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ICTs and Social Capital in the Knowledge Society

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ICTs and Social Capital in the Knowledge Society

Report on a Joint DG JRC/DG Employment Workshop

IPTS, Sevilla, 3-4 November 2003

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Table of Contents

Introduction

Social capital emerges as a relevant topic for consideration in the light of Europe's ambition to become a competitive knowledge-based economy 'with more and better jobs and greater social cohesion' by 2010. Awareness of social capital from a policy perspective could offer opportunities for Europe in its efforts to achieve the Lisbon objectives, especially from the perspective of employment and social affairs policy and IST innovation policy.

It is assumed that the widespread diffusion of information and communication technologies (ICTs), no longer restricted to early adopters, has an influence on, and is influenced by, social capital. The emergence of virtual communities, the importance of interstitial ones, and the challenge to traditional conceptions of time and space give rise to new issues that need to be addressed by research and policy. Therefore, IPTS, and the Knowledge Society Unit of DG Employment and Social Affairs, set up a small research project in 2003 with the aim of providing insights into how the use of ICTs and social capital mutually reinforce each other.

Background papers

IPTS commissioned three background papers to investigate specific facets of the relationship between ICTs and social capital and organised, together with DG Employment and Social Affairs, a workshop in Sevilla on 3-4 November 2003 to discuss the generic issues coming out of these background papers with a wider group of experts. The background papers, the workshop agenda and the list of participants are included in the annex.

Taking the Lisbon declaration as a frame of reference, Valerie Frissen's paper focuses primarily on the social cohesion aspect. In particular, she looks at the impact of ICTs (especially the Internet) on social capital. More specifically, she discusses the impact of ICTs on civic engagement and civil society movements (i.e. more or less organised social relationships).

She addresses a central debate regarding ICTs and social capital, which could be termed the 'empowerment vs. balkanisation' dichotomy. On the one hand, ICTs are assumed to empower civil society, giving new impetus to attempts at building a community, establishing relationships among people, and helping provide the basis for a 'glocal' civil society. On the other hand, however, ICTs are said to lead to an impoverishment of social relations and to an overall decline in civil society, as characterised by Putnam's notion of people 'bowling alone'. Social cohesion, according to this line of thought, is negatively affected by the prevalence of ICTs in society. Relying on a number of case studies, she arrives at the conclusion that ICTs do not appear to lead to a low level of social engagement. On the contrary, ICTs are seen to supplement and strengthen the social capital of civil society. However, this social capital is undergoing a process of transformation, leading to new types of social relationships and networks and which may result in new types of behaviour (such as de-contextualised interaction or 'smart mobbing').

Paul Duguid's and Ed Steinmuller's contributions, on the other hand, focus on the more and better jobs and competitiveness aspects of the Lisbon goals. In particular, they look at the role of ICTs in innovation – a key factor for economic growth and job creation – by discussing the ways in which knowledge is created and shared in communities of practice (CoPs).

Ed Steinmuller's paper begins with a discussion of knowledge generation and exchange, the central feature of the knowledge society. When discussing social capital, he focuses on the interpersonal and

organisational linkages that are key in the generation, exchange and use of knowledge. This focus allows for the inclusion of the term community of practice in the discussion, a useful idea for engaging with the structure and performance of human associations related to knowledge and learning. This term highlights the specific role of social networks of practitioners in the exchange of knowledge. By using this term, therefore, he is able to (a) focus on how networks are formed and maintained and examine their role in the exchange of knowledge and (b) observe the relationship between such networks and ICTs, economic performance and the globalisation and localisation of knowledge creation and exchange.

Steimuller's contribution touches upon the issue of clusters, centring on the notion that an important determinant of existing intra-regional differences within the EU is the effectiveness of CoPs, which are relatively localised social structures (meaning that members are located in proximity to one another). For example, a key factor in CoPs is the existence of trust among members, which often requires frequent face-to-face contact in order to be established. The degree to which computer-mediated communication can replace this contact and lead to the construction and/or maintenance of trust in a CoP, therefore, becomes an interesting point for debate.

Paul Duguid's paper also addressed the production and circulation of knowledge (key to any discussion on innovation), exploring the different perspectives on this issue provided by the literature on social capital and communities of practice. It also covered the issue of intellectual property at length, yet this topic did not spark extensive discussion during the workshop.

The paper defends the notion of tacit knowledge in innovation and looks at the epistemic and ethical dimensions of knowledge, seeking to explain when knowledge 'sticks' and when it 'leaks'. ICTs, in this regard, can facilitate the leakiness of knowledge, but they cannot overcome its stickiness (here is where the distinction between tacit and dis-embedded knowledge is relevant). Tacit knowledge, that which cannot simply be disseminated by ICTs alone, is embodied in practice. This is why ICTs should be designed with practice in mind.

To sum up, Duguid's contribution argues that, in seeking to promote innovation and communication, the focus should not be placed on information and knowledge per se, but rather on social practice and the communities and networks that form around it.

Structure of the report

The following is a thematic summary of the issues that emerged from the discussion on ICTs and social capital during the workshop. The ideas presented here are not accredited to anyone in particular, but rather are taken as the collective product of a stimulating discussion. The only people who are (occasionally) quoted are the authors of the three papers that were presented, as some of the ideas are contained in the papers or were referred to during their presentation.

This document is structured as follows:

- The first section provides an overview of the relationship between social capital and ICTs, stressing the growing importance of ICTs and the need to focus specifically on the use of ICTs.
- The second section discusses some issues that emerge when examining the relationship between social capital and ICTs, such as empowerment and balkanisation theses. It also introduces the notion of networked social capital.
- The third section emphasises the need to focus on the opportunities afforded by ICT use instead of simply looking at access to ICTs. It also discusses the 'death of distance' argument and raises the importance of the region as a level of economic analysis.
- Section four addresses the relationship between social capital and CoPs, ending with a discussion of knowledge transfer across CoPs.
- Section five presents some key messages to policy-makers.
- Finally, section six looks at some research questions which emanate from the present document.
- Annex 1 of the report lists the people that have participated in the workshop. Annex 2 contains the workshop agenda. Full versions of the background papers are included in Annex 3.

1. The role of ICTs: more than just tools

In examining the relationship between social capital and ICTs, the predominant view that emerged during the workshop was that ICTs should not be considered simply as tools that make conventional life easier. Rather, they are increasingly becoming an integral part of people's everyday lives and of organisations (whether profit-seeking or not). Moreover, they are transformative, giving rise to new ways of living and organising which would not exist without them. A prospective glimpse suggests that this trend will only increase.

It is believed that we are today just at the beginning of social change enabled by ICTs. The Internet is still in its infancy, just as television was in the 1960's. Moreover, interactive and online channels of communications are not restricted to fixed PC's, but rather are increasingly available through other, often more mobile, devices. As a result, the realisation of potential of ICT-enabled change is just beginning.

For example, the majority of civil society organisations resort to ICTs today in one way or another. However, it would be short-sighted to understand the use of ICTs as merely enhancing existing activities. In the long run, the use of ICTs can bring along fundamental changes to civil society and, therefore, social capital. In fact, we are already witnessing new emerging forms of civil society organisations that would simply not exist without ICTs (see Frissen in this volume).

Acknowledging the embeddedness of ICTs

A strong theme that emerged during the workshop was that ICTs should not be considered as entities in themselves, existing on a separate plane and somehow independent from the individuals and/or organisations who use them (as suggested by the use of phrases such as 'social capital and ICTs'). To think of ICTs as 'things' which might have an impact or an effect on society, organisations and people is to revert to a technological deterministic approach and to deny that developing, taking up or appropriating ICTs are themselves social processes.

Numerous studies have argued rightfully that technological development, diffusion and use do not happen independently of society. On the contrary, technological innovation is a complex process whereby social, economic, political, and technological factors and actors shape each other. It is this shaping process that causes technological innovations to succeed or fail. The case of e-voting, and particularly the trust and transparency that it requires, was mentioned as an illustrative example during the workshop. Such a practice, which might be acceptable in some EU Member States, might face tough resistance in others.

Taking into consideration the embeddedness of ICTs is one of the core components of the recently established vision on the future of ISTs in Europe, i.e. Ambient Intelligence (AmI). It is a vision whereby computing power and devices become invisible. Humans will be surrounded by intelligent interfaces supported by computing and networking technology that is everywhere, embedded in everyday objects such as furniture, clothes, vehicles, roads and smart materials. It is argued by the ISTAG (Information Society Advisory Group to the EU IST programme), that AmI research should enhance human capability by taking into account the everyday context and environment people and organisations are living in. Therefore, ISTAG identifies the need for IST research to develop new forms of experience design and prototyping, called Experience and Application Research Centres (EARC). These should involve social, cultural and psychological research and require that pilot interactions, interfaces and conceptual maps are undertaken across different cultures or cultural groups in Europe.[1]

1 See www.cordis.lu/ist/istag.htmwww.istag, in particular ftp://ftp.cordis.lu/pub/ist/docs/istag-wg1-final_en.pdf and ftp://ftp.cordis.lu/pub/ist/docs/istag-ist2003_draft_consolidated_report.pdf.

EARCs were not explicitly raised during the workshop but the view that the focus of attention should not be exclusively on ICTs in themselves and on their effects or impacts, but rather on how and why they are (or are not) being used, goes along the same lines. A consequence of such an approach is that ICTs and social capital are not regarded as two separate 'things' which might impact on each other. Rather, the technologies should be seen as embedded, integrated and interrelated with social capital. The uptake of ICTs may result in changes in social capital, but social capital will mutually influence if and how these technologies are taken up and incorporated into everyday life.

Such a perspective is also particularly relevant when thinking about the economic impact of ICT use. On their own, ICTs will not improve productivity, increase economic growth or create more and better jobs. Rather, they have to be embedded in everyday use, particularly organisational practice. Organisations will only reap the rewards of ICTs if they make the appropriate structural changes which facilitate ICT use and maximise its benefits.

2. The relationship between ICT use and social capital

In considering this two-way relationship between social capital and ICTs, the predominant view is that high levels of social capital have a positive influence on ICT appropriation. However, the inverted causal effect also seems true: ICT use may lead to a strengthening of social capital through the creation of virtual communities and on-line forms of civil society (see Frissen paper).

Two examples serve to illustrate this two-way relationship. The first involves Internet cafés as a meeting place for beginners. These can be inter-generational social spaces open to everyone, and emerge as adequate places for acquiring ICT skills. What is particularly helpful to beginners is the social network of skills and experience that is available in the Internet café, which guides them through the familiarisation process. Such a network is a source of social capital one can draw upon.

The second example regards networked breakers yards (or junkyards) in the US. The people in charge of running these sites, while not particularly sophisticated or necessarily highly educated, set up a system of exchanging information on the used car parts they had available on the Internet. Other breakers yard managers could therefore easily see what material was available in other sites. A network was thus formed which enriched the social capital of these managers, and this was made possible by ICTs.

Bridging and bonding

In thinking about the relationship between social capital and ICTs, a key issue to consider is whether the use of ICTs (particularly the Internet) contributes to an increasingly fragmented and individualised civil society, characterised by lower voter turnout and lower participation in government, or whether, on the contrary, it is the catalyst for a 'new' civil society. That is, does the use of ICTs lead to a 'balkanisation' of public interest, or is it empowering?

A related question hinges on the distinction between bridging and bonding social capital, as discussed by Putnam and Burt. Bridging social capital is defined as bonds of connectedness that are formed across diverse social groups, while bonding social capital cements only homogenous groups – such as family, friends or colleagues – often to the deliberate exclusion of others. The question emerges: if the increasing use of ICTs has an effect on social capital, does it primarily affect bonding or bridging social capital?

The evidence suggests that ICTs are empowering for both bridging and bonding social capital. However Frissen (in this volume) believes that they are much more active in bonding social capital – that is, they mainly play a role in enforcing interconnections among people with shared interests rather than connecting people from different communities with different worldviews. Consequently, they may lead people to become self-referential and concentrate too much on their existing close networks, to the neglect of the larger community or national concerns (this phenomenon might also be characterised as 'blinding' social capital). To that extent, the use of ICTs can be said to lead to the balkanisation of public interest.

However, there is also (arguably stronger) evidence in the Netherlands that supports the empowerment thesis (i.e. the use of ICTs is playing an active role in stimulating civic participation). However, the nature of this participation is changing. For one thing, the focus is on particular issues, not ideology or other meta-narratives. The case of the on-line community set up in Vollendam, concerned with a local issue or project (see Frissen in the Annex to this report), is a case in point.

Also, there is greater emphasis on communities of interest than on communities of birth in modern societies. That is, people associate with others who share common interests, and not necessarily with members of the community into which they were born. It is a characteristic of ICT-mediated interaction

that people have the chance to select their identity by choosing which of their interests to pursue – in this sense, individuals enjoy an unprecedented amount of individual sovereignty. In principle, this opportunity is a liberating experience, for it allows people to present themselves and participate in different milieus. However, taking part in too many of these communities of choice might lead to the so-called 'multiple community disorder'.

Moreover, this ICT-mediated interaction in different communities does not require participants to commit to ideas or projects which they might not be entirely in agreement with (unlike, for example, participation in labour unions, where workers yield to the will of the majority). The challenge that lies ahead, therefore, is to find ways of ensuring 'sticky' participation through ICTs. The BBC's iCan initiative is cited as an interesting initiative which seeks to achieve such participation (http://www.bbc.co.uk/dna/ican/).

Transformations and representative democracy

The prevalence of ICTs in modern societies and their widespread use is bringing about changes in civil society. In particular, there is an increasing trend towards individualised and informal forms of ICT-enabled civil society at the expense of collective and formal ways of civic participation. In the future, when ambient intelligence (or ubiquitous computing) pervades everyday life and when ICT devices become ever more mobile and portable, PC platforms will not necessarily be the main way of getting connected. Will it be possible, therefore, to align the individual and the collective when 'the person becomes the portal'? In particular, will it be possible to (a) encourage a shift from informal, individual participation towards formal and collective engagement or will (b) formal, collective civil society need to transform itself in the face of largely informal and individualised participation?

These questions invite a discussion on existing and new forms of civic participation and the way formalized institutions are (or are not) responding to new challenges. If there is a deficit in civic participation today, does it mean that the individual has to be transferred to the collective or rather that the formal needs to adapt itself to the informal? It is a question that touches upon the foundations of representative democracy and the role of civil society. It also opens up the issue of where to find the reasons for a deficit: at the individual level, the collective level or in the relationship between both?

Ambivalent, networked, social capital

In the light of the potential of ICTs to shape aspects of social capital in the future, *networked social capital* emerges as a useful term. Such a notion emphasises that certain aspects of social capital in contemporary society are specifically enabled (or constrained) by ICTs. For example, the existence of virtual communities or the ability to maintain regular contact with dispersed family members or friends are possible because of the existence of ICTs.

Given the already broad nature of a term such as social capital, the notion of *networked* social capital would give room for discussions on the implications (for social capital, well-being and employment) of living in an increasingly networked society. Moreover, in the future the reliance on ICTs will only increase, making the notion of networked social capital more relevant.

It is necessary, however, to examine the social consequences of ICT use with attention, for it can potentially contribute to noble or ignoble causes. They may offer opportunities for integration into a cohesive society, but they may also pose threats to it.

For example, Europe is characterised by diversity, with a great number of diasporic communities in EU member states, including communities from accession countries. ICTs allow these communities to reconnect with friends and family members in their countries of origin. Moreover, ICTs play a role in the increasing mediatisation of these cultures: they offer the opportunity for self-representation and for challenging the stereotypes held by members of the mainstream culture (witness the example of Magreb.nl in Frissen's paper). On the other hand, ICTs can be utilised as a platform by illegal and extremist groups (such as cyber-terrorists) who would otherwise not have the opportunity to associate or propagate their views.

3. Opportunities afforded by ICT use

Given the possibilities and opportunities afforded by ICT use, the disadvantages faced by those who have no access to them is a major (if not *the* major) concern from a policy perspective.

However, an alternative way of approaching the digital divide was discussed in the workshop. While it was acknowledged that unequal and differentiated access to ICTs is still important, it was felt that there was an urgent need to look beyond access and penetration rates and observe what would happen if people had access to ICTs. In this vein, the relevant question is: what are the opportunities that access to ICTs offers? This kind of knowledge is necessary to determine the empowering potential of ICT use, which would in turn affect the level of priority given to ICTs in policy circles.

Another point that was raised with regard to the digital divide was that, in the long run, the digital form of education might result in a second class education if some only have digital access but others have both digital and material access to educational institutions. That is, while it is encouraging to think that greater access to ICTs will lead to more people having access to education, those with access to privileged and 'real' institutions will continue to enjoy a first class education (as they do now). In this regard, the challenge for policy-makers will lie in finding innovative ways of providing high quality education in 'blended learning' environments.

Challenging the notion of space for IST innovation

One of the main impacts of ICTs has been to challenge the traditional conceptions of time and space as they apply to social, economic and political processes. In particular, instant access to information, the ability to communicate cheaply across continents and the possibility of working without a fixed location have been taken as indications that 'distance is dead'. A consequence of this impact of ICTs, as noted earlier, is that dispersed communities have the opportunity to reconnect.

However, for all the attention given to the virtual world, there is a physical dimension too, which should not be entirely neglected – ICTs cannot be seen as completely independent of space. In particular, the links between social capital, ICTs and local contexts are inextricably intertwined.

This emphasis on socio-economic environments is particularly relevant for job creation. The question whether the local dimension is relevant or not has implications for employment policy, which can assume that labour is geographically sticky or mobile. The denial of the death of distance, therefore, implies a recognition of the *region* or *district* as the focus of attention (sometimes polemically referred to as the 'meso-economic' level of analysis).

A key research question from a policy perspective, therefore, is: what does the resilience of these regions (or, as relates to ICT development, *technopoles* or *clusters*) in the networked age tell us about the role of social capital in innovation and production? Answering this question requires exploring previous attempts at setting up such technopoles and analysing not only successes, but also failures. Another option is to look at successful clusters which suddenly collapsed (the example of Cleveland, Ohio was cited). It is important, however, that this should take place in a European context, and that US models (e.g. Silicon Valley) should not be hastily and unquestioningly imitated.

One the one hand, the fact that the region is still relevant as a level of economic analysis can be attributed to technological shortcomings. For example, technologies are, at present, not *stable* enough for teleworkers and SMEs to neglect the spatial dimension – though stable technologies may not, of course, be the only problem. For example, the continuous stream of innovations in open source software brings complications for SMEs and teleworkers, who may face problems installing

and configurating updates. Technological change is constant, and often ordinary workers or single entrepreneurs do not have the capacity, or the time, to absorb these new changes. Moreover, in accession countries, while mobile communications are significantly widespread, the quality and extent of fixed telephone connections lags behind. As a result, teleworkers and SMEs must still rely on a physical space (though not all of the time) for operating reliably.

However, there is also something particular which is offered by face-to-face encounters, and which cannot be supplanted by (current-day) technology. Physical encounters take place in local contexts and have an effect on the way social capital is built and on the way in which technological innovations take place. Conversely, social capital and ICTs will affect the development of local regions in different ways. To sum up, a geographical agglomeration is both relevant and unique. It offers something which technology on its own cannot provide. Moreover, attempts to reproduce such contexts (as shown by Castells and Hall's work on technopoles) will inevitably fail unless they take into account the particular historical and contextual factors which have allowed them to develop.

4. Social capital and communities of practice

Communities of practice (CoPs) were the focus of much attention during the workshop, particularly following the presentations of Paul Duguid and Ed Steinmuller. This term is relevant in the discussion on social capital because to the extent that a CoP contains resources such as trust among members and a stock of shared knowledge and norms, it is a source of social capital. Knowing more about CoPs, therefore, means learning more about particular aspects of social capital.

However, the term CoP also refers to something slightly more tangible than social capital. It describes a group of people who share a certain practice and who are able and willing to exchange knowledge. Two individuals might share a certain network of acquaintances (they might even bowl together!), yet this interconnectedness is not enough to guarantee that they will be willing and able to exchange information that is relevant to their work. According to CoP theory, knowledge will be shared subject to epistemic and ethical commitments – the *can/can't* and *will/won't* dichotomies (see Duguid in the Annex to this report). Such clarifications, which are part of CoP theory, are not necessarily made clear or specifically outlined in social capital theory.

The difference between social capital and CoP might be framed under the broader academic dichotomy between so-called 'lumpers' and 'splitters'. Lumpers attempt to collapse a variety of issues under a single rubric (like Putnam does with social capital), while splitters seek to find differences and distinctions.

Some of the arguments surrounding the debate on social capital, however, also emerge when discussing CoPs. For example, it would be wrong to suggest that CoPs are necessarily 'warm and fuzzy' phenomena. A community of heroin users, for example, qualifies as a CoP (so did Stalin's team of executioners, for that matter). By the same token, relationships *within* CoP are not always harmonious. Often they are conflict-ridden and are plagued with internal tensions. People are constructing and co-ordinating their social identity, which can lead to vicious internal battles. To sum up, while social capital and CoP are notions that have generated a certain amount of enthusiasm among academic circles and are slowly permeating the European policy-making arena, it would be misleading to develop a romantic and idealised view of them.

Finally, however, there is a pragmatic argument for giving preference to the social capital terminology, namely that the terminology is well suited for policy-making. As with any form of capital, social capital should offer a return on investment. Investing in social capital, therefore, can be justified as a sensible initiative, for it should bring about beneficial public and private results (in the form of greater cohesion, collaboration or innovation, for example). It is key, however, to reach an agreed, concrete definition of what constitutes social capital, as policy-makers need to have a good grasp of the phenomenon which they are seeking to promote. Moreover, such an agreed definition could lead to the elaboration of appropriate indicators to measure social capital, which would be (ideally) standardised across Member States and possibly other nations such as Japan and the US.

Transferring knowledge

Finally, in order to achieve the Lisbon objectives (particularly the part about more and better jobs), the value of building connections across communities of practice was highlighted. However, the transfer of knowledge from one CoP to another is an extraordinarily complex matter. Knowledge is codified into particular representations, which are interpreted differently in different CoPs. A CoP will know the limitations of a particular representation, but other CoPs may make different interpretations, without knowing

about limitations. Therefore, representations on their own are not enough to share knowledge.

In this light, the importance of human facilitators should be stressed – more human participation and more human translators are required. Movement of knowledge can be enabled by ICT, but the need for bridges reflects social rather than technological gulfs, so technologies alone are unlikely to work. The human element is important, and this is not always recognised.

Moreover, bridging between CoPs is particularly complex given that all CoPs have emergent practice, and no one has precedence over the others. If one CoP is considered to be in charge of innovating and the others as following, it is easier for information to be translated. However, this hierarchical dimension is gradually being eroded.

In this regard, 'boundary objects' or 'social interfaces' – as specific sites and artefacts where different CoP interact – are key for bridging the considerable gap in understanding between CoPs and allowing knowledge to flow between them. Stable and effective interface design is therefore required (take, for example, the interface of a car, which joins engineers and drivers). It is a formidable challenge, which often does not receive the attention it deserves. ICTs can help meet this challenge, but are unlikely to overcome it on their own.

Finally, in transferring knowledge across CoP, the process of reverse engineering (taking a finished product and deciphering the technology required to produce it) has been successful. The example of the Japanese semi-conductor industry was mentioned. How did it become so competitive? The Japanese resorted to 'creative imitation'. In this process of imitation, they innovated and learned to innovate.

5. Key messages to policy makers

From a policy perspective, the overarching view, expressed in the workshop, was that the 'old hierarchical model' or 'planning paradigm' of policy making is shifting. In an inherently uncertain world, the management of risk poses new challenges. An alternative approach is required which avoids mono-causal explanations and embraces complexity and diversity.

Aside from this general notion, several specific messages for policy-makers emerged, which can be categorised under the following headings:

ICT specific messages

- Promote experimental policy set-ups relating to ICT use
- Fight exclusion in the Information Society
- Highlight the value of social capital for IST innovation
- Support the creation and maintenance of networks in society
- Support bridging between networks in society

General policy messages

- Incentivize practice and support CoPs
- Formulate European values
- Support research

ICT specific messages

Promote experimental policy set-ups relating to ICT use[2]

- Given the importance of situational factors in the relationship between social capital and ICTs, more experimental policy set-ups should be encouraged. Creating competitions and offering prizes is a way of achieving this objective.
- Policy experimentation should be based on good practice. A central databank on how social capital can be best managed could be created.
- Within companies, barriers to information sharing should be eliminated and innovative practice should be stimulated. However, in order for companies to experiment with new methods of work, the related risk factors should be mitigated.
- The case of the built environment in relation to ambient intelligence is an interesting example to consider. Environmental psychological research has shown that there is a relationship between the built environment and the way in which we relate to one another. The design of streets and buildings goes a long way in explaining why some neighbourhoods enjoy high levels of social capital and others do not. For example, semi-private spaces where neighbours can meet in relative safety and seclusion from the outside world are the breeding ground for social capital among neighbours. Can ambient intelligence help provide such a space or at least offer the benefits of such a space, and therefore contribute to social capital formation? Experimental policy-set ups are required to learn about this.

