



Development of Indicators for “Transformative Use of ICTs in EU Regions” – Background & Approach –

Based on the Results of the TRANSFORM Indicator Workshop, Newcastle upon Tyne, 20 October 2006

The Challenge

Among decision-makers in EU regions, there is still a lot of confusion about how they can best tap the full potential of information and communication technologies (ICTs) and the so-called knowledge economy. Likewise, most regions are uncertain about how to react adequately to the challenges arising from recent paradigmatic developments such as **globalisation**, the **network society** and the **new international division of labour**, all of which are directly related to applications of ICT.

Until now, most efforts by regional policy-makers have focussed on laying the **infrastructure for ICT deployment**, and on fostering the **uptake of key ICTs** such as the Internet by private households, businesses, the civic sector and government. Across the EU territory, significant progress has been made on both accounts, as shown for instance in the regional data collected by the UNDERSTAND project¹.

In spite of this fact, most available evidence² suggests that the success in translating ICT investments into real progress in economic and social development **varies considerably** across the EU regions. It appears that some regions have the capacity to adopt ICTs and use them effectively to create new and successful products and services, organisational and administrative forms, and social innovation. In essence, these regions appear to be able to take up new technologies and use them to change their economic and social prospects in positive ways. Other regions, by contrast, appear to be unable to do more than ineffectually ape the innovations of their more creative neighbours. It remains a challenge to explain why this is the case.

Giving an answer to this question also implies the need to advance **statistical measurement systems**, in order to improve their value in informing and guiding policy-making at the regional level. It appears that new indicators are

needed to better reflect the fact that it is not ICTs in themselves, but the ways in which they are utilised by citizens, businesses and government which really count for social and economic development.

Outline of the Project

TRANSFORM (“Benchmarking and Fostering Transformative Use of ICT in EU Regions”; IST-022780) is a so-called Specific Support Action in the 6th Framework Programme of European Commission supported R&D. It started on the 1st of January, 2006 and will be running for a period of 30 months. As part of the project, two **groups of external experts** have been set up to give advice to the consortium.

The project is expected to provide important input to policy development at EU level, which during the project duration will take key steps related mainly to:

- the new generation of **Structural Funds programmes** for the period 2007-2013; and
- the implementation of the **i2010 strategic framework**, in particular its Third Pillar which seeks to promote an inclusive European Information Society, by tackling – amongst other things – the regional digital divide.

The project focuses on “transformative” uses of ICT in European regions, and on exploring how they impact on regions’ performance in the knowledge-based economy and society. Specific attention is given to the role of “soft factors” such as **social** and **networking capital**, **regional institutional capacity** and **regional “innovation cultures”**, and how these are related to the wide variety of observed outcomes among EU regions.

As a core part of the project, TRANSFORM will develop and test methods for **statistical measurement of transformative uses of ICT** in European regions. Indicators will be defined at the level of individuals, firms and the public sector. Development of indicators will proceed in a four-step-process: **first**, available indicators on constructs related to transformative change will be collected; **second**, these will be compared to the indicator requirements which follow from the conceptual research undertaken in the project

¹ See www.understand-eu.net

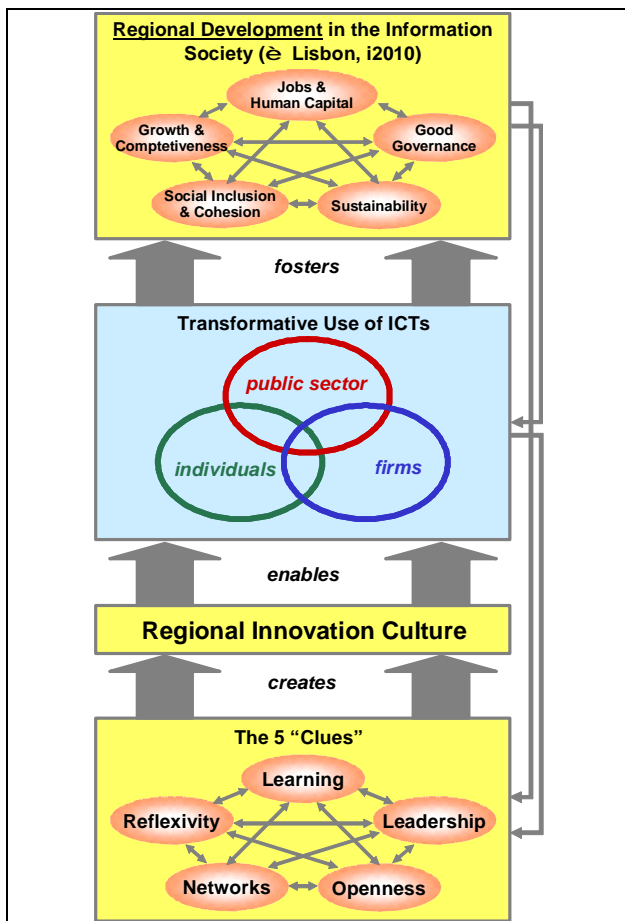
² See for example Editorial Team established by the Coming Presidencies Group (2006): “The Territorial State and Perspectives of the European Union”, Background document for the Territorial Agenda for the EU. See also EUROREG et al. (2006): “ESPON project 1.2.3 – Identification of Spatially Relevant Aspects of the Information Society, Draft Final Report”.

(gap analysis); **third**, to fill these gaps in indicator availability, new indicators will be developed and piloted in real-world contexts; **fourth**, the results from indicator stock-taking and piloting of newly developed measures will feed into the drafting of a **set of TRANSFORM indicators** on transformative change in EU regions.

The aim is to produce recommendations to the European Commission and the European Statistical System about how the current set of ICT related indicators should be supplemented in order to better reflect the impact dimension of ICT use.

Approaching the Subject

The conceptual approach chosen for the study is depicted in the figure below. Transformative use of ICTs is here understood as fostering regional development in the knowledge-based economy and society, the goals of which have been set in the major related EU policy processes, namely the revised **Lisbon agenda** and the **i2010 strategic framework**.



This means that the main goals of regional development are considered to be: economic growth and competitiveness, employment and human capital formation, social inclusion & cohesion, good governance, and environmental

sustainability. With regard to ICT, the i2010 strategic framework defines four **core application domains**: e-business, e-government, e-learning and e-health. These will be the main focus of TRANSFORM.

One of the first work tasks in the project was to explore what the research and practitioner literature has to say about the key factors which explain the different degrees of regions' success in the knowledge-based economy and society. This analysis focussed, in particular, on the role of **soft factors** such as (regional innovation) **culture** in enabling individuals, firms and public administrations to bring about transformative change in a region.

The review identified **five key "clues"** which appear to be of major importance for exploring and understanding why some regions, but not others, are able to use ICTs so much more effectively to achieve their goals:

(1) Networks – and in particular, networks that bridge social worlds – play a key role. This relates to the notion of social capital which has been attracted much interest in policy circles in recent years.

(2) Reflection and reflexivity are important, as are **shared representations** (such as "visions") as the means by which reflexivity can be brought about.

(3) Regional innovation requires learning, not only as a lifelong activity of citizens, but also as **collective, social process**.

(4) The notion of leadership is another, albeit less openly acknowledged, key factor for differentiating between regional innovation cultures.

(5) The literature offers plentiful of evidence for the importance of regional openness to the outside world. Such openness, though, needs to be rooted in a sense of closure, as reflected in the notion of **regional identity**.

These five "clues" are seen as determining the kind of **regional innovation culture** a region is endowed with. One can further hypothesise – based on the state-of-the-art in research about the topic³ – that the extent to which a region has an effective innovation culture is decisive for the ability of individuals, firms and regional government to make best use of ICT – that is, to make **transformative use of ICT**.

³ For an overview, see Gertler, M. (2002) 'Technology, Culture and Social Learning: Regional and National Institutions of Governance', in Gertler, M. and Wolfe, D.A. (eds) 'Innovation and Social Learning', Basingstoke: Macmillan/Palgrave: 111-134. and: MacKinnon, D., Cumbers, A. and Chapman, K. (2002) 'Learning, Innovation and Regional Development: A Critical Appraisal of Recent Debates', *Progress in Human Geography*, 26: 293-311.

What Is Transformative Use of ICTs?

Transformation as a particular kind of ICT-enabled change has recently come to the fore in the public debate⁴. But how can we distinguish transformative uses of ICT from other, more incremental or supplementary uses of ICT?

“Transformative” is understood here as uses of ICT that open up substantially new ways for individuals, firms and governments to achieve their goals. In many cases, this refers to activities which **would not have been possible** without ICTs.

From early on, experts have considered the transformative potential of ICT such as the Internet and the mobile phone to reside in the way they enable **network creation** at a scale and depth not possible before. The specific properties of networks (such as network externalities), in combination with the particularities of (digital) information goods when compared to tangible goods, imply that network creation is one of the main underlying principles for transformative “impacts” of ICT.

Transformation is understood here mainly as the outcome of **strategic initiative**. This does not mean, however, that positive transformation is limited to planned, directed, anticipated change processes. Given today’s volatile economic and technological environment, it is equally important to recognise and react to **emergent change** through the ability to exploit new opportunities. It becomes obvious, then, that **learning** as a continuous, collective process embracing the entire population, and **innovation** (including social innovation) are integral components of transformative use of ICT.

Moreover, the academic and practitioner literature views transformation not as something which is ‘done to’ an individual or organisation. Instead, it requires the (more or less) active involvement and co-operation of those concerned. This points towards the importance of **participation and empowerment** as key elements of beneficial, transformative change.

The notion of empowerment is also central to William Dutton’s work on **social transformation**⁵. According to him, choices about the use (or non-use) of ICT “reconfigure the electronic and physical processes through which you access vital social and economic resources”, namely: people, services, information, and technology. Such

reconfigurations give rise to social transformation, which – in case they are positive – directly relate to empowerment.

We follow that there are three concepts which underlie the notion of ICT-enabled, transformative change: **network creation**, **continuous learning and innovation**, and **participation and empowerment**. They will provide the structure for indicator development in TRANSFORM.

Before discussing indicator needs and existing statistical measures in each of these three domains, the following section looks in more detail into the significance of networks as agents of transformation, and how this relates to the current interest in the topic of **social capital**.

Networks as Agents of Transformation

Not only since Manuel Castells’ seminal work on the “Rise of the Network Society”⁶, the network as structure of social organisation has attracted increasing interest among those with an interest in the relevance of ICT for economic and social development.

In economic thinking, **flexible networks** are seen as a highly competitive alternative to hierarchical, vertically integrated organisations (considered as prototypical of the industrial era) on the one hand, and transactions on the free market (which suffer from lack of trust) on the other hand. Indeed, Castells writes that “while the firm continues to be the unit of accumulation of capital, property rights (usually), and strategic management, business practice is [increasingly] performed by *ad hoc* networks”.

This means that a key element underlying transformative change in businesses relates to structural changes in business processes, enabled by ICT and impacting, in particular, upon the depth and effectiveness of inter-firm networking and collaboration. Examples include supply chain management, ICT-enabled joint R&D, virtual collaboration, etc.

