ESPON

Project proposal for Project 1.2.2.:

Telecommunication Services and Networks: Territorial Trends and Basic Supply of Infrastructure for Territorial Cohesion

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Final Proposal
29th August 2002

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1 Introduction

The European Spatial Development Perspective (ESDP) emphasises three underlying objectives: economic and social cohesion; conservation of natural resources and cultural heritage; and, more balanced competitiveness of the European Territory. The central aim of the ESDP is to "achieve sustainable and balanced development". This relates to both existing members and accession countries. In order to work towards these objectives the ESDP sets out three policy guidelines:

- Development of a balanced and polycentric urban system and a new urban-rural relationship;
- Securing a parity of access to infrastructure and knowledge;
- Sustainable development, prudent management and protection of nature and cultural heritage (CEC, 1999a, para 19).

The proposed project is centrally concerned with the second of these guidelines, viz: parity of access to infrastructure and knowledge. Parity of access, however, should not be seen as an end in itself, but rather as a means to achieving the wider spatial and social goals which result from balanced territorial development. Access to network infrastructure (together with a range of accompanying measures to promote 'softer' infrastructure such as education and training) will be essential in order to underpin balanced competitiveness in Europe, and in particular to realise the policy goal of 'polycentric development', where settlements work together to develop 'functional complementarity' in order to create 'zones of global economic competence'. This applies in respect of both metropolitan areas and their rural hinterlands and smaller towns in less densely settled and economically weaker regions. Access to infrastructures may also impact on environmental sustainability. The substitution of telecommunications for travel may, for example, have beneficial environmental consequences, though the evidence of substitution is far from clear.

In line with the project brief, discussions with the Managing Authority of the ESPON, and the Addendum issued by the Managing Authority dated the 1st of August 2002, the study will focus on telecommunications infrastructure and networks. These services, together with transport, are recognised as being particularly important 'Services of General Interest'[1] both for economic competitiveness and for social and territorial cohesion (CEC, 2000a). The impact of liberalisation of these services and infrastructures raises a number of questions regarding their potential contribution to spatial policy goals. Graham and Marvin (2001) have pointed out that under nationalised infrastructure supply regimes universal service provision and cost transference under a single supplier often hid the differential costs of supply across territories. Liberalisation may be challenging this situation. As the ESDP points out in respect to telecommunications, for instance:

> "Initial signs of liberalisation….indicate that competition and commercial use are steering investment towards areas with high demand…More remote regions with little market potential are threatened by further decline." (CEC, 1999a, para 38.).

[1] Services of *economic* interest that public authorities consider need to be provided even where the market may not have sufficient incentives to do so (CEC, 2000a)

This contention is supported by a number of other studies in both Europe and the US (see, for example, ASPECT 2001; Grubesic, 2001), but little comprehensive data which is consistent across territories appears to be available on this topic. Indeed, the process of market liberalisation may have led to a decline in available data in respect of telecommunications. The liberalisation process has been accompanied by a process of re-regulation with the emergence of national regulators in each area. These regulators are overwhelmingly concerned with competition issues and may not be concerned with spatial issues. Writing in the context of the UK, Vigar and Healey (1999) have pointed to the lack of awareness of the spatial consequences of regulation and governance. The same point has been made in respect of telecommunications regulation, again in the UK context (Gillespie and Cornford, 1996; Richardson, 2002).

The proposed study will wish to explore how regulation plays out in European states where there is less centralised government and whether stronger regional government leads to greater concern for spatial questions amongst infrastructure regulators. There are also likely to be considerable differences across existing Member States and also across other European countries in respect of stages reached in liberalisation of networks. There will also be differences in attitude towards network issues. The interpretation of what is meant by 'services of general interests', for example, largely remains with individual national states (CEC,2000a). At another level there will be differences in emphasis even as regards broader concepts such as the Information Society. Countries such as Finland, for example, may well have different perceptions than say the UK (see Castells, 1996 on the general point; Castells and Pekka, 2001 on Finnish model in particular).