Fight exclusion in the information society

- If unequal access to ICTs is shown to perpetuate inequalities in society, then encouraging the uptake of ICTs is a worthwhile policy objective[3]. However, the question of digital divides should be reformulated. Rather than

2 Experimental policy set-ups could also be linked to new forms of experience design and prototyping, the latter being identified by ISTAG as needed for advancing IST innovation (See section 1 of this report on EARCs and the embeddedness of ICTs).

3 This is acknowledged and already addressed today in European policies such as the e-Europe action plan. See http://europa.eu.int/information_society/eeurope/2005/index_en.htm.

looking at who has access to ICTs and who does not, the focus should be on the value that technology adds to people's lives. For example, can people effectively use ICTs to communicate and connect with one another? Here, the interplay and integration between physical and digital interaction is important.

- It is futile to push people into using ICTs if they do not see them as relevant to their day-to-day lives. ICTs should be an outgrowth of people's desires and needs, not an imposition. Therefore, a key policy implication is to continue implementing initiatives that highlight the opportunities afforded by ICT use, even in unsophisticated and relatively low-tech areas.
- However, policy makers should always keep in mind that digital inclusion does not imply other kinds of inclusion. Some inequalities will persist despite improvements in the digital divide.

Highlight the value of social capital for IST innovation

- Policy makers should highlight the value of a social capital perspective for supporting IST innovation.
- The social capital perspective brings back into focus the role of the 'human factor' in economic activities, which has often been neglected.
- Existing policy conceptions should be combined with social capital analysis. For example, widespread trends – such as work intensification, diminishing offer of training at work, exclusion of aging people from active life – have a significant effect on people's capacity for building and drawing on social capital.
- An agreed-upon social capital framework should lead to the development of appropriate indicators to measure social capital. Ideally, these indicators should be standardised across Member States and the US and Japan (for benchmarking). However, cultural differences across regions and nations need to be taken into account.

Support the creation and maintenance of networks in society

- Since the relationship between ICTs and social capital is not a one-way process, policy-makers need to be aware that social systems require particular technologies which are appropriate to them. A qualitative look at this relationship is required, moving from technological to social innovation, from technological options to appropriation (evolutionary design).
- The development of software for social goals, e.g. for maintaining networks in society, should be encouraged and supported.

Support bridging between networks in society

- Bridging between practices should be more acknowledged in current European policies. It is critical for innovation, and therefore deserves more support. Transfer of knowledge is a problem because knowledge is situated. Critical questions are: how to identify who should bridge with whom? How is innovative thinking diffused?
- Improving the exchange of knowledge involves: enhancing the ability to represent it and therefore facilitate its learning; supporting interconnections across different CoPs and NoPs; and developing social capabilities to shape and make use of the potential of technologies.
- The role of the 'facilitator' is key and must be recognised.
- Some key questions: Who certificates competence creation in CoPs? How can this 'learning' be institutionalised? Such informal initiatives need to be legitimised (and formalised).
- Foster 'creative imitation'; incorporate local knowledge in this process.

General policy messages

Incentivize practice and support CoPs

- Policy makers may want to learn how to build and support CoPs and networks and incentivize practice.

- From a policy perspective there is a problem: CoPs are unique and spontaneous phenomena, and therefore policy can only play a limited role in their creation. However, the existence of formal organisation is a pre-condition for CoPs to emerge spontaneously. For example, the government was heavily involved in the creation of Silicon Valley by providing, directly or indirectly, the formal structures which allowed it to emerge.
- Policy makers must be open to serendipitous outcomes and allow them to take place. In the present context, that means ensuring the conditions are set for practice to emerge spontaneously.
- Cluster failures, as well as successes, should be analysed in order to uncover the key factors involved and the implications for employment. The key question is: How can policies create incentives and opportunities for clusters?

Formulate European values

- Formulate explicitly the values for the Europe of the future. Ethics and quality of life are not compatible with the elimination of older people from active life, violence in urban centres, discrimination, work intensification, etc.
- A particularity of the EU (vis-à-vis its main competitors) is the amount of diversity and variety among its population – this is an asset to be used in policy experimentation and recommendations.

Support research

- Further research (along the lines specified in the following section) is required and policy makers may want to take an active role in supporting such research.

6. Research issues

The relationship between ICTs, social capital and the impact on job creation and social cohesion still needs to be explored further. The following are some research questions which emerged during the workshop, and which should be addressed in future research programmes.

Research on ICTs

- *Networked social capital.* What are civil society organizations doing with ICTs? How is networked social capital being shaped? When and where do social capital structures constrain or facilitate ICT uptake?
- *ICT impact on different kinds of social capital.* Do ICTs have a greater impact on bonding or bridging social capital (i.e. do they help strengthen existing ties within a community or make new ties across different communities)?
- *Usability research.* More work is needed in assessing the user friendliness of interfaces and applications in an ambient intelligence context to overcome possible exclusion problems.
- *The value of being connected.* What are, precisely, the opportunities that arise from having access to ICTs, and what does this imply for those who have no access to ICTs?
- *Intellectual property.* In light of the debate surrounding open source software: what are the costs and benefits of bringing down the intellectual property system?
- *Learning from 'older' networking tools.* Research is needed into the way in which previous ICT innovations (such as the telephone or television) were appropriated and the relationship between their use and social capital. What lessons can we learn for the future?

Research on job creation in Europe

- *Impact of social capital.* What is the evidence of the impact of social capital on jobs and job creation?
- *CoP as units of analysis.* How is knowledge in a CoP created and transferred, and how do members of a CoP view this? What are the epistemic and ethical commitments that made CoP willing and able to share information? And, conversely, how can epistemic and ethical gulfs between communities best be overcome?
- *Clusters/technopoles.* Why are some regions successful in ICT innovation and why do some fail? What can we learn about these clusters' social capital in innovation and production? What are the differences in experiences across Europe?

Annex 1: Workshop Participants

Experts

Mr Liam J. BANNON
(University of Limerick)

Mr Maarten BOTTERMAN
(RAND Europe)

Mr William DAVIES
(The Work Foundation)

Ms Sara FERLANDER
(University College of South Stockholm)

Mr James GOODMAN
(Forum for the Future)

Mr Gabor HEVES
(Regional Environment Center for Central and Eastern Europe)

Ms Marleen HUYSMAN
(Vrije Universiteit Amsterdam)

Ms Simona IAMMARINO
(SPRU, University of Sussex)

Mr Werner KORTE
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Mr Alex MacGILLIVRAY
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Mr Riel MILLER
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IPTS (DG JRC)

Bernard CLEMENTS

Jean-Claude BURGELMAN

Yves PUNIE

Ilkka TUOMI

Rene VAN BAVEL

Annex 2: Workshop Agenda

Chair: Jean-Claude Burgelman
(IPTS/JRC - ICT Unit)

DAY 1 – 3 NOVEMBER	
18.00-20.00	Introductory session
	Welcome by Bernard Clements *(IPTS/JRC – Head of ICT Unit)*
	Introduction by Robert Strauss *(Head of Knowledge Society Unit - DG EMPL)*
	Presentation of participants
21.00	Dinner

DAY 2 – 4 NOVEMBER	
09.00-09.20	*Setting the scene* by Ilkka Tuomi *(IPTS/JRC – ICT Unit).*
09.20-10.00	Discussion
10.00-10.30	*ICTs, civil society and global/local trends in civic participation* by Valerie Frissen, TNO-STB, The Netherlands
10.30-11.15	Discussion
Coffee	
11.45-12.15	*Communities of Practice and their effects on the performance and functioning of organisations* by Ed Steinmuller, SPRU, University of Sussex, UK
12.15-13.00	Discussion
Lunch	
14.30-15.00	*Incentivizing Practice. Communities of Practice, knowledge work, innovation, economic and organisational theory* by Paul Duguid, University of California, Berkeley & Copenhagen Business School
15.00-15.45	Discussion
15.45-16.45	Drawing 'generic' lessons from the cases
Coffee	
17.00-18.30	Major research and policy issues/conclusions

VENUE

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Annex 3: Background papers

ICTs, civil society and global/local trends in civic participation.

Valerie Frissen, TNO-STB, The Netherlands

Communities of Practice and their effects on the performance and functioning of organisations.

Ed Steinmuller, SPRU, University of Sussex, UK

Incentivizing Practice. Communities of Practice, knowledge work, innovation, economic and organisational theory.

Paul Duguid, University of California, Berkeley & Copenhagen Business School

ICTs, Civil Society and Global/Local trends in Civic Participation

Prof. Dr Valerie Frissen*
TNO – Strategy, Technology and Policy
With assistance of Leo Van Audenhove & Arnout Ponsioen

Paper prepared for IPTS (DG JRC) via the ESTO Network

For a Workshop on

ICTs and Social Capital in the Knowledge Society

Sevilla, Spain

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Table of Contents

1. Introduction: human capital, social capital and ICTs

"The Internet makes it necessary to redefine our understanding of what social capital is."
(Quan-Haase & Wellman, 2002) [4]

Since Lisbon and Stockholm, a major ambition of European policy is to turn Europe into the leading knowledge society in the world. Knowledge is assumed to be the main driving force for economic growth and for increasing the quality of life of European citizens. As knowledge building has now become the key concern, it is not surprising that investments in human capital are considered to be of crucial importance. The concept of human capital is particularly salient in employment policies. Human capital can be defined as the skills, knowledge and competencies that enable individuals to improve their socio-economic position and their personal wellbeing. In a knowledge society investments in human capital are seen as crucial for increasing productivity, competiveness and innovation and on a micro-level, to improve the position of individuals on the labour market and the quality of their work.

In the last decades the skills and capabilities of workers have been increasingly defined in terms of ICT-competencies. The ability to use ICTs is no longer just important for workers in the ICT-sector, but has become fundamental for the everyday working practices of virtually all European citizens. ICTs have blended into the rhythms and routines of everyday life, including work. The skills needed here are not only technical, but - more importantly – informational: skills that enable individuals to find, process and interpret information in useful ways. The conclusion that ICTs have a fundamental impact on human capital building and knowledge creation is therefore now more or less undisputed.

The importance of investments in *social capital* in order to realise the ambition of a knowledge society is less widely acknowledged. Nevertheless there is a growing awareness that human capital is built and acquired *in a social context*: within the social networks of family life, local communities, schools and the workplace, and within the networks and organisations of the civil society. It is also assumed that social networks and civic communities contribute to economic welfare by providing trust and confidence, social responsibility and individual/social welfare.

Social capital is a concept - introduced by Pierre Bourdieu – which refers to the social resources individuals can rely on to position themselves in society. Individuals are involved in all sorts of relations and social networks which provide them with the social competencies and resources which can be used to improve their socio-economic position and the quality of their lives. The American Robert Putnam (2000) has made a distinction between two forms of social capital: 'bridging social capital' refers to relationships and networks of people who are differing from each other (heterogeneous social groups), while 'bonding social capital' refers to relationships and networks of individuals, who share the same interests, backgrounds, etc. (homogeneous social groups).

Related to the concept of human capital, social capital may be defined in terms of social and communication skills. In this sense there is a clear connection between ICTs and social capital as well. In a networked society, ICTs play a key role in building and maintaining social relationships and networks. ICTs are more and more used by individuals to build, (re)shape and maintain their social networks (Wellman & Haythornthwaite, 2002; Norris, 2002), both in private and in working life. The ability to use ICTs (technical, informational and communicative skills) is therefore more and more crucial for a discussion on human capital.

4 Anabel Quan-Haase and Barry Wellman: How does the Internet Affect Social Capital? Forthcoming in Marleen Huysman and Volker Wulf, (Eds.). IT and Social Capital. Available draft on the Internet (2002) : http://www.chass.utoronto.ca/~wellman/publications/index.html.

In what sense and to what extent ICTs actually affect social networking and social capital is less clear. Quan Haase & Wellman (2002) have identified a number of different ways in which the effects of the Internet on social capital can be hypothesised:

- The Internet *transforms* social capital: The Internet provides a cheap and simple way to build relationships with others on the basis of shared interests, not hindered by the limitations of time and space. This may lead to "a major transformation in social contact and civic involvement away from local and group-based solidarities and towards more spatially-dispersed and sparsely-knit interest-based social networks".
- The Internet *diminishes* social capital: Just like television was assumed to do earlier in the media history, the Internet draws people away from real-life contacts with family and friends. Further, by facilitating global communication and involvement, it reduces interest in the local community.
- The Internet *supplements* social capital: The Internet is just another means of communication to facilitate existing social relationships and forms of civic engagement. People use the Internet to maintain existing social contacts by adding electronic contact to telephone and face-to-face contact. Further, it adds an online social dimension to existing social networks in the offline world. In this sense the Internet gives an extra impulse to existing patterns of social contact and civic involvement.

In this paper the impact of ICTs, specifically the Internet on social capital will be looked into in more detail. We shall narrow this down to the impacts of ICTs on *civic engagement:* the focus of this paper is the more or less organised social relationships and networks, usually referred to as the *civil society*.

In the literature, the impacts of ICTs on civic engagement are quite heavily disputed. On the one hand ICTs are assumed to *empower* the civil society, by giving new impulses to communication between people and leading to new ways to build a community (cf. Jones, 1996, 1998) and to shape civic engagement (cf. Norris, 2001, 2002). Furthermore, ICTs are seen as strong enablers of new virtual transnational movements, but can at the same time empower the local networks of the civil society. On the other hand ICTs are assumed to cause an impoverishment of social relationships and a decline of what used to be the community and civil society. In modern society citizens are increasingly 'bowling alone', as David Putnam (2000) has put it. This may bring about a *'balkanisation'* of the public interest: although ICTs may lead to a blossoming of all sorts of fragmented single-issue and single-interest groups, the more general public interest and social cohesion in society as a whole will be affected negatively.

The questions that are addressed in this paper are:

- What and how do ICTs contribute to civic engagement?
- What is the global/local impact of ICT-mediated forms of civic participation on social capital?
- What are the bottlenecks and major issues for future European policy?

In the next section the first two questions will be discussed on a conceptual level, while in section 3 we will present some empirical evidence that may help us to answer these questions. In the final section of the paper the last question will be addressed.

2. Setting the field: the 'networked' civil society

As described in the ESTO-request for this paper, the concept 'civil society' refers to forms of voluntary social organisation and association that lie between the private life of individuals, the state and the market: varying from local sports clubs to transnational NGOs and from both strongly organised and even institutionalised forms of civic participation to individual, fragmented and loosely organised forms of civic participation. The balancing and counter-balancing powers of civil society are considered to be of vital importance to democracy. Civil society organisations come in where governments and markets fail and where governments and markets tend to have a negative impact on the life of citizens:

- They provide the platforms for social and political engagement; for voicing public opinion and for organising political pressure;
- They are the mediating channels between citizens and the state or between consumers and the market;
- They provide alternative forms of governance and solutions to small-scale problems, for instance on a local level;
- They provide channels for the representation of cultural identities and, last but not least can be seen as the breeding ground for social capital.

2.1 Contested notions of the civil society: demarcation of the concept[5]

There has been a revival of interest in the concept of civil society in the last decades. Trends such as individualisation, deregulation and the reorganisation of the welfare state, have inspired a debate about the redefinition and division of respective responsibilities of state, market, society and individuals. The tone of this debate has been remarkably gloomy, focussing on issues such as decreasing social cohesion, the intensification of social inequality, the victory of individual interests over collective values such as solidarity, and the 'crisis in democracy'. In this debate, the concept of civil society fulfilled a special role, as the potential answer to many problems. The civil society was considered to be a place for community building, for individual autonomy, for a free public debate, for new collective responsibilities and for a renewal of democracy (Dekker, 1994). In short, the concept was useful to help solve the identity crises of both right and left.[6]

In social theory, the notion of civil society is contested as well. The socio-political changes in Eastern Europe led to a revival of the concept in social theory. According to Alexander (1998:1) 'almost single-handedly, Eastern European intellectuals introduced civil society to contemporary social theory' in the early nineties. Now the concept is widely used by academics, be it with a large variety of different meanings (Keane, 1998:23). There is no clear-cut *shared* definition of the concept, although most often the concept is defined in terms of what it is not (non-governmental, non-market, etc.), delineating it as a sphere separate from other spheres such as the state, the market and private life. The concept of civil society is fraught with normative connotations, for instance as notions of 'civilness' are an integral part of the definition of civil society.[7].

5 This section is primarily based on Audenhove et al, 2002 and Frissen & Ponsioen, 2003

6 In different contexts the meaning of the concept may quite substantially differ: in Eastern Europe, related to the strong opposition movements of the eighties, the concept has a strong anti-etatistic meaning, while in the USA it is more associated with small-scale local communities. In Europe civil society is more considered in relation to the state, and particularly interpreted in terms of the 'public sphere' (Habermas). Moreover, in the Netherlands the concept is related to the former typical socio-corporative organization of society (in 'pillars').

7 In many accounts, an analytic and normative approach to the concept are difficult to separate. How the notion of civil society is understood often depends on the specific position an author takes in a debate about how democratic balance in society, and relationships between state, market and citizens/civil society should be viewed.

In this case we consider civil society as a sphere *with relative autonomy from state and market* in which citizens, with certain values, opinions, interests and preoccupations, organise themselves and communicate with each other in order to reach social and political goals. We also demarcate it from interpersonal interactions, be it in real or virtual space, as a sense of *commonality* plays an important role in civil society. The autonomy of civil society is relative as it is interdependent with and draws much of its resources from the market and the state, and in this sense its relations with the other spheres are constantly shifting. The impact of the civil society on *democracy* is in our view that it provides the checks and balances within a system that is based on well-balanced relations between market, state and individual citizens (Frissen & Ponsioen, 2003).

2.2 Changing patterns of civic engagement and the 'virtual' civil society

With the rise of the Internet, new types of civil society organisations and associations are emerging in the virtual world and existing associations are changing as they start using ICTs to connect and to organise themselves in new ways. However, ICTs have not caused the rise of a 'new civil society', but are embedded in a set of social and political changes which are resulting in a transformation of the civil society. Over the last decades a popular assumption in debates about social and political participation has been that citizens' involvement with social issues is generally decreasing. Warning signs of this assumed trend are sagging electoral turnout, a rising anti-party sentiment, and the decay of civic organizations. This has led to predictions such as 'the crisis in democracy' or the 'disappearance of social cohesion' (Putnam). These developments are assumed to be enhanced by some of the characteristics of late modern society, such as fragmentation and individualisation. ICTs are considered to be a key factor here, either because they are seen as a threat or as a potential solution for this crisis in democracy. However, as we have argued elsewhere (Bardoel & Frissen, 1999, Frissen & Van Bockxmeer, 2001), these assumptions are not strongly warranted empirically. In her book "Democratic Phoenix: Reinventing Political Activism', Pippa Norris (2002) has compared systematic statistical evidence for electoral turnout, party membership and civic activism in countries around the world. She argues that there are good reasons to question these popular assumptions of pervasive decline:

"Not only is the obituary for older forms of political activism premature, but multiple forms of civic engagement may have emerged in modern societies to supplement traditional modes. Political participation appears to have evolved and diversified over the years, in terms of the *agencies* (collective organizations), *repertoires* (the actions commonly used for political expression), and *targets* (the political actors that participants seek to influence)".[8]

According to Norris, modernisation and rising levels of human capital are the driving forces behind these developments. As a result, contrary to the popular assumptions, civic engagement may have been *reinvented*, rather than diminished.

In the Netherlands, the government related research organisation SCP,[9] which monitors socio-cultural developments in the Netherlands for government purposes, has concluded that the level of civic participation of the Dutch has never been as high as in the last decades (SCP, 1998; 2002). According to the SCP, the only decrease in citizens' participation that can actually be observed, is a decrease in *formal* political participation (voter turnout, membership of political parties, etcetera). Civic participation includes the involvement of citizens in different types of civil society-organisations, including political ones. From this

8 This publication can be downloaded from: http://ksghome.harvard.edu/~.pnorris.shorenstein.ksg/everyvoice.htm
9 SCP stands for Sociaal-Cultureel Planbureau (Socio-Cultural Planning Agency)

angle, there is, a strong tendency towards 'active citizenship', claims the SCP, which is expressed in participation in all kinds of social movements, single-issue involvement of citizens, 'bank-account' activism (charity) and a wealth of local, small-scale citizen initiatives. Moreover, the interest in political issues has not decreased, but is growing constantly. What has, however, changed over time is the *nature* of involvement of citizens with these kind of issues and organisations. Participation is more than before based on changing individual preferences and is thus more temporary and volatile. Furthermore, participation is less rooted in face-to face-interactions between citizens and less based on formal membership. What we see here is a paradoxical combination of a tendency towards individualization on the one hand and the blooming of all kinds of social involvement and participation on the other hand. This is what we have called the 'paradox of individual commitment' (Frissen & Van Bockxmeer, 2001). In a similar way, Barry Wellman refers to this as 'networked individualism' (e.g. Wellman & Haithornthwaite, 2002:32).

A trend is also that new forms of civic engagement are increasingly *transnational*. Norris states that, in recent decades, new transnational social movements and advocacy networks are emerging which are "far more amorphous and tricky to gauge" than their predecessors of the 1960s and 1970s. The recent social movements that are concerned with issues like globalisation, human rights, and world trade are operating successfully on a transnational level and thus signal the emergence of a 'global civic society'. These new movements can be characterised by direct action strategies and a sophisticated use of the Internet. The way they organise themselves is also quite different: they are based on loose and 'fuzzy' coalitions, relatively flat organisational structures and more informal modes of belonging (no formal membership) rooted in identity politics (Norris, 2002). As a result of this process, governments face new challenges, as these new forms of civic engagement are more diverse, more fragmented, more unpredictable and – possibly – more effective in mobilising people and influencing politics.

In this context, ICTs and particularly the Internet play a crucial role. The characteristics of the Internet more or less reflect these changes in the nature of civic engagement. The Internet functions as the backbone for these new and diverse forms of connecting with others, connections which are not dependent anymore on real-life, face to-face interactions, and are much less restricted by the boundaries of time and space. The Internet can be seen as one of the platforms where the paradox of individual commitment is visibly taking place and form.

- ICTs enable the fast and efficient mobilisation of fragmented individuals around single issues and interests. The structure of the Internet corresponds with these loosely organised and decentralised forms of commitment and participation. The Internet is informal, low key, easy accessible and it creates less obligations than in the real world. The *network character* of the Internet makes it is very easy to get in touch with people with a common interest. Communities can grow and blossom without face-to-face contact and without time and place constraints. 'Meeting people' is defined fundamentally different. This also implies that *de-territorialisation* can be an effect of the Internet, as the traditional boundaries of the nation-state become less important for networking.
- Another relevant feature of the Internet is its potential to *change the relation between the supplier and user* of information. Users have more choice and are able to offer and distribute information themselves. In terms of social participation this enlarges the possibilities for bottom-up initiatives and for active participation of 'members': it implies a certain degree of *horizontalisation*.
- Furthermore, the *virtual character* of ICT offers possibilities to be anonymous or to play with ones identity: 'Real life becomes just another window', as Sherry Turkle (1995) has put this aptly. This increases the possibility of participating in groups which in real life would possibly be more closed. Another aspect of virtualisation is that it is much easier

to connect with others without the social obligations and rules of real life: this also implies that it is easier to opt out than in real life networks.

- Finally, the *multimedia-character* of the Internet increases the possibilities of cultural representation: on the Internet it is quite easy to construct 'images of oneself', by using a vast and easily accessible array of textual and audio-visual symbols. Together, these characteristics of ICT make Internet a strong 'enabling technology' for the formation and functioning of networks, communities and organisations.

3. Global and local trends in civic engagement: the impact of ICTs

The central question in this paper is: what is the impact of ICT on civic engagement - or the social capital of the civil society - both on a local and a global level? As described in the introduction, we may distinguish two opposite positions in the debate covering this question:

1. The *'empowerment' thesis*: ICT increases the social capital of the civil society (Barry Wellman and Pippa Norris can be seen as well-known advocates of this view),
2. The *'balkanisation' thesis*: ICT may increase the social capital and impact of single interest groups but also leads to a fragmentation of the public interest and thus decreases the social capital of the civil society as a whole in society. (This view is most prominently expressed by David Putnam).

What empirical evidence do we have to support or undermine these different positions? More specifically, if we take the hypotheses in mind that were formulated by Wellman, do ICTs *transform, diminish or supplement* the social capital of the civil society?

Wellman, who has done substantial research on ICT-mediated social networks, concludes that the evidence that he and his fellow researchers have gathered, suggests that the Internet is important for connecting people 'both near and far'. It is also evident that the impact of ICTs on everyday life is becoming more fundamental: ICTs are integrated now into virtually all everyday activities and practices (working, studying, entertainment, communication, etc.) and the time spent on using ICTs is still growing substantially (Wellman & Haythornthwaite, 2002: 22). Whether this affects the time people tend to spend together, and thus affects social interaction, social relationships and social engagement, is an issue that has caused much concern and debate. Wellman and Haythornthwaite have brought some of the empirical evidence in this field together and conclude that the Internet has continued a *"turn towards living in networks rather than in groups"* (ibid.33). This quite fundamental change towards a network society, already highlighted by Castells, is not a development which is exclusively the result of technological developments. Most people in modern societies do not live in one community anymore, in which they were born and which is defined by physical boundaries and traditions. Close social ties are not necessarily physically close. People tend to 'manoeuvre through multiple, specialized partial communities, giving limited commitment to each. Their life is 'glocalized'", as Wellman and Haythornthwaite put it (ibid. 32). Computer-mediated communication has become a part of *all* the relationships and networks people are involved in, instead of a separate sort of relationships.