Among the numerous models which try to conceptualise different degrees of transformation using ICT, the **e-Adoption Ladder** developed by the UK “Information Age Partnership” led by CISCO appears to be the most widely acknowledged⁷. The model shows that the adoption process can be characterised in terms of progression through a number of key steps. Organisations would typically start by introducing e-mail to achieve more efficient communications both internally and externally, then progress

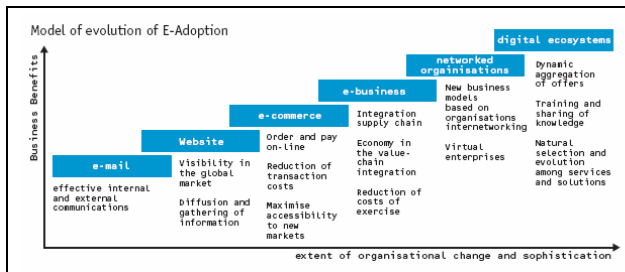
⁴ For example, a recent UK policy document on eGovernment (2005) was entitled “Transformational Government”. The latest book by William H. Dutton, director of the Oxford Internet Institute, is called “Transforming Enterprise”.

⁵ Dutton, W.H. (2004) ‘Social Transformation in an Information Society: Rethinking Access to You and the World’, Paris: UNESCO.

⁶ Castells, M. (1996-1998) ‘The Information Age: Economy, Society and Culture’, 3 Volumes, Cambridge and Oxford: Blackwell.

⁷ As quoted in: Commission of the European Communities and IBM (2003) “European e-Business Showcases”, Luxembourg: Office for Official Publication of the European Communities.

through a simple web presence, towards taking and placing orders online (e-commerce).



Eventually, firms implement ICT throughout their internal business processes and external supply-chain (e-business). In the most advanced cases ICT is used to completely re-invent the business model by scrutinising the roles of value chain partners and remodelling roles & processes in order to maximise network productivity.

The problem is that small and medium-sized enterprises (SMEs), which make up the vast majority of the EU economy, find it persistently difficult to collaborate and network with external organisations – especially if these are not located in their vicinity⁸. There is a recognised need for regional policy-making to help increase the **capacity of local SMEs for collaborative networking**.

At the **individual and community level**, personal networks have attracted much interest in the context of the debate about **social capital**. A useful definition of social capital is provided by Field (2003): “By making connections with one another, and keeping them going over time, people are able to work together to achieve things that they either could not achieve by themselves, or could only achieve with great difficulty. People connect through a series of networks and they tend to share common values with other members of these networks; to the extent that these networks constitute a resource, they can be seen as forming a kind of capital”⁹.

In general, three distinct dimensions of social capital are being distinguished¹⁰: (a) a structural dimension dealing with network ties and configurations and organisation of networks; (b) a cognitive dimension concerned with shared codes, language and narratives; and (c) a relational dimension which is about trust, norms, obligations, and identification. For development of statistical indicators, it appears that the structural dimension is of most importance because of the

more elusive nature of the cognitive and relational dimensions.

Whereas the notion of social capital has generally been considered in the policy process as something positive for those who are endowed with it¹¹, closer analysis reveals the need for distinguishing between three different types¹²:

- **bonding social capital**, i.e. strong ties between like people (or organisations) in similar situations;
- **bridging social capital**, i.e. more distant or “weak ties” of like persons (or organisations);
- **linking social capital**, i.e. weak ties which reach out to unlike people/organisations, such as those which are entirely outside of the community or in a different sector.

Arguably it is the latter two types of social capital which appear to be of most importance as determinants of success in the knowledge-based economy and society¹³.

Against this background, an increasing number of commentators and researchers have pointed out that the Internet can play a decisive role in **transforming access to social capital**. Castells, for example, contends that “the Internet is effective in maintaining weak ties, which otherwise would be lost in the trade-off between the effort to engage in physical interaction (including telephone interaction) and the value of the communication”¹⁴.

Other researchers established evidence that the Internet also *creates* social capital in the form of *new* weak ties. These are often related to interaction in so-called “**virtual communities**”. The current debate about what has been termed “**Web 2.0**”¹⁵, which is being taken up enthusiastically by users, as well as likely future developments in **mobile applications**¹⁶ point towards an increasing range of possibilities for Internet-based

⁸ For example, see Frenz, M., Mitchie, J. and Oughton, C. (2004) ‘Co-operation and Innovation: Evidence from the Community Innovation Survey’, working paper, University of London.

⁹ Field, J. (2003) ‘Social Capital’, London & New York: Routledge.

¹⁰ Nahapiet, J. and Ghoshal, S. (1998) ‘Social capital, intellectual capital, and the organizational advantage’, *Academy of Management Review* 23(2): 242-266.

¹¹ For example, see OECD (2001) ‘The Well-being of Nations: The Role of Social and Human Capital’, Paris: OECD; and Parissaki, M. & Humphreys, E. (2005) ‘Regional Social Capital in Europe’, Luxembourg: Office for Official Publication of the European Communities.

¹² Woolcock, M. (2001) ‘The Place of Social Capital in Understanding Social and Economic Outcomes’, *Canadian Journal of Policy Research*, 27(2): 151-208.

¹³ This notion has already been hinted at in the well-known work by Granovetter, M. (1973) ‘The Strength of Weak Ties’, *American Journal of Sociology*, 91: 1360-1380.

¹⁴ Castells, M. (2001) ‘The Internet Galaxy – Reflections on the Internet, Business, and Society’, Oxford and New York: Oxford University Press., p. 129.

¹⁵ See Benkler, Y. (2006) ‘The Wealth of Networks: How Social Production Transforms Markets and Freedom’, New Haven, CT & London: Yale University Press.

¹⁶ See Rheingold, H. (2002) ‘Smart Mobs – The Next Social Revolution’, Cambridge, MA: Basic Books; and Benkler, Y. (2006) Mitchell, W.J. (2004) ‘Me++: The Cyborg Self and the Networked City’, Cambridge, MA & London: MIT Press.

social innovations to transform patterns of sociability.

At the **government level**, there is a growing consensus in the literature about the importance of governance at regional level for economic development. However, the links between the regional governance networking and the use of ICTs (and the way these can be measured or benchmarked) remain to be explored.

For obvious reasons, intra-regional ICT networks play a huge role in the **reorganisation of government back-offices**. A recent review of good practice in the area identified eight promising reorganisation strategies¹⁷: (a) Digitisation of well performing back-office, (b) Deep reorganisation of back-office, (c) Centralisation of back-office and de-centralisation of front-office functions, (d) Set-up of a back-office clearing house, (e) Greater use of generic types of interaction between user and agency, (f) Specific, general and personal portals, (g) Development of pro-active services, (h) Giving user greater control over back-office data and service components. All of these require increased levels of inter-agency networking, which often turns out to be an organisational rather than a technical challenge.

The Three Indicator Domains

Above we identified three key domains for which indicators are to be developed:

- the degree to which individuals, firms and the public sector are endowed with **social capital** and engaged in maintaining and creating it through ICT-based or ICT-enhanced **networks and networking activities**;
- the extent to which regional actors are engaged in ICT-based or ICT-enhanced **lifelong learning and collective learning**, and the translation of these into **innovation**;
- the level of ICT-enabled or ICT-enhanced **participation in decision- and policy-making** in the regional society, including issues of **empowerment** of citizens, workers, and SMEs.

The challenge is now to identify indicators which adequately measure the extent and success with which regions apply ICTs for making progress in each of these three domains.

There has been a large number of initiatives towards defining indicators on ICT usage which go beyond simple measures of readiness and uptake¹⁸. Most of these, however, have been

¹⁷ Millard, J. et al. (2004) 'Reorganisation of Government Back-Offices for Better Electronic Public Services – European Good Practices', Final Report, Brussels: European Commission.

¹⁸ For an overview, see OECD (2005) 'Guide to Measuring the Information Society', Working Party on the Information Society,

concerned with indicators to be applied at the national level. Regional policy-makers have specific requirements when it comes to indicators which can inform political action.

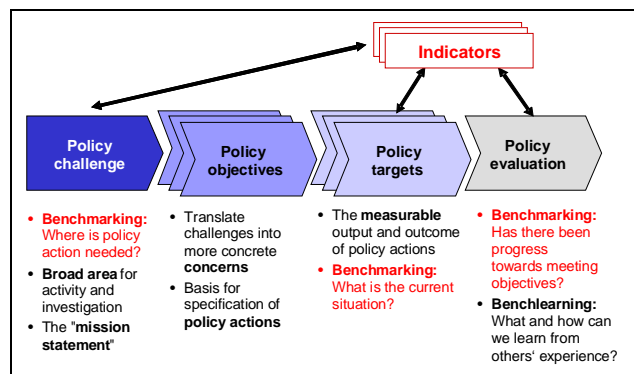
The Need for Regional Indicators

The focus in TRANSFORM is on transformational change which is of benefit for **regional development** at large. For the definition of the overarching goals of regional development, our point of reference are the revised Lisbon agenda and, as far as applications of ICT are concerned, the i2010 strategic framework.

Regional policy-makers need indicators which represent the geographical reference unit at which they (as opposed to national or local actors) operate. Only then can indicators fulfil the function of giving input to the policy-making process at the regional level.

Indicators on transformative use of ICTs can play an important role for identifying regional policy challenges, assessing the current situation, and evaluating whether policy objectives are being met (see figure).

An indicator can be considered of particular relevance for regional benchmarking if it measures a construct (a) which is of direct relevance for regional economic and/or social development, and (b) which can be directly influenced by regional policy-makers.



The latter means that the degree to which indicators are of interest for regional benchmarking depends partly on the specific structures of government and public administration in a country.

In TRANSFORM, every indicator suggested for regional benchmarking systems needs to be assessed along the lines outlined above.

To take an example: When it comes to communities, social interaction and business networks, we need to ask how the transformative changes associated with increasing use of ICTs (if

Paris: OECD; and Empirica (2005) 'A Guide to ICT Usage Indicators', Working Paper 03/2006, Bonn: Empirica.

there are any) are related to spatial levels of analysis: For example, does strong involvement in virtual communities have an equivalent in the offline world, and if so, how does this relate to the region in which the people/organisations which are participating in the virtual community reside?

This brings us to the discussion of existing indicators in the three domain areas which have been defined in the preceding section: networking and social capital; lifelong and collective learning; and participation & empowerment.

Indicators on ICT-enabled Networking and Social Capital Building

Individuals: ICT's potential to support the formation of social capital in the form of strong ties and, in particular, weak (bridging) ties is of special interest here. In spite of many decades of research, however, measurement of social capital still poses serious conceptual and methodological challenges¹⁹. A key instrument used for research on the topic is the **Wold Value Survey**, but this does not very well distinguish between types of social capital, and it also does not include data on ICT usage.

An important contribution has been made recently by the **Pew Internet & American Life Project**, which conducted a survey on the relevance of the Internet for social networking and the ability to access help in cases of need²⁰. The researchers first established the size of the network of weak and strong ties for each respondent, before asking about the communication modes used for interacting with them.

The questionnaire also included a module about the extent to which any of the weak and strong ties have helped the respondent with a number of activities (find a new job or a place to live; make major purchases, investments or financial decisions; help in case of major illness; help with renovations; decide who to vote for in elections). Also covered was the heterogeneity of personal networks of weak links.

By correlating these variables with information about ICT usage patterns (and controlling for the influence of demographics etc.), the study was able to find evidence for positive association between Internet use and social network capital at individual level.

A number of studies have applied indicators on stocks of social capital among workers, and its use for employment- and work-related purposes²¹.

Few studies exist, however, which look into the role of ICTs in this context.

