

Essay: Innovation Networks – Realising Benefits from ICT in Post-compulsory Education Institutions

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Introduction and Scope

This essay is concerned with innovation in the use of ICT in post-compulsory education, i.e. with the appropriation and possible adaptation of ICT from outside the sector and the associated changes in practice and process to lead to a useful effect. It is particularly concerned with a sector-level perspective and the question of how to promote innovation at this level; questions of how an educational institution might promote innovation internally are not directly addressed, although parallels may be drawn. In very specific terms, this essay is the first part to a response to the question: “how could JISC (the Joint Information Systems Committee¹) support universities and colleges in realising benefits from ICT in teaching and learning, research and management through innovation networks?”²

There is a great deal of literature dealing with “innovation” and since the coming of the age of the internet a great deal of this has focussed on “networks”. These works largely focus on commercial product and service development. This limits the degree to which any prescription or analysis can be taken as-is for the post-compulsory education sector; its ends and means differ too much. This means that the insights from this literature must be pieced together and supplemented by a combination of argument and intuition based on an understanding of how the sector works. That is what this essay attempts.

Conceptions of Network

“Network” is a very general concept concerned with relationships of any kind between people, organisations and things (etc).

Considering innovation networks, a number of stereotypes for the purpose of the network can be identified:

- the marketplace,
- crowd-sourcing,
- the commons.

The Marketplace

The marketplace is a common assumption behind many uses of “innovation network”, particularly when regional development or national economic performance is in view. Interventions to support this kind of innovation network typically involve actions aimed at match-making organisations (frequently SMEs) who have some know-how that can be traded - the network is about partner-finding – or maybe “pitch-fests” where ideas are pitched to potential investors.

Similar to the way value is added to goods down a supply chain, trading of know-how leads to similar structures: networks of intellectual property value. The idea of trading intellectual property

1 <http://www.jisc.ac.uk/>

2 It does not suppose that innovation networks are the only way that JISC would address this aim.

(IP), rather than products, was termed “Open Innovation” by Henry Chesbrough and has been explored in some detail (Chesbrough, Vanhaverbeke, & West, 2006) since he popularised the term in around 2003. Chesbrough's argument was that companies that saw their boundaries as being permeable to IP were at an advantage compared to those that tried to isolate their R&D. He substantiated this claim by reference to several decades of history. The six modes of IP transfer are: licence in, licence out, spin in, spin out, acquire and divest.

Supporting this kind of open innovation is one of the objectives of the Knowledge Transfer Networks that are supported by the Technology Strategy Board, the UK's innovation agency.

While this concept is clearly of interest to universities as generators of intellectual property through research (Pera International, 2009), it is outside the scope of this paper. It is also worth noting that “Open Innovation” is sometimes used in a different sense to that of Chesbrough *et al*; it may be used to indicate “open = transparent to inspection and freely usable” in the sense of Open Source Software.

Crowd-sourcing

The second common assumption behind use of “innovation network” is the case where a network is used to help steer product development. This may be more or less passive but embeds the idea that there is a product (or service) provider and a large number of actual or potential users. Ideas for improvement or novel offerings may be generated by either users or providers and the “wisdom of crowds” principle used to determine which has the most promise. It is unfortunate that the term “open innovation platform” has been used by providers of software to support this stereotype.

Most accounts of this stereotype assume that there are a clear separation of users and providers. Hence, while the concept of crowd-sourcing is relevant to us, it is insufficient by itself as a model for sector-level innovation because we are both users and innovators. There are, of course, students and staff who are potential users of innovation and who can be usefully engaged with using crowd-sourcing.

The Commons

A much less-explored stereotype, at least in the innovation/business literature, is the idea that the purpose of a network is the common good. This is not to deny that the Open Source Software phenomenon, particularly Linux³, has been considered in some detail; Ilkka Tuomi considers Linux as one of two central case studies (with the internet) in his book “Networks of Innovation” (Tuomi, 2002). Tuomi makes the case for Linux as a test case for theories of innovation and technological development and shows how its history presents us with lessons for innovation in the age of the internet.

This stereotype is the closest to a model for sector-level collaborative innovation and examples such as Linux provide some pointers towards a practical realisation of sector innovation networks. It would be naïve to equate Open Source Software development with innovation in the use of ICT in universities and colleges; it is the underpinnings expressed as theories about innovation that Linux exemplifies that should be considered.