This problem of data availability, referred to above, is particularly pronounced at the sub-regional level. The proposed project will contribute to a process aimed at rectifying this situation. The project will therefore focus on the question of telecommunications infrastructure and balanced development through:

- Identifying the existing spatial structure of the European Union in relation to *basic* telecommunications infrastructure – access to these infrastructures will be a minimum requirement for participating in 'eEurope';
- Identifying trends in the spatial configuration of more advanced infrastructures – it is these advanced services which will become key elements in the competitivity of the Union as a whole and of particular places within 'eEurope'. The degree of liberalisation and its impact on the spatial configuration of networks may be one issue to be explored;
- The distinction between basic and advanced services is not an constant one, either across time or across space. As mentioned above concepts of what are basic services vary across countries. Further, definitions of what are basic services and what 'advanced' services change over time, as technological change occurs. These concepts, therefore will have to be problematised and examined as part of the research project.
- Drawing that information together to create telecommunications databases and to map that data to show its spatial configuration (though see health warning below);
- Defining concepts and finding appropriate indicators to allow the measuring and mapping of the distribution of network infrastructures and services across Europe at a sufficiently fine level to allow conclusions to be drawn as to how

different types of territories are, or have the potential to be, connected to infrastructures;

- Exploring the role of these infrastructures in attracting and retaining mobile investment from multinational companies, whether these be head offices, call centres, back offices or advanced factories. What infrastructure requirements do these companies have and how crucial are these infrastructures in location decision making processes?;
- Each of these elements of the research are aimed at producing indicators which describe the spatial diffusion of infrastructures and spatial differentiation of infrastructure supply. The study will not necessarily be able to produce a detailed package of these indicators but it will lay the foundations for such work;
- Developing recommendations as to how public policy can ensure that network infrastructure investment (which is mainly a private sector responsibility) can be influenced – for example, by public-private initiatives or through regulations – so as to contribute towards more balanced territorial development.

The proposed project is concerned primarily with one set of *network* infrastructures and services: telecommunications, but linkages will be made to other ESPON projects. The project will be conducted in close co-operation with ESPON projects 1.1.1, 1.2.2, 2.1.1 and 3.1.

At this stage a 'health warning' must be interjected. The proposed project is by its nature *exploratory*. As the ESPON 2006 Programme Document[2] makes clear *there is a paucity of data at the regional level* on telecommunications infrastructures (see also SPESP, 2000 report on spatial integration[3]). Intra-regional level date is likely to be even scarcer. Previous research in this area, as well as research carried out in preparing this proposal, confirms this view (see following section). In addition, much of the new data which we will seek to uncover is, in a liberalised market, proprietary and is regarded as confidential by the owners of the data. Furthermore, *there is a limited amount of conceptual work* in respect of the role of telecommunications infrastructure as an integrative force for balanced development within or across regions. The overarching aims of the project, therefore, are to provide a better understanding of relationship between telecommunications infrastructures and services and balanced spatial development, and to create a platform (data, indicators, concepts and methodologies) upon which future research and policy can build.

A central task for the contractor is the establishment of a new database, based on available and comparable indicators, and with the ability to produce Europe-wide (EU 27, Norway and Switzerland) maps related to basic supply as well as trends and impacts of the development of telecommunications infrastructure network.

The final report should identify further data requirements and ideas for territorial indicators, concepts and typologies, as well as on further developments linked to the database and mapping facilities.

[2] ESPON 2006 Programme – final version 30.1.2002, p26
[3] SPESP 2000 report of working group on spatial integration available at http://www.nordregio.se.

2 Previous Research

The proposed project will be policy-focused, but it will draw on the relevant work from both the policy *and* academic literatures in order to underpin our understanding of the issues, to develop methodologies, to collect data, to develop indicators, and to explore and to develop methods of mapping and visualising infrastructure networks.