Firms: Recent years have brought some clarification about the exact pathways in which business applications of ICT impact on performance. As a result, substantial progress has also been achieved in developing frameworks, constructs and indicators for measuring firms' use of ICTs and impacts derived from this²². The extent to which implementation of ICT is embedded within structural changes in business processes aiming at increasing depth and effectiveness of inter-firm networking and collaborative modes of production plays a key role.

The **e-Adoption Ladder** model already mentioned above is considered of much operational use for measurement of transformational use of ICT. Rusten & Cornford²³ stress, however, that no automatism is postulated which would imply that all businesses need to take all steps of this ladder (in consecutive order). In fact, increasing transaction costs might undo any benefit from a network-type organisation in cases where trust relationships are of vital importance.

There are very little statistical measures available for mapping the extent to which companies are engaged in networks and networking activities²⁴. This is surprising against growing evidence which suggests that collaboration, even if defined in a very crude way, is associated with higher productivity and higher rates of innovative activity.

The SIBIS project developed an indicator on **tele-cooperation**, operationalised for survey research as "employees communicating with external business contacts via e-mail, video-conferencing or electronic data transfer"²⁵.

An important indicator on **inter-firm collaboration** in general is provided by the European Community Innovation Survey (ECIS): The "percentage of all innovative firms that cooperate with other firms or organisations" The definition used for innovation covers "co-operation

¹⁹ see Field, J. (2003) 'Social Capital', London & New York: Routledge, in particular pp. 123-126.

²⁰ Boase, J., Horrigan, J.B., Wellman, B. and Rainie, L. (2006) 'The Strength of Internet Ties', Washington: Pew Internet.

²¹ For example: Stone, W. et al. (2003) 'Social Capital at Work', Research Paper no. 31, Australian Institute of Family Studies.

²² See for example: Clayton, T. (2002) "Towards a Measurement Framework for International e-Commerce Benchmarking", London: ONS; Clayton, T. and Criscuolo, C. (2005) "Electronic Commerce and Business Change", *Economic Trends*, 583: 62-69; OECD (2005) "Guide to Measuring the Information Society", Working Party on the Information Society.

²³ Rusten, G. and Cornford, J. (2003) "Web-site strategies and performance in SMEs: performance indicators and regional challenges". Paper presented at the Regional Studies Association International Conference, Pisa, Italy.

²⁴ See Gareis, K. (2006) "New Work Environments: An Upcoming Paradigm and How to Measure It", *empirica working paper*, 06/2006, Bonn: empirica.

²⁵ Gareis, K. and Hüsing, T. (2002) 'A New Approach Towards Measuring Spread and Outcomes of Telework', in Stanford-Smith, B. et al. (eds) *Challenges and Achievements in E-business and E-work*, Amsterdam et al.: IOS Press, 497-503.

which is active participation with other enterprises or non-commercial institutions on innovation activities. Both partners do not need to commercially benefit. Respondents should exclude pure contracting out of work with no active co-operation". This indicator does not take account of the role which ICT play for collaboration, but this could easily be modified.

Indicators on ICT-enabled cooperation have been piloted in the context of the EMERGENCE project²⁶ (focussing on formalised collaboration along the value chain) and the ongoing European eBusiness Watch²⁷. There are also a number of national business surveys as well as surveys on work environments which have applied innovative indicators about inter-firm collaboration using ICT²⁸.

The **social capital** concept has only rarely been applied to firms. The ESCR / Cardiff University UK Small Firm Performance Survey piloted a number of indicators on collaborative relationships, community memberships and other "soft factors" which may be of importance for decision-makers in firms²⁹.

Regional government: Here, the focus is on use of ICT for strategic changes to the design and delivery of government and public services, which may have the form of more effective and efficient inter-agency collaboration and partnership building.

The concept of an **adoption ladder** has also been applied to **e-government**. It indicates the depth with which governments have reorganised their service delivery through ICT³⁰, distinguishing between 5 stages:

- (1) establish a basic official website – "emerging presence",
- (2) extend the non-interactive website presence – "enhanced presence",
- (3) provide limited interactivity – "inter-active presence",
- (4) provide transaction capability – "transactional presence", and
- (5) provide 'one stop' interactive services – "networked presence".

²⁶ Huws, U. and O'Regan, S. (2001) "eWork in Europe: The EMERGENCE 18-Country Employer Survey", IES Report No. 380, Brighton: Institute for Employment Studies.

²⁷ www.ebusiness-watch.org

²⁸ see STILE Questionnaire Database at www.stile.be/surveydb/

²⁹ However, see Cooke, P., Clifton, N. and Oleaga, M. (2005) "Social Capital, Firm Embeddedness and Regional Development", *Regional Studies*, 39(8).

³⁰ See Mansell, R. and Nikolychuk, L. (2002) 'The Economic Importance of Electronic Networks: Assessing the Micro-level Evidence Base', Final Report, London: LSE; United Nations (2005) 'UN Global E-government Readiness Report 2005: From E-government to E-inclusion', New York: UN.

National-level data on this is available from the eGovernment benchmarking survey carried out annually by Capgemini³¹.

The UNDERSTAND project has piloted region-level indicators which go even further into details³². Data on demand and uptake comes from Eurostat's ICT Usage Household Survey, which introduced a new module on e-government in 2006.

This ladder model, however, makes only limited reference to the **back-office reorganisation** which is necessary to achieve improvements in service delivery. The UNDERSTAND project, again, has come up with a large number of measures which appear to be well-suited for the purpose. They include the extent to which regional and local authorities have implemented **joined up service delivery** by sharing of information, front desk facilities, call centre facilities, private networks, extranets and access to databases between public agencies.

In order to assess the success such measures have in improving public service delivery, **performance indicators** are required. The eGovernment Economics project (eGep³³) suggests to directly measure the gains in staff productivity resulting from back-office reorganisation (e.g. full time equivalent gains against baseline year; change in number of cases/files handled per full time equivalent). Unfortunately, such indicators will be extremely hard to compare across countries because of the different institutional and regulatory context, and the differences in productivity at the initial stage.

With regard to **social capital building**, little attempt have been made to capture the degree to which policy-makers are involved in inter-regional and intra-regional networks for the purpose of exchange of practice and institutional learning.

Indicators on Lifelong and Collective Learning and Innovation

Individuals: A number of key indicators on human capital formation, lifelong learning, R&D and innovation are already included in the Commission's REGIO database. Indeed, when Richard Florida set out to repeat his famous research on the "**creative class**" in Europe, he used mainly well established indicators from Eurostat³⁴: first, the proportion of the occupations

³¹ Capgemini (2006) 'Online Availability of Public Services: How Is Europe Progressing? Report of the 6th Measurement', Diegem: Capgemini Belgium.

³² See UNDERSTAND (2006) 'Methodology Handbook', Swansea: University of Wales.

³³ Codagnone, C. et al. (2006) 'eGep Measurement Framework, Final Version', Brussels: European Commission.

³⁴ Florida, R. and Tinagli, I. (2004) 'Europe in the Creative Age', London: Demos.

defined as the “creative class” in the workforce; second, a raw human capital score based on the proportion of the working age population with a degree; and third, the share of scientists and engineers in the population.

Nevertheless, it appears that important elements of the concept of lifelong learning and learning as a social process, and the role which ICT play for these, are not yet well covered in statistics. This applies, for example, to statistics on **eLearning**. Some indicators have been piloted in EU research projects such as SIBIS, BISER and eUSER³⁵.

A topic of interest is **incidental/experiential learning**³⁶, which many believe is of increasing importance in the knowledge-based economy and society. It can also be effectively supported by ICT. Indicators which use data on collaboration to arrive at measures of **collective learning** are also lacking.

Measures of the **skills base** of a region, and its distribution across different subgroups of the population and the business community, are of relevance as indicators (partly) of the success of learning activities. A number of efforts have been undertaken to conceptualise the skills needed for full participation in ICT-based or -enhanced activities. One such effort distinguishes between **nine generic skills categories** of high relevance for working in the knowledge economy: literacy skills, number skills, technical ‘know-how’, high-level communication, client communication, horizontal communication, planning, problem-solving, and checking skills³⁷.

Developing operational indicators for endowment with knowledge economy/society related skills is, however, difficult because of the prohibitive costs of methodologies based on direct measurement, and because of problems with validity of indirect measurement (e.g. surveys asking for self-perceived skills). For this reason, most common measurements of IS skills are based on data on individual experience in using ICT applications for certain purposes.

Firms: Indicators on business investments in ICT-related human capital formation are not well developed in Europe. The **Continuing Vocational Training Survey** (CVTS) collects harmonised data on some topics of interest. The **European eBusiness W@tch** includes variables on the extent to which firms offer ICT training to staff.

³⁵ www.sibis-eu.org; www.biser-eu.com; www.euser-eu.org.

³⁶ See Tuomi, I. (2006) ‘The Future of Learning in the Knowledge Society – Disruptive Changes for Europe by 2020’, in: Punie, Y. et al. (eds) ‘The Future of ICT and Learning in the Knowledge Society’, Joint Research Centre, Luxembourg: Publications Office.

³⁷ Gareis (2006), see above

Innovation-related indicators and data are available from the European Regional Innovation Scoreboard (RIS), which is part of the **European Trend Chart on Innovation**³⁸. Primary data sources for this are the Labour Force Survey, the European Patent Office and Eurostat R&D statistics. Data from the **European Community Innovation Survey** (ECIS), which covers in great depth the innovative activity at firm-level, was used for the RIS in 2003, but due to the sampling frame used validity of the results is limited. The ECIS (together with the Innobarometer, a Eurobarometer Flash Survey targeted at innovative businesses in the EU25³⁹) offers a number of interesting indicators which should be applied at the sub-national level to better inform regional policy-making.

In general, the coverage of innovation related activity in official statistics remains insufficient. A recent paper by Arundel and Hollanders⁴⁰ identified a number of issues for which new indicators need to be established. It includes, amongst others, indicators on: firms’ absorptive capacity for external innovations; enterprise churn; spin-off formation by existing firms; perceived availability of venture capital; better coverage of organisational innovation; local demand for innovative products; and public sector innovation. All of these are, to some extent, related to the innovative use of ICTs.

Policy-making puts much emphasis on improving Europe’s capability to translate R&D into stronger competitiveness, through product and process innovation. In this regard, the instrumental role of **entrepreneurship** is widely acknowledged. Start-up activity and related attitudes need to be better covered in statistics. The European Commission has conducted a number of surveys on the issue of attitudes towards entrepreneurship⁴¹. Still, a convincing measure on **entrepreneurship capital** – and on the role of ICT-related innovation – is as yet missing⁴².

Regional government: The UNDERSTAND project piloted region-level indicators on regional/local authorities offering ICT training and eLearning respectively, and the share of staff who have received such training in the reference period⁴³.

³⁸ See Hollanders, H. (2006) ‘European Regional Innovation Scoreboard’, Brussels: European Commission.

³⁹ EOS Gallup Europe (2004) ‘Flash Eurobarometer 164: Innobarometer 2004’, Brussels: European Commission.

⁴⁰ Arundel, A. & Hollanders, H. (2006) ‘Searching the Forest for the Trees: “Missing” Indicators of Innovation – 2006 Trend Chart Methodology Report’, Brussels: European Commission.

⁴¹ See EOS Gallup Europe Flash 160 “Entrepreneurship” (12/04/2004 - 29/04/2004).