The Case for Collaboration

The preceding sections have implicitly introduced the assumption that a sector innovation network

3 Linux is a Free Open Source Software computer operating system - <http://en.wikipedia.org/wiki/Linux>

would be a collaborative affair. This section defends that assumption.

The concept of pre-competitive collaboration as a means to establish a platform for productive and efficient innovation in a range of R&D fields is well established although the pre-competitive/competitive break-point is the subject of debate and discussion. These discussions are generally focussed on R&D into what is ultimately traded. In this essay, however, the focus is on ICT as an enabler for some-how better teaching and learning and research; ICT is not the business of universities and colleges. Hence, it is easier to argue for a collaborative approach to ICT innovation; it is a platform and amplifier for expression of hot-spots of institutional excellence, for distinctive character, for quality and relevance to stakeholders (students, employers, industry, research councils...). ICT as an enabler is, in short, pre-competitive by definition because it supports competitive activity.

To take advantage of ICT to better serve those distinctive and competitive activities that are institution-specific requires know-how across a range of generality, from the very general aspects that are common across many industries and domestic life, through those that are more or less common within the post-compulsory education sector through to the highly contextualised knowledge of how to effectively apply ICT to serve an institution's unique mission.

It would be costly to try to discover all transferable know-how for yourself and for the case where there is established practice this is obviously unnecessary. But when *innovation* is occurring, there is no established practice and, as the following sections argue, the meaning of innovation

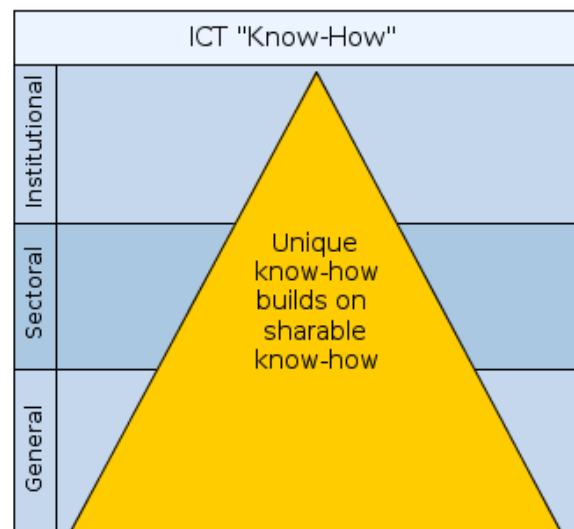
is not transparent to an outside observer when the knowledge it represents becomes complex. The challenge of getting to the point where context-specific – i.e. highest value – know-how comes into view can be addressed by collaboration and knowledge-sharing networks. Even if it costs to collaborate, doing so puts you at an advantage compared to those that try to go it alone so long as:

1. useful knowledge is discovered,
2. transferable knowledge is discovered,
3. knowledge transfer actually occurs among collaborators.

From a sector-level perspective, or indeed from government or national interest, this is a “no brainer”; we need to maximise the re-use of shareable knowledge since discovering it costs time and money. The three points above are pointers to possible performance indicators for any attempt to stimulate ICT innovation at sector scale.

Innovation as a Social Practice, Complementarities

The central argument in “Networks of Innovation” (Tuomi, 2002) is that innovation is fundamentally tied to social practice. Tuomi points to the fallacy of the conventional linear model of invention - “creative insight and heroic efforts in problems solving” - followed by innovation - “a process that refines inventions and translates them into usable products.” The linear model matches



our instinctive mental image of objects in response to the word “technology” and has its roots in the technology push/pull models that have largely been overtaken since the 1970's. In addition to the weaknesses that are shortly to be described, innovation based on pull from market analysis risks a fall into the trap of technological incrementalism which can, for example, lead to the phenomenon of market incumbents being undermined by so-called disruptive innovations⁴, i.e. ultimately cheaper or better products or services with a radically different approach at their heart.

Rather than thinking of technology as things, it is more appropriate to see it as “know-how” of making and using things. This is consistent with the etymology of “technology” from the Ancient Greek “techne” (τέχνη), which is usually translated as “craft or art”, i.e. practical knowledge.

Tuomi puts it slightly differently:

“To talk about something as technology means that we already assume some uses. ... Technological objects... exist as material artefacts that embed uses... are artefacts full of meaning.”

Following on from this, he argues that the meaning of a potential innovation is only realised through the social practices that are co-created with associated artefacts. Innovation is often more about creating meaning than it is about creating things. The balance varies, of course, with some strands of technological development being very object centred but for the scope of this paper, the application of ICT to the business of universities and colleges, the social model is manifestly of great significance.