2.1 Network infrastructure and the city

The importance of infrastructures to territorial development has long been recognised by spatial planners. Peter Hall in his book 'Cities in Civilisation' (Hall, 1998) shows how infrastructures were crucial to the creation, development and sustenance of major cities in both the ancient and modern worlds. In a networked society (Castells, 1996) there is a need for a particular focus on network infrastructures, especially telecommunications infrastructures. Despite this recognition, however, several authors argue that these infrastructures have been relatively under-researched by urbanists and planners in recent years (see Graham and Marvin, (2001) for a review of this literature). Both Hall (1998) and Graham and Marvin (1996 and 2001) are particularly concerned with the implications of network infrastructures for cities – their function and their form – as well as the urban system as a whole. It has been documented, for example, that there is a distinct metropolitan bias to telecommunications infrastructure investment, with the largest, most economically dominant cities in Europe (and, indeed, in North America) receive disproportionately high levels of investment in telecommunications infrastructure (Moss, 1987; Hall, 1992; Graham and Marvin, 1996; Moss and Townsend, 2000a). These authors also address infrastructure as an explanatory variable in the continued (or increasing) dominance of (some) cities vis-à-vis other types of settlement and also their growing disconnectedness with their hinterlands. This literature tends to be short on empirical data, but it may provide useful conceptual underpinning for our research.

2.2 Telecommunications and differentiated regional development

In addition to the infrastructure and cities literature there is a body of literature concerned with the impact of infrastructure on regional development. This literature has been particularly concerned with the potential impact of advanced information and communications telecommunications on remote and less prosperous territories and regions of Europe as we move towards an 'Information Society'. Much of this literature has grown out of research supported by the European Union which has been a significant investor in network infrastructure in less favoured territories of the Union under a number of programmes (commencing with the STAR Programme in the 1987-91 period). Early studies suggested that there was a spatially differentiated pattern of ICT infrastructure investment with remote and rural areas losing out (see, for example, NEXUS/CURDS, 1996; Richardson and Gillespie, 1996; Cornford *et al*, 1996; CEC, 1996). More recent studies suggest that this remains the case in the new millennium (CEC, 1999a; OECD, 2001a; ASPECT, 2001; Gillespie *et al*, 2001; Richardson, 2002).

This literature, however, also shows that the relationship between infrastructure investment and territorial development is a complex one and that although infrastructure remains a necessary condition for development it is not a sufficient

condition (see, for example, NEXUS/CURDS, 1996; Richardson and Gillespie, 1996; CEC, 1996). Rather there is a need to stimulate awareness of, demand for, and ability to use telecommunications' infrastructure and services. The need for demand stimulation, though awareness raising, the provision of appropriate services, training and education and targeting resources, for example on SMEs, as well as infrastructure supply is now widely recognised (see, for example, CEC, 1999a; CEC, 2000b; CEC, 2002). From a regional perspective the focus is moving towards the learning or knowledge region (see, for example, Maskell et al, 1998).

Whilst supporting these calls for a more sophisticated approach to considering the spatial dimensions of the information society, a recent study under Interreg IIc suggested that differential access to advanced infrastructure in different parts of the European Union is still an important issue (ASPECT, 2001). It also suggested that in the liberalised environment pursued by the European Union and Member States less prosperous places are likely to be denied access to advanced telecommunications infrastructures and services, at least in the medium term (see ASPECT, 2001; Richardson, 2002). This latter point echoes concerns raised in the ESDP and in the 2nd Cohesion Report (CEC, 1999a; CEC, 2001a) and also briefly in competition policy documents (e.g., CEC, 1999b; CEC, 2000a). What was also clear from the ASPECT report, however, *is that there is a lack of systematic, publicly available data from which spatial patterns of infrastructure investment can be identified*. The majority of work on regional development in this field is based on local or regional case studies.

2.3 Mapping and Measuring Telecommunications Networks

The literatures referred to above have been crucial in contributing to our understanding of the role – realised and potential – and the limitations of telecommunications network infrastructures on territorial development. Above all they have highlighted (1) that network infrastructure is not uniformly present across territories and that investment in advanced networks is concentrated in core regions (or parts thereof) (2) that infrastructure is a necessary but not a sufficient condition for development. What this literature generally fails to do, however, is to provide detailed quantitative data to illustrate these differences or to graphically map the differences. There are a number of reasons for this, the most important being:

- the commercial sensitivity and proprietary nature of much of the data held on infrastructures[4];
- the cost of accessing information collected by private consulting firms and short shelf-life of this sort of data;
- the growing complexity of network infrastructure markets, with a burgeoning supply of new market entrants and an explosion of technologies;
- the rapid pace of technological change which presents researchers with a 'moving target';
- the failure of statistical agencies to address network infrastructure questions in general, but particularly to address these issues in relation to territorial differences within countries;

[4] For example, a recent report by the UK's e-envoy and e-Minister presented a number of maps based on data provided by the telecommunications and cable companies, but that data could not be accessed itself for further analysis because of commercial confidentiality questions (see, UK Online (2001))

- the lack of conceptual tools, particularly in relation to studying and analysing flows across the networks.