⁴² Audretsch, D.B. and Keilbach, M. (2004) “Entrepreneurship Capital and Economic Performance”, *Regional Studies*, 38(8): 949–959.

⁴³ UNDERSTAND (2006)

Indicators on e-Participation and ICT-enabled Empowerment

Individuals: The level of **social or civic participation** is one of the main indicators suggested by Putnam in his influential research about the development of social capital in Italy and the USA⁴⁴. Partly based on established measurement frameworks such as the World Value Survey, he used as indicators **active membership** in socio-cultural, sports, recreation and religious organisations, interest groups and other formal/informal groups. While each of these measures is hard to contest, substantial debate has arisen about the question whether taken together, such activities amount to a valid index on social/civic participation⁴⁵.

Thus, while it is easy to see how traditional measures of civic participation could be taken up in order to construct indicators on ICT-based modes of social participation, this would not solve the basic question of how to adequately cover all relevant ways in which citizens (as well as businesses) can participate in regional decision-making processes. Some researchers claim that Internet-based sociability and engagement in virtual communities (which are not covered by traditional indicators on civic participation) are better suited to the dominant trend in the evolution of social relationship in our societies, which is the rise of individualism. In this context, Manuel Castells talks about “**networked individualism**”⁴⁶.

With regard to **political participation**, population surveys are a traditional tool for gathering insight into attitudes and behavioural patterns among citizens. Only very few of these have started to cover also ICT-based forms of political participation⁴⁷. Dedicated studies on so-called **e-participation** are rare, and mostly appear to concentrate on supply-side analysis⁴⁸. An exception are indicators on the use of e-mail and the Internet for contacting local policy-makers or political candidates, which have been applied e.g. in Finland and in the UK.

As far as more general **empowerment** is concerned, the issue of **user-generated content** has recently attracted a lot of interest. Indicators which adequately cover citizens’ activities in this area have been piloted, for example, by Statistics

Finland⁴⁹ and the Pew Internet and American Life project. From a regional development point of view, such activities would be of particular value if they remain (in some way) tied to specific regional contexts/activities rather than being limited to the virtual domain. Existing measures do not allow such differentiation.

Other domains in which the Internet and other ICTs are believed to foster empowerment of citizens are **e-commerce**, **e-learning** (see above), **e-government** and **e-health**. All of these have been subject to intensive indicator development and piloting.

Firms: In addition to political participation by citizens, the extent to which **businesses are engaged in local/regional policy-making** needs to be covered by appropriate indicators.

As employers, firms are key actors in deciding about the degree of **worker participation and empowerment** in a region or country. While these are not directly related to ICT, there is now a body of research which shows that the implementation of ICT needs to go hand-in-hand with organisational restructuring in order to be successful⁵⁰. Paul David stressed already in 1990 the need for complementary organisational change to ‘unlock’ the powers of ICT⁵¹.

A large number of subsequent empirical studies demonstrated that ICT introduction needs to be embedded in a wider strategy of organisational change, focussing on internal decentralisation of and adoption of people-centred work organisation⁵². But how can implementation of such “new forms of work organisation” be measured?

Research on this topic has first been carried out in the Nordic countries. Indeed, a recent study conducted in Finland found evidence that new forms organising knowledge-intensive work tend to have positive impacts also at the level of the individual worker. This applies to work which combines a high level of worker control over the job with strong job demands in terms of self-responsibility and quality of outcomes – what the authors call “**pro-active work organisation**” (see top right cell in the figure below)⁵³.

⁴⁴ Putnam, R. (2000) “Bowling Alone. The Collapse and Revival of American Community”, Simon & Schuster: New York.

⁴⁵ See for example: Misztal, B.A. (2000) “Informality: Social Theory and Contemporary Practice” London: Routledge.

⁴⁶ Castells (2001)

⁴⁷ For example the UK’s Home Office Citizenship Survey 2005.

⁴⁸ For example, see OECD (2003) ‘Promise and Problems of e-Democracy: Challenges of Online Citizen Engagement’, Paris: OECD.

⁴⁹ Nurmela, J. et al. (2004) “Finnish People’s Communication Capabilities in Interactive Society of the 2000s”, Reviews 2004/7, Helsinki: Statistics Finland.

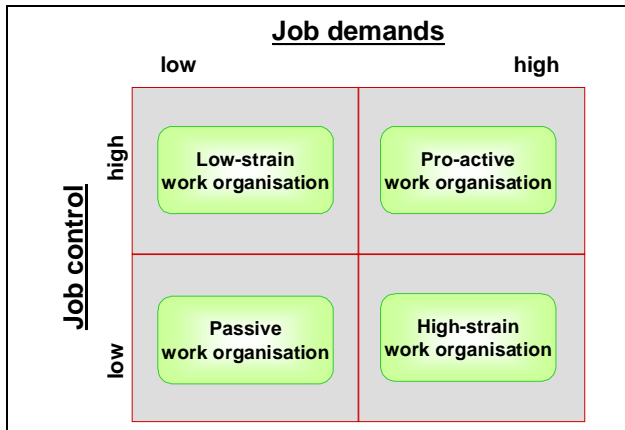
⁵⁰ OECD (2001): 32-34.

⁵¹ David P.A. (1990) ‘The Dynamo And The Computer – An Historical-Perspective On The Modern Productivity Paradox’, American Economic Review, 80: 355-61.

⁵² For an overview, see Gareis, K. (2006) ‘New Work Environments: An Overview over Available Evidence on Success Factors and Impacts’, empirica working paper, 07/2006, Bonn: empirica.

⁵³ Anttila, J. (2005), Veteen piirretty viiva? Työn ja yksityiselämän välisen rajapinnan tarkastelua, Työpoliittinen tutkimus, No 272, Helsinki: Työministeriö; Ylöstalo, P. (2005), Työn uudet

These and other researchers have developed indicators for measuring the degree to which an organisation makes use of pro-active work organisation. Their applicability across the whole of Europe, with its considerable cultural differences, remains open to debate.



Regional government: The state acts as the “supplier” of **e-participation** to citizens. Some organisations have tried to develop compound indicators on the extent to which governments have opened themselves up to citizens. An example is the UN e-Participation Index⁵⁴. Pew Internet has collected data on US politicians attitudes and behaviour about online interaction with citizens and for election campaign management⁵⁵. In the UK, in 2005 indicators were developed for a survey targeted at local authorities⁵⁶. The survey focussed on attitudes and experiences with e-democracy, as well as comparisons between offline and online political engagement of citizens.

Transformative Use of ICTs – A 3-Step Process?

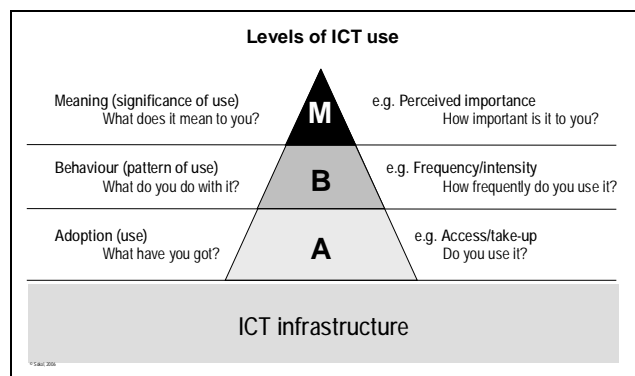
For measuring transformative use of ICT, it may be useful to distinguish between four dimensions or layers of ICT use: At the bottom there is the **infrastructure** which acts as the foundation for any application of ICT. Arguably, most efforts at the regional level have until now focussed on improving this layer – for example, by ensuring universal availability of broadband even in disadvantaged regions.

The next layer (A) denotes **adoption** of a technology, such as the Internet or mobile telephony. Take-up alone does not provide utility

to households, firms or public administrations (at least not any transformative), but it is the necessary condition for it.

Layer B denotes **behaviour** which utilises the technology for purposes which can be anything between self-determined on the one hand and imposed by somebody else (e.g. employer, teacher) on the other hand.

The final layer (M), then, denotes uses of ICT becoming important/significant creators of **meaning**. So far, very little attention has been paid to this layer, partly because perceptions and meanings of ICT use are the least visible and hardest to capture in statistical terms. It is here, however, where we can expect transformational effects of ICT use to manifest themselves.



A way to measure transformative use is to explore whether ICT applications have provided the opportunity to do things which have been impossible before, and which are of relevance to individuals, firms and governments to achieve their goals. The eUSER survey on eLearning, for example, collected information on respondents’ attitudes towards, interest in and practice of lifelong learning, before asking about the use of eLearning for this purpose. In a third step, the survey asked whether the participation in a learning course would have been possible if the eLearning option had not been available.

This way, eUSER found that about every second user of online eLearning courses would have been likely not to participate in lifelong learning if it was not for eLearning.⁵⁷

organisointitavat. Käyttö ja käytön esteet yksityisellä ja julkisella sektorilla. Tykes Rapportteja 39, Helsinki: Työministeriö.

⁵⁴ United Nations (2005) 'Global E-Government Readiness Report 2005', New York: United Nations Publications.

⁵⁵ Pew Internet and American Life Project (2002) 'Digital Town Hall: How local officials use the Internet and the civic benefits they cite from dealing with constituents online'.

⁵⁶ MORI (2005) 'e-Democracy – Survey 2005. Local authorities experiences of democracy on and off line', Bristol: Bristol City Council.

⁵⁷ eUSER (2006) 'Report on Current Demand/Supply Match and Relevant Developments', downloadable from www.euser-eu.org.

Some Methodological Issues Concerning Regional Indicators

For the purpose of collecting data at the regional level, a question of vital importance concerns the **regional breakdown** being used. Eurostat, DG Regio and other Commission bodies mainly use the “Nomenclature of Territorial Units for Statistics” (**NUTS**), especially for the framing of Community regional policies. Comparability problems result from the fact that NUTS is mainly built on existing administrative units in the Member States, as opposed to a **functional regional classification** which would more adequately reflect the internal structure of the territory, as well as size and population of a region⁵⁸. This is unfortunate for scientific regional analysis in general.

Many researchers have pointed out that the use of diverging concepts (e.g. of unemployment) for national comparisons is problematic. This is usually acknowledged and treated as a problem by policy-makers⁵⁹. However, the use of different territorial units is usually not identified as a challenge in this respect (see e.g. the Cohesion Reports published by the European Commission). However, as can easily be shown, aggregation of data into territorial units can considerably distort findings.

From an operational point of view, there is another drawback in using NUTS. The system also makes use of regional units which are of low or no administrative importance for the countries in question, which is necessary in order to construct a complete hierarchical system of territorial units. While this may be of benefit for comparability, it means that NUTS data is not always of much use for the Member States⁶⁰. National and regional policy-makers need data which reflect the regional territorial structure of their country as it is reflected in their administrative structure, but also in culture and in the public mindset – that is, data for a **regional classification that “makes sense”**.

⁵⁸ See OECD (2002) “Redefining Territories - the Functional Regions”, Paris: OECD.

⁵⁹ See for example: Quick, M. (1994) “Die Vergleichbarkeit territorialer Einheiten in der komparativen Europaforschung”, *Europa Regional*, 2(3): 20-29.

⁶⁰ For example, when the Eurostat Working Group on Information Society Statistics discussed about the EU-harmonised ICT user household and enterprise surveys, representatives from most National Statistical Institutes showed no interest in the option of ensuring that national data can be broken down to NUTS levels (e.g. NUTS 1 and NUTS2).