Although seeing innovation as social practice gives us a much richer picture of how it works, it also makes clear that effective innovation requires dealing with a great deal more complexity and nuance than, for example, the design of the Universal Serial Bus (USB). We are in the realm of the social sciences not engineering; while it is possible to study the context of potential innovations and hypothesise about the effect of a changed artefact or practice, it isn't possible to speculate far ahead without tripping over un-knowables. To be effective, innovation must be a practical and iterative process involving the community whose social practices give meaning to the innovation (see the section “Communities of Practice”, below).

The social model of innovation also implies that the evaluation and management of innovative activities cannot be achieved by only looking at the artefacts.

Research on the link between IT investment and productivity has demonstrated the same underlying connection. For example, Brynjolfsson and Saunders (Brynjolfsson & Saunders, 2010) summarise numerous pieces of research showing the necessity of “complementarities” in realising a return on IT investment, specifically the need to understand how to work differently to realise the potential benefits. They ascribe a lag between IT investment and increased productivity in the US economy to the time it took for industry and commerce to understand how to use the purchased technology. This could be described as evidence of a failure to account for innovation as social practice and it makes clear that seeing ICT as an opportunity for cost reduction of existing business processes is to miss the point.

The challenge facing us is that these complementarities are variously context-specific and multi-dimensional; whereas the know-how of backups or database administration are universal, the know-how of doing something useful cannot be assumed either to be transferable or to be a single definable practice. It would be wise to be cautious and critical about adopting potential innovations that have proven themselves in another industry or even to assume that success in another

4 The term is used in the sense of Clayton M Christensen who has developed a clear description of the phenomenon over several years. A useful summary of the concept is given on wikipedia [http://en.wikipedia.org/wiki/Disruptive_innovation].

institution within the post-compulsory education sector necessarily indicates “best practice”. Brynjolfsson and Saunders summarise this pithily in the subheading “Theory of Complementarities: It's Not Just One 'Best Practice'” that introduces several examples to emphasise the point that there are typically many complementary practices to a *prime facie* innovation that are difficult for an outsider to observe or replicate.

The two key conclusions are:

1. Seeing innovation as social practice and recognising that this is variously distinct at several levels – sector, institution (potentially also faculty/school/department) – means we must be active participants in the innovation process rather than being consumers of exogenous innovation;
2. Adoption of an exogenous innovation without considering the context-specific complementarities is unlikely to give a return on investment.

Sector Knowledge and the Problem of “Public Goods”

In the parlance of economists, intra-sector transferable knowledge is usually a pure public good. Such goods are non-rivalrous – my enjoyment of the good does not prevent anyone else from the same – and non-excludable – the creator of the knowledge cannot prevent others from enjoying the good (unless it happened to be patentable, which is unlikely for ICT-oriented innovation as social practice in an educational setting). The problem with such goods is that the usual mechanisms of pricing, supply and demand break down. This presents a special kind of challenge to anyone attempting to manage the creation and transfer of such know-how.

For public goods, a number of statements can be made:

1. Since the marginal cost for using public goods is zero, a classically efficient market would set the price to zero. But this means there is no incentive to invest in creating the good (there is generally a minimum investment for the good to become usable at all).
2. Although it may be possible to use artificial means to set a non-zero price (e.g. digital rights management on resources, patents to make the good excludable) these introduce conflicts and market inefficiencies.
3. It is practically very hard to get an accurate assessment of the value of the good to users because no payment occurs. This makes it difficult to make judgements about levels of supply.

While we may put up with market inefficiencies (i.e. market failure) in the external market, if we are concerned about supply of sector knowledge – i.e. with innovation – from a sector-level perspective then a more concerned stance is warranted.

The diagnostic framework for firm inefficiency developed by Aidan Vining (Vining, 2003) provides a useful lens on the problem, although no easy answers. This essay assumes that it is reasonable to see the post-compulsory education sector as being an Enterprise or a firm and hence to adopt much of Vining's analysis with caution.

Vining explores several sources of internal market failure and internal governance failure and his account contains much that is applicable both at the level of an individual institution and to the sector at large. Innovative know-how is, for example, an internal public good, especially when we take account of innovation as social practice; social practice is definitely neither rivalrous nor excludable.

In this analysis a sector agency (e.g. JISC, funding council, etc.) faces the difficult decision about an appropriate level and composition of supply: following point #3 above, how much to invest and in what? This problem is made worse by stakeholders gaming the system by either under or over-valuing the good when asked, depending on whether they expect to have to contribute or not.