These questions are beginning to be addressed– albeit very much in an exploratory and tentative manner – and there are a number of studies upon which the proposed study will draw and build. Three types of study can be identified:

(1) Household and Individual Surveys

First household and individual surveys of public attitudes towards, demand for and usage of technologies and services. The best established of these is the US Department of Commerce's 'Falling through the Net' series which started in 1995 (see US Dept of Commerce, 2000). These reports draw on US Census Bureau survey data. They analyse uptake and use of a range technologies by various socio-economic variables including degree of urban-ness (rural, urban, central city). We are not aware of such in-depth studies being carried at the European level on serial basis, though some surveys have been carried out on an occasional basis. A study of households carried out for the European Commission (DG Infosoc, 2000) reported at the national level. An earlier study for ISPO, by Gallup Europe (ISPO, 1999) surveyed households in 130 regions across the 15 Member States and analysed the data at NUTS II level. Results were also reported by degree of urbanness (metropolitan, urban and rural). The report also reported a survey of small and medium sized enterprises across Europe. Again we would need to explore whether the data was comparable across these studies and whether data could be re-aggregated at sub-national level. One potential source of both indicators and data upon which we would wish to draw is the *e*Europe Benchmarking work being undertaking as part of the monitoring process of the *e*Europe Action Plan. The indicators used for early monitoring appear not to include a regional element though it is believed that discussions between DG Regio and DG Information Society will result in regional indicators being developed in future phases.

Some household and business survey studies within Member States have studied regional variations, though there is little consistency in approaches or areal bases in such studies.

(2) Indicators of telecommunications supply availability and quality

Second, studies which explore supply of infrastructure or services, using indicators such as number of suppliers, minimum prices charged, availability of particular network technologies, particularly broadband technologies such as cable modems and DSL, in particular market places. The OECD has carried out several reports using such indicators (e.g., OECD, 2001b; OECD, 2001c). The Information Society Directorate General has also published a number of reports in this area, covering both existing Member States and 'Mediterranean' and Central and Eastern European countries (DG Infosoc, 2000; 2001a; 2001b; 2001c; Hobley, 2001). An interesting report by the consultants BDRC (DG Infosoc, 2001a) considered the availability of various forms of technologies available in each of the Member States. It carried out a country comparison and benchmarked the EU against USA and Japan. This study was based on secondary research sources, but also crucially on face-to-face interviews with senior representatives of telecommunications (telcos, cable, internet, etc.) providers, regulators and government organisations in eleven member states and at the European level. Telephone interviews with 51 organisations were also carried out.

For the purposes of the proposed ESPON study there are at least two problems with these studies. First, the studies report data at the national level only. Second, generally speaking the data used come from a wide range of sources – mainly through web searches, including data from consultants and from telecommunication regulators and telecommunications companies – and it is not clear how comparable these are beyond giving an indicative picture of international differences in, say, broadband penetration. The project will need to explore in more detail the nature and sources of the data and also whether and to what extent it is possible to re-aggregate the data at sub-national level.