Development of Indicators for “Transformative Use of ICTs in EU Regions” – Background & Approach –

Based on the Results of the TRANSFORM Indicator Workshop, Newcastle upon Tyne, 20 October 2006

The Challenge

Among decision-makers in EU regions, there is still a lot of confusion about how they can best tap the full potential of information and communication technologies (ICTs) and the so-called knowledge economy. Likewise, most regions are uncertain about how to react adequately to the challenges arising from recent paradigmatic developments such as **globalisation**, the **network society** and the **new international division of labour**, all of which are directly related to applications of ICT.

Until now, most efforts by regional policy-makers have focussed on laying the **infrastructure for ICT deployment**, and on fostering the **uptake of key ICTs** such as the Internet by private households, businesses, the civic sector and government. Across the EU territory, significant progress has been made on both accounts, as shown for instance in the regional data collected by the UNDERSTAND project¹.

In spite of this fact, most available evidence² suggests that the success in translating ICT investments into real progress in economic and social development **varies considerably** across the EU regions. It appears that some regions have the capacity to adopt ICTs and use them effectively to create new and successful products and services, organisational and administrative forms, and social innovation. In essence, these regions appear to be able to take up new technologies and use them to change their economic and social prospects in positive ways. Other regions, by contrast, appear to be unable to do more than ineffectually ape the innovations of their more creative neighbours. It remains a challenge to explain why this is the case.

Giving an answer to this question also implies the need to advance **statistical measurement systems**, in order to improve their value in informing and guiding policy-making at the regional level. It appears that new indicators are

needed to better reflect the fact that it is not ICTs in themselves, but the ways in which they are utilised by citizens, businesses and government which really count for social and economic development.

Outline of the Project

TRANSFORM (“Benchmarking and Fostering Transformative Use of ICT in EU Regions”; IST-022780) is a so-called Specific Support Action in the 6th Framework Programme of European Commission supported R&D. It started on the 1st of January, 2006 and will be running for a period of 30 months. As part of the project, two **groups of external experts** have been set up to give advice to the consortium.

The project is expected to provide important input to policy development at EU level, which during the project duration will take key steps related mainly to:

- the new generation of **Structural Funds programmes** for the period 2007-2013; and
- the implementation of the **i2010 strategic framework**, in particular its Third Pillar which seeks to promote an inclusive European Information Society, by tackling – amongst other things – the regional digital divide.

The project focuses on “transformative” uses of ICT in European regions, and on exploring how they impact on regions’ performance in the knowledge-based economy and society. Specific attention is given to the role of “soft factors” such as **social** and **networking capital**, **regional institutional capacity** and **regional “innovation cultures”**, and how these are related to the wide variety of observed outcomes among EU regions.

As a core part of the project, TRANSFORM will develop and test methods for **statistical measurement of transformative uses of ICT** in European regions. Indicators will be defined at the level of individuals, firms and the public sector. Development of indicators will proceed in a four-step-process: **first**, available indicators on constructs related to transformative change will be collected; **second**, these will be compared to the indicator requirements which follow from the conceptual research undertaken in the project

¹ See www.understand-eu.net

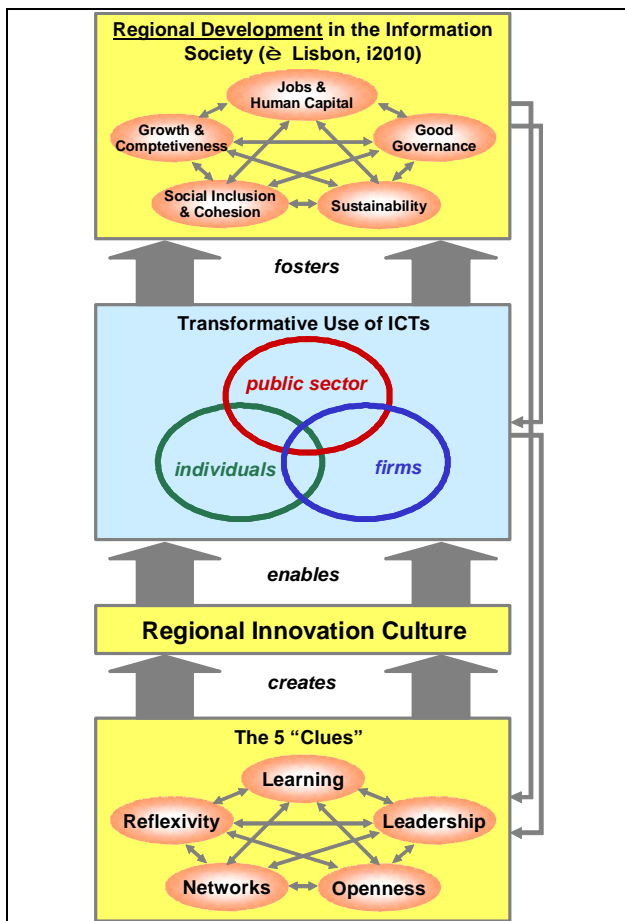
² See for example Editorial Team established by the Coming Presidencies Group (2006): “The Territorial State and Perspectives of the European Union”, Background document for the Territorial Agenda for the EU. See also EUROREG et al. (2006): “ESPON project 1.2.3 – Identification of Spatially Relevant Aspects of the Information Society, Draft Final Report”.

(gap analysis); **third**, to fill these gaps in indicator availability, new indicators will be developed and piloted in real-world contexts; **fourth**, the results from indicator stock-taking and piloting of newly developed measures will feed into the drafting of a **set of TRANSFORM indicators** on transformative change in EU regions.

The aim is to produce recommendations to the European Commission and the European Statistical System about how the current set of ICT related indicators should be supplemented in order to better reflect the impact dimension of ICT use.

Approaching the Subject

The conceptual approach chosen for the study is depicted in the figure below. Transformative use of ICTs is here understood as fostering regional development in the knowledge-based economy and society, the goals of which have been set in the major related EU policy processes, namely the revised **Lisbon agenda** and the **i2010 strategic framework**.



This means that the main goals of regional development are considered to be: economic growth and competitiveness, employment and human capital formation, social inclusion & cohesion, good governance, and environmental

sustainability. With regard to ICT, the i2010 strategic framework defines four **core application domains**: e-business, e-government, e-learning and e-health. These will be the main focus of TRANSFORM.

One of the first work tasks in the project was to explore what the research and practitioner literature has to say about the key factors which explain the different degrees of regions' success in the knowledge-based economy and society. This analysis focussed, in particular, on the role of **soft factors** such as (regional innovation) **culture** in enabling individuals, firms and public administrations to bring about transformative change in a region.

The review identified **five key "clues"** which appear to be of major importance for exploring and understanding why some regions, but not others, are able to use ICTs so much more effectively to achieve their goals:

(1) Networks – and in particular, networks that bridge social worlds – play a key role. This relates to the notion of social capital which has been attracted much interest in policy circles in recent years.

(2) Reflection and reflexivity are important, as are **shared representations** (such as "visions") as the means by which reflexivity can be brought about.

(3) Regional innovation requires learning, not only as a lifelong activity of citizens, but also as **collective, social process**.

(4) The notion of leadership is another, albeit less openly acknowledged, key factor for differentiating between regional innovation cultures.

(5) The literature offers plentiful of evidence for the importance of regional openness to the outside world. Such openness, though, needs to be rooted in a sense of closure, as reflected in the notion of **regional identity**.

These five "clues" are seen as determining the kind of **regional innovation culture** a region is endowed with. One can further hypothesise – based on the state-of-the-art in research about the topic³ – that the extent to which a region has an effective innovation culture is decisive for the ability of individuals, firms and regional government to make best use of ICT – that is, to make **transformative use of ICT**.

³ For an overview, see Gertler, M. (2002) 'Technology, Culture and Social Learning: Regional and National Institutions of Governance', in Gertler, M. and Wolfe, D.A. (eds) 'Innovation and Social Learning', Basingstoke: Macmillan/Palgrave: 111-134. and: MacKinnon, D., Cumbers, A. and Chapman, K. (2002) 'Learning, Innovation and Regional Development: A Critical Appraisal of Recent Debates', *Progress in Human Geography*, 26: 293-311.

What Is Transformative Use of ICTs?

Transformation as a particular kind of ICT-enabled change has recently come to the fore in the public debate⁴. But how can we distinguish transformative uses of ICT from other, more incremental or supplementary uses of ICT?

“Transformative” is understood here as uses of ICT that open up substantially new ways for individuals, firms and governments to achieve their goals. In many cases, this refers to activities which **would not have been possible** without ICTs.

From early on, experts have considered the transformative potential of ICT such as the Internet and the mobile phone to reside in the way they enable **network creation** at a scale and depth not possible before. The specific properties of networks (such as network externalities), in combination with the particularities of (digital) information goods when compared to tangible goods, imply that network creation is one of the main underlying principles for transformative “impacts” of ICT.

Transformation is understood here mainly as the outcome of **strategic initiative**. This does not mean, however, that positive transformation is limited to planned, directed, anticipated change processes. Given today’s volatile economic and technological environment, it is equally important to recognise and react to **emergent change** through the ability to exploit new opportunities. It becomes obvious, then, that **learning** as a continuous, collective process embracing the entire population, and **innovation** (including social innovation) are integral components of transformative use of ICT.

Moreover, the academic and practitioner literature views transformation not as something which is ‘done to’ an individual or organisation. Instead, it requires the (more or less) active involvement and co-operation of those concerned. This points towards the importance of **participation and empowerment** as key elements of beneficial, transformative change.

The notion of empowerment is also central to William Dutton’s work on **social transformation**⁵. According to him, choices about the use (or non-use) of ICT “reconfigure the electronic and physical processes through which you access vital social and economic resources”, namely: people, services, information, and technology. Such

reconfigurations give rise to social transformation, which – in case they are positive – directly relate to empowerment.

We follow that there are three concepts which underlie the notion of ICT-enabled, transformative change: **network creation**, **continuous learning and innovation**, and **participation and empowerment**. They will provide the structure for indicator development in TRANSFORM.

Before discussing indicator needs and existing statistical measures in each of these three domains, the following section looks in more detail into the significance of networks as agents of transformation, and how this relates to the current interest in the topic of **social capital**.

Networks as Agents of Transformation

Not only since Manuel Castells’ seminal work on the “Rise of the Network Society”⁶, the network as structure of social organisation has attracted increasing interest among those with an interest in the relevance of ICT for economic and social development.

In economic thinking, **flexible networks** are seen as a highly competitive alternative to hierarchical, vertically integrated organisations (considered as prototypical of the industrial era) on the one hand, and transactions on the free market (which suffer from lack of trust) on the other hand. Indeed, Castells writes that “while the firm continues to be the unit of accumulation of capital, property rights (usually), and strategic management, business practice is [increasingly] performed by *ad hoc* networks”.

This means that a key element underlying transformative change in businesses relates to structural changes in business processes, enabled by ICT and impacting, in particular, upon the depth and effectiveness of inter-firm networking and collaboration. Examples include supply chain management, ICT-enabled joint R&D, virtual collaboration, etc.

Among the numerous models which try to conceptualise different degrees of transformation using ICT, the **e-Adoption Ladder** developed by the UK “Information Age Partnership” led by CISCO appears to be the most widely acknowledged⁷. The model shows that the adoption process can be characterised in terms of progression through a number of key steps. Organisations would typically start by introducing e-mail to achieve more efficient communications both internally and externally, then progress

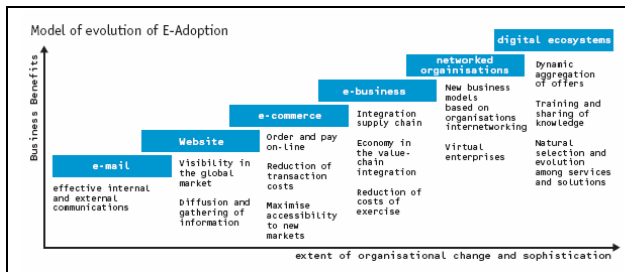
⁴ For example, a recent UK policy document on eGovernment (2005) was entitled “Transformational Government”. The latest book by William H. Dutton, director of the Oxford Internet Institute, is called “Transforming Enterprise”.

⁵ Dutton, W.H. (2004) ‘Social Transformation in an Information Society: Rethinking Access to You and the World’, Paris: UNESCO.

⁶ Castells, M. (1996-1998) ‘The Information Age: Economy, Society and Culture’, 3 Volumes, Cambridge and Oxford: Blackwell.

⁷ As quoted in: Commission of the European Communities and IBM (2003) “European e-Business Showcases”, Luxembourg: Office for Official Publication of the European Communities.

through a simple web presence, towards taking and placing orders online (e-commerce).



Eventually, firms implement ICT throughout their internal business processes and external supply-chain (e-business). In the most advanced cases ICT is used to completely re-invent the business model by scrutinising the roles of value chain partners and remodelling roles & processes in order to maximise network productivity.

The problem is that small and medium-sized enterprises (SMEs), which make up the vast majority of the EU economy, find it persistently difficult to collaborate and network with external organisations – especially if these are not located in their vicinity⁸. There is a recognised need for regional policy-making to help increase the **capacity of local SMEs for collaborative networking**.

At the **individual and community level**, personal networks have attracted much interest in the context of the debate about **social capital**. A useful definition of social capital is provided by Field (2003): “By making connections with one another, and keeping them going over time, people are able to work together to achieve things that they either could not achieve by themselves, or could only achieve with great difficulty. People connect through a series of networks and they tend to share common values with other members of these networks; to the extent that these networks constitute a resource, they can be seen as forming a kind of capital”⁹.

In general, three distinct dimensions of social capital are being distinguished¹⁰: (a) a structural dimension dealing with network ties and configurations and organisation of networks; (b) a cognitive dimension concerned with shared codes, language and narratives; and (c) a relational dimension which is about trust, norms, obligations, and identification. For development of statistical indicators, it appears that the structural dimension is of most importance because of the

more elusive nature of the cognitive and relational dimensions.

Whereas the notion of social capital has generally been considered in the policy process as something positive for those who are endowed with it¹¹, closer analysis reveals the need for distinguishing between three different types¹²:

- **bonding social capital**, i.e. strong ties between like people (or organisations) in similar situations;
- **bridging social capital**, i.e. more distant or “weak ties” of like persons (or organisations);
- **linking social capital**, i.e. weak ties which reach out to unlike people/organisations, such as those which are entirely outside of the community or in a different sector.

Arguably it is the latter two types of social capital which appear to be of most importance as determinants of success in the knowledge-based economy and society¹³.

Against this background, an increasing number of commentators and researchers have pointed out that the Internet can play a decisive role in **transforming access to social capital**. Castells, for example, contends that “the Internet is effective in maintaining weak ties, which otherwise would be lost in the trade-off between the effort to engage in physical interaction (including telephone interaction) and the value of the communication”¹⁴.

Other researchers established evidence that the Internet also *creates* social capital in the form of *new* weak ties. These are often related to interaction in so-called “**virtual communities**”. The current debate about what has been termed “**Web 2.0**”¹⁵, which is being taken up enthusiastically by users, as well as likely future developments in **mobile applications**¹⁶ point towards an increasing range of possibilities for Internet-based

⁸ For example, see Frenz, M., Mitchie, J. and Oughton, C. (2004) ‘Co-operation and Innovation: Evidence from the Community Innovation Survey’, working paper, University of London.

⁹ Field, J. (2003) ‘Social Capital’, London & New York: Routledge.

¹⁰ Nahapiet, J. and Ghoshal, S. (1998) ‘Social capital, intellectual capital, and the organizational advantage’, *Academy of Management Review* 23(2): 242-266.

¹¹ For example, see OECD (2001) ‘The Well-being of Nations: The Role of Social and Human Capital’, Paris: OECD; and Parissaki, M. & Humphreys, E. (2005) ‘Regional Social Capital in Europe’, Luxembourg: Office for Official Publication of the European Communities.

¹² Woolcock, M. (2001) ‘The Place of Social Capital in Understanding Social and Economic Outcomes’, *Canadian Journal of Policy Research*, 27(2): 151-208.

¹³ This notion has already been hinted at in the well-known work by Granovetter, M. (1973) ‘The Strength of Weak Ties’, *American Journal of Sociology*, 91: 1360-1380.

¹⁴ Castells, M. (2001) ‘The Internet Galaxy – Reflections on the Internet, Business, and Society’, Oxford and New York: Oxford University Press., p. 129.

¹⁵ See Benkler, Y. (2006) ‘The Wealth of Networks: How Social Production Transforms Markets and Freedom’, New Haven, CT & London: Yale University Press.

¹⁶ See Rheingold, H. (2002) ‘Smart Mobs – The Next Social Revolution’, Cambridge, MA: Basic Books; and Benkler, Y. (2006) Mitchell, W.J. (2004) ‘Me++: The Cyborg Self and the Networked City’, Cambridge, MA & London: MIT Press.

social innovations to transform patterns of sociability.

At the **government level**, there is a growing consensus in the literature about the importance of governance at regional level for economic development. However, the links between the regional governance networking and the use of ICTs (and the way these can be measured or benchmarked) remain to be explored.

For obvious reasons, intra-regional ICT networks play a huge role in the **reorganisation of government back-offices**. A recent review of good practice in the area identified eight promising reorganisation strategies¹⁷: (a) Digitisation of well performing back-office, (b) Deep reorganisation of back-office, (c) Centralisation of back-office and de-centralisation of front-office functions, (d) Set-up of a back-office clearing house, (e) Greater use of generic types of interaction between user and agency, (f) Specific, general and personal portals, (g) Development of pro-active services, (h) Giving user greater control over back-office data and service components. All of these require increased levels of inter-agency networking, which often turns out to be an organisational rather than a technical challenge.

The Three Indicator Domains

Above we identified three key domains for which indicators are to be developed:

- the degree to which individuals, firms and the public sector are endowed with **social capital** and engaged in maintaining and creating it through ICT-based or ICT-enhanced **networks and networking activities**;
- the extent to which regional actors are engaged in ICT-based or ICT-enhanced **lifelong learning and collective learning**, and the translation of these into **innovation**;
- the level of ICT-enabled or ICT-enhanced **participation in decision- and policy-making** in the regional society, including issues of **empowerment** of citizens, workers, and SMEs.

The challenge is now to identify indicators which adequately measure the extent and success with which regions apply ICTs for making progress in each of these three domains.

There has been a large number of initiatives towards defining indicators on ICT usage which go beyond simple measures of readiness and uptake¹⁸. Most of these, however, have been

concerned with indicators to be applied at the national level. Regional policy-makers have specific requirements when it comes to indicators which can inform political action.

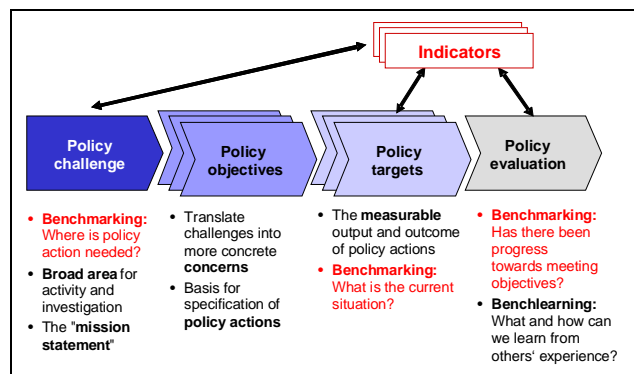
The Need for Regional Indicators

The focus in TRANSFORM is on transformational change which is of benefit for **regional development** at large. For the definition of the overarching goals of regional development, our point of reference are the revised Lisbon agenda and, as far as applications of ICT are concerned, the i2010 strategic framework.

Regional policy-makers need indicators which represent the geographical reference unit at which they (as opposed to national or local actors) operate. Only then can indicators fulfil the function of giving input to the policy-making process at the regional level.

Indicators on transformative use of ICTs can play an important role for identifying regional policy challenges, assessing the current situation, and evaluating whether policy objectives are being met (see figure).

An indicator can be considered of particular relevance for regional benchmarking if it measures a construct (a) which is of direct relevance for regional economic and/or social development, and (b) which can be directly influenced by regional policy-makers.



The latter means that the degree to which indicators are of interest for regional benchmarking depends partly on the specific structures of government and public administration in a country.

In TRANSFORM, every indicator suggested for regional benchmarking systems needs to be assessed along the lines outlined above.

To take an example: When it comes to communities, social interaction and business networks, we need to ask how the transformative changes associated with increasing use of ICTs (if

¹⁷ Millard, J. et al. (2004) 'Reorganisation of Government Back-Offices for Better Electronic Public Services – European Good Practices', Final Report, Brussels: European Commission.

¹⁸ For an overview, see OECD (2005) 'Guide to Measuring the Information Society', Working Party on the Information Society,

Paris: OECD; and Empirica (2005) 'A Guide to ICT Usage Indicators', Working Paper 03/2006, Bonn: Empirica.

there are any) are related to spatial levels of analysis: For example, does strong involvement in virtual communities have an equivalent in the offline world, and if so, how does this relate to the region in which the people/organisations which are participating in the virtual community reside?

This brings us to the discussion of existing indicators in the three domain areas which have been defined in the preceding section: networking and social capital; lifelong and collective learning; and participation & empowerment.

Indicators on ICT-enabled Networking and Social Capital Building

Individuals: ICT's potential to support the formation of social capital in the form of strong ties and, in particular, weak (bridging) ties is of special interest here. In spite of many decades of research, however, measurement of social capital still poses serious conceptual and methodological challenges¹⁹. A key instrument used for research on the topic is the **Wold Value Survey**, but this does not very well distinguish between types of social capital, and it also does not include data on ICT usage.

An important contribution has been made recently by the **Pew Internet & American Life Project**, which conducted a survey on the relevance of the Internet for social networking and the ability to access help in cases of need²⁰. The researchers first established the size of the network of weak and strong ties for each respondent, before asking about the communication modes used for interacting with them.

The questionnaire also included a module about the extent to which any of the weak and strong ties have helped the respondent with a number of activities (find a new job or a place to live; make major purchases, investments or financial decisions; help in case of major illness; help with renovations; decide who to vote for in elections). Also covered was the heterogeneity of personal networks of weak links.

By correlating these variables with information about ICT usage patterns (and controlling for the influence of demographics etc.), the study was able to find evidence for positive association between Internet use and social network capital at individual level.

A number of studies have applied indicators on stocks of social capital among workers, and its use for employment- and work-related purposes²¹.

Few studies exist, however, which look into the role of ICTs in this context.