Although firm-level investment will be important, it is not the only source of internal public goods. Some will be created by employees (or institutions) moonlighting or investing personal time and effort. Vining points out that difficult or uncertain operating conditions cause suppliers of internal public goods to divert effort to the provision of internal private goods, particularly those showing quick returns, as a kind of insurance; they divert effort to activities that are perceived as having higher value. He points to this as a factor driving a potential downwards spiral in which public goods are under-supplied leading to worsening conditions:

“much popular management literature focusses on how firms can credibly convince employees that they should engage in risky but potentially valuable intrapreneurial activities. These activities almost always involve significant time expenditure by employees that become 'sunk' investments.”

A further complication is often termed “knowledge spill-over”, an example of an “internal positive externality” in the economic parlance of Vining's paper. These terms describe the situation where there are additional positive effects to acquisition of knowledge or other transaction beyond those that motivated the transaction. They are down-stream or knock-on benefits and are highly likely to go unnoticed and hence the value be under-estimated. The optimum level of supply of knowledge creation (innovation) is, therefore, usually higher than the evidence suggests because the evidence is incomplete. It is quite conceivable for beneficiaries of an innovation-oriented investment to be wholly unaware of positive spill-over and hence to assign no value to the knowledge it creates.

This all points to a need to intervene at sector level; the creation and dissemination of innovation is bound to be inadequate otherwise. Although the issues above cannot be overcome, some actions can be taken to ameliorate their impact:

- undertake investment in innovation and transferable knowledge creation at sector level;
- avoid introducing artificial excludability to knowledge goods;
- provide an environment that promotes the “intrapreneurial activities” and gives people confidence to take a long term view and to invest personal effort in public goods;
- capture and account for more spill-over effects.

Structural Aspects of Networks

Since the 1960's a number of waves of research have considered social and organisational networks and their effect on innovation. A good summary of the underpinning concepts and of the evidence appears in the chapter “Innovation from a Network Perspective” in the book “Managing and Shaping Innovation” (Conway & Steward, 2009), which summarises the state of affairs as:

“from a review of the literature, it is clear that there is plenty of empirical evidence to suggest that social networks and organizational networks are a prevalent and important feature of innovative activity within and between many modern organizations, sectors and regions.”

The essence of network is relationship, which may take many forms such as: friendship or other forms of emotional tie, the flow of information or more overtly instrumental exchanges such as the transfer of goods and money. In some cases the relationship may be direct and active– e.g. two people meet to exchange ideas – or indirect and passive – e.g. by a disseminated piece of writing.

The nature of the relationships and the local and large-scale structure of the network determines what is commonly termed “social capital”, which may be defined as the network and the assets that may be mobilised through the network (i.e. it includes the potentiality of the network). As an intangible asset, social capital is hard to measure and often under-estimated or even overlooked.

Two key writers on social capital, Janine Nahapiet and Sumantra Ghoshal, distinguish three dimensions of social capital as being relevant to the processes by which it may be mobilised to create knowledge: structural (the network as objectively observed), cognitive (shared meaning between members of the network) and relational (trust and ethical pre-requisites for collective action). These three dimensions, particularly the second two, recur many times in this essay.

The remainder of this section will focus on structural aspects but this is not to deny the importance of cognitive and relational factors as being critical to the effectiveness of the network, i.e. to its ability to mobilise potential into actual effect. The case of trust is, for example, a key component in promoting formal collaboration.

Three inter-related purposes of a network of innovation are assumed in the following account:

1. to allow novel ideas to diffuse widely and beyond the boundaries of organisational structure or established communities of practice;
2. to promote collective sense-making of environmental factors, new ideas, local issues and the intersection between them;
3. to catalyse formal collaboration, particularly to create new and improved artefacts.

Research has shown that innovation is promoted by certain kinds of structure; it is not simply a case of connecting the most people, whether actively or passively. It has also shown that the dynamics of the network, i.e. the changes arising from the networking behaviour of the members, are important factors in its effectiveness. In different circumstances either a stable or labile network may be desirable but in either case an effective network will be one containing members that respond appropriately to their environment. This suggests subtlety is a requirement for anyone intent on supporting or promoting effective networks; external interventions may falsely promote ossification or artificial dynamism (e.g. “ball-chasing behaviour”) whereas authentic internal participation as a network member is less likely to introduce such distortions.

Conway and Steward identify a number of structural aspects with implications for innovation. A summary of the key points appears in Table 1.