(3) Mapping the Internet

A rapidly growing literature attempts to map the territorial patterns of the growth in new telecommunications infrastructure, particularly, though not exclusively, relating to the Internet. To date the majority of studies have concentrated on the global level or on the United States. One focus of this research is the changing (or unchanging) relative competitive position of cities in the US as measured by their relationship to advanced infrastructures (e.g., Moss and Townsend, 2000b; Wheeler and O'Kelly, 1999). A second focus is spatial disparities between urban and rural settlements within individual states. Grubesic (2001), for example, explores differences in access to broadband technologies within the state of Ohio using a statistical modelling approach. Grubesic and Murray (2001), analyse spatial disparities in broadband access at a smaller spatial level, focusing on Franklin County in Ohio. Examples of phenomena measured include availability of Digital Subscriber Lines (DSL), Internet Points of Presence (POPs), and network backbones. These studies draw on data from a mixture of sources. The main sources of data are 'data vendors' i.e., consultants which specialise in collecting data on network infrastructures – it is not known what the quality of that data is. Geographical information systems (GIS) are used to map the results of all these studies (or predictive results). The proposed research will draw on these studies to suggest new approaches to the collection of data, new conceptual tools and new mapping techniques. As suggested above the majority of research in mapping and measuring has taken place in the US, though some work has recently taken place in Europe (for example, Dodge and Shiode, 2000, Dodge and Kitchin, 2001).

In addition to these literatures a search will be made for any ongoing research which will complement the proposed project. Linkages will be forged with the researchers on these projects. Links with Interreg III will be particularly important. Other studies such as the IST-funded BISER project which is creating a database of regional information society indicators. Information from private consultancies which monitor the telecommunication industry, such as Boardwatch will also be searched.

3 Methodology of Proposed Research

The proposed project will be divided into 5 workpackages (WP). The workpackages are designed to allow us to reflect on network developments and their implications at various levels of the European spatial hierarchy and across a range of types of territory.

Workpackage 0 (WP0) – Project Management and Co-ordination

This workpackage is designed to ensure that the output and processes of the project are delivered on time, according to the budget and at a high level of quality. WP0 will include:

- Preparation and negotiation of contracts with project partners
- Preparation and submission of periodic management and financial progress reports
- Co-ordination, preparation and submission of interim and final scientific reports
- Organisation and minuting of project meetings of which there will be four
- Liaison and discussion with the Managing Authority
- Creating communication channels with other project partners
- Co-ordination with other ESPON projects and other EC projects

4 partner project meetings will take place during the project. These will have two components: a scientific component – developing tools, assessing findings against key spatial planning issues, brainstorming etc.; and, a project management component discussing management and budgetary issues etc.

A project extranet will be established to allow the common access to data, and publications collected by the various partners. Email communication will be widely used.

Project partners will be required to submit progress reports to the Lead Partner covering project activity and financial details. This will enable the Lead Partner to submit 6-monthly progress reports to the Managing Authority.

Workpackage 1 (WP1) – Review of Existing European-level Data

This workpackage will involve a review of *existing* data, statistical sources and indicators of territorial trends and basic supply of telecommunications network infrastructures at the European level. A central task in this review is to provide an analysis of the comparability at Community level of all the available data. The aim of this work package will be to develop an understanding of the kinds of spatial data *readily available* on telecommunications infrastructures and services, to collate that data, provide a preliminary analysis of that data, to identify gaps in the data available – in terms of types of data available and of spatial levels which it is available for –, to make preliminary suggestions as to what other data might be required and at what spatial levels and how this might be collected.

A thorough review and analysis of existing reports on the availability, connectivity and capacity of network infrastructures will be undertaken. This will draw on:

- Studies at the European level (European Commission, Eurostat, OECD etc.);
- Commission documentation on investment on ICT infrastructure under various programmes (if available).

It should be emphasised that at this stage only limited data relating to sub-national level territories is likely to be found and that information relating to territories below NUTS II and NUTS III is extremely unlikely to be available.

All candidate countries (EU27) plus Norway and Switzerland should be integrated into the analysis, at least at national level, in order to have a complete picture of the enlarged European Union.

WP1 will be undertaken by CURDS. A report will be circulated to partners summarising the findings. This report will form the focus of a 'brainstorming' meeting of the project group. The aim of this meeting will be to reach a consensus on the most appropriate indicators for the collection of data to begin to plug identified gaps. This approach will allow us to begin to sketch the situation as regards patterns of access to relevant network infrastructures in Europe. The review will identify gaps in data and information. This will result in:

- A consensus on indicators and data needed including territorial indicators and facilities required for map-making and the appropriate geographical level and technology required for data collection, based on the *current* availability of relevant data.

- A set of main requests for statistical and geographical data to be collected from Eurostat, and National Statistical Institutes and National Mapping Agencies.