Firms: Recent years have brought some clarification about the exact pathways in which business applications of ICT impact on performance. As a result, substantial progress has also been achieved in developing frameworks, constructs and indicators for measuring firms' use of ICTs and impacts derived from this²². The extent to which implementation of ICT is embedded within structural changes in business processes aiming at increasing depth and effectiveness of inter-firm networking and collaborative modes of production plays a key role.

The **e-Adoption Ladder** model already mentioned above is considered of much operational use for measurement of transformational use of ICT. Rusten & Cornford²³ stress, however, that no automatism is postulated which would imply that all businesses need to take all steps of this ladder (in consecutive order). In fact, increasing transaction costs might undo any benefit from a network-type organisation in cases where trust relationships are of vital importance.

There are very little statistical measures available for mapping the extent to which companies are engaged in networks and networking activities²⁴. This is surprising against growing evidence which suggests that collaboration, even if defined in a very crude way, is associated with higher productivity and higher rates of innovative activity.

The SIBIS project developed an indicator on **tele-cooperation**, operationalised for survey research as "employees communicating with external business contacts via e-mail, video-conferencing or electronic data transfer"²⁵.

An important indicator on **inter-firm collaboration** in general is provided by the European Community Innovation Survey (ECIS): The "percentage of all innovative firms that cooperate with other firms or organisations" The definition used for innovation covers "co-operation

¹⁹ see Field, J. (2003) 'Social Capital', London & New York: Routledge, in particular pp. 123-126.

²⁰ Boase, J., Horrigan, J.B., Wellman, B. and Rainie, L. (2006) 'The Strength of Internet Ties', Washington: Pew Internet.

²¹ For example: Stone, W. et al. (2003) 'Social Capital at Work', Research Paper no. 31, Australian Institute of Family Studies.

²² See for example: Clayton, T. (2002) "Towards a Measurement Framework for International e-Commerce Benchmarking", London: ONS; Clayton, T. and Criscuolo, C. (2005) "Electronic Commerce and Business Change", *Economic Trends*, 583: 62-69; OECD (2005) "Guide to Measuring the Information Society", Working Party on the Information Society.

²³ Rusten, G. and Cornford, J. (2003) "Web-site strategies and performance in SMEs: performance indicators and regional challenges". Paper presented at the Regional Studies Association International Conference, Pisa, Italy.

²⁴ See Gareis, K. (2006) "New Work Environments: An Upcoming Paradigm and How to Measure It", *empirica working paper*, 06/2006, Bonn: empirica.

²⁵ Gareis, K. and Hüsing, T. (2002) 'A New Approach Towards Measuring Spread and Outcomes of Telework', in Stanford-Smith, B. et al. (eds) *Challenges and Achievements in E-business and E-work*, Amsterdam et al.: IOS Press, 497-503.

which is active participation with other enterprises or non-commercial institutions on innovation activities. Both partners do not need to commercially benefit. Respondents should exclude pure contracting out of work with no active co-operation". This indicator does not take account of the role which ICT play for collaboration, but this could easily be modified.

Indicators on ICT-enabled cooperation have been piloted in the context of the EMERGENCE project²⁶ (focussing on formalised collaboration along the value chain) and the ongoing European eBusiness Watch²⁷. There are also a number of national business surveys as well as surveys on work environments which have applied innovative indicators about inter-firm collaboration using ICT²⁸.

The **social capital** concept has only rarely been applied to firms. The ESCR / Cardiff University UK Small Firm Performance Survey piloted a number of indicators on collaborative relationships, community memberships and other "soft factors" which may be of importance for decision-makers in firms²⁹.

Regional government: Here, the focus is on use of ICT for strategic changes to the design and delivery of government and public services, which may have the form of more effective and efficient inter-agency collaboration and partnership building.

The concept of an **adoption ladder** has also been applied to **e-government**. It indicates the depth with which governments have reorganised their service delivery through ICT³⁰, distinguishing between 5 stages:

- (1) establish a basic official website – "emerging presence",
- (2) extend the non-interactive website presence – "enhanced presence",
- (3) provide limited interactivity – "inter-active presence",
- (4) provide transaction capability – "transactional presence", and
- (5) provide 'one stop' interactive services – "networked presence".

²⁶ Huws, U. and O'Regan, S. (2001) "eWork in Europe: The EMERGENCE 18-Country Employer Survey", IES Report No. 380, Brighton: Institute for Employment Studies.

²⁷ www.ebusiness-watch.org

²⁸ see STILE Questionnaire Database at www.stile.be/surveydb/

²⁹ However, see Cooke, P., Clifton, N. and Oleaga, M. (2005) "Social Capital, Firm Embeddedness and Regional Development", *Regional Studies*, 39(8).

³⁰ See Mansell, R. and Nikolychuk, L. (2002) 'The Economic Importance of Electronic Networks: Assessing the Micro-level Evidence Base', Final Report, London: LSE; United Nations (2005) 'UN Global E-government Readiness Report 2005: From E-government to E-inclusion', New York: UN.

National-level data on this is available from the eGovernment benchmarking survey carried out annually by Capgemini³¹.

The UNDERSTAND project has piloted region-level indicators which go even further into details³². Data on demand and uptake comes from Eurostat's ICT Usage Household Survey, which introduced a new module on e-government in 2006.

This ladder model, however, makes only limited reference to the **back-office reorganisation** which is necessary to achieve improvements in service delivery. The UNDERSTAND project, again, has come up with a large number of measures which appear to be well-suited for the purpose. They include the extent to which regional and local authorities have implemented **joined up service delivery** by sharing of information, front desk facilities, call centre facilities, private networks, extranets and access to databases between public agencies.

In order to assess the success such measures have in improving public service delivery, **performance indicators** are required. The eGovernment Economics project (eGep³³) suggests to directly measure the gains in staff productivity resulting from back-office reorganisation (e.g. full time equivalent gains against baseline year; change in number of cases/files handled per full time equivalent). Unfortunately, such indicators will be extremely hard to compare across countries because of the different institutional and regulatory context, and the differences in productivity at the initial stage.

With regard to **social capital building**, little attempt have been made to capture the degree to which policy-makers are involved in inter-regional and intra-regional networks for the purpose of exchange of practice and institutional learning.

Indicators on Lifelong and Collective Learning and Innovation

Individuals: A number of key indicators on human capital formation, lifelong learning, R&D and innovation are already included in the Commission's REGIO database. Indeed, when Richard Florida set out to repeat his famous research on the "**creative class**" in Europe, he used mainly well established indicators from Eurostat³⁴: first, the proportion of the occupations

³¹ Capgemini (2006) 'Online Availability of Public Services: How Is Europe Progressing? Report of the 6th Measurement', Diegem: Capgemini Belgium.

³² See UNDERSTAND (2006) 'Methodology Handbook', Swansea: University of Wales.

³³ Codagnone, C. et al. (2006) 'eGep Measurement Framework, Final Version', Brussels: European Commission.

³⁴ Florida, R. and Tinagli, I. (2004) 'Europe in the Creative Age', London: Demos.

defined as the “creative class” in the workforce; second, a raw human capital score based on the proportion of the working age population with a degree; and third, the share of scientists and engineers in the population.

Nevertheless, it appears that important elements of the concept of lifelong learning and learning as a social process, and the role which ICT play for these, are not yet well covered in statistics. This applies, for example, to statistics on **eLearning**. Some indicators have been piloted in EU research projects such as SIBIS, BISER and eUSER³⁵.

A topic of interest is **incidental/experiential learning**³⁶, which many believe is of increasing importance in the knowledge-based economy and society. It can also be effectively supported by ICT. Indicators which use data on collaboration to arrive at measures of **collective learning** are also lacking.

Measures of the **skills base** of a region, and its distribution across different subgroups of the population and the business community, are of relevance as indicators (partly) of the success of learning activities. A number of efforts have been undertaken to conceptualise the skills needed for full participation in ICT-based or -enhanced activities. One such effort distinguishes between **nine generic skills categories** of high relevance for working in the knowledge economy: literacy skills, number skills, technical ‘know-how’, high-level communication, client communication, horizontal communication, planning, problem-solving, and checking skills³⁷.

Developing operational indicators for endowment with knowledge economy/society related skills is, however, difficult because of the prohibitive costs of methodologies based on direct measurement, and because of problems with validity of indirect measurement (e.g. surveys asking for self-perceived skills). For this reason, most common measurements of IS skills are based on data on individual experience in using ICT applications for certain purposes.

Firms: Indicators on business investments in ICT-related human capital formation are not well developed in Europe. The **Continuing Vocational Training Survey** (CVTS) collects harmonised data on some topics of interest. The **European eBusiness W@tch** includes variables on the extent to which firms offer ICT training to staff.

³⁵ www.sibis-eu.org; www.biser-eu.com; www.euser-eu.org.

³⁶ See Tuomi, I. (2006) ‘The Future of Learning in the Knowledge Society – Disruptive Changes for Europe by 2020’, in: Punie, Y. et al. (eds) ‘The Future of ICT and Learning in the Knowledge Society’, Joint Research Centre, Luxembourg: Publications Office.

³⁷ Gareis (2006), see above

Innovation-related indicators and data are available from the European Regional Innovation Scoreboard (RIS), which is part of the **European Trend Chart on Innovation**³⁸. Primary data sources for this are the Labour Force Survey, the European Patent Office and Eurostat R&D statistics. Data from the **European Community Innovation Survey** (ECIS), which covers in great depth the innovative activity at firm-level, was used for the RIS in 2003, but due to the sampling frame used validity of the results is limited. The ECIS (together with the Innobarometer, a Eurobarometer Flash Survey targeted at innovative businesses in the EU25³⁹) offers a number of interesting indicators which should be applied at the sub-national level to better inform regional policy-making.

In general, the coverage of innovation related activity in official statistics remains insufficient. A recent paper by Arundel and Hollanders⁴⁰ identified a number of issues for which new indicators need to be established. It includes, amongst others, indicators on: firms’ absorptive capacity for external innovations; enterprise churn; spin-off formation by existing firms; perceived availability of venture capital; better coverage of organisational innovation; local demand for innovative products; and public sector innovation. All of these are, to some extent, related to the innovative use of ICTs.

Policy-making puts much emphasis on improving Europe’s capability to translate R&D into stronger competitiveness, through product and process innovation. In this regard, the instrumental role of **entrepreneurship** is widely acknowledged. Start-up activity and related attitudes need to be better covered in statistics. The European Commission has conducted a number of surveys on the issue of attitudes towards entrepreneurship⁴¹. Still, a convincing measure on **entrepreneurship capital** – and on the role of ICT-related innovation – is as yet missing⁴².

Regional government: The UNDERSTAND project piloted region-level indicators on regional/local authorities offering ICT training and eLearning respectively, and the share of staff who have received such training in the reference period⁴³.

³⁸ See Hollanders, H. (2006) ‘European Regional Innovation Scoreboard’, Brussels: European Commission.

³⁹ EOS Gallup Europe (2004) ‘Flash Eurobarometer 164: Innobarometer 2004’, Brussels: European Commission.

⁴⁰ Arundel, A. & Hollanders, H. (2006) ‘Searching the Forest for the Trees: “Missing” Indicators of Innovation – 2006 Trend Chart Methodology Report’, Brussels: European Commission.

⁴¹ See EOS Gallup Europe Flash 160 “Entrepreneurship” (12/04/2004 - 29/04/2004).