Macro-scale Properties	
Density	Dense networks are those where a large fraction of possible relationships actually exist. They are effective for the rapid diffusion of information. In practice it is only appropriate to talk of dense areas or clusters; there is a size limit on dense networks.
Reachability	Reachability is the number of links between two people. The more complex information is, the shorter the path must be for diffusion of knowledge to occur.
Diversity	Is a measure of the heterogeneity in the network. High diversity indicates an increased chance of innovation due to the presence of different information, knowledge or perspectives.
Openness	Openness is a measure of the degree to which there are clusters with overlapping (intersecting) membership. Openness, as diversity, combats the risks of group-think.
Configuration Properties and Roles	
Weak tie/ Strong tie balance	Weak ties are relationships with people with whom someone does not interact frequently. They are known to be important for the diffusion of new ideas so long as these are not complex; a novel idea is more likely to come to you via a weak tie. Strong ties – relationships of frequent interaction - are important underpinnings of practical collaborative action. They also become important for the diffusion of complex knowledge.
Structural Holes	Structural holes is a term given to the absence of potential relationships in a network. The importance of a hole is determined by what would be unlocked if it were filled. Structural holes exist because they are not obvious; insiders may miss them because of their habits and outsiders may miss them because they lack context.
Boundary-spanner	A boundary-spanner is someone who provides a bridge between networks. Effective boundary-spanners can speak the language of several groups and are able to select and filter the information they disseminate. By doing this, they can increase the variety and complexity of information that can diffuse. Someone who can identify a structural hole and become a boundary-spanner will also increase reachability, diversity and openness in the network. These are key people for innovation and Ronald Burt (the originator of the term “structural hole”) has shown that people with the best ideas are more likely to have larger and more open networks.

Table 1: Network Structure and Innovation, A Summary

Table 1 gives a list of desirable properties but not the procedure for attaining them or for balancing contradictions within them. It is likely that there is no procedure at all, in the sense that it is unrealistic to write a project plan to directly build the perfect innovation network. To do so would be to deny the complexity of what it is that innovation networks do. Rather than introduce formality, interventions to support the evolution of effective innovation networks should allow for the insight and intuition of actors in the network to be expressed in its dynamics. One way this could be achieved is to attempt to preserve or increase the numbers of people with boundary-spanning talent and the space to exercise that talent.

A network may be a “community” when there is a common sense of identity but it need not be so. Ideas of community are considered in the following sections.

Communities of Practice

The phrase “community of practice” (CoP) has sometimes been over- and mis-used in educational settings, at least to judge actual usage against the social practice theory advanced by Jean Lave and Etienne Wenger. Because of this, the phrase is generally avoided in this essay. This is not to say that it is an irrelevant concept; in fact, as Tuomi (Tuomi, 2002) argues, innovation is rooted in social practice and this matches the emphasis Wenger gives to “practice” in his (informal) 2006 “Communities of Practice – a brief introduction”. In this brief introduction, Wenger states:

“A community of practice is not merely a community of interest, people who like certain kinds of movies, for instance. Members of a community of practice are practitioners. They develop a shared repertoire of resources: experiences, stories, tools, ways of addressing recurring problems—in short a shared practice. This takes time and sustained interaction.”

Wenger is particularly interested in learning within such communities and he, with others, has naturally applied this to the problem of knowledge management in the book “Cultivating Communities of Practice” (Wenger, McDermott, & Snyder, 2002). The element of practice is somewhat down-played in this book - “communities of practice are groups of people who share a concern, a set of problems or a passion about a topic” - but this may be a consequence of writing for the intended the audience. It contains a wealth of practical advice on fostering communities but notes:

“The challenge of cultivating communities, therefore, is not only in organising groups but also about transforming organisations.”

An additional cautionary note is warranted, even it if states the obvious. The CoPs that exist in our universities and colleges – which are generally concerned with teaching, research, student services etc - are not necessarily well equipped to be generators of know-how in the application of ICT and our ICT-oriented CoPs are generally ill-equipped to support innovation in the others or have an institutional imperative that militates against it.

That a CoP has shared practice indicates: 1) a historical perspective and 2) differentiation from other communities. Both of these indicate a challenge for innovation. The former indicates stability, conservatism and an approach to change that is incremental in the absence of exogenous shocks; the community persisted by reproducing itself. Alternatively, it might simply be the case that members are stuck in the trenches of day-to-day practice. CoP differentiation is challenging to innovative intentions because the necessary capabilities to innovate – which includes, for example, an ability to appreciate the potential of, or to adapt, an artefact or practice from outside the CoP – may be missing from the shared repertoire. The sum of this is that tensions, inefficiencies or inadequacy of social practice may be insufficient to produce change.