- A preliminary overview of concepts, methodologies and hypotheses for further investigation.

- A preliminary overview of the spatial distribution of telecommunications networks, their accessibility and usage across Euro 27, plus Norway and Switzerland

- A set of policy observations indicating our initial line of thinking.

Workpackage 2 (WP2) – Collection of European-level Telecommunications Network and Associated Data

This workpackage will enhance our understanding of the territorial distribution of telecommunications networks at the European level. WP1 will have provided a sketch of territorial patterns of telecommunications infrastructure at the European level, based on *publicly, readily available* data. WP2 will build on this and attempt to 'fill the gaps', through interviews with key players and through the collection of further

data not already collected (or at least not made publicly available) by the agencies referred to in WP1. The overarching goals of WP2 will be (a) to create a more complete picture of the current situation at the European (EU 27) level and (b) to suggest indicators, methods and directions for future work, including recommendations for the Commission and for the statistical agencies.

This will comprise three sub-workpackages:

Sub-workpackage 2.1 will involve a set of interviews/discussions with the relevant international agencies such as DG Regio, DG Information Society, Eurostat, the OECD, ITU and with academic and private sector consultants in order to verify and validate our understanding of the situation relating to the availability of data collected in WP1; and, to explore what other kinds of data are available at the European level and how existing data might be re-aggregated to provide a more complete understanding of territorial patterns. This work will be undertaken by the Lead Partner.

Sub-workpackage 2.2 will involve telecommunications network analysis with an analysis of the existing spatial patterns and future roll out plans of around 12 *key* telecommunications providers with extensive markets in Europe. Here we will cover fixed link, cable, mobile and satellite providers. The purpose of this exercise is to enhance our understanding of the existing investment and planned investment patterns of the key players in Europe and to draw together new data and mapping sources. This sub-workpackage will have three stages.

- The first stage will be to identify the key companies with pan-European interests. Such firms include Deutsche Telecom, France Telecom, British Telecom, Telefonica, Mercury, Orange and Vodafone, as well as companies providing Internet backbone networks. We will use industry sources to establish which are the appropriate companies for study. The main factor will be extensiveness of European coverage.

- The second stage will involve a search for publicly-accessible data of network availability (past, present and future) from web-sites, annual reports, etc. for each of these companies, disaggregated spatially as far as possible. In order to provide some standardisation of data collected, we will attempt to obtain for each network examined coverage with respect to a list of over 100 European cities.

- The third stage will involve interviews with senior executives in the companies in which investment strategies are explored. A key aim of this element will be to uncover proprietary data not accessible in WP1 or in stages one and two of this Unit. The interviews will also explore the telecommunications companies' attitudes to spatial issues. One research question which will be explored during the interviews is the relationship between infrastructure provision and MNE investment.

The telecommunications-network studies will be divided between the Lead Partner and the project partners.

Sub-workpackage 2.3 will draw together, analyse and map the data gathered from the above process. A European level report will be prepared which will draw together the findings from WP1 and WP2. Graphic illustrations will be accompanied by a detailed commentary regarding, for example, accessibility, connectivity and pricing at various territorial levels. The report will also build on our initial policy observations from WP1 and make clearer our line of thinking on policy issues.

Workpackage 3 (WP3) – Territorial Telecommunications Network Trends at the National Level

This WP will seek to build a detailed understanding of territorial demand and supply side trends in liberalised telecommunications markets at the national level. Whereas WPs 1 and 2 will seek to build a picture of the situation at the European level making cross-border comparisons, WP3 will seek to explore differences between member states and between territories within particular member states. The overarching goal is to help clarify the existing territorial imbalances and regional disparities in the whole European territory (EU27).

This workpackage will involve the collection and spatial analysis of data from appropriate agencies at the national level. Such agencies will mainly comprise:

- National statistical agencies
- Telecommunications regulators
- Information society policy agencies and sponsoring government departments.
- The *principal* telecommunications network and service providers with national coverage.

The data collection will be supplemented where appropriate with interviews with key actors in these agencies. The purpose of these interviews is two-fold. First, to set publicly-available data in policy and strategy context. Second, to facilitate access to unpublished data which may have been collected but not published by the agencies. Any such data will be analysed to explore territorial differences between European regions.