Thus, answering the above questions, we may conclude that in *the short run,* ICTs are *adding on to* – rather than transforming or diminishing – social capital. What makes the Internet unique is its capability to support many-to-many information exchanges among geographically dispersed people. Online communities around a wide variety of topics flourish by allowing people to exchange ideas and provide social support (Wellman & Gulia, 1999). Although it helps to connect disconnected communities, it also connects and reinforces local communities, as the famous Netville study by Hampton and Wellman (2002) has shown.

In *the long run*, however, ICTs may have more fundamental impacts, in the sense that they tend to transform the nature of networking and communication behaviour. Users tend to use ICTs in unforeseen ways, which gives rise to new types of behaviour. For example, the use of SMS may lead to increased social contact because it is often used to arrange face-to-face meetings with close friends. Mobile technologies, particularly when combined with Internet technology, are used for what Rheingold (2003) has labelled *'smart mobs'*:

meetings and forms of interaction and cooperation that are organised instantly, just in time and just in place. Moreover, the unique features of the Internet will interact with existing social factors creating new, often unexpected, behaviours and relationships. Wellman refers to these more fundamental behavioural shifts related to the use of the Internet, as *'networked individualism'* or 'self-directed networking'. Individualism increasingly becomes the dominant pattern of modern behaviour. This, however, does not imply that this behaviour is a- or anti-social: on the contrary, individuals are increasingly looking for and finding connections with others based on highly individualised interests, preferences and choices. Particularly the Internet enables them to do so, to express themselves, to find and mobilise related souls and to organise these communities of interest.

A fundamental behavioural shift which we may expect in the long run, is that the 'contextual' dimension of behaviour will lose importance. Characteristics of the newer technologies, such as personalisation, portability, ubiquitous connectivity and wireless mobility, will make de-contextualised individuals the centre of community-building:

> *"It is I-alone that is reachable wherever I am. (..)The person has become the portal (..) Each person is a switchboard between ties and networks. (ibid. 34)*

In this sense the network society increasingly is a 'mosaic society' and a 'drifting society' as well. It can be expected that the impact these behavioural shifts will have, will be both positive and negative and that technologies will be used by groups with the best intentions but also with the worst intentions. On the one hand these developments may cause what we have labelled elsewhere as 'a multiple community disorder' (Frissen & De Mul, 2000) or what Putnam refers to as the 'balkanisation' of the public interest. On the other hand these shifts may lead to new forms of connectivity and collective interest-building, which may be highly beneficial to groups that before had too little social capital to organise themselves and to reach their specific goals.

In the following sections we shall analyse some of these developments on both the global and the local level in more detail, using case material as an illustration. First we shall focus on developments on the global, or transnational level, and second, some data from our own research in the Netherlands will be presented.[10]

3.1 Towards a transnational civil society?[11]

Research[12] has shown that the Internet offers civil society organisations *new means* to extend their action radius geographically, to organise themselves internationally, to build global coalitions with like-minded organisations, to mobilise beyond their own constituencies and to spread information on a global scale supporting global public spheres or - in the words of Manuel Castells - 'a global electronic agora' (e.g. Norris, 2001; 2002; Warkentin; 2000; Warkentin & Mingst, 2000; Calabrese, 1999; Anheier et. al., 2001: 6; Castells, 2001: 138). So, at first sight these findings seem to suggest strong support for the 'empowerment-thesis'.

Craig Warkentin, who has conducted a comparative study on the use of the Internet by *existing* INGOs, concludes that the Internet relates to the (global) civil society on three levels. First, its characteristics *parallel* those of

10 The case material presented here is taken from different studies which have not used the same analytical framework. Therefore the descriptions of these cases is not completely comparable: the transnational cases have focussed on organisational aspects, while the local cases have focussed on implications of ICT–use for community building and democratic participation. We shall, however, answer the same questions for all of these cases, namely what and how do ICTs contribute to civic engagement and what is the impact of ICT-mediated forms of civic participation on social capital?

11 Primarily based on Van Audenhove et al., 2002

12 To a large extent these accounts are based on rather loose experiences and observations. There is only limited research on the relation between the Internet, civil society and global civil society. The research available largely focuses on the use of the Internet by individual social movements at the national level and INGOs at the global level. It pays less attention to new virtual forms of organisation, especially at the global level.

the global civil society. Second, the Internet's inherent qualities *facilitate the development* of a global civil society's constitutive network of social relations. Third, the Internet and global civil society *reinforce* each other in an ongoing matter (Warkentin, 2001:32). Once established 'these transnational connections provide channels of opportunity that can be employed by a wider range of actors, working from various points on the political spectrum and towards sometimes contradictory political ends' (Warkentin, 2001: 174). Thus, a virtual space is created for a global civil society. In this sense ICTs mainly seem to *supplement* the social capital of the global civil society by providing new opportunity structures.

A more far-reaching impact is that, apart from the use of ICTs by *existing* organisations, the Internet also provides the possibility of creating new *virtual* civil society organisations. Through the use of Internet, loose associations of individuals and groups can organise themselves as part of a global civil society. The Internet provides the means to move away from 'communities of birth', based on physical location and traditions, towards 'communities of interest', based on shared values and ad hoc interests (Norris, 2001; Frissen et al. 2001). Manuel Castells puts it this way:

'Formal civic associations are in full decline as forms of social engagement, (…). This is not to say that people do not organize and mobilize in defence of their interests or in the affirmation of their values. But loose coalitions, semi-spontaneous mobilizations, and *ad hoc* movements of the neo-anarchist brand substitute for permanent, structured, formal organisations. Emotional movements, often triggered by a media event, or by a major crisis, seem often to be more important sources of social change than the day-to-day routine of dutiful NGOs' (Castells, 2001: 141).

Based on a set of case studies of existing and new 'virtual' civil society organisations, Frissen et al. (2001: 46) have distinguished organisations with an instrumental and an organic approach towards the use of ICTs. The instrumental approach refers to the use of the Internet as a tool in function of the working of the organisation. It does not have a substantial impact on the organisation itself neither does it transform its functioning, but it more *adds on* to these patterns. The organic approach refers to the use of the Internet as a platform on which new activities and associations can be initiated. As such it can have substantial *transforming* impact on the ways these associations are organised and operate (Frissen et al., 2001: 74) and on the *kind* of networks that are in fact constituted here.

These authors also make a distinction between late-modern and post-modern social associations. Late modern associations consist of new forms of protest, collectivity and activism. They critically reflect on modernisation and react against the strong individualisation of modern society. In political terms collective action is one of the prime objectives (Frissen et al.; 2001: 85-86). Cases 1 and 2 can be seen as examples of this type. *Post-modern* associations are rooted in and expressions of individualised lifestyles, tastes and interests, or what Wellman has called 'networked individualism'. They are characterised by an absence of traditional grounds of association, such as history, tradition, ideologies, etc. Politically the associations are geared at individual freedom and single issues, with a strong focus on identity politics (Frissen et al., 2001: 85). In terms of Internet use, particularly the post-modern associations use the Internet in an organic way. In this paper cases 3, 4 and 5 can be seen as examples of post-modern associations.

Interesting to note is that many authors suggest that the transition to the Internet and its effects on global civil society have a *democratising effect* on international governance. Pippa Norris for instance claims that:

'The transition to the Internet seems to be altering and transposing certain common ways of doing things—like lobbying, communication and organizing—thereby subtly tipping the balance of power and resources among intermediary political actors, like the shift from network TV news to their wired cousins, or from traditional international organizations like the WTO and IMF towards transnational networks' (Norris, 2001).

However, a recent IST-study on voluntary organisations in Europe has also shown that not all organisations have the financial means and professional skills to use these new technologies appropriately, e.g. in terms of communication and content development (O'Donnel, 2001) and exerting influence. Small and low-income voluntary organisations even experience problems in keeping the organisations connected ('O Donnel, 2001: 37). This underlines that we must be careful not to exaggerate the 'empowerment' potential of ICTs: it may be possible that ICTs tend to empower particularly those organisations that are already quite 'rich' in terms of social capital. This needs to be further investigated.

Qualitative case material can shed a more detailed light on the uses of ICTs within the transnational civil society, particularly on how this impacts the functioning, the ways of organising themselves and the potential to reach goals. This will enable us to answer the question whether ICTs do contribute to the 'social capital' of these organisations and whether they diminish, supplement or transform the social capital of the civil society. Two cases are presented here as illustrations of the 'new' *transnational* civil society, both being an interesting mix of online and offline strategies and activities. These two cases can both be seen as examples of the *empowering* potential of the Internet, but they do so in different ways, which will be described below.

CASE 1: Association for Progressive Communications

The Association for Progressive Communications functions as a network of networks and has been active since 1990. It can be regarded as an international non-profit umbrella organization linking 24 national or regional computer networks[13] and serving the needs of civil society organisations aiming at social change (peace, human rights, development and protection of the environment). It was established to *facilitate co-operation, information sharing, and technical interoperability among its members:* in this sense the way Internet is used is quite instrumental. Internet is approached as an 'extra service' that can be provided to empower the member organisations. APC not only promotes the development of non-commercial online spaces for and by NGOs, but also lobbies for the inclusion of the information and communication needs of civil society in telecommunication, donor and investment policy. Most APC sub-networks provide a wide range of services, including dial-up access, e-mail, computer conferencing, online databases, and website development and hosting. Furthermore, APC-services provide in-house training sessions, training sessions in the user's workplace or at conferences and workshops for activists. According to O'Brien and Clement (2000), APC has played a vital role in the introduction of ICTs into civil society.

In contrast to the next case –Indymedia- APC is characterised by a strong degree of institutionalisation. The organisation works along well-defined formalised rules and the structures are stable. Nevertheless, the organisation uses participatory decision-making procedures. The organisation has a professional staff, which takes care of the daily management and membership structures are formalised. APC also shows a high degree of virtualisation at different organisational levels. The organisation does not have local branches. In spite of the rather strong institutionalisation and professionalisation, APC does not have central offices nor has it a central physical address. Its regular staff works on a totally decentralised basis, making use of ICTs to communicate and organise. This makes the organisation an exception to many other civil society organisations that have strong virtual components, but often have a sound grounding in (some of its) local or national branches as well. Apart from its *virtual office,* APCs communication

13 Argentina, Australia, Bulgaria, Colombia, Canada, Czech Rep., Curacao, Hungary, Ecuador, Germany, Japan, Mexico, Nigeria, Nicaragua, Romania, Senegal, Slovakia, S-Africa, S-Korea, Spain, Ukraine, UK, USA, Uruguay

with members is totally virtualised as well. What is also interesting is that APCs staff, although working on a decentralised virtual basis, does represent its constituent members *in real life* in international institutions such as ICANN and the UN-ECOSOC. At the extra-organisational level the organisation thus has a strong real life component, which can assert considerable influence.

Interpersonal communication via e-mail plays an important role within the organisation, more specifically at the level of the core staff. At this level, more interactive forms of communication play an important role as well, such as an online discussion-list to organise themselves internally. This helps to support the completely decentralised and virtualised basis on which these staff members cooperate. Without the use of ICTs this would not have been possible. In its relations with member-organisations not only regular e-mail and the website, but also more interactive tools such as mailing- and discussion lists, play an important role. Especially the discussion lists provide for decentralised decision-making procedures over distance. Again, at this level, ICTs and more particularly the Internet seem to make these forms of organisation possible—or at least more easily sustainable.

This case shows that ICTs play a crucial role in enabling this organisation to work on a transnational level, and to bridge the potential barriers of distance and time that it would be confronted with without the Internet. In this sense the Internet is essential for the transnational functioning of APC, although it is not clear whether without the Internet there would have been no transnational organisation at all. ICTs both contribute to the networking abilities of the member organisations and to the collaborative working practices of the staff, who are able to organise their work in a completely virtual environment. In this sense ICTs particularly *supplement* the social capital of this organisation (and particularly IST member organisations). The next case strongly supports the thesis that some civil society organisations would not have had an impact without the Internet, and even would not have existed without the Internet.

CASE 2: INDYMEDIA[14]

The World Trade Organisation meeting in Seattle in November 1999 brought together an alliance of quite diverse activist groups, such as labour and environmental activists, consumer advocates, anticapitalists, and grassroots movements. This alliance is usually referred to as the anti-globalist movement. A remarkable feature of this alliance was that it sophisticatedly and successfully integrated the Internet into its strategies. The International Civil Society website provided – for example - hourly updates about the demonstrations in Seattle to a network of almost 700 NGOs in some 80 countries, including groups of environmentalists, students, religious groups, human rights organizations, trade unions and related movements (see Norris, 2002). The Seattle meeting (and after that other manifestations that took place during EC and G8 meetings in Gothenburg, Stockholm, Prague, Brussels and Genoa), have demonstrated the potential of the Internet for transnational activism.

Indymedia is the umbrella organisation which coordinates an organises (to a certain extent) all the web-related activities of the anti-globalist movement, particularly during an event such as an G8 meeting. Indymedia is characterised by a weak degree of institutionalisation. It is organised in a decentralised way, leaving the local and national branches in total control of their own working and processes. Leadership and professionalisation are almost absent. Decision-making and management are taken care of by collectives on the basis of democratic participatory processes. Membership is not an issue and is thus barely structured. The only cement of the organisation seems to be the progressive leftist ideology which all highly committed participants, who stem from quite diverse

14 See: http://www.indymedia.org.

activist groups, share. ICTs and more particularly the Internet play a key role in all the processes that this movement is involved in, particularly on the transnational level, but locally as well.

Taking the German 'independent media centre' (IMCs, as they are called) as exemplary for some of the local IMCs and looking at the overall international IMC Network, Indymedia can be seen as an organisation that is organised on an almost exclusively virtual basis. At all levels of the organisation, activities take place by means of mediated communication, more specifically by means of the Internet (but also mobile technologies). This is particularly the case at the international *intra-organisational* level. At this level the Internet shows its impressive potential in terms of overcoming obstacles of space and time, providing flexible and cheap tools for communication and organisation. It is highly questionable whether the radical democratic and participatory nature of the organisation would have been sustainable at the transnational level without the existence of the Internet. Activities taking place in real life are rare. In the case of Indymedia the *extra-organisational* communication is exclusively organised on a virtual basis, be it through the Internet or through other media. The organisation does not have any RL-contacts with the public, or with political or economic institutions.

Most of the uses of ICTs by Indymedia can be characterised as *organic*. On all levels Indymedia uses multi-point-to-multi-point means of communication. Mailing-lists and chat-forums form the backbone of organisational communication both at national and international intra-organisational level. The Internets' exceptional potential for interactive communication is thus fully exploited. What makes Indymedia interesting is that also the extra-organisational communication is mainly organised as multi-point-to-multi-point. The websites are based on a 'bottom up' principle. Being only slightly moderated by a small core-group that works mainly 'behind the screen' leaves ample room for interactive participation and debate. Therefore, the heart or identity of Indymedia consists of the totality of contributions made by a large community of people. The website of Indymedia is nothing more than a *virtual forum* to be used for alternative expression. By posting 'alternative' news stories or giving comments on other peoples' postings, people construct and reconstruct a 'sense of belonging' or community. The content is delivered by any person who invests time to do so. Again it is difficult to imagine how such an interactive system - providing the possibility to potentially hundreds of millions of people to become either an active sender or a less active receiver - would be feasible without the Internet.

This case shows that the Internet has indeed a strong enabling and empowering character. Iit is fair to conclude that without the Internet, Indymedia would not have existed, although this does not apply to the constituting elements of Indymedia, the quite diverse associations sharing a more or less similar ideological perspective. Those associations, however, would not have tied up together without the Internet and thus would not have had a similar impact on the global political agenda. In this sense we may conclude that ICTs not only *add on* to the social capital of the civil society (in this case they bring together quite different subgroups with different objectives and strategies: what is referred to as 'bridging social capital'), but also tend to *transform* the ways these organisations operate. They now not only have a much stronger basis to organise themselves transnationally, but also do this in quite new ways; organising themselves spontaneously around specific events (just in time, just in place) and in a very decentralised and organic way. In this sense they reflect the trend that has been pointed to by Rheingold as 'smart mobs', which he claims is characteristic for future forms of connectivity.

In the following section two other examples of quite new forms of connectivity are presented, with a local (Dutch) basis.

3.2 The local civil society

Recently we conducted several studies on the use of ICTs by Dutch civil society organisations (see

Frissen et al, 2001, Frissen & Van Bockxmeer, 2001; Frissen & Ponsioen, 2003) In one of those (Frissen & Ponsioen 2003, commissioned by the Dutch Ministry of Interior Affairs), we combined a national survey with in-depth case-studies.[15] The results of the survey showed that now almost all (96 %) of the researched Dutch organisations are online and have started using the Internet, mostly in a quite instrumental way. At this point e-mail and websites are the most popular applications. The more sophisticated applications of the Internet, such as newsletters, mailing lists, intranet, discussion fora, chat possibilities and streaming audio/video, are however, much less widely used. It seems that the interactive and multimedia potential of the Internet has until now not yet been fully discovered in practices of use. The Internet mainly serves *intra-organisational* contacts (including contacts with 'members/adherers') and contacts with other civil society organisations with similar goals. The Internet is hardly used for building relations with organisations or actors outside of the civil society, for instance in the domain of government and market. Thus, the use of ICT seems to stimulate specifically the *internal* orientation of the civil society, and particularly the internal organisation and communication (and is this sense stimulates the development of 'bonding social capital').

In our research we also conducted several in-depth case-studies of both existing and new ('virtual') civil society organisations, which provide us with interesting material to address the question whether and how ICTs contribute to the social capital of these organisations. Furthermore they enable us to reflect on the empowerment versus balkanisation thesis. Some illustrations of this case-material are presented below.

CASE 3: Mahgreb.nl

This case is an example of how the Internet is used to create an online community of interest and a platform for expressing and sharing a specific cultural identity. The 'members' of this virtual community – mainly young Moroccans who were born in the Netherlands - find it difficult to express their identity in the real-life communities they belong to.

Since the 1960s, a substantial number of people have immigrated to the Netherlands from Morocco. For several reasons the current image of the Moroccan community in the Netherlands is not very positive. To contribute to alternative ways of representing (young) Moroccans in the Netherlands, in 2000 two young Moroccan businessmen started a now very popular 'life style magazine' on the Internet called Maghreb.nl. They aim to bridge the gap between the Dutch and Moroccan community. The purpose of the website is to show the community in a positive way, to be open to other cultures and to present 'outsiders' with alternative representations of what Moroccan culture and religion is about. It especially aims at reaching young people and to enable them to express their everyday life concerns and to shape their identity. For instance the issue how to integrate the Islam into their everyday life in a Dutch Christian society, is a recurrent topic within this community. The website offers opportunities to discuss those issues relatively anonymously and in a separate space from the traditional real life-meeting places, which are more socially closed (such as the mosque or the coffee house), and not very attractive to young people who grew up in the Netherlands.

The website has several quite sophisticated multimedia and communication options and is highly interactive. It contains news and information, entertainment (games, Miss Moroccan contest, music, etc.), different types of chatting and discussion, and the advice of a 'Cyber Imam' can be sought. The site is a good example of how the Internet is used by a 'diasporic community' to integrate two different worlds and at the same time to express their own double-bind cultural identity. This case shows how in a traditional community of birth, such as the community of Moroccans

15 The particular focus of this project was: democratic implications of the uses of the internet within the Dutch civil society. The following questions were addressed: does the use of Internet lead to changes in the ways these organisations function and operate and what does this imply for their position within society? Does this lead to changes in the balancing and counter-balancing role of the civil society in democracy?

in the Netherlands, ICTs can be used to open up to the outside world and at the same time to broaden the space of the traditionally organised Moroccan real-life community. Dutch people, who normally would never enter a Moroccan teahouse for information of discussion, can now lurk or actively participate in these relatively open communities (the site focuses on young Moroccans but the language used is Dutch). The website is remarkably open and tolerant for all kinds of viewpoints and virtually no editing or moderation is taking place (which also implies that the communication and interaction is not always 'civilised'). The Internet helps to broaden the ideological and cultural perspective of the real life-community, for instance by looking at the Islam from a young people's perspective. The Internet also offers new possibilities to cope with uncertainties and to meet people in a similar situation. The Internet enables young people to ask questions which are more or less taboo in real life communities, which are experienced by them as a confusing mix of Moroccan, Islamic and western elements. Questions about religion, gender relations and sexuality are raised and answered (anonymously). All these possibilities have made this website extremely popular.

Another remarkable feature of this website is its hybrid character. There seems to be no distinction between expert-knowledge and knowledge based on personal experiences presented on this site. Both serious and light subjects are discussed - there are remarkable combinations of far-reaching intimacy and public debate. The traditional boundaries between emotional and rational content, between individual and public interests, between information and communication and between commercial, private and public messages are rather blurred. There is an intensive and vivid, social traffic on this website. As it is organised in an essentially organic way, there is much room for bottom-up diversity and pluralism. This also implies that the 'collective' is hard to define.

This case is an excellent example of the networked individualism as described by Wellman and others. The interaction taking place within this community also corresponds with what Anand Mitra (1997) in his study of the use of the Internet within the Indian diasporic community, has described as the 'centralizing and segmenting' forces of the Internet. Interestingly, these two apparently opposing forces are occurring quite unproblematically at the same time. The Internet creates a wealth of opportunities for very diverse opinions and expressions of identity and on the other hand serves as a binding or centralizing factor among people who are otherwise dispersed. In this sense it is difficult to assess whether ICTs contribute to *bonding* or *bridging* social capital: what we see here is actually both types of social capital seem to be built up by the individuals who participate in this community. We see 'bonding', in the strengthening of a specific cultural identity, which is seen as 'different' from other Moroccans and different from Dutch, or young Dutch. At the same time the website presents an opportunity for Dutch and Moroccans to meet and gain mutual understanding, which reflects the 'bridging' character of the interactions taking place. Furthermore, we may conclude that this community would probably not have existed without the Internet. ICTs both *supplement* the existing social capital of young Moroccans (by providing them with digital tools to meet and to express themselves) but also contribute to the *transformation* of the social capital of this community, a transformation which is particularly expressed in the 'hybrid' character of this virtual community, as we have described above.

CASE 4: Jongeren.Volendam.nl

New year's eve of 2001/2002 was a very sad night for the local Dutch community Volendam, a former fishing village with a catholic background which is still a quite close-knit community. In one of the local bars there was a big party for young people which ended in a tragedy when the Christmas decorations took fire. In ample time this resulted in a blazing fire, that took many lives and left many other young people heavily scarred, both physically and emotionally. As this community is quite close and closed, this disaster

was experienced as a collective trauma. Later on, when it appeared that safety regulation and control had been insufficient, the expressions of sympathy and grief to a certain degree turned into political discontent, directed towards both local and national authorities.

The website Jongeren.Volendam.nl was an initiative of a local politician, who wanted to provide a platform for young 'Volendammers' to share their feelings and to discuss local developments and politics. It also archives information and news about the fire and the events following from that fire. The website grew out to be a big success, which is remarkable as the members of this small community all know each other quite well and meet regularly face-to-face. The Internet thus seemed to provide appealing new opportunities for the traumatised young inhabitants of Volendam. The website consists of a discussion forum, a news section, several guest books, which are specifically used for expressions of grief and sympathy, for instance from victims of a similar event in Göteborg in Sweden. The discussion in the forum focuses on both the new years fire as on local politics. The main attraction of this website, however, is the intensive interaction between young people, who share their emotions and opinions here. The character of the discussions on the website is notably negative and expresses a fundamental lack of trust and confidence in local authorities. The initiator of the website uses the site for feedback on his political activities and there are indications that other local politicians do the same.

The potential of the Internet here is mainly 'voicing' feelings and opinions and strengthening social relationships among those who share a common concern. The negative image of local politics which is expressed through the website is constantly being fed and reconfirmed in the different discussions on the website. On the other hand there is no indication within these fora that participants want to do something themselves in order to change this situation. So, although in terms of *social capital* this website may have an empowering effect - as it strengthens social relationships and networks in which feelings can be shared easily and which contributes to making sense of the traumatic experiences that these young people have to cope with - in a *political* sense it is hardly empowering. The use of Internet here even seems to contribute to a shutting off of the outside world and a shift towards a (virtual) community which is even more closed and inward looking than the real-life community of Volendam. It definitely contributes to a widening of the gap between citizens and politics in this community.

This case is a good example of networked individualism as well. Moreover, this case is particularly interesting as it shows that this potential of the Internet can also be used intensively for networking on a *small scale local level* and among people who actually know each other quite well and meet regularly. In this sense the hypothesis that Internet draws people away from real-life contacts with family and friends and - by facilitating global communication and involvement - reduces interest in the local community, cannot be asserted at all. But, where in other cases we have argued that this paradoxical combination of individualism and connectivity does not imply a diminishment but more a *reinvention of civic engagement*, in this case we see that the very strong focus on *bonding* social capital within this typical community of interest seems to bring about a loss of interest in civic engagement. In contrast to the Netville case, the retreat of these young people into a virtual community, does not give an impulse to their local civil engagement, but only seems to contribute to the shaping of a collective 'victim' identity.