Hence, while CoP's are at the heart of innovation, their existence does not guarantee it. There may be both a lack of capability and a lack of active intent, particularly when there is no established culture of innovation. Anyone interested in promoting innovation should, therefore, attend to such weaknesses to enable innovation to occur where it is needed.

When considering an innovation network, we need to imagine CoPs as being embedded within it; innovation can be promoted by developing a range of variously strong and weak ties, supporting boundary-spanners and fostering a sense of community around extra- and trans-CoP collaboration.

A wider innovation network that embeds CoPs can also enable restructuring and reorganisation of the relationships between communities; as practices change so communities and the boundary objects⁵ between them may need to change for them to remain viable.

There is a further reason not to be fixated on the CoP; as Tuomi makes clear, there is an inherent creative and playful streak to human beings. Sometimes an individual's "crazy idea" does catalyse change; innovation does not always conform to logical incrementalism or highly programmed approaches. It will be difficult to predict which of many maverick ideas has potential but this difficulty can be reduced by bringing these semi-isolates into an innovation network.

Although it is clear from Tuomi's account (Tuomi, 2002) of numerous perspectives on "community" to be found in the literature that there is no simple recipe for social models of innovation, the following affordances of an innovation network could build on the stability of communities of practice to amplify innovation:

- Diversity and density of inter-CoP weak and strong ties increases the mobility of ideas between them (a crude example might be between practitioners in student services and software developers).
- Increased network relationships increase the visibility of individual creativity from within and without a CoP.
- Wider networks provide an opportunity to reorganise/restructure communities as the environment changes.

On "Sense of Community"

Participation in each of the three stereotype conceptions of network – market, crowd-sourcing and commons – will be promoted by different factors according to the mechanism of reward. Since a collaborative model aligned with "the commons" is the best fit to the problem scoped out at the start of this essay, it makes sense to consider research on community psychology rather than to assume "sense of community" is common sense.

A clear, and it seems a durable and well-cited, account of sense of community was given in 1986 by David McMillan and David Chavis (McMillan & Chavis, 1986). This paper reviews a collection of prior research and explicitly considers theory applicable to both geographical/neighbourhood communities and relational/professional communities.

McMillan and Chavis define "sense of community" via four elements, summarised as follows:

- Membership – comprising boundaries, emotional safety, sense of belonging, personal investment and a common symbol system.
- Influence – both influence of the individual member on the group and of the group on individuals.
- Integration and fulfilment of needs.
- Shared emotional connection – including aspects such as shared history, quality of interactions and closure to events.

While it is clear from this definition that creating a strong community is a tall order – witness the

⁵ A boundary object is a tool, material, product, person, information or other "thing or stuff" that acts as the interface between communities, i.e. is something that two communities consider meaningful, although maybe in different ways, and which allows them to interact.

numerous cases where a project attempting this fails to realise a sustainable community – it is also clear that there is ample scope for leadership to increase sense of community, hence ability to act in pursuit of common aims and objectives. A consideration of these four elements provides useful pointers for how an innovation network should be supported.

Open Source and Open Standards Communities

The Linux community was referred to earlier as a network that works and which provides useful lessons for anyone considering networks of innovation (Tuomi, 2002). The concept of open innovation has also been referred to and the observation made that “open” means quite different things between that usage and “open source”.

Although it is clear that innovation in the use of ICT in post-compulsory education and the development of a computer operating system cannot be equated, the lessons learned about collaborative networks in the internet age are plausibly highly transferable. The case for the transferability of operating models, ethics and value proposition of open-source-like collaborative networks to other domains is made by Peter Gloor in his book “Swarm Creativity” (Gloor, 2006) in which he uses the phrase “Collaborative Innovation Networks” (COINS, a term which he coined to capture a recurrent pattern he observes). While Gloor's conception of innovation falls short of the sophistication shown by Tuomi – Gloor lives in the linear invention → innovation world and neglects social practice – he provides a number of examples from the corporate and consulting world that illustrate the potential creative and productive power of networks showing the following:

- a *raison d'etre* based on an intersection of interest/passion/enthusiasm among self-motivated people;
- diverse membership, including outsiders, with potential for fluidity;
- transparent and honest information sharing;
- shared ethics;
- members have influence based on merit and reputation among peers.

These match the McMillan and Chavis definition for a sense of community (previous section) rather well and help to establish a more operationally-focussed understanding of the more general principles of sense of community.