This process will allow us to understand what spatially differentiated data is available (or could be made available) at the national level which is not currently being utilised. For example, the telecommunications regulators may well have information on the territorial distribution of licences (say for mobile phones or cable operators). This will allow us to begin to map differentiated access and connectivity across sub-national territories. The granting of licenses does not, of course, mean that an area is covered and we will have to distinguish between *actual* and *potential* coverage. There are likely to be gaps in the spatial data gathered by the regulators. There may also be data which is simply not analysed spatially, as the regulators tend to be most concerned with competition and price issues, but is capable of yielding important spatial patterns. We will also explore what data is held by the infrastructure companies. For example, the ASPECT study (1999-2001) showed that data on, for example, ADSL roll out plans was available in some territories.

The research will be designed so as to address the role and contribution of telecommunications to territorial development at various spatial scales, in particular,

addressing questions relating to the relationship of these networks to policy goals of polycentricity, differential regional growth, balanced urban and rural development.

Two research questions relating to the relationship between ICTs and economic development will be addressed. First, the relationship between infrastructure provision and MNE locational decisions. Second, the uptake and use of ICTs by SMEs. Here we will draw upon existing studies and data sources to explore regional differences.

A 'brainstorming' meeting will be held where the results will be assessed against the key spatial development issues making use of the spatial typologies of the other ongoing projects. A revised and extended set of indicators to be collected from Eurostat and other agencies will be developed. A set of interim policy recommendations will be put forward at this stage.

Workpackage 4 (WP4) – Mapping and Visualisation

The development of data-bases, indicators, concepts and maps and mapping techniques will be a continuous process throughout the research. However, a stand alone work package will be designed in order to ensure that the process is a coherent one and target deliverables are produced. Drawing on 'best practise' approaches to mapping and visualising network infrastructures and the 'cyber-spaces' they make possible, this module will develop a suite of mapping and imaging tools for displaying the uneven geography of telecommunications networks and infrastructures. This process will include a third partner project 'brainstorming' meeting at which the issues will be discussed in detail by the team.

4 Project Deliverables

There will be two forms of deliverable required to be submitted during the proposed project. First, a set of 'scientific' reports containing the key findings and reflections of the project team. Each of these reports will present findings on specific workpackages. They will also contain initial reflections on these findings. Each report will also contain a policy recommendations section, though the nature of the project (in which successive workpackage build on previous workpackages) and the structure of the reporting mechanisms mean that these reflections will not be fully elaborated until the final report. Second, a set of progress reports consisting of an activity report and a financial report.

Scientific Reports

The research team will deliver *four scientific reports* during the course of the project, namely three interim reports and a final report.

Deliverable 1: A first interim report will be submitted at the end of October 2002 in line with the requirements of the ESPON Managing Authority. This document will report on WP 1. It will consist of;

- A concise and accessible summary of the findings of our review of existing data including key maps of telecommunications networks and spatial

development, addressing in particular how these technologies relate to relevant key concerns of the ESDP.

- A preliminary consensus on indicators and data needed including territorial indicators and facilities required for map-making and the appropriate geographical level and technology required for data collection, based on the *current* availability of relevant data.

- A set of main requests for statistical and geographical data to be collected from Eurostat, National Statistical Institutes and National Mapping Agencies.

- A preliminary overview of concepts, methodologies and hypotheses for further investigation.

- A section laying out our initial line of thinking on policy directions and some preliminary policy recommendations.

Deliverable 2: The second interim report at the end of March 2003 will present the findings of WP2. The report will, *inter alia*, provide:

- European (EU 27 plus Norway and Switzerland) maps and data on the basis of available territorial indicators showing the different telecommunications infrastructure networks and services and relating them to degrees of polycentrism and regional differentiation within the territories of Europe. Particular attention to be paid to areas lagging behind and peripheral and ultra-peripheral regions as well as the territorial integration of the candidate countries.

- A fuller understanding of the existing and future spatiality of European telecommunications.

- An overview of concepts and methodology to be used in WP3 and WP4.

