institutions have been funded.⁴⁶

Initiatives to facilitate collaborative innovation are taking place across the UK

In April 2006, SEEDA (the South East England Development Agency) set up an Innovation Advisory Service (IAS) to help businesses engage in open innovation processes. A number of other English regions are currently looking at setting up similar schemes.⁴⁷

In January 2007, Highlands & Islands Enterprise set up Distance Lab to develop an interdisciplinary work environment for creative scientists, designers, artists and engineers. The aim is to build working prototypes and demonstrations of new technologies which can then be channelled into new products and services that challenge the way people think about distance.⁴⁸

The UK needs to understand and harness collaboration

Policy should support more extreme forms of collaboration

To date, when it has sought to build collaboration, policy has tended to focus on the development of formal, closed networks, frequently confined to an individual geography or sector. Instead, future policy should view innovation as a collaborative exercise across sectors and regions between producers, distributors and users.

Greater effort to develop an IPR system that supports collaborative working

The UK Government should consider Creative Commons licences and the principles embodied in the Adelphi Charter, both of which strive for an important middle ground between the extremes of copyright-control and the uncontrolled exploitation of IP.⁴⁹

To better enable cross-European collaboration, the 'Community Patent' concept must be vigorously pursued. In the meantime, the UK Intellectual Property Office (UKIPO) should follow up the commitment made in the Gower's review to provide more support to

UK businesses looking to file for protection in other countries.⁵⁰

The UKIPO should also improve understanding of how the patent system works, and help businesses to navigate the system. One such approach could be to develop an IP support product as part of the Business Support Simplification programme, which could be rolled out across the UK.

Overcoming cultural barriers to collaboration

The skills and attitudes necessary for effective collaboration later in life are best developed at an early age.⁵¹ In Northern Ireland, a revised school curriculum incorporating cross-curricular skills such as communication is already being introduced.⁵² Other parts of the UK should learn from this approach, and examine how these attributes can be best developed through both formal and informal education.⁵³

NESTA Connect – creating innovative collaborations

NESTA Connect exists to create new, unexpected or extreme collaborations – disrupting the traditional boundaries between disciplines, organisations and places.

Over the next three years, NESTA Connect will focus on interdisciplinary collaboration, corporate open innovation, and online innovation communities. The first three flagship projects are:

- DESIGN-LONDON – an interdisciplinary centre of excellence and incubator in design, engineering, technology and business, in partnership with the Imperial College Faculty of Engineering, the Royal College of Art and Tanaka Business School.
- PROCTER & GAMBLE OPEN INNOVATION CHALLENGE – a pilot programme in partnership with BDI and Oakland Consulting, seeking to harness the potential of design companies to develop the next generation of products and services for P&G.
- CRUCIBLE – offering early-career researchers in science, technology, engineering, and social sciences an opportunity to develop new collaborations across disciplines and explore the wider potential of their work.