Gloor's principle audience, judging by his line of argument and the language of the book, is the leadership of traditional businesses who he is encouraging to let go of active hierarchical management and to act in ways that foster COINs. The more collegial nature of our sector makes the “don't be stiflingly corporate” message easier to absorb and Gloor would certainly identify COINs in existence in the sector but it is arguably the case that we are not making the most of the concept.

In a sense, the title of this section misses the point; open source communities and open standards communities (particularly web standards) are merely well established and researched examples of a collaborative pattern that has become particularly effective because of the communication affordances of the internet and which is well suited to the uncertainty and unpredictability of innovation. While these communities certainly do share practices - collaborative practices certainly, and maybe others besides (e.g. Linux developers) - they are not likely to be Communities of Practice in Wenger's sense. COINs are more likely to be the kind of interdisciplinary and heterogenous networks in which innovation based on recombining, reshaping and importing ideas

occurs, places where a creative outsider with a “crazy idea” might go.

A COIN, then, is a useful shorthand for a particular kind of innovation-focused group that embeds the members of several CoPs while the COIN persists and which realises desirable network structure (see Structural Aspects of Networks, above).

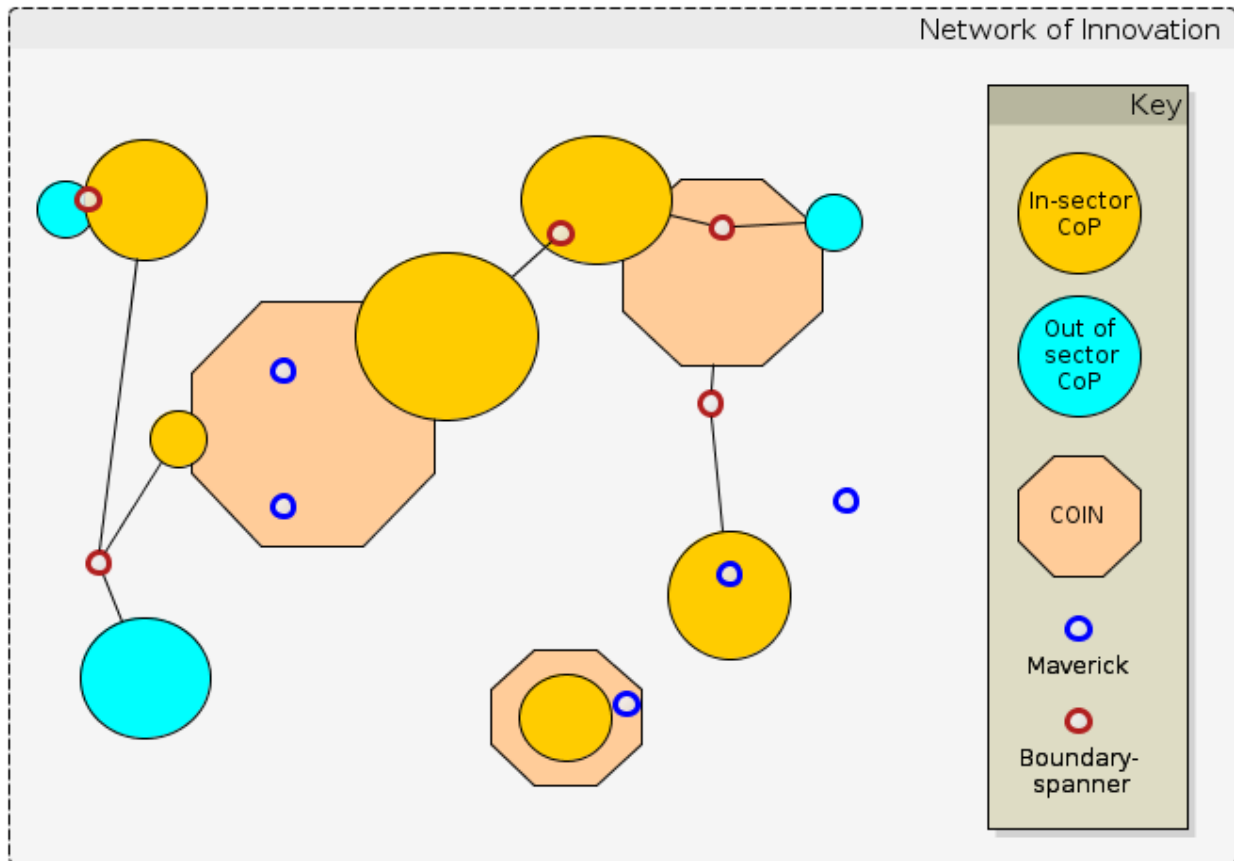


Illustration 1: Stylised view of the combination of CoPs, COINs and extra-ordinary individuals comprising a network of innovation

Relationship to the Private Sector⁶

Although the scope of this paper, hence the centre of gravity of the discussion, is concerned with a network of peers, the private sector is an important part of a network of innovation both as a giver and as a taker.