More generally, the impact of the Internet on Dutch civil society organisations, we have concluded elsewhere (Frissen & Ponsioen, 2003)[16] that from the perspective of the organisations themselves, the impact of the Internet is experienced as highly *positive*. Most of the civil society organisations studied by us, claim that ICTs make it easier for them to reach their goals

16 Based on both survey- and case study-material

and to cooperate with others, and that ICTs have improved the internal communication and social cohesion within the organisations. Furthermore both the communication with their own members and adherers and their visibility in the outside world are felt to have improved substantially. In this study we have distinguished the following major impacts the Internet has on the organisation, functioning and the social capital of the Dutch civil society:

1) Network building

Internet is used to build and maintain networks both at the transnational, national and the local level and both networks of people who already know each other and networks of people who do not know each other. Furthermore, in terms of Putnam, Internet serves both the building of 'bridging' and 'bonding' networks: it brings together social groups that are quite homogeneous (see for instance case 3 and 4), but also groups that show a great diversity (such as case 2).

2) Information and mobilisation of members/ adherers

The Internet is used to inform, organise and mobilise people who sympathise with the organisation. Activist organisations use the medium for virtual actions, such as e-mail petitions or server-bombings and other cyber-actions (and even cyber-attacks), but also for organising real-life actions. Indymedia is a good example of this particular surplus value of the Internet. The Internet can also be used to construct personal profiles of members, which can than be used to approach them personally and mobilise them for specific actions or voluntary activities. In some cases, where the use of the Internet is more organic, the users of information are also producers in the sense that they are invited to bring in their own information, which enables decentralisation and horizontalisation of the organisation.

3) Public relations

Many civil society organisations have the feeling that their visibility in the outside world has grown, as they now have access to a very easy-to-use instrument to promote themselves. Some of our cases – such as Indymedia - show how effective these organisations are in applying a mix of media and ICT-instruments for public relations; specifically the larger environmental and activist movements show a high degree of professionalisation in this respect. Norris (2002) describes Greenpeace as a good example of this strategy and in our own study the Dutch animal rights organisation Wakker Dier is an excellent example of this. These organisations use the Internet as an integral part of a sophisticated multimedia-strategy, in which all media refer to each other and in which the respective strong elements of each medium are used in a quite smart way.

4) Access to and transparency of information

Internet enables organisations to publish independent information or organise information in such a way that it is highly accessible and transparent for specific targeted groups. Internet provides these organisations with their own channels of information and communication and thus makes them less dependent on regular media. The case Jongeren.Volendam.nl shows, for instance, how the Internet enables this very specific group to collect and store information from differing sources and bring this together in a complete and detailed archive, which is highly relevant for this particular group of people, and which can be permanently actualised. In another case, described in our study, government information (jurisdiction on welfare laws) which is now difficult to access for welfare-clients, was published on a website and made 'searchable', in order to empower the target group in their contacts with government officials.

Summarising, we may conclude that the Internet is experienced within the Dutch civil society as having a clear empowerment potential. Positive effects on many organisational and instrumental aspects and on the potential to network and communicate are acknowledged by almost all of the organisations in our study. There are strong indications that Internet improves the independence of these organisations, improves the possibilities to

represent themselves and to express their identities, improves the possibilities to inform others and to be informed themselves, enlarges the range of activist strategies and increases the possibilities for political pressure. There are almost no reported negative impacts, although the time-consuming character of Internet-communication is an issue here: particularly e-mail leads to an intensification of communication patterns, which is not always a benefit.

Regarding the 'balkanisation thesis': in our study we have noted a tendency that the civil society is becoming more introvert. As it is increasingly easy to *bond* through the Internet with others on the basis of (sometimes extremely) specialized interests, it is also increasingly easier to shut off the rest of the world, which may cause a high degree of fragmentation of the 'public interest' and a diminishment of social cohesion. Whether this is a serious problem (which can be labelled as 'balkanisation' or a 'multiple community disorder'), or whether we must see this primarily as a transformation or *reinvention* of civic engagement, is hard to assess. To a certain degree multiple personality disorder, is the only useful strategy for patients suffering from this disorder to cope with their everyday life. In the same vein, multiple community disorder may be the best fitting strategy to cope with the complexities and uncertainties of late modernity. In both cases, the creative and empowering potential of these strategies is at least remarkable. To really answer these questions, longitudinal research is needed, which focuses on the macro-societal impacts of these transformations in the civil society.

4. Discussion: implications for policy

Although we ended the former section with an unanswered question, in terms of policy the issue of the impact on *social cohesion* is of course very important and needs to be monitored and assessed in a much more systematic way than this is done now.

The issues discussed in this paper fit in with the EC-agenda of an **inclusive information society**. This paper has clearly shown that a *low* level of civic engagement is not the issue here at all. On the contrary, we have concluded that ICTs do not cause a diminishment of social capital, but in many cases supplement and strengthen the social capital of the civil society. For IST-policy this implies that there are many starting points within the civil society which may be addressed by policy makers in order to improve the inclusion and participation of citizens in policy and decision making processes. The main policy focus here should not be to stimulate citizens to use ICTs for these purposes (they are already doing this) or or to help them to develop skills to use ICTs (as they already are quite skilled), but for policy makers to develop a greater awareness and sensitivity towards the blossoming networks of the civil society in order to address them more appropriately.

In our view the interesting policy challenges are particularly within what we have depicted as the *transformation* or *reinvention* of social capital within the civil society. What we see here is that citizens have started using the Internet to build new types of social relationships and networks. More fundamentally, in the long run this may bring about new kinds of behaviour such as networked individualism and de-contextualized interaction (or 'smart mobbing' as it is called by Rheingold), as described in this paper. Although it may be too early to assess the societal implications of these new behaviours, it is very important to envision what these changes may imply in the long run. The European Commission (ISTAG), has formulated a vision on **Ambient Intelligence** (IPTS, 2001), based on scenario's which also reflect some of these long term behaviourial shifts, although the starting point for these scenario's lies more within the technological changes involved with ambient intelligence. In these scenario's people are surrounded by intelligent intuitive interfaces, which are capable of recognising and interacting with different individuals. These developments will take the trend towards *de-contextualised, networked individualism* even further. If this vision of ubiquitous technology, melted together with the everyday life routines and rhythms of European citizens in a seamless and unobtrusive way, is to be realised, which seems to be the ambition of the EC, we need to know how this vision will translate into future behaviour. In this case, we need to know what these future developments imply for social capital, civic engagement and the local and global civil society, which will in turn impact the democratic balance between state, market and civil society.

When the 'person becomes the portal' and this person will, moreover, be increasingly de-contextualised, this imposes quite challenging policy questions and issues, such as:

- If the 'public interest' is a major policy concern, as it has always been, how do we find ways to define and serve the public interest in this highly individualised context? What does this mean for the current representative democratic system, which is not at all based on these individualised patterns of behaviour?
- How can we ensure trust and confidence in the increasingly complicated and fragmented relationships between government and its citizens?
- If citizens' engagement is increasingly virtualised, what does this imply for exerting control over what happens within these networks?

More specifically, the EC-agenda for a **knowledge society** focuses on the impact of ICT on human capital building and knowledge creation. In the introduction we argued that there is a growing awareness that human capital is built and acquired *in a social context*: within the social networks of for instance the civil society. It is also assumed that social networks and civic communities have the potential to *empower* people, as they offer a context in which social resources can be built up and applied in order to reach certain goals. The former section of this paper ended with the conclusion that the empowerment potential of ICTs is indeed impressive and the impact on the social capital of these organisations is generally quite positive. ICTs are now more and more frequently and effectively used by civil society organisations. The take up of ICTs within the civil society is relatively unproblematic and thus does not foster an urgent need for policy to invest heavily in the building up of social capital through ICTs. What is of some concern here, is that software should be open and 'social' enough to ensure that citizens can use them in such a way that it contributes to their social capital and that it is accessible to all (an argument which is for instance hammered on by the open source movement).

Again, the more challenging issues here are how the new types of behaviour and engagement signalled here, may impact *what it is that constitutes 'human capital' or 'knowledge'*. In our view these issues need serious reconsideration, based on good prospective thinking. What are the future skills I need to move around in an increasingly de-contextualised networked society and to do this in such a way that this will improve my position as a European citizen? The ISTAG-scenario's provide some clues how to envision these new skills and learning practices: a focus on distant and social learning practices for instance and a certain degree of co-production of learning material. Other very challenging issues that are involved here are: how to integrate all the different cultural backgrounds, learning styles and languages of people in the mosaic society into a collective learning process? This is for instance taken up by Shell - which evidently has to operate on a global level - in its strategy on 'blended learning'. But, even more fundamentally, what is needed here is a vision on what 'knowledge' in the term 'knowledge society' actually means. The case study of Maghreb.nl presented in this paper, shows how the boundaries between expert knowledge and 'lay' knowledge, between private and public information, between the rational and the emotional or experiential level become increasingly blurred, which seems to be a typical feature of many of the networks of the civil society. Although this is just an example, it may point to new ways of processing information and building up knowledge, which will become more and more important in order to move around easily in the network society. If we want to realise a knowledge society, we cannot afford to neglect these fundamental challenges.

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Communities of Practice and their effects on performance and functioning of organisations

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Table of Contents

Introduction

The processes of knowledge generation and exchange are now recognised as a central feature in modern economies and a primary source of economic and employment growth as well as competitive strength. It is increasingly difficult to identify economic activities that involve 'ordinary' or 'routine' production, i.e. that are unaffected by the prospect of significant product or process innovation or in which the application of knowledge has remained constant in recent memory. These developments have led to a burgeoning literature on knowledge-based economies.[17] A central feature of this literature is the assumption that the greater application and relevance of knowledge, not only of science and technology but also of new methods of organisation and management, provides new possibilities for improving productivity and for reaping increasing returns in different spheres of economic activity.[18] Ideas about knowledge-based economies have co-evolved with studies of the effects of information and communication technologies (ICTs) on growth, productivity, employment, and organisation. The conclusions that follow from these two lines of analysis are cautiously optimistic regarding the returns that may be gained from public and private investment in knowledge creation and distribution.[19] They also provide a new rationale for raising the level of these investments.

Translating the processes of knowledge generation and exchange into improvements in economic performance and employment is, however, a complex social processes – even the most brilliant and original idea will languish without an extensive process of development engaging hundred or thousands of individuals in refining, adapting, and commercialising the idea for the market as well as supporting the products and services that result from the application of the idea. International differences in the capabilities to perform these functions are one of the sources of differences in the long-term economic growth of advanced economies – which in these economies is defined by the ability to 'forge ahead' in output and productivity growth.[20] Correspondingly, the social capabilities related to knowledge (and encompassing learning within and between organisations in society) are of central importance in the ability to 'catch up,' to advance in the direction of greater productivity and competitiveness in middle income countries – those countries that have established significant industrial infrastructures.[21] The emphasis on social capabilities to generate, distribute and use knowledge does not supplant other factors that contribute to progress such as investment or institutional reform; but social capabilities are likely to be complementary with these other factors as well.

A basic problem with the recognition that social capabilities are important determinants of international differences in long-term economic growth is that there is no 'blueprint' for constructing social capabilities. For example, historical examples from virtually all of the advanced economies would suggest that a highly educated labour force that is relatively mobile is one source of social capability. In searching out opportunities for higher quality jobs in

17 See, for example, (OECD 2001). Of course, all economies, even those that are dominated by pre-industrial agriculture, are based upon knowledge. What is different is the quickening pace of change in the knowledge that is applied or that might be applicable.

18 (Romer 1986). A central assumption of this literature is that the generation and use of knowledge involves fixed costs that can be amortised through knowledge (information) re-use and distribution within and, in some cases, between organisations.

19 (Abramovitz and David 1999), (David and Foray 1995), and (David 1991).

20 (Abramovitz 1989). The traditional argument that output growth would be constrained by productivity due to the full employment of other factors of production has remained problematic for much of Europe due to persistent problems in achieving full employment of labour.

21 In the lowest-income countries which have yet to develop significant industrial infrastructures it is possible to over-emphasise the learning and knowledge nexus at the expense of more basic investments such as the construction of reliable transport and communication infrastructures or public health measures related to clean water and sanitation. While the ideas developed here are not irrelevant in these contexts, they would involve a different set of priorities and different institutions than discussed here, comprising an entirely different paper.

different organisations or regions of a country, these individuals spread knowledge between organisations and regions. In recent years, however, an important source of growth appears to be the intensive development of specific regions within countries – while it is true that labour mobility *within* these regions may be important, the value of historical example appears to be diminished. A similar problem in 'planning for social capability' is the lack of specific guidance with respect to its components and dimensions. For example, high levels of education appear to be linked to the ability to 'catch up' while no simple measure of educational attainment serves to distinguish those countries that are able to 'forge ahead' of their rivals, other advanced countries with high levels of educational attainment.

Over the past decade considerable attention has been paid to the role of the social factors in the performance of societies, in both the political and economic spheres. In the political sphere, the attention stems from concern over declining participation in voting and membership in political parties in the richer economies. In the transition economies, these political concerns are related to the complex processes of reconstructing a wide range of political and social institutions. In the economic sphere, social factors are central to continued worries within advanced economies about the competitive challenges of the new century, the specific problems discovered in the rush to liberalise within the transition economies and the renewed interest in the problems of middle-income countries (both those in transition and those overseas) in the context of globalised industrial production. Many ideas have been generated by this discussion, but one that is particularly persistent involves a re-examination of the voluntary or associational foundations of modern societies and has come to be called the 'social capital' idea.

A central idea of modern theories of 'social capital'[22] is that the capabilities of a society to achieve democratic organisation are influenced by the density and structure of social networks. Much of the early 'social capital' literature focussed on the effectiveness of the operation of civil society. The 'social capital' terminology has also been used to call attention to the role of social relationships in the definition and use of other forms of 'capital,' suggesting, along the lines suggested by Karl Marx, that neglecting the social relationships accompanying and structuring the ownership and use of capital was to omit a vitally important set of relationships.[23] As the 'social capital' idea has been taken up more broadly the distinction between social capital and social capability has blurred so that in defining 'social capital' the World Bank includes both the formal organisations comprising society as well as social networks.[24] It is important to note, however, that the literature on social capital has recognised that the social networks that might contribute positively to the functioning of civil society or the production and use of knowledge are also capable of being exclusionary and parochial, of creating divisions as well as co-operation and co-ordination.[25]

For the purposes of this paper, and in order to provoke discussion in the workshop about the scope and applicability of the social capital terminology, the focus will be on 'interpersonal and organisational linkages that directly guide or shape a society's capabilities for generating, exchanging and utilising knowledge.' This focus is fairly broad, e.g. a society's system of formal education clearly guide and shape its ability to exchange knowledge as well as the structure of its social networks, the pattern of inter-firm alliances, the nature of its formal and informal associations and so forth. It does, however, put to one side a number of larger issues such as the operation of civil society that determines the

22 (Putnam 2000), (Lin 2001) (Putnam 2002). The 'social capital' idea has been criticised by a number of others who are concerned that it distracts attention from the role of the state in economic development ((Harriss 2002), misuses the term of art 'capital' in ways that are not helpful to deeper understanding (Arrow 1999) and ignores the dysfunctional outcomes that occur when the strengthening of (exclusive) voluntary association substitutes for potentially more inclusive institutions of civil society (Durlauf 1999).

23 (Bourdieu 1986), (Bourdieu 1993)

24 http://www.worldbank.org/poverty/scapital/whatsc.htm (Accessed 23 October 2003).

25 (Portes and Landholt 1996)

funding for research or education or the structure of laws that govern what parts of knowledge may be reserved for the exclusive use of inventors.

Within the recent literature on social processes related to knowledge one of the most useful ideas to emerge for grappling with the structure and performance of human associations related to knowledge and learning is that of 'communities of practice.'[26] The usage of the term 'communities of practice' (hereafter CoP) in this paper is aimed at highlighting the specific role of **social networks of practitioners** with similar vocations or professions in aiding in the exchange of knowledge (learning), the identification of relevant skills and capabilities (referral for knowledge exchange), and the collective recognition of competence and excellence (qualification).[27] This usage, as explained in the following methodological note, differs from the usage of the terminology in the sociological literature, which focuses more explicitly on what constitutes practice and how practice is reproduced.

Methodological Note – Use of the Communities of Practice Terminology

The major purpose for devising the term 'communities of practice,' as it has been used in the sociological literature, is to understand the conditions under which situated learning occurs, a key element in the exchange of knowledge. Operating within the assumption that much of the knowledge related to practice is bound within a community of practice, the process of learning requires legitimation of participation of those not already recognised as competent practitioners. The conditions under which such participation may take place help define the social structure referred to as a community of practice. Taking this social structure as the unit of analysis the central questions concern the nature of practice and the ways in which capabilities to practice are mastered. These questions are of considerable importance, but they are not taken as central in the following paper for two reasons.

First, while the sociological literature provides clear criterion for defining communities of practice, there have been no large-scale efforts to comprehensively enumerate and classify such communities. Conclusions about the relative prevalence of specific practices and the methods of situated learning associated with them are therefore not available.

Second, the sociological literature has also produced a wide variety of other concepts including Granovetter's 'weak ties,' Bordieu's 'social and cultural capital,' and Putnam and Coleman's ideas concerning 'social capital' that are relevant to the exchange of knowledge within social networks.[28] These ideas do not assign a central role to 'practice' nor do they specifically address the reproduction of competence in practice – they do, however, identify social structures and interactions that contribute to the exchange of knowledge relevant to practice.

This produces a definitional conundrum – one may refer to the collectivity of these social connections and processes as 'social networks' in which the more precise understanding of 'communities of practice' is assigned specifically to those communities in which a well-defined process of legitimate peripheral participation occurs. However, it would be necessary to further indicate that the relevant 'social networks' of concern were ones in which the exchange of information and knowledge played a direct role *and* where the participants in the social network had access to experience relevant to practice. Instead of inventing new terminology, this paper extends the terminology 'communities of practice' to refer to embrace all of the social networks that may be relevant to practice and the gaining or improvement of competence in practice. This broader usage is not intended to deflect attention from more specific attention to communities of practice in which both 'practice' and 'practitioners' are more sharply delineated.

26 (Lave and Wenger 1991), (Brown and Duguid 1996).

27 Some writers prefer to distinguish 'professions' from 'communities of practice' and thus to omit discussion of the issue of 'qualification' which is often governed by formal regulations. However, many 'communities of practice' arise from within professional groupings and associations and are not separately identified – thus, for example, Merton noted the presence of 'invisible colleges' among scientists with formal degree qualifications and professional positions that spanned the institutions of their employment and sometimes the discipline with which they were identified.

28 See (Granovetter 1974; Granovetter 1985), (Bourdieu 1986), (Coleman 1988), (Putnam 2000)

More prosaically, CoP are formed because individuals engaged in similar pursuits often have an interest in mutual aid and interaction. CoP may be defined by the vocational practice of their participants although they often focus on narrower domains of expertise or knowledge than an entire vocation or profession. The 'communities of practice' that are considered in this paper may span the boundaries of particular work or living place social relationships that are the basis for other types of social networks.[29]

The motives for highlighting the importance of social networks of practitioners, which are termed 'communities of practice' herein, are twofold. The first is to direct attention to the changing conditions of the formation, maintenance, and cohesion of these social networks and to the roles of these social networks in aiding in the exchange and validation of knowledge related to practice. The second is to consider how these social networks are influenced by (and influence) the utilisation of information and communication technologies, economic performance at various levels of aggregation and the localisation and globalisation of knowledge creation and exchange. The analysis of these influences provides some indications of policies that might be directed at improving the cohesion and functioning of these networks. The first set of motives emerge from the discussion of the second, more specific, set of motives that provide the basis for the four themes of this paper.

First Theme: ICT and CoP

A specific reason for attention to CoP in recent years is that the new forms of computer-mediated communication involving the Internet and the World Wide Web (WWW) are providing opportunities to extend and re-combine these communities in ways that might improve their capacities. While opening up opportunities, the use of computer-mediated communication in CoP also is creating new challenges. The formation and maintenance of CoP networks has historically been closely tied to issues of interpersonal trust supported by face-to-face interaction as well as the formation of social hierarchies of expertise and specialisation. While similar social structures can be created in the 'virtual communities' made possible by the Internet and WWW, doing so requires social as well as ICT engineering. These issues are discussed in Section 2 which also takes up the problems of organisational change that are linked to the so-called 'productivity paradox' in the use of ICTs.

Second Theme: CoP Effects on Economic Performance

A second reason for recent attention to CoP is that they appear to play an important role in the competitiveness of the advanced industrialised countries. In these countries, the breadth and depth of expertise and specialisation or the 'division of knowledge-related labour' makes it possible to identify a wider range and to pursue at greater depth the issues of innovation and of the improvement of products and production methods. In effect, it is reasonable to hypothesise that the articulation of CoP is more developed in advanced industrialised countries, although there are important differences among these countries in the extent of CoP development. With the greater complexity of the social structure of CoP in these countries, however, there are also costs of 'negotiating' and 'filtering' the right connections to these networks. Thus, while it may be said that these networks reflect a higher level and greater articulation of 'social capital' than in less advanced or middle-income industrialised economies, there is also the risk of

29 As per the methodological note above, CoP are defined broadly and with less precision than in much of the literature on the topic. Much of the communities of practice literature (e.g. (Lave and Wenger 1991) or (Brown and Duguid 1996)) is based upon empirical cases involving particular workplaces in order to focus on the definition and reproduction of practice. This paper is concerned not only with these more well-specified environments, but also with larger social networks of practitioners, the ability of participants to distinguish their connection with others in a common social structure that is meant to exclude others that do not have a similar savoir faire in the area of practice. The term 'networks of practice' has been used to refer to these larger social networks, see (Brown and Duguid 2000).

over-specialisation and confusion or conflict in the mobilisation of this expertise to address specific issues. These issues are discussed in Section 3.

Third Theme: CoP Interaction with Globalisation and Localisation

Historically, CoP have been highly localised suggesting that, within Europe, the analysis of CoP would primarily be of interest to policymakers and academics within an individual Member State context. Even if this was the case, inter-country comparisons would be relevant as a means of exchanging information concerning helpful or detrimental policies. There is reason to believe, however, that CoP issues are quickly moving towards the forefront due to the pace of global economic change in which institutions for knowledge generation, exchange and use are being spread by multinational enterprise and by rapidly growing networks of enterprises engaged in collaborative knowledge-related activities. The importance of these developments is heightened in the context to enlargement where important initiatives will be required to build cohesion with the new and candidate Member States as well as extending the degree of cohesion achieved in the original 15 Member States. Finally, the re-formulation of the European RTD&D framework programmes around the 'European Research Area' concept suggests a range of practical considerations linked to CoP ideas. These issues are discussed in Section 4.

Fourth Reason/Theme: CoP and Policy

A final reason for considering CoP is suggested by the confluence of the prior three reasons –computer mediated communication offer opportunities and challenges to extend and re-configure CoP in an increasingly complex global context and to achieve a higher level of economic performance (particularly in areas related to knowledge and innovation). Are these developments self-organising or are there areas where policy intervention or assistance would lead to better outcomes? As the discussion below will reveal, the current state of understanding and evidence is simply too weak to provide definitive assurances regarding specific policies and hence the inevitable call for more research. There are, however, several principles and guidelines that appear to offer a starting point for policies supportive of CoP enhancement. If the earlier assumption that economic performance is linked to social capital is accepted, it follows that it likely to be in our societies' interests to increase the amount or improve the quality (or both) of social capital and improvements in the cohesion and articulation of CoP provide one means to achieve this aim. These ideas are considered in Section 5 below.

ICTs and CoP

Communities of practitioners have traditionally been formed through direct personal association involving relatively frequent face-to-face meetings in which interpersonal trust is forged and provides a basis for the identification and filtering of knowledge that is worth exchanging. Similar intensive inter-personal interactions have historically been central to collaborative research processes. A central question to be asked about the tools that are evolving for Internet-based collaboration is the extent to which they will change the mechanisms by which interpersonal trust is constructed in communities of practice. Traditionally, the mutual identification of individuals with similar levels of understanding of a domain of knowledge was not achieved through casual meeting or contact. Like other significant social relationships, 'trust-building' was required that involved a series of exchanges and 'tests' before a true acceptance of the 'peer' qualities of others' expertise was achieved.

Trust is an essential component in communities of practice because the most valuable contribution that these associations can provide is a reduction in the time needed to verify and validate knowledge outside of one's own personal experience. To accept someone else's understandings and conclusions, however, involves reaching a high degree of confidence that a given issue is being perceived in the same way, that the assumptions held by the other individual are compatible or at least clearly understood, that the other individual has tested or validated the knowledge in ways that are at least as rigorous as one would do for oneself, and that the domain of application over which they have gained this knowledge is similar or at least conformable to that which will govern one's own application of the knowledge.

The mechanisms for constructing trust using computer-mediated communications (hereafter CMC) are examined in the first sub-section (2.1). Regardless of the effectiveness of CMC in trust construction, CMCs have a proven role in maintaining collaborative relationships, in facilitating certain types of collaboration that would be difficult to conduct by other means, and in providing unique resources for collaborative activities. These issues are considered in the second sub-section (2.2) which highlights the contributions of scientific communities (including CoP related to software design) to the use of CMCs by CoP. The final sub-section takes up the specific challenges of 'interacting' CoP that are more characteristic of business and non-research public sector environments and highlights the significance of 'boundary objects.'