- A new database based on the information gathered across the first two work packages. This will seek to establish sets of indicators relating to basic supply of infrastructure as well as the trends and impacts of network developments and supply.

- A second and revised set of indicators to be collected from Eurostat, National Statistical Offices and National Mapping Offices.

- A section developing the line of thinking set out in the first interim report and a further set of policy recommendations

Deliverable 3: The third interim report in August 2003 will be a working report on the preliminary results, data and maps from WP3 and WP4 and will provide:

- An analysis of the spatial patterns of telecommunications infrastructure in each member country (EU 15) and the accession countries and Norway and Switzerland.

- A preliminary analysis comparing and contrasting differences between the 27 study countries, and a preliminary explanation of these similarities and differences (WP3).

The report will include data, indicators, methodologies and maps and will explore the relationship between infrastructure and intra-regional territorial development trajectories experienced in different countries and in different regions within these countries. The goal will be to establish indicators and maps at the NUTS-3 regional level and below, but as indicated in the 'health warning' data at this level may not be available, estimates for missing data at NUTS 3 level should be developed. Policy recommendations will be clearly linked to the policy orientations of the ESDP.

In each case these analyses will be supported by European (EU 27 plus Norway and Switzerland) maps and comparable data.

Deliverable 4: The final report due in month 24 (end July 2004) will provide:

- An executive summary of the main results of the research undertaken and recommendations for policy development.

- A presentation of supply, trends and impacts of telecommunication networks and services in relation to polycentric and balanced development of an enlarged European Union.

- Presentation of access points and concrete ideas for policy responses to the territorial trends facing the development of the telecommunications networks and services, at different geographical scales, and in different parts of the Union, that could improve territorial cohesion.

- Presentation of territorial indicators, concepts and typologies linked to telecommunications networks and services, including maps.

- Presentation of the database and the mapping facilities developed, covering an enlarged EU and neighbouring countries.

- Listing of further data requirements and ideas of territorial indicators, concept and typologies as well as on further developments linked to the database and mapping facilities.

- Policy recommendations will be clearly linked to the policy orientations of the ESDP.

6-monthly Progress Reports

6 monthly progress reports, consisting of an activity report and a financial report, will be in accordance with the Guidelines prepared by the Managing Authority.

5 Outline of Transnational Project Group

Proposed Transnational Project Group

Partner role	*Partner no.*	*Organisation*
Lead Partner	1	Centre for Urban and Regional Development Studies (CURDS), University of Newcastle, UK
Project Partner	2	Karelian Institute, University of Joensuu, Finland
Project Partner	3	Universidade de Aveiro, Portugal
Project Partner telecoms	4	CNRS, University of Caen, France
National Focal Point (NFP)	5	School of Planning and Housing, Edinburgh College of Art, Herriot-Watt University, United Kingdom

The project research team for the proposed project brings together a number of high quality researchers and research centres from a range of European countries.

The project will be led by the **Centre for Urban and Regional Development Studies (CURDS) of the University of Newcastle**. CURDS has extensive experience of managing multi-partner European projects, and long-established, leading edge expertise in the territorial aspects of telecommunications networks.

In management terms, CURDS will have responsibility for coordination, organising meetings, creating communication channels with other project partners, liaising with and reporting to the Managing Authority. In scientific terms, CURDS will lead the development of project methodologies, be responsible for the collection and mapping of EU-level data on telecommunications networks, and undertake the UK data collection and research on telecommunications networks. It will also take responsibility for the mapping of outputs of the overall project. Two main staff (in addition to specialist GIS and mapping staff) will be involved in the project:

- **Ranald Richardson**, a Principal Research Associate, will be project manager and lead the scientific work.
- **Andrew Gillespie**, the Centre's Executive Director and a Professor of Communications Geography, will contribute to the scientific work and have overall responsibility for assuring the quality of deliverables.

The **Karelian Institute, Social Sciences Department, University of Joensuu,** is a large multi-disciplinary research unit, highly experienced in international research co-operation. They will be responsible for providing a particular perspective based on Scandinavian experience, and will undertake data collection and research on telecommunications networks in Finland. Three main staff will be involved in the project: