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P. Roberti, M. G. Calza, F. Oropallo e S. Rossetti

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Summary

Abstract

This report summarises the research undertaken by the consortium members and highlights Euroky-pia main achievements and results. Targets have been met and results have gone even beyond consortium members' expectations. Euroky-pia has made important steps forward. It has shown great potentiality for PIA. The research effort has been organised around four thematic groups: NSIs, ITC firms, Academia and Research Institutions. The analysis began by examining the information we have and we need to support the Lisbon Objectives and New Governance in the areas of social, business-cycle and economic-structural/market statistics. Then the opportunities that New Technologies can open up for the development and management of information systems are exploited. The analysis follows by reviewing the analytical tools that are used for policy impact analysis, including models and coherence between indicators and relevance to what they are supposed to measure. Finally, the existing tools and methods for policy impact analysis are evaluated from an applied perspective. Attention focuses on how systems, techniques and tools can be improved in the short term to provide better support for policy making. Most of the analysis stresses the need of a robust knowledge or evidence base on which policy makers can draw. In the field of business policies it paves the way for a new approach to build the evidence base for policies through the matching of micro-data on firms. The overall objective is to develop a highly flexible modelling environment to meet the wide range of requirements. Modelling must develop from the relatively static limited data models that served yesterday's needs to dynamic models using multi-sourced micro-data combined with relevant macro-data.

Introduction

Euroky-pia[1] addresses the issue of establishing knowledge databases to support policy impact analysis across all areas of government In brief, the aim of the Euroky-pia project has been to enhance the knowledge of the European society and the economy through improved data collection and PIA.

Originally conceived as an Accompanying Measure to lay out a road-map for a major integrated project under the 6th Framework Programme, the research agenda was designed in part as a response to the economic and measurement issues thrown into relief by the ambitious Lisbon 2000 Council strategy. Accordingly, a wide-reaching research programme was launched, with the aim of bringing together the diverse interest groups in the policy, academic and business communities working in the area.

This project was designed to propose a working roadmap and framework to improve the statistical data collection as well as to create the necessary statistical and modelling environment aimed at policy analysis in order to make the best conceivable use of the data collected.

The following implementation steps were envisaged:

(1) Identification of all possible data sources and of their software environment (metadata);
(2) Identification of a software environment to allow easy access of metadata to interested parties;
(3) Definition of the information content to be collected to reflect the recent evolution of the economy and to anticipate future evolution;
(4) Analysis/ comparison of the statistical content available in other countries, like the U.S. and others;
(5) Identification and creation of the statistical indicators which best monitor the evolution of the economic activity;
(6) Identification and creation of the tools and models able to supply meaningful evaluation of the impact and sustainability of the policy actions.

In order to achieve these goals, a network of four thematic groups has been established as follows:

(1) National Statistical Institutes (NSIs), that collect, hold and provide high-quality information This group has investigated *all aspects concerning information that is needed to support the Lisbon Objectives and New Governance* in the areas of social, business cycle and economic-structural/market statistics. Essentially this will concentrate on fact-finding and establishing the state-of-the-art.

(2) An ICT group responsible for developing a strategy for *improving policy support through the imaginative application of new technologie*s. The perspective has been forward-looking and will focus less on leveraging technology to do the same faster, but on technological innovation and novel application of ICT to provide more, better and faster information in support of policy-making. The ICT group interacted closely with the other three groups.

[1] This work represents the final report of the *Euroky-pia* project, financed by the Information Society Technologies Programme (5th Research Programme of the European Union) (contract n. IST-2002-38704) coordinated by Paolo Roberti, Istat. Members of the consortium, coordinated by Istat, are: Inland Revenue, Ceis-University of Rome Tor Vergata, Informer SA Computer System & Management Consulting, Global Insight information company, Mantos Consulting Limited.

(3) Academia and research institutions group responsible for all research and related activities concerning the *broader scientific, analytical and general aspects of policy and socio-economic analysi*s. The main perspective has been the soundness and strength of the analytical tools that are used for policy impact analysis, including coherence between indicators and relevance to what they are supposed to measure. Since the 'new' economy is characterised by a number of structural changes, this group also studied how the latter affect indicators, functional relationships and the extent to which they actually serve to measure systemic (or socio-economic textures) performance, strengths and weaknesses etc.

(4) An applied research group responsible for all issues relating *to improving the performance of existing tools and methods from an applied perspective*. The focus here has been on what steps can and need to be taken to improve policy making using existing techniques. This included the spread of best practice and 'frontier' tools and methods, and how they might be adapted for the EU over the mid-term.