⁴² Audretsch, D.B. and Keilbach, M. (2004) “Entrepreneurship Capital and Economic Performance”, *Regional Studies*, 38(8): 949–959.

⁴³ UNDERSTAND (2006)

Indicators on e-Participation and ICT-enabled Empowerment

Individuals: The level of **social or civic participation** is one of the main indicators suggested by Putnam in his influential research about the development of social capital in Italy and the USA⁴⁴. Partly based on established measurement frameworks such as the World Value Survey, he used as indicators **active membership** in socio-cultural, sports, recreation and religious organisations, interest groups and other formal/informal groups. While each of these measures is hard to contest, substantial debate has arisen about the question whether taken together, such activities amount to a valid index on social/civic participation⁴⁵.

Thus, while it is easy to see how traditional measures of civic participation could be taken up in order to construct indicators on ICT-based modes of social participation, this would not solve the basic question of how to adequately cover all relevant ways in which citizens (as well as businesses) can participate in regional decision-making processes. Some researchers claim that Internet-based sociability and engagement in virtual communities (which are not covered by traditional indicators on civic participation) are better suited to the dominant trend in the evolution of social relationship in our societies, which is the rise of individualism. In this context, Manuel Castells talks about “**networked individualism**”⁴⁶.

With regard to **political participation**, population surveys are a traditional tool for gathering insight into attitudes and behavioural patterns among citizens. Only very few of these have started to cover also ICT-based forms of political participation⁴⁷. Dedicated studies on so-called **e-participation** are rare, and mostly appear to concentrate on supply-side analysis⁴⁸. An exception are indicators on the use of e-mail and the Internet for contacting local policy-makers or political candidates, which have been applied e.g. in Finland and in the UK.

As far as more general **empowerment** is concerned, the issue of **user-generated content** has recently attracted a lot of interest. Indicators which adequately cover citizens’ activities in this area have been piloted, for example, by Statistics

Finland⁴⁹ and the Pew Internet and American Life project. From a regional development point of view, such activities would be of particular value if they remain (in some way) tied to specific regional contexts/activities rather than being limited to the virtual domain. Existing measures do not allow such differentiation.

Other domains in which the Internet and other ICTs are believed to foster empowerment of citizens are **e-commerce**, **e-learning** (see above), **e-government** and **e-health**. All of these have been subject to intensive indicator development and piloting.

Firms: In addition to political participation by citizens, the extent to which **businesses are engaged in local/regional policy-making** needs to be covered by appropriate indicators.

As employers, firms are key actors in deciding about the degree of **worker participation and empowerment** in a region or country. While these are not directly related to ICT, there is now a body of research which shows that the implementation of ICT needs to go hand-in-hand with organisational restructuring in order to be successful⁵⁰. Paul David stressed already in 1990 the need for complementary organisational change to ‘unlock’ the powers of ICT⁵¹.

A large number of subsequent empirical studies demonstrated that ICT introduction needs to be embedded in a wider strategy of organisational change, focussing on internal decentralisation of and adoption of people-centred work organisation⁵². But how can implementation of such “new forms of work organisation” be measured?

Research on this topic has first been carried out in the Nordic countries. Indeed, a recent study conducted in Finland found evidence that new forms organising knowledge-intensive work tend to have positive impacts also at the level of the individual worker. This applies to work which combines a high level of worker control over the job with strong job demands in terms of self-responsibility and quality of outcomes – what the authors call “**pro-active work organisation**” (see top right cell in the figure below)⁵³.

⁴⁴ Putnam, R. (2000) “Bowling Alone. The Collapse and Revival of American Community”, Simon & Schuster: New York.

⁴⁵ See for example: Misztal, B.A. (2000) “Informality: Social Theory and Contemporary Practice” London: Routledge.

⁴⁶ Castells (2001)

⁴⁷ For example the UK’s Home Office Citizenship Survey 2005.

⁴⁸ For example, see OECD (2003) ‘Promise and Problems of e-Democracy: Challenges of Online Citizen Engagement’, Paris: OECD.

⁴⁹ Nurmela, J. et al. (2004) “Finnish People’s Communication Capabilities in Interactive Society of the 2000s”, Reviews 2004/7, Helsinki: Statistics Finland.

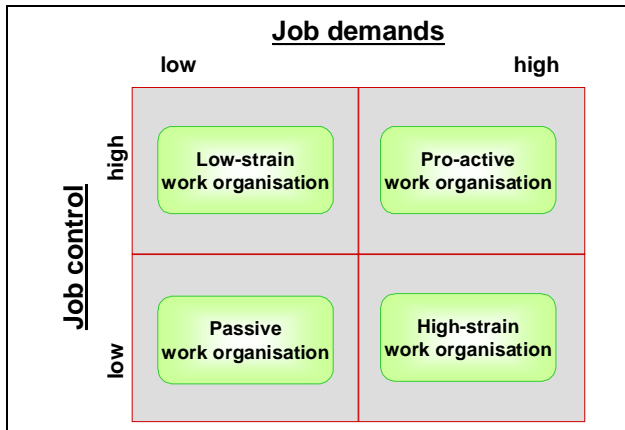
⁵⁰ OECD (2001): 32-34.

⁵¹ David P.A. (1990) ‘The Dynamo And The Computer – An Historical-Perspective On The Modern Productivity Paradox’, American Economic Review, 80: 355-61.

⁵² For an overview, see Gareis, K. (2006) ‘New Work Environments: An Overview over Available Evidence on Success Factors and Impacts’, empirica working paper, 07/2006, Bonn: empirica.

⁵³ Anttila, J. (2005), Veteen piirretty viiva? Työn ja yksityiselämän välisen rajapinnan tarkastelua, Työpoliittinen tutkimus, No 272, Helsinki: Työministeriö; Ylöstalo, P. (2005), Työn uudet

These and other researchers have developed indicators for measuring the degree to which an organisation makes use of pro-active work organisation. Their applicability across the whole of Europe, with its considerable cultural differences, remains open to debate.



Regional government: The state acts as the “supplier” of **e-participation** to citizens. Some organisations have tried to develop compound indicators on the extent to which governments have opened themselves up to citizens. An example is the UN e-Participation Index⁵⁴. Pew Internet has collected data on US politicians attitudes and behaviour about online interaction with citizens and for election campaign management⁵⁵. In the UK, in 2005 indicators were developed for a survey targeted at local authorities⁵⁶. The survey focussed on attitudes and experiences with e-democracy, as well as comparisons between offline and online political engagement of citizens.

Transformative Use of ICTs – A 3-Step Process?

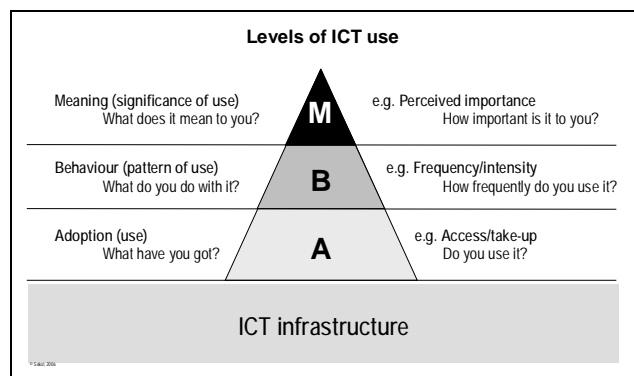
For measuring transformative use of ICT, it may be useful to distinguish between four dimensions or layers of ICT use: At the bottom there is the **infrastructure** which acts as the foundation for any application of ICT. Arguably, most efforts at the regional level have until now focussed on improving this layer – for example, by ensuring universal availability of broadband even in disadvantaged regions.

The next layer (A) denotes **adoption** of a technology, such as the Internet or mobile telephony. Take-up alone does not provide utility

to households, firms or public administrations (at least not any transformative), but it is the necessary condition for it.

Layer B denotes **behaviour** which utilises the technology for purposes which can be anything between self-determined on the one hand and imposed by somebody else (e.g. employer, teacher) on the other hand.

The final layer (M), then, denotes uses of ICT becoming important/significant creators of **meaning**. So far, very little attention has been paid to this layer, partly because perceptions and meanings of ICT use are the least visible and hardest to capture in statistical terms. It is here, however, where we can expect transformational effects of ICT use to manifest themselves.



A way to measure transformative use is to explore whether ICT applications have provided the opportunity to do things which have been impossible before, and which are of relevance to individuals, firms and governments to achieve their goals. The eUSER survey on eLearning, for example, collected information on respondents’ attitudes towards, interest in and practice of lifelong learning, before asking about the use of eLearning for this purpose. In a third step, the survey asked whether the participation in a learning course would have been possible if the eLearning option had not been available.

This way, eUSER found that about every second user of online eLearning courses would have been likely not to participate in lifelong learning if it was not for eLearning.⁵⁷

organisointitavat. Käyttö ja käytön esteet yksityisellä ja julkisella sektorilla. Tykes Rapportteja 39, Helsinki: Työministeriö.

⁵⁴ United Nations (2005) 'Global E-Government Readiness Report 2005', New York: United Nations Publications.

⁵⁵ Pew Internet and American Life Project (2002) ' Digital Town Hall: How local officials use the Internet and the civic benefits they cite from dealing with constituents online'.

⁵⁶ MORI (2005) 'e-Democracy – Survey 2005. Local authorities experiences of democracy on and off line', Bristol: Bristol City Council.

⁵⁷ eUSER (2006) 'Report on Current Demand/Supply Match and Relevant Developments', downloadable from www.euser-eu.org.

Some Methodological Issues Concerning Regional Indicators

For the purpose of collecting data at the regional level, a question of vital importance concerns the **regional breakdown** being used. Eurostat, DG Regio and other Commission bodies mainly use the “Nomenclature of Territorial Units for Statistics” (**NUTS**), especially for the framing of Community regional policies. Comparability problems result from the fact that NUTS is mainly built on existing administrative units in the Member States, as opposed to a **functional regional classification** which would more adequately reflect the internal structure of the territory, as well as size and population of a region⁵⁸. This is unfortunate for scientific regional analysis in general.

Many researchers have pointed out that the use of diverging concepts (e.g. of unemployment) for national comparisons is problematic. This is usually acknowledged and treated as a problem by policy-makers⁵⁹. However, the use of different territorial units is usually not identified as a challenge in this respect (see e.g. the Cohesion Reports published by the European Commission). However, as can easily be shown, aggregation of data into territorial units can considerably distort findings.

From an operational point of view, there is another drawback in using NUTS. The system also makes use of regional units which are of low or no administrative importance for the countries in question, which is necessary in order to construct a complete hierarchical system of territorial units. While this may be of benefit for comparability, it means that NUTS data is not always of much use for the Member States⁶⁰. National and regional policy-makers need data which reflect the regional territorial structure of their country as it is reflected in their administrative structure, but also in culture and in the public mindset – that is, data for a **regional classification that “makes sense”**.

⁵⁸ See OECD (2002) “Redefining Territories - the Functional Regions”, Paris: OECD.

⁵⁹ See for example: Quick, M. (1994) “Die Vergleichbarkeit territorialer Einheiten in der komparativen Europaforschung”, *Europa Regional*, 2(3): 20-29.

⁶⁰ For example, when the Eurostat Working Group on Information Society Statistics discussed about the EU-harmonised ICT user household and enterprise surveys, representatives from most National Statistical Institutes showed no interest in the option of ensuring that national data can be broken down to NUTS levels (e.g. NUTS 1 and NUTS2).