Relationships with out-of-sector private sector members may be important vectors for diffusion of new ideas, sparks that ignite some creativity, etc. This is a potential “weak tie” connection and is one where a boundary-spanner is likely to be useful to translate language, culture and values and to contextualise alien technology. Given the relative scale of out-of-sector compared to the education sector it makes sense to maximise the sharing of the knowledge which arises from such links.

In contrast, relationships with members of the private sector who see education as being their market offers a different set of potential benefits. Among these is that more meaningful intelligence

⁶ “Private sector” is taken to include suppliers who distribute and support Open Source Software in addition to more established software, hardware, integration, training, consultancy, etc suppliers.

on sector needs is likely to arise from engagement with the innovation process than through sales relationships and decisions based on what might sell. Given that it is generally cost effective to procure IT rather than to develop and maintain it at institutional level (although there are some exceptions such as Sakai where a group of universities have a case to collaborate to do this), it is clear that the nature of supplied ICT is a potential restraint on change. Hence we should favour a network that spans public and private sectors in order to accelerate the innovation process.

Support for Innovation Networks

There are abundant references in the innovation literature to the affordances of the myriad services enabled by the internet. The spontaneous formation of networks directed towards innovation of many kinds is common but this observation does not mean that they are evenly distributed or that we have anything like an optimal approach to ICT innovation as defined in the scope of this paper.

Internet services make many aspects of communication “a given”, things which there is unlikely to be a case for supply by sector or national bodies. There are, however, some issues and questions that beg for support, coordination, etc. that have been outlined above. These are recapped as:

1. Useful and transferable knowledge is discovered
 - Support networks that embed CoPs, complementing their strengths and compensating for their weaknesses.
 - Focus on topics where there are already self-motivated explorers and sense-makers who are hungry for dialogue to calibrate their current ideas and to short-list next steps.
 - Avoid distorting the topics of innovation by over-anticipation of trends.
 - Look for possible structural holes as a focus for attention.
 - Be transparent and honest in information sharing as this favours serendipity, reciprocation, fluidity of membership/participation and velocity of innovation.
2. There is a basis for practical collaborative action
 - Provide opportunities for potential collaborators to build mutual trust through interaction and low-risk joint ventures.
 - Attend to “sense of community”.
 - Inject funding to follow cooperative and collaborative activity and to fuel its progress and the involvement of newcomers, rather than to lead it.
3. Institutions and individuals are motivated to innovate and motivated to participate in a network
 - Legitimise involvement through the existence of a visible network and open recognition of its activities.
 - Provide an environment that promotes the “intrapreneurial activities” and gives people confidence to take a long term view and to invest personal effort in public goods;
 - Ensure that network members have influence based on merit and reputation among peers.

4. Maintenance of “the commons”
 - Be a creator of artefacts and of ideas not just an external supporter or facilitator.
 - Curate the knowledge.
 - Avoid introducing artificial excludability to knowledge goods.
 - Capture and account for more spill-over effects.
 - Actively lead the collaborative development of artefacts (documents, software, standards) modelled on COIN principles.
5. See the network as a dynamic self-organising form
 - Recognise that there is not a single homogeneous community but a network structure with inner clusters.
 - Avoid the temptation to impose or create new structures or communities; build on the existing ones, catalysing self-organisation.
 - Be process and structure oriented rather than outcome oriented.
 - Reduce risks of distortion that intervention may have and increase sensitivity to network dynamics by being part of it.
 - Guard against decadence, self-interest, personality cults in COINs,
6. Promoting and maintaining the flow of knowledge and novel ideas
 - Invest in boundary-spanners.
 - Hook in out-of-sector and private sector participants.
 - Accommodate and encourage a diverse membership and fluidity of membership.
 - Support innovation activity in F/HEIs since this increases their ability to appreciate and correctly select exogenous innovations (absorptive capacity is increased).

References

The following may also be found in the Mendeley Group:

<http://www.mendeley.com/groups/2342281/innovation-networks/papers/>

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