CMCs and Trust Construction

CoP, like most other human institutions, have hierarchical elements. Within them, some individuals are recognised as having greater expertise than others and the processes of gaining this recognition as well as the mechanisms by which this expertise is recognised by others may play an important role in the effectiveness of the CoP in providing mutual aid to its participants in knowledge acquisition or validation.

As noted earlier, CoP are based upon voluntary membership – while a community of practice may exist within an organisation, the organisational boundaries (even if large) do not encompass the entire community. Thus, virtually all CoP face the problem of 'organisational authority' – who is recognised as being part of the community and who is viewed as an 'outsider.' The distinction is important because of the problems of validating and valorising knowledge that is exchanged between those within the CoP. A strong organisational authority will endeavour to protect the interests of the participants by setting barriers to the entry of individuals to prevent unwanted or ineffective interactions with other members. A weak organisational authority will be permissive regarding individuals joining a CoP and, in this case, other mechanisms of trust

building, such as the formation of sub-networks, will become more important.

At present, many of the technologies employed in CMC are relatively open and permissive. This means that CoP that make extensive use of CMC must implement additional authentication mechanisms if a higher level of organisational authority is desired. Mechanisms such as password-protected sites, IP domain or address recognition and other forms of user authentication serve this purpose but at the expense of introducing greater constraints on participation than would be likely to apply in social networks. For example, scientific conferences are generally relatively open and it is not unusual for interaction in a conference session to lead immediately to further exchange over coffee, drinks or dinner. Such interactions are limited in time and are only likely to lead to sustained interactions according to mutual interest. By contrast, providing an individual with authenticated access to a CMC-based CoP is a commitment to interactions whose duration and intensity are unknown *a priori*.

Even if the participants in a CMC-based CoP seek a more 'open' structure, they may prefer additional guidance about the expertise of individual members. There has been considerable experimentation in recent years in the 'open source' and other technology-related CoP with the assignment of status by nomination.[30] For example, an individual that is nominated by a number of others as having useful knowledge receives a 'rating' that can then be used as a signal of the level of trust that should be afforded to this individual's expertise or communication. In practice, these methods have proven controversial with the 'rating' being taken by many to be an indication of social connectedness (or worse, opportunistic 'gaming' of the ratings system) rather than the individual's actual level of expertise. Correspondingly, there are difficult cognitive and informational problems in establishing the domain of an individual's expertise (e.g. if they are highly rated based on their contributions to one area, does this qualify them as expert in other areas?). The issues of ratings and trust are increasingly central in auction e-commerce settings where buyers and sellers are engaged in one-off transactions and desire reliable information concerning each other. In this context, the 'ratings' approach seems to work better. Thus, it would be premature to take early criticism of the 'ratings' approach as indicative of any inherent weakness – it is more likely that it is the mechanism of eliciting ratings, i.e. nominations, that is flawed than the process of rating.

Another approach to establishing hierarchy is to make the domain of expertise so small that the number of people that are mutually interested can quickly sort out the issues of hierarchy by mutual interaction and observation. An example of this possibility is the 'open source' *content*[31] community Wikipedia where the domain of expertise is divided among over 160,000 individual encyclopaedia-type articles.[32] Since a primary 'domain' for interaction between people is a single article, the relatively low number of individuals (this community is have more than 40,000 contributors for the 160,000 articles) with interests in any specific article provides a means of creating narrowly defined 'interest groups' that can negotiate with one another concerning the contents of an article.[33] Wikipedia as a whole cannot be considered a CoP as the domain of expertise it covers is very broad, nor can the smaller domains of individuals be considered CoP

30 See the University of Michigan site on reputation research http://databases.si.umich.edu/reputations/ , (Accessed 23 October 2003).

31 'Open source' content virtual communities are based upon 'open source' intellectual property principles such as CopyLeft but produce text or multimedia content rather than software. Another example is DMOZ and the virtual community responsible for the Open Directory Project (the project is owned by Netscape, which operates it according to a social contract, see http://dmoz.org/socialcontract.html (accessed 27 September 2003)).

32 Although the number contributors is not known precisely, 800 people have provided their names, there are over 17,500 user accounts (i.e. a larger number of people who haven't provided their identity directly) and the possibility of individuals to make contributions anonymously.

33 Wikipedia operates under rules approaching philosophical anarchism with any user (and no restrictions on becoming a user) able to edit any page at will. It is also the case, however, that any user can reverse edits made by others. The result is a flexible and variegated system for content negotiation.

as they encompass a relatively small number of individuals. Nonetheless, the techniques used in Wikipedia provide an important illustration of how CMC tools offer potential for further developments within communities of practice.

The use of CMC tools raises important issues of trust creation that are difficult to resolve, both because interpersonal interaction has historically been the cornerstone for trust creation and because of limitations in CMC technologies with respect to the problems of organisational authority and hierarchy construction that exist when the CoP spans organisational boundaries. These issues are likely to change over time as new technologies become available, including those like the Wikipedia approach, that spill over from other uses of CMC and as users develop skills of trust building in online interactions. The entry of younger generations of Internet users who have formed friendships and other associational ties in the Internet environment is likely to be an important influence on future CMC uses for trust creation.

Maintaining Interpersonal Interaction and Facilitating Collaboration

Subject to the reservations of the previous section regarding *building* trust, CMC play very important roles within existing CoP in maintaining interpersonal interaction and facilitating collaboration. The limitations noted in the previous section do, however, shape the form of these interactions and collaborations. For example, interpersonal communication within CoP may operate through the exchange of e-mail including the very common use of e-mail 'lists' where the organisational authority issue can be flexibly defined from highly exclusive to very inclusive by establishing a simple set of rules regarding who can join a list (lists can also be maintained privately). As noted in the previous section, this sort of 'web of interpersonal trust' model is somewhat exclusive – serving the needs for hierarchy and trust while failing to offer possibilities for enhancing recruitment of CoP members. When the domain of a CoP is limited, it is possible to screen all possible members and to be inclusive or even to be pro-active in recruiting individuals who have not explicitly indicated a desire to join.

E-mailings within CoP thus provide a means to keep interested individuals up to date on areas of common interest. For example, the European Association of Forensic Entomologists (EAFE) provides a link to 24 members who were willing to be identified.[34] The EAFE site is publicly accessible, and may be relatively private due to the specialised subject matter of the community and the small number of members. Large CoP that publish e-mail addresses of members risk having these addresses harvested by producers of unsolicited advertising (SPAMMERS), subjecting members to the growing tide of this material. Again, the capabilities of CMC for achieving a specific CoP purpose is limited by a combination of current technology and user knowledge – in this case the names of the members could have been reserved, but doing so would have required additional technical knowledge and services.

These limitations suggest that CoP use of CMC requires a more deliberate set of purposes than simply providing a common directory services and may also require a higher degree of control than a publicly accessible website. Both of these issues push the use of CMC by CoP towards a 'club' model in which club members interact with one another behind security walls with various levels of protection. Selecting a 'club model,' however, does not vanquish problems of security anymore than it solves problems of interpersonal trust. The two are largely synonymous – shortcomings in trust can quickly become problems of security. For example, disaffected members of club may surreptitiously compromise security.

Once a 'club model' is selected, there are many additional possibilities for explicit collaborative activity. In an EU-wide context, these are now partially understood as the result

34 See www.eafe.org (accessed 5 October 2003).

of various studies of consortium activities within ICT-related Framework research programmes such as TAP or ACTS. Within research consortia, there is widespread use of e-mail, the adoption of common practices for data exchange such as word processing documents and forms derived using word processing applications.[35] Many scientific collaborators do exchange data and code within consortia and discuss outstanding problems and opportunities within the research process.

Enumerating the full range of collaborative technologies suitable for CoP application is beyond the scope of this paper, but the following examples indicate part of the range of functionalities that can be supported:

Construction of computer software using CVS (current versioning system) and related tools and various types of 'open source' models of copyright protection (or protection for the public domain quality of the software)

> *Example: Three major directories of open source projects are GNU Free Software Directory, SourceForge and Freshmeat.*[36]

Compilation of databases involving division of labour among collaborators

> *Example: The European Bioinformatics Institute provides 'some of the world's oldest and biggest databases of DNA and protein sequences, and a host of services operated by highly trained biologists who are simultaneously involved in their own research.*[37]

Development of large scale data sets for scientific research

> *Example: The global GRID initiative including initiatives like CERN's openlab for DataGrid applications 'a collaboration between CERN and industrial partners to develop data-intensive Grid technologies to be used by the worldwide community of scientists working at the next-generation Large Hadron Collider. These experiments will generate enormous amounts of data – several million gigabytes a year – and will require a computing environment thousands of times more powerful and functional than anything running on today's Internet.*[38]

Recurring issues in the use of collaborative tools include version control, validation of data entry, data overload filtering and visualisation, and negotiation of common cognitive maps for collaborative work. The last of these issues is a particularly difficult issue in collaborative technologies. The way that knowledge is 'mapped' by those originally conceiving a collaboration often proves to be unsuitable as experience with the project is accumulated during the project's life. Technological solutions do not resolve the human conflicts and misunderstandings that produce unsuitable cognitive frameworks for organising informational resources – a problem very similar to trying to move into someone else's office filing system.

In summary, CMC and collaborative technologies offer growing opportunities for CoP that can effectively deal with the problems of regulating membership and participation to maintain trust among participants. It is particularly notable that the most extensive networks of resources for augmenting communities of practice have emerged in scientific communities. This seems likely to be the consequence of the long scientific tradition of public data disclosure and exchange as well as the more recent development of vast data libraries whose maintenance and enhancement can only be financed through the development of collaborative and new access technologies. CMC and other information and communication technologies do not provide an immediate or direct substitute for historical methods of constructing communities of practice based upon trust. Instead, the value of such communication capabilities is in enhancing and augmenting communication

35 For TAP see (ASSENT 1999)
36 www.gnu.org/directory, www.sourceforge.net, and http://freshmeat.net (all accessed 25 September 2003).
37 www.ebi.ac.uk (accessed 25 September 2003)
38 http://proj-openlab-public.web.cern.ch/proj-openlab-datagrid-public (accessed 25 September 2003).

in support of collaborations whose formation and sustenance also relies upon more traditional relationships.[39]

Interactions between CoP

While the preceding section has emphasised the contribution of the scientific community to the use of CMC and other ICT by CoP, the use of these technologies is certainly not limited to scientific communities. Many important and challenging issues concern the use of CMC and other ICT involve the joining together of different CoP through the use of these technologies. In a variety of business and government contexts CoP must be linked to achieve innovation, to maintain and support complex systems, or to provide links between domains of expertise. In some respects, the use of these technologies in producing innovations is most similar to scientific uses. Collaborative research involving interaction between different companies produces local networks of interconnection and communication for which the collaboration tools used in scientific research communities are often useful.

Beyond the more routine processes of providing communication connections for collaborating industrial researchers, however, CoP interact using the new tools that have emerged to address the specific problems of product design, prototype testing, and co-ordination of manufacturing operations. An important class of these tools is computer aided design and engineering systems.[40] For example Dassault Systèmes, the world leader in product lifecycle management software, produces CATIA a software solution for product design that 'allows manufacturers to simulate all the industrial design processes, from the pre-project phase, through detailed design, analysis, simulation, assembly and maintenance.'[41]

At a first glance, computer aided design and engineering software appears to be peripheral to issues of the formation, maintenance and performance of CoP. This type of software, however, provides the platform for interactions between different parts of a company and between different companies for the design of products. It therefore creates the 'objects' that define interaction between CoP – a rather different environment for communication than a scientific research subject field or even a large scientific project (such as the Large Hadron Collider). In analysing the social processes related to interacting CoP, scholars have taken to using the term 'boundary objects' to identify the specific sites and artefacts where different CoP interact.[42]

The existence of a boundary object – typically an artefact or a plan for construction of an artefact – stimulates a series of exchanges between CoP that are designed to align the use of language, processes that involve 'translation' between different cognitive frameworks. Translation involves a process of negotiation between CoP in which workable understandings must be constructed. The degree to which these understandings are actually 'common' or unified is debated among academics, but the functionality of the translation process must achieve sufficient commonality that different CoP do not introduce major problems in the design and production process through misunderstanding. In addition, the effectiveness of the translation process is essential if knowledge from different CoP is to be successfully combined.

Large and specialised projects may engage a high share of particular specialised CoP. Projects in the aerospace, automotive, electronics, and pharmaceutical industries, particularly those involving generic technologies and standards involve broad cross-sections of CoP. More specific development projects engage sub-sets of larger CoP and a significant issue in the management of projects within firms is the ability of project and research managers to negotiate with the larger CoP for information and knowledge that is not immediately available. It is also apparent the CoP

39 (Finholt and Olson 1997)
40 (D'Adderio 2001), (D'Adderio 2001)
41 www.3ds.com/en/brands/catia_ipf.asp (accessed 29 September 2003).
42 (Star and Griesemer 1989), (Fujimura 1992)

proliferate over time, expanding the problems of identification and co-ordination.[43] These issues are often analysed in the context of information and knowledge 'sourcing' and a number of studies, many derived from Community Innovation Survey data, indicate that the sources of information and knowledge relied upon is extensive and systematically differs between industrial sectors.

For example, the Brescia mechanical cluster focuses on the production of specialised textile machinery.[44] What Lissoni found in his extensive study of this sector was an intimate relationship between producers of capital equipment and users that was driven by the need of users for customisation of machinery for the production of specific products. A product catalogue providing intricate detail of the capabilities of different components of capital equipment provided a means for producers and users to interact over the customisation specification. The existence of this 'boundary object,' the product catalogue, provided a means for negotiating not only common understanding but also product specification. There is no reason to believe that the Brescia example is a unique instance of the importance of detailed product specifications in the definition of customised capital equipment, an area which remains a strength of European producers in many Member States.

The systematic study of interactions among CoP in the private sector using the concepts of boundary objects, translation processes, producer-user interactions, and similar processes is very young —it is at the frontier of science, technology and innovation studies field— as such, there are important limitations in what can be said about removing barriers to such interactions or promoting them. Nonetheless, it is clear that very complex and highly functional tools are being constructed for CoP in the private sector to interact in the specification and design of new products and services. There is a basis in theory for deriving some of the implications that these tools have for economic performance and these are examined in the following section (Section 3). The private sector is actively engaged in building and refining these tools. Given the scope of private sector activity and the complexity of the application and knowledge domains for which these tools are being developed, it seems rather unlikely that clear priorities could be set for public support of research programmes in this area. Another way of saying this is that it is relatively easy to define promising areas for technology development and relatively hard to assess how any specific project will fare in relation to other initiatives.

43 (Tuomi 2002)
44 (Lissoni 2001)

CoP Effects on Economic Performance

The use of CMC and other ICT by CoP clearly offers important opportunities to improve economic performance. Measuring the location and scale of these opportunities is, however, extremely difficult. A major reason for this is the shortcomings of existing systems of measurement for capturing important features of the innovation process related to product design and improvement. We know that modern economies are generating a growing diversity of products, that capital equipment is becoming ever more complex with the embedding of electronic controls and instrumentation, and that the definitions of product quality are becoming more extensive as issues of life cycle costs and environmental sustainability are taken into consideration.

None of these features of economic performance are well recorded by national income and product accounts. These accounts focus on a relatively stable market basket of goods for assessing price changes, a limited range of measures of inputs and outputs for assessing productivity change, and fairly aggregate product and service categories for determining output growth. Within the European Union there is enormous difference in the detail and comprehensiveness of labour market statistics at the Member State and regional level. Nonetheless, these statistics all provide fairly superficial guidance as to what activities individuals are actually engaged in despite the fairly rich detail available (particularly in some countries, e.g. Denmark or France) concerning the boundaries of job classifications and qualifications.

Thus, it is very possible that major changes are underway in the importance of product and organisational design for which the major clues are relatively obscure industrial or innovation case studies. Generalising from these more situated studies and developing measurement methods for tracking the specific influence of CoP is difficult and considerable ingenuity is required in the use of available statistics to provide even a suggestive trace of these changes. A key reason for these difficulties is the growing inadequacy of the price deflators employed to measure changes in physical output. This inadequacy is the consequence of significant quality change in the products offered in the market. An alternative favoured by those who seek to identify changes in the value added in specific industries, 'revenue productivity' (often measured with the crude productivity measure of revenue per worker) is problematic. As is well known by economists, revenue per worker conflates the effects quality change with market power and capital intensity – increasing levels of either of these latter factors will raise the apparent level of output per worker and, while market power is likely to increase profitability, capital intensity may have no or negative effects on profits. Nonetheless, revenue productivity is likely to be influenced by improvements in the quality and variety (customisation) of products and services with higher levels of either likely to command higher prices and therefore an increase in the revenue per worker. The problem of controlling for the effects of conflating influences are, however, severe and changes can easily be obscured by (or attributed to) changes in the capital stock (including intangible capital).

What *can* be said is that a growing share of economic activity in advanced industrialised countries is organised around 'projects,' e.g. in construction, research, new product development and software creation. As described in the previous section, the mobilisation of CoP in these areas often involves a focus on a particular artefact that requires contributions from multiple communities. If this mobilisation effort is successful, it could be expect that a higher level of productivity (both physical and revenue) might be generated. At the same time, however, the costs of mobilising this effort (e.g. the time spent in interacting within an inter-organisational CoP) are likely to be significant. Here, there are very significant problems in measurement because there is no 'baseline' against

which current levels of interaction in CoP could be measured. Is the time currently spent on such interactions smaller or larger than in the past, and does CMC and other ICT raise or lower the time and other costs of this interaction? No one knows. All that can be said is that the time that *is* spent is likely to be productive if the individuals involved have appropriate incentives for maximising the value of their company.

The movement towards higher levels of variety (customisation) and quality is likely to generate an increasing number of jobs in design, research, testing and similar pursuits. In this respect, the labour market statistics can provide a crude guide to changes that might be underway. It would be reasonable to expect that increasing levels of employment in these types of jobs would be accompanied by higher levels of participation in CoP spanning a large number of organisations. Effective support of these interactions using CMC and other ICTs would further increase the productivity of these interactions. However, since increasing variety and quality are likely to be cost increasing activities, the problem of measurement is one of comparing a counter-factual (nonexistent in practice) level of productivity that would exist without such CoP or without effective support of CMC and ICT for CoP interactions. Promising lines of investigation are therefore likely to be case study based and indicative rather than comprehensive and representative with some additional possibilities for international or sectoral/regional comparisons to shed light on relative performance.

A somewhat more promising avenue for exploration is the specific study of the composition, activities, and contributions of CoP. Taking CoP as a unit of social analysis and attempting to trace the processes in which they are engaged has been a productive line of investigation in the innovation studies field where vonHippel has demonstrated important consequences stemming from informal inter-organisational exchanges within engineering CoP.[45] These consequences suggest that CoP augment in important ways the R&D capacities of individual firms. Alternatively, they may be seen as ways to compensate for the growing complexity of the knowledge base needed to participate in the production of advanced products and avoid spiralling costs of adding research personnel. Enhanced CoP may also be seen as a means of economising on R&D by making more intensive use of existing personnel. With regard to the latter strategy, it is important to note that vonHippel and Augsdorfer both observe that the exchange of knowledge within CoP is intended to be reciprocal, if not immediately, over a longer-term interaction between individuals. Companies that would seek to exploit a CoP opportunistically (i.e. by expecting their employees to take from the CoP without contributing to it) could therefore expect to be excluded after the pattern became apparent.

Examining the composition, activities and contributions of CoP would provide further clues as to their evolution and sources of functionality and dysfunctionality within such communities. For example, it may be possible that changes in the legal environment related to intellectual property, liability, or worker contract law may be seen as adversely affecting the functioning of CoP and that members of specific CoP could provide evidence of these effects. The selection of CoP as a unit of social analysis would also provide a means to examine the use of CMC and other ICTs in such communities. Are there significant differences between CoP related to specific industries in the use of these tools? Have there been major changes in the tools employed, such as the earlier cited use of PLM (product lifecycle management) software within specific communities? Are there conspicuous unexploited opportunities for the use of these tools in particular and identifiable CoP? Answers to these sorts of questions would provide valuable information for policy actions that might seek to mitigate the negative or enhance the positive effects of the environment influencing CoP interactions.

45 (Hippel 1994; Hippel 1994). (Augsdorfer 1996) has performed a similar analysis in a European context.

Further evidence is likely to accumulate as researchers examine situated examples of the use of CMC and other ICT within CoP. Ideally, these studies will consider the specific roles of these tools within projects in industries where projects are the principal form of interaction (e.g. construction, aerospace, capital goods, scientific instruments, software, business consultancy, legal services, etc.). It is particularly important to identify how industry-specific differences in the processes of learning and other forms of knowledge exchange within communities of practice influence the use of CMC and other ICTs.

A particularly promising line of investigation is in the examination of 'modularity' in manufacturing, the effort to 'decompose' products into specific subsystems that are inter-operable and can be produced by multiple suppliers (allowing a higher degree of specialisation for the critical 'modules' defining competitive advantage). Are the new tools emerging for combining and connecting CoP particularly influential in the movement toward modular systems architecture in modern products or is it primarily the cost savings of standardised component outsourcing that is driving these developments? In the systems industries such as building, transport infrastructure, and health services investigations of the integrative role of CMC and ICTs is needed. We know that these tools offer important opportunities in accountability and financial management – do they offer similar advantages in supporting the interactions of CoP in these industries? What can be learned from these types of studies is a roadmap for more quantitative investigation and a series of 'best practice' lessons about how to exploit opportunities or deal with problems that are encountered in a number of different contexts.

By pursuing the operation of CoP, it is possible to provide correlative links to other measures of economic performance. Research of this type would meet some of the challenges raised by (Coleman 1988) in one of the important early contribution to 'social capital' theory. Coleman offered a series of structured speculations concerning the role of cohesiveness of communities in the success of individuals in acquiring human capital and thus contributing higher quality labour input to productive activities. By taking CoP as a unit of social analysis attempting to characterise their functionality (and dysfunctionality) substantial progress might be made to implementing the research agenda suggested by Coleman.[46]

One further virtue of taking CoP as the social unit of analysis for studying innovation processes would be a deeper understanding of the geographic boundaries of CoP. For the study of CoP to be distinct from broader concepts such as 'national technological capabilities' or 'national systems of innovation' it would appear necessary that CoP have boundaries within nations. Closer examination, however, suggests that that CoP may be both more local and more global than national boundaries and that while these developments are particular salient in Europe they are more widespread and may reflect a very basic structural change in how knowledge is being sourced, developed, re-combined and exchanged throughout the world. These developments are considered further in the next section (Section 4).

46 Several authors have provide further conceptual guidance for this sort of research including (Cooke and Morgan 1998; Cooke 2001) and (Lundvall and Maskell 2000).

CoP Interaction with Globalisation and Localisation

The ICT-enabled extension of communities of practice may allow an increase in the global sourcing of knowledge and problem-solving activities. In effect, markets for knowledge are extended through the social network of CoP. Changes in CoP, particularly those changes influenced by the advance of CMC and related ICT technologies, are likely to have important implications for growth, competitiveness, and employment. The problem, as noted in the previous section (Section 3) is that existing empirical research on CoP is based upon highly situated case studies that provide a very modest slender for generalisation. That section concluded that taking CoP as a unit of social analysis offered important opportunities for linking change in CoP to economic performance.

The main reservation or problem in pursuing this line of research is that the boundaries of CoP are likely to be changing, influenced by CMC and related ICTs as well as EU policies such as RTD Framework programmes that have been attempting to integrate European research communities. This section considers these issues, both as a methodological issue in research and as a practical issue with implications for policy. It advances a working hypothesis concerning the nature of these changes that is linked to empirical research concerning the patterns of international research collaboration in industry and to studies of civil society conducted in the 'social capital' tradition. Assuming that this hypothesis can be supported, a number of policy implications follow and these are discussed in the next and last section (Section 5).

The central hypothesis is that an important determinant of existing intra-regional differences within the EU are governed and shaped by the effectiveness of CoP that are relatively localised social structures, i.e. most of whose participants are located in proximity to one another. As noted in the Introduction (Section 1), CoP rely upon the construction of trust among individuals with competence or *savoir faire* in a particular domain of expertise. The construction of trust is a necessary component if the CoP is to augment and extend the expertise of an individual – it serves to validate and valorise information and knowledge received by others. In economic thought, which somewhat oversimplifies the issues involved, trust serves to reduce transaction costs in the exchange of knowledge.[47] More broadly, trust supports a 'learning environment' in which the experience of others is more readily translated and re-combined with one's own experience in useful ways.[48]

Traditionally, the establishment of such trust required frequent face-to-face meetings between individuals who often also had a long history of association in various social contexts. It is reasonable to conclude that a variety of localised organisations such as professional associations and civic associations and the like might provide such individuals with opportunities to build new associations or build upon associations established in the past. In this respect there are close parallels between CoP and the associational economy described by (Cooke and Morgan 1998) and studies in the 'social capital' tradition.[49] All of these features point towards CoP being a *localised* social structure. It is a short step in logic to conclude that the relative effectiveness of different regions, particularly in the deployment and use of knowledge as an important input to economic performance, is an important determinant of differences in economic performance *between* regions. That is, where differences in economic performance between regions can be traced to differences in the deployment and use of knowledge, the articulation of CoP and the effectiveness of CoP in serving the needs for knowledge of their

47 (Maskell 2001)
48 (Lundvall and Maskell 2000)
49 (Putnam 2002) and (Portes 1998)

participants may be an important determinant of these differences.

The trend towards globalisation of investment has served to deploy research capabilities throughout the world. In the choice of where to locate such facilities, multinational companies (MNCs) have favoured locales with established research capabilities and therefore prior formations of effective CoP have been reinforced by the localisation decisions of MNCs.[50] This observation has led to a number of studies confirming the existence of a reinforcing effect between localised strength of research capabilities and the location of MNC research capabilities.[51] Paradoxically, then, it would appear that trends towards globalisation reinforce localisation – at least for those regions that are able to establish research capabilities sufficiently attractive to attract MNC investment.

The reinforcing effects created by MNC investment raises concerns about regions that are unable to accumulate such capabilities since they are likely to be further marginalized by the dynamics of this localisation process. It also raises further questions concerning whether this is process is a transition towards the reinforcement of economies of scale in which larger MNCs with global networks of research are able to grow at the expense of smaller rivals (both MNCs and national firms) with less extensive networks. The alternative to this relatively fixed structure of dominance is that more flexible and re-configurable networks among specialised centres of competence may be emerging – MNCs tap into these competences by establishing local research capabilities, but so do other firms including smaller MNC rivals and companies that are primarily oriented towards national markets. In this case, the long-term growth of large MNCs at the expense of smaller rivals might be constrained by the localised spill-over effects of knowledge – i.e. the knowledge generated may be of comparable benefit to global MNCs and their smaller national and multinational rivals.[52]

A further issue concerns the competition between regions. In some industries all of the time and in all industries some of the time, larger MNCs would like to source knowledge from locales that not only have competences, but where the costs of establishing research outposts are lower. Thus, regional centres of competence face competition not only with other regions of competence located in countries with similar costs, but also with regions where labour and other costs are lower. This is a particularly important issue for the advanced countries in Europe given the rapid improvement in the industrial research capabilities of other countries. It is also may be an opportunity for the few less advanced regions in the EU 15 and the more numerous regions in the EU 25 that have strong human resources in technical research areas. The extent of agglomeration and centralisation of research activities at the 'core' is, however, discouraging with regard to such diversification.

The role of CMC and other ICTs for exchanging information and knowledge in these changes is uncertain. On the one hand, it is precisely the localisation of interaction that distinguishes local clusters or regions of competence and is believed to account for the marked disparity between local clusters and regions in the extent of knowledge-intensive activities. On the other hand, CMC and other ICTs appear to play a role both in the ability of MNCs to disperse research activities and in augmenting the capabilities of local research capabilities. It may be the case that the influence of CMC and other ICTs are constrained to distinctly different types of knowledge, e.g. more generic research results that require considerable further development or research activities in which there is a well-defined context for conducting search or design activities that allows parallel efforts. In

50 (Cantwell 1989)
51 See (Cantwell and Iammarino 2003) and accompanying references.
52 This latter possibility is less credible if the large MNC and smaller rivals are competing in standardised product markets based upon cost. However, if a principal source of company growth and sustainability lies in the capability to create product innovations, good ideas and ways to implement them are more footloose.

this case, one would expect that certain industries and certain types of research processes involved higher degrees of CMC and ICT tool use than others. There is anecdotal evidence that this is true for integrated circuit design and some forms of chemical research involving parallel search processes. However, insufficient systematic evidence is available to distinguish activities that benefit considerably from CMC and ICT tool use. If such a distinction exists, it may be changing over time, enlarging the range of activities that can be internationalised and thus providing more opportunities for relocating research where qualified researchers are available at lower cost in areas with strong local technical competencies.

Two further issues complicate the general tendencies identified in the previous several paragraphs. First, the discussion has not controlled for the extent of investment in face-to-face meetings between individuals in 'remote' research facilities and those in the centralised facilities in large MNCs. It may be that CoP that are established in a local context can be extended to non-proximate locations (aided by CMC and other ICTs) and there is some indication that research sites that were previously peripheral to patterns of airline traffic have been able to achieve a higher standing through the use of these technologies. Alternatively, researchers from remote locations may be able to achieve sufficient interaction with the CoP located in proximity to MNC central research laboratories to achieve the trust necessary to be included in the CoP operating in that locale. The ability to make this investment in mobility (with its corresponding costs in the loss of day to day services of the employed researcher) is likely to favour larger MNCs at the expense of smaller MNC and national company rivals. Thus, there is some further reason to believe that the research efforts of larger MNCs will achieve a benefit at the expense of rivals from participation in local CoP and the use of CMC and related ICTs.[53]

Second, in considering the extent to which research can be dispersed around the world, it may be necessary to grapple with the recurrent, and generally not very illuminating, issue of cultural differences. A premise of European RTD programmes has been that it is both feasible and desirable to improve the connections across national cultural boundaries within Europe. The theory has been that intervention could nudge researchers towards greater intra-European collaboration and that this would provide social benefits for Europe as a whole. These policies as implemented in the funding and management of European RTD programmes have supported the linkage of CoP across Member State boundaries. There is some evidence that this policy has been successful in increasing the integration of European research and therefore in bridging cultural differences within Europe. There is also some evidence that these bridges remain in place once constructed, e.g. the persistence of research teams across projects within Framework projects.[54]

There is also evidence that such bridges can be and have been constructed in some industries, e.g. software in Bangalore India without the direct support of European RTD policies. It is possible that cultural differences between the UK and India are larger than between Sweden and Spain or Poland and Italy, but any generalised conclusions regarding the effect of cultural differences is hazardous. This is particularly true in scientific and technical research where there are long traditions of international education, scientific conferences, and mobility. It is thus risky to presume that cultural barriers will prevent the further dispersal of research activities. A much more plausible assumption is that the number and variety of pre-existing local CoP in Europe will provide attractive destinations for inbound investment and attractive alternatives to investing abroad.[55]

53 This assumes that larger MNCs and their smaller rivals have similar capabilities in the use of CMC and related ICTs for supporting CoP and that it is possible to make effective transfers of knowledge between remote and central research facilities.

54 (ASSENT 1999)

55 The tendency towards 'lock-in' to a particular hierarchy of concentration research in particular regions is a principal conclusion of (Cantwell and Iammarino 2003).

In summary, there are several conflicting consequences of trends towards the internationalisation of research as part of the broader trend towards globalisation. The best and most comprehensive evidence would suggest that Member States with strong and effective localised CoPs stand to benefit from the process of globalisation through increased inward investment in research and through spillovers from this investment at a local level. These effects are enhanced and augmented by the trends in CMC and related ICTs that increase the feasibility and functionality of these dispersed research capability investments. More speculatively, there is the possibility that, over the longer term, larger MNCs may benefit from these developments at the expense of smaller MNCs and national firms if there are economies of scale in the knowledge collection and re-combination processes. The effects for any particular Member State are uncertain, although there is little reason to believe that Europe as a single market will be disadvantaged by these developments.

Within Europe, those most likely to be disadvantaged are Member States with research areas that are less well developed and that also have fewer large MNCs that might benefit from investment in other countries.[56] At a regional level these developments are likely to increase the inequality in research development further *within* countries (e.g. North Italy versus the *mezzogiorno* or Southeast England versus Northern England. There is some risk, although it is only possible to speculate upon its extent, that the bridging of CoP on an international level may lead to further outflow of research activities from traditional research-intensive locales towards locales with research expertise outside of Europe that have lower researcher costs. It would be premature to conclude that this is a significant risk. The available evidence suggests a move towards locales that have a significant history of research activity. All of these conclusions are tentative and aggregate – there are certain to be contradictions to the general pattern in specific industries or in specific regions.

The issues surrounding internationalisation of research and the possibilities for extension of CoP raise several policy issues that are considered in the next section along with policy issues that arise from the prior sections (Sections 1-4).

56 Unfortunately, the two conditions are likely to be linked and thus national industries in specific countries such as Greece and Portugal as well as the expansion countries may encounter increased competition as the result of these developments.

CoP and Policy

Much of the literature on communities of practice (CoP) is highly situated and specific to individual communities that have been the subject of academic investigation. Unlike other areas of policy relevance to the 'new economy' such as e-commerce or knowledge-based services there is not, at present, very much empirical literature, particularly of a comparative nature, to draw upon as a foundation for policy action. The preceding sections, however, do suggest several policy themes that bear further examination and discussion.

European economic performance depends upon effectiveness in the research process and there is some evidence for the proposition that CoP play a significant role in research effectiveness. The traditional construction and maintenance of CoP was largely a matter of individual initiative and participation in social relations that would construct expertise within specific domains of expertise or practice. As in other areas where a degree of voluntarism is involved, it is helpful if individuals have the time and resources to contribute to the success of collective efforts. In specific, the recognition that CoP are important social structures that aid our societies in the quest for sustainable economic growth as well as other desirable ends may be thought of as a worthwhile policy in its own right. Just as it is possible to recognise the importance of voluntary or 'third sector' activities as important to civil society, it is possible to recognise and hence lend moral support to CoP as an important component of our societies technological and economic capabilities.

More specifically, however, CoP are evolving as our economies move towards a higher level of research-related knowledge in all facets of economic life. These changes are marked by growth in 'project-based' firms in industries such as construction, aerospace, and the infrastructure industries, by 'project' activities in other branches of manufacturing such as the automotive industry, and by systems concepts such as 'modularity' that have potentially very widespread application in both manufacturing and services. In each of these cases, traditional CoP are being enlarged and re-combined by the needs to source and deploy expertise. Recognising these changes at the European level is an important complement to national policies that might encourage greater flexibility and effectiveness in CoP. The principal role of the European Commission and other European-wide institutions in this regard may be supporting a better understanding of these challenges including mapping some of the challenges CoP are likely to face in coming years on a comparative and European-wide basis. It is especially important in this regard to include the expansion countries in such efforts due to the profound and continuing changes in the structure of these societies.

Although the available evidence is fragmented and incomplete, it appears that computer mediated communication (CMC) and related ICTs provide a means to enhance and augment CoP. There are constraints to the role of these technologies due to the importance of interpersonal trust in constructing and maintaining CoP. Within well-established CoP, however these technologies may make important contributions. There are some specific issues that, with further examination, might be considered for policy action:

- Systems supporting easy to use yet secure authentication of users may play an important supporting role in facilitating personal interaction within CoP.
- A better taxonomy and understanding of the ways in which CoP may be dysfunctional is needed to understand differences in their contribution to economic performance.
- Better understanding and implementation of technologies that support structuration in knowledge-related social groupings (the creation of hierarchies, peer groups, and referral networks) is needed.

- A greater attention to the issues surrounding the creation and use of collaborative technologies is needed. These technologies are rapidly evolving and experience with them is often confined to specific communities such as academics or the open source software communities – more accessible evaluations of the potentials and limitations of these technologies would aid other CoP assess their suitability for deployment.
- A re-examination of the persistence or sustainability of informational and communication resources created within RTD programmes would be useful. It is not helpful, for example, to devote significant resources to the creation of information or communication resources that are abandoned following the end of funding. Given the difficulties in financing the costs of these activities more attention needs to be paid to the value of 'distributing' information and sustaining resources around which CoP are likely to organise or find a home.[57]

The ability to make definitive statements concerning the effects that CoP have on economic performance or social cohesion is severely constrained by the absence of systematic data. Without an explicit effort to gather data on many CoP as units of social analysis, research on CoP is likely to continue to focus on situated case studies of individual CoP. Developing data on the existence of functioning of CoP at the regional level within Europe provides the most promising line of investigation for ascertaining the effect of CoP on economic performance. Such research faces important methodological issues concerning definition, enumeration, the delineation of geographic specific boundaries, and the measurement of effectiveness or health of CoP. These challenges can, however, be met with sufficient investment in this line of research.

Some of the policy-relevant questions that might be answered by this line of research include:

- To what extent are CoP localised and how have European RTD programmes affected this pattern of localisation within European regions?
- What is the extent of correlation between measures of participation in CoP in a particular region and esconomic performance?
- What are the principal barriers to enhancing the performance of CoP in meeting participants' hopes and expectations (and thereby CoP contributions to economic aims)?
- What are the specific challenges faced by CoP as the result of growing attention to quality, timeliness, and variety in production or the growing importance of system concepts such as modularity that define interactions between different CoP?

Better understanding of the simultaneous trends towards globalisation and localisation in the structure of CoP, particularly in research CoP is urgently needed. A precise understanding can only be achieved by commissioning research on CoP as units of social analysis. Nonetheless, some advance can be made by assuming that there are strong linkages between the effectiveness of CoP and existing differences in regional research performance. Testing this hypothesis is a matter of considerable urgency. Assuming that it can be supported there is a basis for the following policy-relevant conclusions:

- Identifying means to locate and raise the profile of existing competences within regions is a useful means of supporting inbound investment in research facilities and outposts.
- A broader understanding of the medium to long-term nature of investments in building local competence is needed for regional policy as is an assessment of the internationally comparable standing of such local competences.

57 It would, of course, be helpful to do both. See (David and Foray 1995) for an argument in favour of making a move (at the margin) towards greater distribution at the expense of new research.

- Greater knowledge of the opportunities and limitations of remote research collaboration is needed. The opportunities support the case for inbound investment in established European CoP. The limitations suggest that 'outsourcing' of research activities may not meet expectations that investors might have.
- Differences among industries and changes over time in the skills of researchers in the use of CMC and other ICTs for remote collaboration should be taken into account in the formulation of European policy, particularly in the RTD era.

In conclusion, there is considerable reason to believe that CoP have the capability to enhance our economic performance. CoP are playing an increasingly central role in our knowledge-based economies. They are evolving in response to changes in structure of economic activity and to opportunities provide by information society technologies including computer mediated communication and related information and communication technologies. It is likely that they are linked to present and future differences in research-intensity at a regional level within Europe and with the dispersal of research activities on a global basis. The contribution of CoP to European research and production capabilities deserves greater attention in both academic and policy circles.

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Incentivizing Practice

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Table of Contents

Introduction

Social capital has proved an increasingly useful and —as this workshop itself testifies— influential perspective for understanding learning, work, and innovation in a knowledge society. The social capital [SC] approach shares a great deal with community of practice analysis —the perspective this paper will attempt to lay out—. In particular, in discussions susceptible to individualistic and economistic thinking, both stress the social underpinnings of knowledge work.

As this workshop is focused on the notion of SC, and most contributions will explore SC's particular strengths, it seems less useful to go over the common ground between the two perspectives, extensive though that is, than to discusses differences between the two, and by extension what community of practice [CoP] theory can add to our understanding of knowledge and social organization. So I will focus here on what is distinctive about the CoP approach and in the process offer a critique —but I hope a constructive critique— of SC theory and its assumptions.[59]

SC theory draws attention to the networks of individuals which help to embed economic interactions in social relations (Polanyi, 1944; Granovetter, 1985). Through social exchanges, people build webs of trust (Fukuyama, 1995; Putnam, 1993, 2000), obligation, reputation, expectations, and norms (Coleman, 1988). In these webs and through these relations, SC theory suggests, people are willing and able to share knowledge.[60] The CoP perspective goes along with these claims until it pauses at the word "able." That is, CoP analysis accepts the importance of social capital networks to understanding why people will and will not share. But the CoP perspective makes a distinction between people's willingness to share and their ability to share. It suggests that people have to engage in similar or shared practices to be able to share new and innovative knowledge about those practices.[61] Thus, where SC theory points to the unseen links that unite people, CoP theory points equally to unseen boundaries —boundaries shaped by practice— that divide knowledge networks from one another, despite all the obligations of good will and social capital that may connect them.

The two theories differ, then, over their assumptions of the way knowledge circulates. Such assumptions are critical to any discussion of innovation and the right social incentives for promoting it. Currently, discussions concerning new ICT related incentives —digital rights management or software patents, for example— are becoming increasingly contentious.[62] It is 50 years since Penrose (1952) claimed that "If national patent laws did not exist, it would be difficult to make a conclusive case for introducing them." To many eyes, in the intervening period, the intellectual property incentive system has graduated from being merely inadequate to being counterproductive. Mowery, Nelson, Sampat & Ziedonis (2001) believe patenting is now inhibiting U.S. scientific communication. Foray (1997) and others are concerned about a general tendency of the system to "tip" away from openness. David

59 There have been several recent critiques of social capital from other perspectives. A special issue of Journal of Economic Issues on "Social Capital, Karl Polanyi, and American Social and Institutional Economics" (Summer, 2003) in particular notes how SC is being used to allow governments to avoid their responsibilities. See Carrol & Stanfield (2003), Dolfsma & Dannreuther (2003), and van Staveren (2003); see also Portes & Landolt (1996).

60 Liam Bannon wisely pointed out that share is a problematic term. It might well be that something like "coordinate practice" might be less misleading. Equally, I find the idea of a "knowledge society" a little worrying, but to avoid adding further hand-wringing complications to an already abstruse essay, I shall stick to the more recognizable terms.

61 The emphasis here is on "new and innovative"; as I note later in the paper, society has built numerous workarounds to deal with established, settled knowledge.

62 Some will find it hard to think of digital rights management as an incentive scheme, but that is how it is presented in Stefik's (1996) seminal paper on the topic.

(2003) and Kogut & Metiu (2001) are among several who believe we should worry less about the tragedy of the commons (Hardin, 1968), which has been freely invoked to justify rigorous intellectual property, than about the tragedy of the anticommons" (Heller & Eisenberg, 1998). Built to promote innovation (though see Moser, 2003), the intellectual property system may rather be strangling it.[63] Thus the two different perspectives on the flow of knowledge contested here, however abstruse, have practical —and timely— policy implications.

In offering the distinct perspective of CoP theory, this paper holds that, while emphasizing *social* in the research lexicon, SC has nonetheless remained fairly close to its roots in economics (residual in that word *capital*).[64] This has a couple of implications. First, SC theorists' focus on "rational actors" (Coleman, 1988) portrays social groups as little more than "combinations" of individuals (Nahapiet & Ghoshal, 1996). The CoP perspective, by contrast, sees knowledge-sharing networks as more complex than the aggregate choice of individual rational actors. So, while SC analysis ranges indifferently over a broad array of social groups, including such things as firms, bowling leagues, housing organizations, and families, the CoP perspective, by contrast, limits itself to communities and networks that are distinguished by the particular practices members share. These communities can only be joined by entering into the practice. Second, while some SC theorists, again like economists, tend to view the sharing of knowledge as little more than the exchange of "information that facilitates action" (Coleman, 1988, p. 104) between individuals, CoP theory suggests that isolation of individuals and information underestimates the challenge of sharing knowledge and fails to predict where knowledge "sticks" (von Hippel, 1994; Cowan, David, & Foray, 1999) or "leaks" (Szulanski, 1996)--critical questions for promoting innovation.

This paper thus begins by challenging economistic views of knowledge sharing, noting in particular the effort of some economists to dismiss the notion of *tacit* knowledge from debates about innovation. Tacit knowledge, important to CoP theory, is problematic for economists because it is hard to explain in terms of information exchanged between individuals. The paper then explores the links between the tacit dimension of knowledge and social practice. It looks beyond information and beyond individuals to argue that practice forms two interconnected knowledge groupings, the community of practice and the network of practice. It is these that help predict the flow —or lack of flow— of new knowledge in society. The paper goes on to argue that social practice has two dimensions, the epistemic and the ethical. These explain not only why people will and will not share knowledge (the focus of SC theory), but also where knowledge can and cannot flow —despite accumulations of social capital—. The epistemic dimension determines where knowledge sticks, the ethical helps explain why it leaks.

Having followed a principally theoretical path, the paper then pauses to analyze "Open Source" software in the terms laid out above. This discussion helps link the issues raised so far to ICTs. Moreover, Open Source is an area of particular interest because it has challenged conventional ideas about incentives for and the organization of innovative in a knowledge society. Open Source networks are celebrated for leaking knowledge (hence the *open* in *open source*), but we also need to understand where and why Open Source knowledge sticks. The paper suggests that such an understanding helps illuminate in terms of practice different roles of networks and organizations.

In conclusion, the paper questions both the assumption that ICTs circulate knowledge and the assumption that stronger intellectual property provides better incentives for innovation. It

63 Lawyers seem to have been more aggressive than economists in pointing to the flaws of the IP system. See Boyle, 1996; Lessig, 1999, 2001; Litman, 2001 and Law and Contemporary Problems, special issue 2003 66 (1&2).

64 Coleman is quite explicit about this. His aim is "to import the economist's principle of rational action for use in the analysis of social systems proper ... [t]the concept of social capital is a tool to aid in this" (1988, p. 97).

argues that if we seek to promote innovation and communications, we should attend neither to information nor to knowledge, *per se*, but to practice and its social, organizational, epistemological, and ethical entailments. In closing, it suggests that the system of copyright, patents, and trademarks should be altered to keep knowledge "open." Finally, it outlines some implications for policy and research.

Tacit Knowledge & Sceptical Economists

Stigler (1961) opens a seminal essay on the economics of information with a rapid but not atypical transition between information and knowledge: "One should hardly have to tell academicians that information is a valuable resource: knowledge *is* power" (p. 213). More generally the economics of information and of knowledge seem indistinguishable or interchangeable (Arrow, 1969). Consequently, many discussions of incentives for a knowledge society focus primarily on the circulation of information and the extent to which it can be carried by ICTs and encouraged by legal protection of intellectual property, or sheltered by organizations (Schumpeter, 1947; Chandler, 1962; Nelson & Winter, 1982). Tacit knowledge makes problems. How do we share something that is tacit? How do we put it in ICTs? How does capital (economic, human, or social) bear on it? Hence, while economists and economic historians increasingly embrace the contribution of knowledge to economic progress (Nelson & Winter, 1982; Mokyr, 1990; North, 1980, 1992) and the "knowledge economy" (Mokyr, 2002), they treat tacit knowledge with a certain suspicion and move quickly, like Stigler, to information.

Atypically, Cowan, David and Foray (1999) make their move explicit. They describe their approach as "the skeptical economist's guide to 'tacit knowledge.'"[65] These skeptical economists (SE) motivate their argument from a paradox they detect in appeals for government-subsidized incentives for innovation. On the one hand, the SE note, these appeals justify government funding by arguing that markets deal poorly with nonrivalrous, nonexcludable public goods like knowledge. Yet, when it is claimed that national subsidies are inefficient because some nations will free ride on the economic subvention of others, the same people, according to the SE, argue that tacitness will make the new knowledge "sticky" and so prevent free riding.[66] The two claims, the SE argue, are incompatible. Knowledge can't be both so "leaky" that markets fail, and yet so "sticky" that free riding fails. The source of this incoherence, the SE claim, lies in this quasi-mystical notion of tacitness that they seek to dismiss.[67]

Champions of the tacit are guilty, the SE argue, of concluding that what they can't see must be inherently invisible. While it may be true that a group of experienced colleagues may, in Polanyi's famous phrase, "know more than [they] can say," it does not follow what is left unsaid is fundamentally unsayable. Rather, the SE claim, the relevant knowledge is merely "latent" in such groups, whose members do not need to codify and thus lack incentives to overcome the "substantial marginal cost" of codification.[68] There is, from this point of view, no logical barrier between tacit and explicit, only an economic one.

There are many reasons to take the SE argument seriously. David, in particular, has helped show economists the problems of market failure and the limits of neoclassical approaches to knowledge, he is dubious about the benefits of the current intellectual property system, and he is committed to "openness" in science. Above

65 This paper has since been published as Cowan, David, & Foray (2000). As the quotations and page numbers used in my argument are from the working paper, which is still available online, I shall cite the later rather than the published version.

66 The SE paper doesn't actually provide examples of either argument but simply talks of "the standard argument" put forward by "proponents" who are identified as Harry Collins (1974), Michel Callon (1995), and Bruno Latour (who is indicted but not cited); a group that ideologically does not sit happily together.

67 The paradox of knowledge appearing both sticky and leaky is addressed in Brown & Duguid (2001), on which much of the discussion here is based.

68 For economic ideas of coding, see Arrow (1964).

all, he and his colleagues take the problem of the tacit seriously: "the nature of knowledge, its codification or tacitness, lurks only just beneath the surface of important ideas about economic growth" (p. 12).[69] Yet their dismissal is not as conclusive as they would like it to be. In the first place, they actually avoid the heart of the question they raise, setting aside the critical category of "unarticulated and unarticulable knowledge" as "not very interesting" (p. 14). Their conclusions thus arise from analysis of knowledge that they have agreed in advance is either "articulated" (and thus codified), or unarticulated but codifiable.

Further, in its analysis of codification (the process of transforming tacit knowledge into explicit knowledge), the SE's argument seems to have a logical flaw. Codification, they argue, merely requires a suitable codebook. With the right codebook, any piece knowledge becomes economically tractable. There are economic costs to producing such a codebook, but not, in the SE argument, epistemological barriers. They fail to show, however, how we come to understand any particular codebook in order to decode the knowledge to which it applies. A codebook must either explain itself or require another codebook to explain it. The argument is thus trapped between circularity (with codebooks explaining themselves) and an infinite regress (with codebooks explaining codebooks).

Of course there is another alternative. There could be another kind of knowledge to get us started.[70] This would seem to be what serious proponents of the tacit are trying to argue. In a tradition that stretches back less to the sociologists of science that the SE name than to Socrates and the *Meno*, a chain of arguments suggests that codified knowledge rests on an uncodifiable substrate. It is this that Polanyi (1966) calls not tacit knowledge, but importantly the "tacit dimension."

Beyond Information

Ryle (1949) makes a similar argument with his famous distinction between *know how* and *know what*. These two are not alternative kinds of knowledge. They are interdependent dimensions of knowledge. Consequently, *know how* doesn't reduce to *know what* -a book of codified knowledge. Rather *know how* allows us to interpret *know what* and make it actionable. Avoiding a regress, this tacit dimension or *know how* is logically distinct and separately acquired from the explicit or *know what*, but it makes the latter actionable. Usable knowledge is always two-dimensional. (Even theorizing, Ryle argues, requires a particular *know how* -the *know how* of theorizing.) Thus, while the SE argue that codification and explication are the essence of learning, Ryle suggests that no amount of explicit *know what* can produce tacit *know how*. We learn *how*, he argues, in practice.

This two-dimensional character of knowledge helps explain the contradictory character of knowledge from which the SE launch their argument. Those who have acquired *know how* through practice can make use of and understand related *know what*. Consequently, for them, codified *know what* related to that practice would be an inherently leaky, nonrivalrous, public good, able to spread readily and usefully among other practitioners. Scientific disciplines, professional societies, and other networks of practitioners (what Strauss (1978) calls "social worlds") share *know what* in documents, phone calls, faxes, email messages, etc. with relative ease. For those who lack the practice, the same *know what* is inherently sticky, communicating little or nothing actionable. Academics speaking outside their discipline, judges instructing juries in the law, economists talking to humanists all meet points at which the significance of what they are saying,

69 Others tend to skirt the issue. Mokyr (2002), for instance, notes the tacit and claims it is uncodifiable, but doesn't go on to weigh what the implications of that claim are. See also Nelson & Winter (1982), pp 76-82, whose conclusion on p. 82, the SE seem to be following.

70 The SE in part concede this point, noting that "Successfully reading the code ... may involve prior acquisition of considerable knowledge (quite possibly including knowledge not written down anywhere)" (p. 9). They give no explanation of how this is acquired.

transparent to the speaker and his or her "world," becomes opaque to the audience.[71]

It would appear, then, that the standard elision between information and knowledge can be problematic. *Know what* is pretty much what economists mean when they talk of *information* and is inherently "leaky."[72] It is the sort of stuff we pass around or store in ICTs. But to be useful, requires the requisite *know how*. While we can store or transfer information/*know what* in IT systems, while we can balance information asymmetries, while we can explore the transaction costs of information exchanges, the outcome of this effort is futile if the second dimension, the requisite *know how* is not in place. And *know how*, by contrast, is "sticky." It doesn't fill codebooks, cannot be stored or transmitted in IT systems, is indifferent to information symmetries, and can make transaction costs exorbitant.[73]

Beyond Individuals

Ryle's argument that we gain *know how* not through receiving *know what*, but through practice--through our engagement in the material and social world--puts him (perhaps surprisingly) in the tradition of practice theorists, a tradition that stretches back to Aristotle and has been recently revitalized by, among others, Oakeshott (1991) and Bourdieu (1977) and underpins Lave's notion of communities of practice. In this tradition, knowledge is less a thing than an aspect of the relation between a person and the world. Thus the knowledge of the high-energy physicists that Knorr-Cetina (1999) studied is "object centred," that is, the physicists' knowledge is structured around objects through which and on which they work. Similarly, the knowledge possessed by the technicians in Orr's (1996) classic study of the Xerox service representatives (or "reps") rose out of, was expressed in relation to, and is inseparable from the machines that they worked on. The knowledge of the navigators Hutchins (1991) studied or the physicists Collins (1974) studied again reflect the tools with which they work and world these tools make visible. In each case, the particular person-world relation of participants develops a particular kind of *know how* that makes related *know what* intelligible and actionable.

One corollary of this relational view is that knowledge is socially situated: the "world" in the person-world relation includes the social world —colleagues, competitors, clients, etc.— as well as the material world. Thus learning, in Lave & Wenger's (1991) view is not the acquisition of information, but the development of a social identity. In learning physics successfully, you learn to be a physicist--to act as and be recognized as a physicist. A second corollary is that people who share a particular practice and thus share similar person-world relations, come to share *know how* that allows them to communicate *know what*. The knowledge of the microbiologists Knorr-Cetina also studied is also object centered, like that of the physicists. But the objects involved are significantly different. Consequently, as Knorr-Cetina argues, the two fields construct their knowledge/identities differently and develop into distinct "epistemic cultures." As the notion of a "culture" suggests, the groups that form around practice are not merely combinations of individuals, as SC theory would argue. Shared practice creates social groups with distinct properties. In them, *know what* relevant to the common practice circulates efficiently and effectively (Kreiner, 2001) supported by the shared

71 Richardson (1972), whose work on networks formed by organizations is more insightful than much that has been written since, was evidently aware of Ryle's work and its implications. He argues, for instance, "Technology cannot always be transferred simply by selling the right to use a process. It is rarely reducible to mere information to be passed on but consists also of experience and skills. In terms of Professor Ryle's celebrated distinction, much of it is "knowledge how" rather than "knowledge that" (p. 895).

72 This argument that we produce information through elaborate processes (Duguid, 1996), echoes Tuomi's (2001) argument that. T. S. Eliot's often-quoted progression from data to knowledge is upside down.

73 Focus on information alone may not merely be ineffectual but also counterproductive. Incentives for codification may actually impede the development of know how, the ability, in SE terms, to decode. For example, educational and training systems tend to assume that the ideal place to transfer know what are technologies of learning (from the classroom to the computer terminal) that withdraw learners from the messiness of everyday life. They thereby hide from learners the very social-material conditions of practice from which we acquire know how. Consequently, some learning technologies can paradoxically increase the difficulty of learning. Of course, for learners that already possess the requisite know how, these technologies may work well.

substrate of *know how*. Of course, we share a great deal of practice by virtue of being human. But participation in specialized and esoteric practices inevitably reduces the number of people with whom we can communicate effectively about that practice--though we may be in the same bowling league.

Aside from humanity at large, two related kinds of social group that develop around practice seem of particular significance when trying to understand innovation. The first is the community of practice (CoP), whose members not only have a practice in common but coordinate that practice with one another. The second is the network of practice (NoP), whose members share but do not directly and systematically coordinate practice.

The Community of Practice

Developed in a theory of learning proposed by Lave and Wenger (1991), the CoP comprises a group of people who share, coordinate, and over time help to reproduce their practice. The CoP is the social locus through which aspects of a person's identity related to that practice are developed and in which that identity is performed.[74] A CoP's members are interdependent, their person-world relations significantly similar, their practice often collaborative, so the knowledge related to that practice is distributed across the collective rather than held by individuals (Hutchins, 1995).[75] These knowledge collectives do not fit easily with some conventional economic views of knowledge. Simon (1991), for example, argues that all learning takes place inside individual human heads (p. 12), while Mokyr (2002) argues that knowledge resides in people's minds (or storage devices) (p. 4). Social relations, collaborative work, and distributed identities do not figure into these models. The CoP perspective does not deny the integrity of the individual-given their distinct life trajectories, each individual's person-world relation, however similar to others', will be distinct. But the CoP perspective situates individuality in social relations, making separating individual from collective knowledge difficult and often pointless.[76]

Many organization theorists have found the CoP to be inherently attractive notion. But it needs to be noted that the process of identity formation is more or less indifferent to the identity formed. The concept would seem applicable the formation of drug using collectives (Bourgeois, 2002), Mafia families (Lewis, 1964), or the inner circle of megalomaniac dictators (Sebag Montefiore, 2003). Moreover, even more socially acceptable groups are not necessarily collegial or compliant. Invested in the reproduction of a practice over time, the CoP is rife with internal tensions around "continuity and displacement" (Lave & Wenger, 1991). Shared practice may provide grounds for a fight as much as grounds for agreement. Collective defense of shared identity also creates external tensions between a CoP and those who would change its practice from outside.[77] The CoP may

74 Everyone has multiple sites in which they acquire and perform identities. For many, their work identity is among the most significant (the answer to the question "what do you do?"). Given that any CoP member will have an idiosyncratic set of identity sites, CoP members, though they may have much in common, are nonetheless diverse.

75 Some people, and perhaps even Lave & Wenger, do not restrict the CoP to an interdependent group. It was with the purpose of distinguishing interdependent groups from groups of people that share practice but do not coordinate one another's practice that Brown & Duguid (2001) introduced the notion of the network of practice (see below).

76 Knorr-Cetina (1999) talks of a new epistemic subject, a procurer of knowledge that is collective and dispersed (p. 178).

77 Contu & Willmott (2003) have recently condemned the argument in Brown & Duguid (1991) as "structuralist functionalist" because it argued that a CoP of Xerox technicians furthered the aims of the company. The technicians proved an interesting example because by ignoring the company's instructions they did indeed protect it from its own folly. The paper did not claim, as Contu & Willmott suggest, that all CoPs have this property. After all, it was other CoPs in the same company that were the source of this folly. If all Cops merely reinforced the company's strategic goals, there would be no problems for the technicians non-canonical behaviour to solve. Whatever the functionalist appearance of the technicians, their CoP, in Orr's (1996) insightful account, highlighted the potential significance of local, communal knowledge. Probably antedating Taylor and certainly since Roy's classic studies (1952, 1953, 1954), the literature has been well-stocked with examples of disruptive workers and small group "goldbricking." Consequently, organizations and academics--even those who denounce organizational power--have felt free to disrupt small group cohesion or deprecate local knowledge. A central goal of Brown & Duguid (1991) was to give an alternative vision of local knowledge. It was not to deny that small group actions may undermine corporate interests. Vaast (2003), in her Ph.D. thesis explores "the dark side" of CoPs, showing that they may not act even in their own interests, let alone a corporation's.

then be less comfortable than an SC network.[78] But, as a site where knowledge is developed and shared, the CoP is critical to understanding innovation.

The Network of Practice

My schema reserves the term *CoP* for interdependent practitioners who share and coordinate practice and have implicit responsibility for the reproduction of their community. But most practices are shared by more than local practitioners. The *network* of practice designates the collective of all practitioners of a particular practice, of which the CoP is then a subset. Thus Knorr-Cetina's (1999) epistemic culture of high-energy physicists constitutes a global NoP, within which individual labs are the sites of local CoPs. Equally, there is a worldwide NoP of some Xerox 20,000 technicians doing similar jobs; within this, the CoP of technicians that Orr (1996) studied formed a subset.

It needs to be acknowledged that *network* is on its own a vague term (Zucharman, 2003)--as indeed is *group* (Merton, 1968) and *community* (Williams, 1976). There are economic networks (some of which replace market relations, and some of which include market relations) and there are social networks (in some of which the people know each other and in others they don't). There are networks where the intriguing feature is the nodes, and networks where it is the link. There are networks with heterogeneous nodes or links, and networks with homogeneous nodes or links. There are formal networks, and there are informal networks. In truth, almost any aggregate can be called a network. Some discrimination is useful.

The NoP is a primarily social non-market network, with nodes comprise CoPs or individual practitioners. The similarity of the practices and, by extension, the person-world relations they engage in and the CoPs they are part of unite the members of this network.[79] (The SC network is similar, but it comprises individuals who are connected by social ties rather than ties of practice.) Within these NoPs, common practices allow the members to exchange *know that* and common person-world relations allow this to be "reembedded" (Giddens, 1990) in a local context in a relatively effective, coherent way.[80] In such networks, then, as Ryle argues, practice precedes theory, providing the substrate on which theoretical knowledge circulates. In attempting to move between NoPs —even along paths built by SC— where by definition practice is not continuous, knowledge is likely to stick.

The CoP and the NoP are ideal types that like most sociological categories suffer "boundary specification problems." Relations among members are most dense in the CoP and fade gradually towards oblivion at the outer reaches of the NoP as the amount of practice in common diminishes and the variation in person-world relations grows. Boundaries between CoP and NoP or between NoP and other practices and practitioners are not necessarily well defined. The major distinction between the CoP and the NoP turns on the control and coordination of the reproduction of a group and its practice. Within a CoP —whether it is a department of economists in a university, a group of coders in an IT department, or a criminal "family" in a New Jersey suburb— members influence who joins and under what terms and so directly affect the evolution of local practice.[81] NoPs, by contrast, are more extensive and less coordinated.

78 It is often forgotten that Coleman (1988) insisted that SC accounted for such things as cartels and could reduce innovativeness. Constant (1989) makes a similar point about "communities of practice" (though his use of that term is closer to the NoPs described here).

79 This last is an important distinction. Different person-world relations make the network of nurses distinct from the network of doctors (Leonard & Sensiper, 1998); the network of accountants distinct from networks of forecasters (Arrow, 1984); or networks of conmen distinct from the genuine practitioners they imitate. The information that circulates among these similar groups may be quite similar, but the way in which it is interpreted and used is distinct.

80 The work-related NoP is thus similar to Barley's (1988) occupational communities, but NoPs are not necessarily occupation related. Many in the NoP of OSS coders, for example, do it as a hobby not as part of their occupation.

NoPs offer a powerful example of the kind of networks along which information, supported by shared practices, moves with extraordinary efficiency —and where it can be easily supported by ICTs. Powell, Koput, Smith-Doerr (1996) reveal networks stretching through diverse institutions--universities, research labs, small firms, large corporations— distributing knowledge across organizational boundaries, even in the competitive world of biotechnology. The "locus of learning," these authors argue, is the network rather than the individual firm. Their study focuses for the most part on formal networks. Kreiner & Schultz (1993) discuss similar but informal and often unauthorized links that sidestep formal restrictions but allow practitioners in one organization to draw on knowledge generated elsewhere and circulating through NoPs.[82] Such leakage along NoPs does not only involve science or high-tech NoPs. Every profession has its workshops, conferences, and annual meetings for knowledge sharing, and most practitioners at one time or another reach out across competitive boundaries to draw on connections in other companies. As Offer (1994) argues, the market economy has always been porous. NoPs do not necessarily show us something new, but they do help us to see where the leaks have and have not been occurring.

They also help us understand the value of leakiness. The density of such NoPs, the distribution of practitioners, and the extent of leaking help explain the vitality of industrial districts (Marshall, 1916; Almeida & Kogut, 1999; Brown & Duguid, 2001) and their "regional advantage" (Saxenian, 1994). Networks running across districts like Silicon Valley help overcome "innovators' dilemmas" (Christensen, 1997) by pushing knowledge from where it is developed but stuck to where it is more likely to be used. In so doing, NoPs may help spur aggregate growth, but at the expense of the initial innovator--an outcome that questions the advisability of tight intellectual property rights and hermetic "regimes of appropriation" which separate the rights individual economic actors from the interests of larger collectives.

Innovation and Communication

We have so far looked from the perspective of practice at, for the most part, the circulation of knowledge. Any theory of innovation has also to explain its production. At base, invention requires having new ideas, which, from a practice perspective, entails a change in person-world relations. As neither the world nor an individual's identity is static, this relation is always changing.[83] New practice remains like a private language if kept at the level of the individual. When it becomes social practice, it has taken an initial step on the Schumpeterian journey from invention to innovation, which, as Tuomi (2002) argues, "happens when social practice changes" (p. 10).[84] This definition helps map the terrain on which innovation can occur, from changes in local practice within a community, to changes propagated along a network of practice, to —the most challenging of all— changes spread beyond the network to affect other practices. In this way, the social context is both a determinant and a register of innovation.

Within CoPs, novelty can propagate almost invisibly through coordinated practice. It may not always do so, however. As a site of identity

81 Continuity is important here. Transient groups of people--work teams--that do not reproduce themselves over time are not, in this analysis, CoPs. Of course, workplace CoPs don't usually get to choose their members, but as Lave & Wenger (1991) point out, such groups have their own powers of exclusion which can give them a certain amount of control over their reproduction. They also accrue their own knowledge, which can give them a certain amount of power in relation to formal organizations.

82 For recent work on networks, for example, the Tedis group in Venice (Charvesio et al., 2003) and Teigland's (2003) Ph.D. dissertation at the Stockholm School of Economics.

83 Knowledge is a dynamic phenomenon, though paradoxically, a great deal of unnoticed effort seems to go into both keeping routine stable in a changing world and keeping the effort involved in stabilizing routine invisible. Dynamic in the cause of stability, we conceal from ourselves, as Suchman (1989) has shown, a great deal of the spontaneous change to which we are involved.

84 Edquist's (1997) notion of introducing new knowledge or new combinations of knowledge into the economy, Mokyr's (2002) idea of new useful knowledge, or Nelson & Winters' (1982) idea of "changes in routine" are all congruent with Tuomi's (2002) definition, but tend to focus on knowledge and to heighten the tendency to think of knowledge as a self-sufficient entity with inherent properties. The importance of Tuomi's definition is that it changes focus to practice.

formation, CoPs represent major personal investment by members. Change, whether driven from within or without affects those identities and can meet with strong resistance. The battle between continuity and change can be fierce.[85] Beyond the CoP, new ideas can also spread among practitioners, though as noted the varying social and material circumstances in which it must be re-embedded will cause mutations. As NoPs are less tightly coordinated, resistance to change is less likely to be as fiercely contested. New ideas can simply be ignored until demand for network coherence becomes unavoidable. Even scientific communities seem able to manage in practice a fair amount of loose coupling and incoherence, though they are, as Ziman (1968) notes, more committed than the humanities or social sciences to seeking consensus.

Once the practitioners are separated, however, the challenge of communication among them grows. Academic NoPs, while useful illustrations (given the likely audience of this paper), can conceal the challenge of communication because, unlike many NoPs, communication is very much a part of their practice. Sociologists of science seemed shocked to discover that writing is central to scientific practice and documents are critical scientific instruments (Latour & Woolgar, 1986), but reflective scientists have long recognized this (Ziman, 1968). Scientific publishing does not merely record scientific practice; it is, as Ziman noted, scientific practice. Yet even here where the process of dis-embedding and re-embedding, of annunciation and interpretation, are part of practice, communication cannot be taken for granted. But the disciplines have highly formal processes to help promote communication in the network (these are undoubtedly backed up by many informal processes). In networks where the practice does not involve communication and formal systems are not in place, dis-embedding *know what* from practice can be far more demanding and the task of formalizing and of dis-embedding alien to practitioners and resented. ERP and other systems that demand increasing formal reporting can be seen by people then not as an extension of their practice but a burden upon it (Micheelson & Damkjar, 2002). The failure of "knowledge management" systems, often designed by people to whom the demands of academic communication have become relatively invisible, may arise from this extra and complex demand (Hansen, 2000; Bansler & Havn, 2002).[86] Although they may appear to offer an easy solution to spreading "best practice," building ICT connections between practitioners may raise as many problems as it solves.

While inevitably the challenge of changing practice locally and spreading knowledge along a network is more demanding than this schematic sketch can show, it is clear that incentives for innovation and communication face different forms of stickiness, from individual resistance to changing identity, to collective resistance to demands of embedding and re-embedding, to unexpected differences between embedding conditions. In this regard, no one should expect ICTs to offer a simple solution.

I have laid out the CoP and the NoP so extensively because I think they help draw distinctions between SC and CoP theory while offering insight into the way knowledge flows and fails to flow. Thus they help explore, on the one hand, incentives to promote knowledge flow that include but are not limited to social capital, and on the other, the contribution ICTs can and cannot make--central issues in a knowledge society and issues to which I now turn.

85 Contu & Willmott (2003) insist on setting CoP relations in the context capitalist relations. Of course, in a capitalist society, these relations are unavoidable. The challenge is to understand how these relations manifest themselves in any particular CoP. It is important to note that while many CoPs are inevitably the product of capitalist organizations, the CoP as a social structure antedates capitalism. Moreover, CoPs may develop in a semi-autonomous fashion and their reproduction may exist in tension with changes dictated by the formal organizations of capitalism.

86 The "sceptical economists" (Cowan, David, & Foray, 1999) are thus right to point to the substantial overhead of encoding, though wrong to assume that, once that is done, re-embedding is relatively costless.

Epistemic and Ethical Dimensions of Practice

Economic studies of the contribution of innovation to growth imply that society develops by promoting the codification of knowledge (Cowan et al., 1999), providing access to information (Mokyr, 2002), reducing the transaction costs (Williamson, 1981) and protecting private interests (North, 1982). Social capital theory reflects most of these views, implying that the accrual of social capital, by increasing trust in particular, reduces transaction costs and so increases economic efficiency (Coleman, 1988; Nahapiet & Ghoshal, 1996).[87] A practice perspective modifies these notions of codification, access, and costs as the critical elements for innovation along two distinct dimensions, which for brevity we might distinguish as can/can't versus will/won't. On the one hand, even with access, there are difficulties around what people can share. On the other, there are also difficulties concerning what people will share. These challenges, it should now be clear, are not simply economic. Local communities and even disaggregated networks of practice may simply not want to share what they know (Constant, 1989); or (and this lies on the same dimension but is less discussed), they may not want to hide what they know, despite the existence of regimes of appropriation. To clarify these dimensions, we need to understand a bit more about the epistemic and ethical consequences of practice.[88]

Epistemic entailments: can/can't

Modern society organizes itself around a division of labour, which might as easily be called a division of practice. As practice gives rise to knowledge, these divisions have epistemic implications. The division of labour/practice, as the argument presented so far would suggest, produces a division of knowledge. Knorr-Cetina (1999) helps clarify this process in talking of an "epistemic culture" (which she likens to a Durkheimian collective conscious). Cultures are determinants of meaning, so, as most people accept, within cultures, knowledge can travel with relative ease; between, it usually cannot flow without difficulty.[89] The same is true of NoPs, which are epistemic cultures under another name. Promoting flow within a NoP, as suggested, is relatively easy. Promoting it across the epistemic gulfs between practices is much more challenging —even when the different practices lie together within an organization (Bechky, 2003; Carlile, 2002; Osterlund, 1996)— but critical to promoting innovation and in dealing with such things as "complementary assets" (Teece, Rumelt, Dosi, & Winter, 1986).[90]

This problem of "stickiness" is well recognized, though it is not always considered in terms of practice and is instead often addressed as a problem of information, to be addressed by ICT. Simply pushing information across an epistemic gulf is not, my argument suggests, a great deal of help. Alternative strategies for bringing two different communities into alignment, include using standards, routines (Nelson & Winter, 1982), boundary objects (Star & Greisemer, 1989), or boundary spanners. Most of these, however, tend to be fairly static, establishing a fixed relationship between two communities but offering little scope for dealing with the dynamics of a changing relationship.

The challenge faced here may help clarify the advantages of the famous "lean" Japanese manufacturing over the conventional U.S. system (Womack, Jones, & Roos, 1990). The U.S. system, in the tradition of Taylor and Ford, works with an

87 Some differ over whether social capital has tangible financial returns for a firm. Nahapiet & Sumantra (1996) seem fairly confident that it has, whereas Cohen & Prusak (2001) despite their title, are more agnostic.

88 While Foss (2003) argues that organizational analysis does not consider interactions of "cognition" and "motivation," this paper attempts to connect the two along these epistemic and ethical dimensions (see below), though probably not in a form that Foss would approve.

89 Mokyr (2002), for example, acknowledges the difficulty of getting knowledge from Europe to Asia and vice versa. While economists seem willing to acknowledge cultural differences on this large scale, they seem less willing to consider them on a smaller scale.

90 Richardson (1972) more judiciously called them "complementary activities," which opens the door to the significance of practice.

entrenched mental/manual division of labour.[91] Cars are built by workers on the production line, who report to foremen who do not work on the line. Through the foreman, who stands thus at one remove from the practice of the line, lies the path to the rest of the system, the mangers, the engineers, the designers, and so forth. Communication, in this system, has to bridge all these divisions and cross the gulfs of practice/knowledge that separate them. One way to deal with this challenge is to formalize reporting, but formalization has ultimately to predict in advance the character of the problem. If formalization is rigorously followed, nothing fundamentally new can be reported. The U.S. system, though encumbered with ICTs, has a great deal of difficulty dealing with novel problems. Here, information may flow, but unexpected knowledge (the critical knowledge to repairing breakdowns) sticks.

The lean system also works around about a division of labour, but not only are there many fewer divisions, there is also a great deal in the structure that helps avoid or bridge them. For instance, less hindered by mental/manual divisions, the workers on the lean lines have responsibility for many of the issues that arise there (Womack et al., 1991). Work groups can address the challenge of understanding the issue itself, without having to deal with the extra challenge of how to communicate it to someone both outside the team and outside the practice--who, if and when the problem is understood, must face the mirror-image problem of communicating what is to be done back to the workers on the line. Where such divisions cannot be avoided, efforts are made to blur the boundaries of practice. Japanese engineers, for example, spend their first three months with the company on the production line. This makes them participants--if only novices--in the practice of manufacturing. Similarly, when production on the line slows, line workers are sent out to work with the sales force, where they get to understand the challenge of selling what they build. As a result, through common practice, epistemic barriers become usefully susceptible to leakage.

Ethical commitments: will/won't

Lean car production illustrates, from a practice perspective, how knowledge sticks or flows at the boundaries between practice and suggests a couple of ways to get around the problem in the context of formal organization. But even where knowledge can be shared more easily than this, we also need to understand why and when people will and will not share what they know. Regimes of appropriation assume that those who have competitive knowledge will not share it with those outside the regime. Conversely, knowledge management systems tend to assume that people will share the useful knowledge they have. Incentives are offered in both cases. Despite these, however, people will sometimes share what they are expected to hold secret, and conversely will not share, despite encouragements, when they are expected to reveal (Constant, 1989). People may resist incentives from the market economy aimed at individual self-interest on behalf of collective interests and what Thompson (1971) famously called the "moral economy." Knowledge, that is, may stick or flow for ethical rather than epistemic reasons.[92]

In creating social allegiances, the division of labour produces ethical as well as epistemic commitments. As Marx and Engels (1978) argued, those among whom labour is divided develop a "communal interest" (p. 53). Durkheim (1960) expands this notion when he argues that "The division of labour becomes a predominant source of social solidarity at the same time it becomes the foundation of the moral order" (p. 333).

91 Along with an entrenched mental/manual division of labour (which is also evident in its highly managerial sports), the U.S. has a profound faith in the power of explication. Toulmin (2001) argues that this faith may be misplaced. He notes intriguingly that people may agree in practice but, when they articulate reasons for this practice, come to disagree. Eckert (2001) gives a nice example of a group of girls who use an image to represent their unity, but when they are asked to explain what the image means produce quite different explanations.

92 Epistemic and ethical commitments are, in my account, more collective than the individualist motives discussed by Foss (2003). See Bollier (2002) for another look at the "moral economy".

More recently, the ethical philosopher Alasdair MacIntyre (1981) argued that "the self has to find its moral identity in and through its membership of communities" (p. 205).[93] Thompson, following Marx, suggests that such social groups will resist, in the name of their moral interests, changes in the economic and social order that they deem unreasonable.

Thompson draws his example from the late eighteenth century. Across the century, people resisted the shifting power that came with the rise of capitalism and that was felt in, among other things, the denial of customary rights and the appropriation of common land (which, *pace* Harding, had been developed and protected through collective action (Moor, Shaw-Taylor, and Warde, 2002)) or of collective produce by individual interests. People responded particularly aggressively when they found factors taking or simply pricing corn produced locally out of local markets in order to sell it elsewhere, resulting in some cases in local starvation. To prevent this, locals seized departing shipments, organized impromptu markets, and sold the corn at prices the local market would bear (delivering the income to the owner). These collective actions, Thompson argues, reflect the struggle of the moral economy with the market economy.

I will elaborate on implications of this moral economy and its tension with the market in the following discussion of "open source" software [OSS]. For the moment, it is worth emphasizing how practice, through creating ethical commitments, can create significant tensions between identities of allegiance, such as membership in an organization and identities of practice, such as participation in a profession — tensions that may actually pit social capital against a moral economy. Ziman (1968) highlights the way organizational mandates for secrecy and authority and professional obligations to openness and freedom can divide the loyalties of scientists working for corporations quite problematically.[94]

Open Source Practice

The success of OSS —whereby remarkably robust software has been created by loosely connected, independent programmers (von Hippel & Krogh, 2003— has challenged notions of the firm as a critical site for innovation (Schumpeter, 1947; Chandler, 1962; Nelson & Winter, 1982), while turning attention instead to the loose, informal networks which produce OSS.[95] OSS has also questioned the idea that well-defined and well-protected individual property rights are the price society should pay for the efficient production of socially beneficial intellectual goods.[96] Consequently, it seems a useful site to address issues raised in this workshop and this paper. This section, then, situates ideas discussed already —of CoPs and NoPs, of incentives, innovation and communication, and of epistemic and ethical commitments— in the context of OSS, while addressing central themes of the organization of a knowledge society and the incentivization of innovation.

CoPs, NoPs, and formal organization

OSS coders present interesting examples of CoPs and NoPs. Though some researchers (Kogut & Metiu, 2000) have labeled the collective of Linux contributors a CoP, this collective is too large and amorphous to fall under the present use of the term. It would, however, qualify as a NoP: the membership do share a common practice (coding) and very similar person-world relations. On the other hand, within distinct groups working on a particular project--a driver, port, or most critically a kernel--members fairly directly coordinate how

93 As both are cited in this paper, it should be noted that Toulmin and Giddens reject MacIntyre's view of moral order.
94 Bourgois (2002) offers another interesting example of the moral economy at work, this time among intravenous drug users, whose ethical commitment to share leads them to share needles despite the risk of AIDS.
95 Some researchers see these networks as foreshadowing the economic structure of the future. See, for example, Castells (2001), Lamoreaux, Raff & Temin (2002), Piore & Sabel (1984), and Sturgeon (2003).
96 OSSS cleverly (if a little quixotically) uses IP law to defend itself (O'Mahony, 2003)

tasks will be divided or shared, who can and cannot "commit" to that particular project, and so how the group evolves over time. Consequently, these smaller projects, coordinating practice and helping determine its reproduction, qualify as CoPs by the definition offered above. Membership in these NoPs and Cops is clearly not by affiliation or association, it is through practice. Indeed, OSS communities involve a fairly strict meritocracy. You perform your membership by contributing. If you cannot hack, you can't belong. There is no other qualification. In that way, OSS coders might be thought of rather pure CoPs and NoPs, where the centrality of practice is not obscured by institutional or organizational distortions.

On the other hand, OSS communities are distinct from most other CoPs because they do not seem to require the face-to-face interaction. Before embracing ideas of the death of distance and the end of face-to-face interaction, we should note the peculiarities of this particular practice. Not only does practice here almost always engage seamlessly with global communications technology, but also that technology and the projects involved, though highly sophisticated, constrain practice tightly within quite distinct limits. Consequently, face-to-face communication may become less important. Outside those limits, when, for example, trying to develop complex new features such as the implementation of SMP in FreeBSD (Jorgensen, 2001) or to plan the future of the Linux kernel, coordination does indeed seem to require face-to-face interaction. Moreover, OSS practice is surrounded by robust face-to-face institutions that support it almost invisibly. Not only do firms and universities support most people who work in OSS (Lakhani, Wolf, & Bates, 2002), but such organizations introduce OSS coders into the practice.[97] Indeed, rather than the alternative to conventional forms of business and education that some theorists envisage, OSS networks appear to be complementary to them, feeding off and feeding into formal organizations. Instead of seeing the history of organizational forms as one of replacement, with networks replacing firms, it may be better to see them in terms of increasing differentiation and complementarity: networks and firms, not networks or firms. But this complementary relationship also suggests how practice-based communities and networks may be distinct from and conceptually orthogonal to social capital developed inside a firm.[98]

Barriers to communication: epistemic commitments

In their success, OSS networks illustrate how knowledge can spread within a NoP, pushed by both the will and the ability of practitioners to share and constrained by the common material world they work with. Unfortunately, OSS networks also help illustrate how difficult it can be to move knowledge across divisions of practice--even in a relatively static form--particularly across the division between producer and consumer. OSS coders, unexpectedly successful in providing software along their networks, have had a great deal of difficulty addressing directly the practices of "ordinary" computer users outside these networks. (OSS coders, for the most part being anything but ordinary.) In ICTs, the conventional way this is done is through user interfaces. These form a boundary object (Star & Greisemer, 1989) coordinating the two different practices (of expert and ordinary user) without demanding that practitioners on either side understand each other. The boundary object and its designer mediate between both practices--this, indeed, is the critical challenge and importance of good design.

Within its networks, OSS has developed around a system of progressively transparent, modularized black boxes that, when necessary, can be opened and inspected, but otherwise can be taken for granted (Tuomi, 2001). Programmers

97 Moreover, such institutions, often unknowingly, launched central features of OSS including Unix (at AT&T), GNU (at MIT), BSD and BIND (at Berkeley), Linux (at Helsinki University), and Apache (at NCSA)

98 This distinction is not made to deprecate SC networks, but to note that they should not be confused with NoPs and CoPs.

can take them on trust or inspect them at will. This strategy does not work so well with unsophisticated computer users, for whom the closed box is as opaque as the open one is a quagmire. What they need is less like transparency and more like a mirror: users need to see not the inside of the programmer's strange world (which OSS wonderfully provides), but a reflection of their own, familiar world.[99] For the distance between the two sides to be bridged, it first has to be understood as one not of information shortage--to which the conventional response merely burdens the user even further (Brown & Duguid, 1996b)—but of distinct practices. OSS has struggled to reflect ordinary practice in its interfaces— even with the Windows-like GNU/Linux graphical user interfaces KDE and GNOME.[100] Here we may perhaps be confronting one of the limits of these creative networks such as OSS. Weakened by their own strong ties (Granovetter, 1973) though very good at reinforcing the knowledge within the network, they face difficulties in developing the necessary "negative capability" to understand those outside the network and to look on their own practice from an outsider's perspective. That task —particularly as it is represented in the ordinary-user interface— may not be decomposable, may not, in Raymond's (1999) terms, be made shallow by multiple eyeballs (Jorgensen, 2001). For that reason, it may require complex organization and, perhaps, complex organizations, too.

In the struggle to overcome epistemic barriers, we may start to understand, in terms of practice, the complementarity between the firm and NoPs such as the OSS projects. As already noted, there has been a tendency to think of the relationship as one of replacement, with the network replacing the firm. Benkler (2002), using an argument developed around human and social capital, suggests that IT has reduced the transaction costs that, according to Coase hold the firm together. By decomposing tasks into small, modular granules, IT makes it possible for human capital to assign itself to tasks that previously required the hierarchy of the firm. He gives examples of Slashdot, OSS projects, Project Gutenberg, Napster, Google, Amazon rankings, and NASA "clickworkers". All of these draw on distributed contributions of individuals, and each is remarkable in its own right. But reading from left to right, each requires larger and larger organizations either to decompose the task for modularization or to re-aggregate the results.[101] None of this argument either invalidates or deprecates OSS (or ICTs). It does suggest, however, that as with technologies (Duguid, 1996), so with organizational forms, replacement may be less common than augmentation and complementarity. The core competencies of successful organizations may lie in their ability to coordinate practices that, without external prompting, would be increasingly inward looking (Adler & Borys, 1996; Adler, 2003). It the realm of user interfaces, the relationship between Apple and the freeBSD OSS project may exemplify this complementarity. OSS may, then be telling us where NoPs can replace formal organization and, by the same process, where they cannot.

Barriers to barriers: ethical commitments and moral economies

As well as exemplary CoPs and NoPs, OSS coders provide an interesting example of ethical commitment and a moral economy at work.[102] Clearly, code is not corn and starvation has not been a significant problem for OSS coders as it was for the labourers Thompson studied. The parallel lies in the resistance to the appropriation of local

99 When Apple redesigned the Xerox user interface, it wisely reduced choices and simplified options that would have overwhelmed its customers. The vilified single-button mouse is a legacy of this process.

100 KDE, which is designed for the user to have greatest control over the configuration of the interface, is particularly difficult for people who may not understand either the implementation or the implications of the choices they are offered.

101 The original Napster, of course, relied on the recording industry and Project Gutenberg relies on the publishing industry--as, more directly, did the Oxford English Dictionary, another favourite example of open source at work avant la lettre (Lessig, 2001).

102 Shared practice may also produce shared aesthetic commitments. Moody (2001) notes that shared aesthetics are one way OSS practice limits a tendency to "fork". See also Tuomi (2002) p. 175.

labour and the denial of access for workers to what they helped produce. In OSS, the primal case is the deal between MIT & Symbolics, which in the name of intellectual property denied programmers at MIT access to their own code (Levy, 1984; Moody, 2001). Similarly, copyright agreements between the University of California, Berkeley, and AT&T and then Novell attempted to deprive university coders access to Unix code, even though they had developed a significant amount of it. In both cases, the coders responded by creating or releasing code in such a way to guarantee continued local access. As the projects developed and contributors spread, the underlying commitment to resist closure was woven into the practice of coding. (Though there are many other reasons for contributing to OSS, a recent survey found more coders contributing because code "should be open" than for any other reason (Lakhani et al., 2002).) OSS and closed code offer two distinct approaches to the incentivization of innovation. OSS involves NoPs where people, because they share practice, can circulate the knowledge they have developed. Economic incentives and legal restrictions try to arrange things so that they will not share. The moral economy, however, leads people to share. Hence, although there may be complementarity between OSS networks and formal organizations, there is also a good deal of tension.[103]

In this OSS networks are not entirely new. Like scholarly communities, they are part of a broader historic tradition in which ethical implications of social ownership and customary rights are closely associated with the epistemic implications of the practice. Mauss (1990) analysed this tradition in his study of the "gift," which as Douglas noted is part of a French social tradition in reaction to Anglo-Saxon individualism. For Tocqueville and Durkheim as for Mauss the individual was also a social being who of necessity drew on humanity's common stock, but in so doing incurred social obligations to contribute to and maintain that stock in common. Neither the gift economy nor the moral economy is separate from the market economy. All are entwined, as markets are "embedded" in the social world (Granovetter, 1984). Creating markets and equitable market incentives, then, becomes a remarkably tricky endeavour.

Many of these ethical commitments also emerge in SC networks, but they are not necessarily a commitment to practice-based activities. For that reason I suggest the resistance is fiercer in NoPs than in other, heterogeneous networks. By rewarding individual ownership and building barriers around intellectual property, the incentive system attempts to separate individuals from the network in which they shaped their identity and out of which their product came. Intellectual property rights make private what was built on public resources and exclude from practitioners products to which their collective practice has contributed. Within NoPs, dividing individual production from collective contributions in an equitable way is particularly difficult. The reaction to artificial developments may be correspondingly fierce and the ability to disrupt division more effective. Indeed, OSS may only be the latest (and most successful) in a tradition of resisting appropriation among loose networks of expertise.[104] Thomas Rogers, one of the great early railroad designers, provided specifications of his improvements to the Patent Office, but did not request a patent (Kahn & Sokoloff, 1993). Eli Whitney was also generous in providing details of his gin to other innovators, and was forced into court primarily to keep his inventions open by prosecuting those who tried to patent and profit from what Whitney had shared for free (Scotchmer, 1991). OSS, which uses copyright law to promote rather than restrict the right to copy, inherits this tradition of using the intellectual property regime against itself and of putting the moral economy ahead of the economic

103 Undoubtedly, all members of OSS networks do not share equally in the moral conviction--see, for example, the difference between the "free" and "open" software movements--but the practice creates strong pressure to observe certain ethical norms and to resist the commodification of collective products.

104 Thompson (1975) also writes about how laws were "turned" against those who wielded them most aggressively in the eighteenth century.

economy.[105] The particular moral economy of OSS has been sufficiently productive that it suggests we may need to reassess the relationship between networks of practice and formal organization, the moral and the market economy.

Conclusion: IT & IP--Open or Closed?

The paper has attempted to lay out a set of relations among social practice, social entities (the CoP and the NoP), and social commitments (ethical and epistemic). In so doing, it has tried to highlight practice and its entailments, suggesting that these distinguish CoP theory from SC theory. And it has sought to look beyond information and beyond the articulated interests of individual rational actors in order to understand the complex social contexts in which knowledge is created, acquired, and circulated. In so doing, it has suggested that neither ICT nor SC, critically important though both are, are sufficient to bridge epistemic and ethical divisions created by practice. Similarly, it has suggested that our intellectual property system [IP] may be introducing and reinforcing divisions which it would be better to try to overcome.

In conclusion, I shall try to sketch some implications of these claims for ICT and IP respectively, before ending with some policy suggestions.

ICT

Focussing primarily on information and individuals, economists presume that communication involves the circulation of information and that new information technologies simply reduce communication costs —see, in particular, Mokyr's (2002) interpretation of Eisenstein (1983)— and thereby help promote the spread of knowledge. As I have argued, ICTs deal primarily with the explicit dimension of knowledge. Thus they can promote leakiness of information without being able to overcome stickiness of knowledge —the paradox that the sceptical economists found puzzling. That is, ICTs are powerful disseminators of dis-embedded information but not of the tacit dimension. To receive and re-embed that information successfully requires the relevant practice to be in place already. ICTs need to be designed, then, with practice in mind.

Eureka (Bobrow & Whalen, 2002), a well-known knowledge-sharing ICT system implemented by researchers from Xerox. Helping to circulate practice-based tips among the network of technicians, it is an example of a elegant and successful ICT implementation. It implicitly relies, however, on the extensively shared tacit knowledge of a large body of technicians that has been built up by the common practices in which they engage and to which the tips apply. Further, in its design, the Eureka system also honoured the epistemic commitments of the technicians. At the technicians' request, for instance, the designers abandoned the initial plan of financial rewards for tips and relied instead on the technicians' moral economy and the value of peer recognition it embraced. As we recognize the system's success, it is important to understand its practice-based limits. Eureka worked well within the NoP of Xerox technicians worldwide —people who shared a similar practice, working in a similar way on similar machines. It has proved difficult to use the system to move knowledge between the technicians and the designers and engineers to whom this system and its tips might in theory provide insight into the real-life use of the machines the company builds. From the perspective of practice this is not surprising. The reps' understanding of the machines is not the same as the engineers'.

The model has also proved relatively hard to replicate in other domains (Bansler & Havn, 2003). This may be because alternative implementations have ignored the significance of the NoP to the success of the system and tried to use similar platforms to move information across boundaries of practice— in essence attempting to transform Eureka from a peer-to-peer service, as which it has been particularly successful, into a hierarchical

105 For another fight over the transformation of public goods into private ones, see the fight over the human genome involving Craig Venter, Celera, and the publicly funded Human Genome Project.

one. The argument presented here suggests that this will not succeed, both for epistemic and for ethical reasons. Intriguingly, Orlikowski (2001) describes a system designed to cross boundaries (between academics and students) which became successful and transformed itself in practice into a peer-to-peer system among students alone. The successes and failures of Eureka-like implementations intimate that developing ICTs to spread innovation, and understanding the successes and failures of such developments, requires taking into account not just social capital (though that may be important) but also social practice and the epistemic and ethical commitments it gives rise to.

IP

While, in the right circumstances and within the confines of shared practice, ICT dramatically furthers the spread of information and encourage openness not only of software, but also of science more generally, we cannot jump to the conclusion that the technology inherently favours openness and access or that it reduces transaction costs. The degree of openness is a function of design and use. ICTs actually make very good black boxes and in so doing can both disrupt social capital and violate practitioners' moral economy. They can, for example, hide code in binaries, a transformation which drove the early "free software" proponents to resistance. It can also make secure or "trusted" systems for "digital rights management" (Stefik, 1996) and other forms of biased (Innis, 1951) communication and exchange (Bar, 2001). When combined with the belief that innovation is best promoted through IP, these ICT capabilities contribute to a more general and more worrying trend towards closedness where fear of leakiness outweighs all other considerations. Technology is continually being redesigned to offer more tightly defined and finely divided control over property rights with the implicit justification that, because IP has made a significant contribution to economic development, ever-stronger IP will make an ever-stronger contribution. But in the process, the balance between private control and public disclosure that IP previously maintained (Jaszi, 1996) —though not without difficulty (Litman, 2001)— is being lost. David (2000) notes the increase in patents that reveal little and in new forms of copyright than can reveal nothing (particularly binaries), while Kelty (2001) describes a move from Ziman's "public knowledge," theoretically accessible to all, to "publicly visible, privately owned" knowledge, where access may be denied. This trend not only violates the moral economy of numerous NoPs, but it is corrosive to SC. The use of peer-to-peer networks to share copyrighted files would seem to be a reaction to this trend of restrictions and privatization.

The trend towards secrecy moves innovation to some degree away from IP, which traded publication for legal protection towards trade secrets and the "code of code" (Lessig, 2000), where nothing is revealed. In many ways, this is a move back in time to a period when inadequate IP protection encouraged extraordinary efforts to maintain secrecy. Two hundred years ago, entrepreneurs hired idiots and customs officers searched suitcases in the effort to stop knowledge flowing ("Josiah Wedgwood", 1867; Shaw, 1864). Now we do it more efficiently with ICTs. But this movement is not entirely away from IP —only from those aspects of IP that demand reciprocal openness: copyright and patenting. The third leg of the IP stool, trademarks, plays an important role in the ability to maintain secrecy and yet sell goods. Arrow (1984) argues that purchasers rely on institutional endorsement to warrant what they cannot inspect for themselves. Trademarks provide a similar kind of endorsement. When you download an Open Source package, you can inspect the code. When you buy a proprietary, shrink-wrapped, licensed package, you have to rely on the accompanying trademark to warrant the product. Trade secrets and trademarks, the underappreciated facet of IP, play together, allowing firms to resist openness while working in open markets. Successful brands are a remarkably powerful form of IP, tipping the rents in complementary assets from the ideal shared state that Teece (1986) suggests towards the strongest brand in the chain, which then squeezes all others (Duguid, 2003). They are also, unlike copyright and patents, not limited to a set period.

Even OSS does not escape the power of trademarks. While it has subverted copyright (in "copyleft") and resisted patents, it has embraced brands (O'Mahony, 2003). Linux is a trademark, one whose power may help account for the software's ascendancy over the various flavours of BSD. While the Linux network, wary of the centralization of copyrights in the Apache OSS model, keeps copyright distributed among those who write the code, its brand is privately owned. Red Hat's remarkable market value after its IPO shows the power of such brands. And given the paucity of business models under the GPL, it is not wholly surprising to see another OSS distributor, Mandrake, trying to monetize its brand. Brands in other sectors change hands every day. It would not be surprising to see them change hands here. The Unix brand, after all, has been alienated from the Unix code. Unless it is recognized that OSS is not independent of the market but integrally part of it, the IP constraints that the moral economy has pushed out through one port may be brought in through another by the market economy and its thirst for brands. More broadly, until we understand that innovation is an aspect of social practice and is hedged in by both epistemic and ethical constraints and boundaries, our chances of devising an ICT system that does not stumble over epistemic boundaries and an IP regime that does not affront the ethical commitments of people contributing to the knowledge economy will be severely limited.

To narrow these broad conclusions down to some more specific recommendations from the perspective of practice, I suggest that we need to move even further away from the assumptions of rational *homo economicus* working in a world of information and individual property than social capital theory has managed to get. In the process, we need to try to reestablish a balance between the market economy and the moral economy. From the development of the Stationers' register and King James's Statute of Monopolies to the Digital Millennium Copyright Act, Anglo-Saxon society has developed and modified incentives for the dissemination of creative innovation in response to changes in the means of communication (Jaszi, 1991; Rose, 1993, Litman, 2001).[106] ICTs - with their ability to enclose - have disturbed this balance once again. Increasing the strength of IP, piling rewards on individuals while extracting ever greater monopoly rents from the network, the current trend, will only exacerbate the problem. Indeed, in acknowledgement of the joint history of ICT and IP, it is worth considering that as ICT and the means of circulation get ever further from their roots, it may be time to return IP and the incentives for production closer to theirs. Copyright for 14 or 28 years after the death of the author would seem adequate to garner all justifiable rewards in "Internet time."[107] Similarly, patents only for conventional technologies, not for business processes or software, would help acknowledge the distance between the old system and the new capabilities. Software, as a form of expression, would remain with copyright--but one that should have to be expressed to claim a copyright. Business processes could look after themselves as they always have. But perhaps most of all, in an age of trade secrets, trademarks, and the increasing problems arising from the trademarked products, it would be particularly useful to reassert the notion of trademarks as implied guarantees that carry with them, in cases where the trademarked goods are trade secrets, responsibility for quality and performance on the part of the trademark holder, who--at least in the realm of software--can only escape that responsibility by placing the trade secrets in the public domain. That way, the incentive to hide and sequester would be balanced by important rewards for openness.

106 Space does not allow consideration of more than the Anglo-Saxon tradition. I do not assume that this was the dominant tradition. Indeed, during the nineteenth century, at least, the French dominated (may even be said to have created) the triple-branched system of IP; across that century, other countries, including Britain and the US, changed their legislation in response to French prompting.

107 See, in this regard, the work of the Creative Commons: www.creativecommons.com.

Policy initiatives: understanding social interfaces

Finally, this paper has attempted to draw attention to divisions that, though they often pass unnoticed, may help explain ways in which knowledge "stick." Many of these divisions pass unnoticed because society has developed boundary objects (Star & Greisemer, 1989), or what might loosely be called "social interfaces" to help negotiate the gaps between networks. Distinct from social capital, these interfaces make an enormously important contribution to social cohesion and communication. Today, however, traditional boundary objects may be coming under increasing stress as the networks on either side change with increasing rapidity. A worthwhile set of initiatives for research and implementation would involve investigation of particularly significant types of social interface —whether they be institutions, technologies, or interstitial communities— and resources to develop new types to deal with emerging epistemic and ethical boundaries. Critical boundaries for investigation are those between technical and non-technical communities (where epistemic rifts emerge) and between public and private provision of goods and services (where moral economies clash). Understanding how these gaps develop and can be bridged and supporting efforts to bridge them —particularly in the development of new kinds of boundary spanning institutions, organizations, and communities— would make a critical contribution to the development of a viable knowledge society.

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