Work has been organised in four workpackages:

- **WP1:** In building up **effective and policy-oriented system of information** to support the Lisbon objectives;
- **WP2:** In exploiting the **opportunities that New Technologies** can **open up** for the development and management of information systems;
- **WP3:** In developing State-of-the-art, **users focused scientific and analytical knowledge for PIA;**
- **WP4:** In developing **tools** and **methods** that can be tailored to serve national and EU PIA needs.

EUROKY-PIA output has consisted of:

- Reports (12 Deliverables);
- Prototypes (EISIS, Large and fine-grained systemic maps and indicators);
- Dissemination activities (journal articles, Conferences, seminars and workshops);
- Policy papers and microsimulation, models*;
- Networking in view of future developments;
- Follow-ups and "targeted" policy-area-specific initiatives;

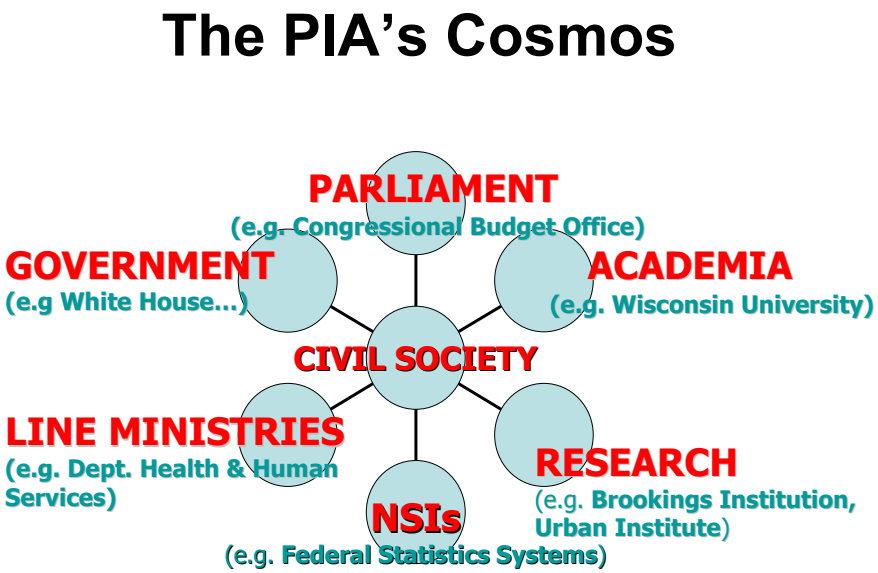
- A "framework" has been developed and a strategy has emerged;
- We have made path breaking advances with Enterprise EISES and mapping;
- We have carried out microsimulation work;
- PIG Quadrant follow up (to be extended to cover a fourth "E", i.e. Efficiency, Equity, Exclusion, Environment);
- NETI follow up;
- We are establishing a network and contacts in view of engaging in a follow-up project.

The project has confirmed the following issues:

- The Value of PIA
- The Importance and Need to Invest in PIA data
- The Need to Invest in PIA tools
- The importance of implanting PIA capacity in Governments
- The importance of a networked approach, or EU and national PIA will never "talk".

In a nutshell, EUROKY-PIA's has confirmed that there is need and scope for a coordinated EU wide gradual PIA investment. What this investment is to look like cannot be decided ex-ante, but it is a question that has to be decided taking into account who among the various actors in the PIA cosmos is involved and the policies that are to be evaluated.

Chart 1



This final report is organized in two sections. Section one places the Euroky-pia research programme in context, with special reference to the implications of the Lisbon 2000 strategy for the positioning of policy impact analysis (PIA). Section II contains a synthesis of the research findings structured by workpackages. Analysis in this section is organised in three chapters which have been shaped around the main challenges envisaged in the field of policy analysis. The first chapter reviews the state of the art on the information that is needed to support the Lisbon Objectives and New Governance in the social and economic-structural/market definition. Policy impact analysis is heavily dependent upon the availability of high quality, highly disaggregated statistical information. This information can be made easily accessible or inaccessible, unless "appropriately treated". It emerges the importance and need to invest and develop integrated and systematized statistical information systems. The analysis on information needs is completed by working on a set of thematic studies which deal with i) the UK experience on PIA; ii) the best way to track the new economy, and iii) the way to monitor sustainable growth in a multidimensional and multilevel framework.

Chapter II exploits the opportunities that New technologies can open up for the development and management of information systems. One aim of EUROKY-PIA is to develop e-accessible statistical information systems of micro-data, including metadata, relational models, software and statistical methodologies to support PIA in various policy areas. The objective is to make them accessible to Government Agencies, the research community and stakeholders. As described in the paper, this requires reconciling (data-linking) statistics from multiple sources, taking into account differences in definitions and adjusting for inconsistencies between sources (metadata matrix), as well as knowledge of the quality and reliability (statistical properties) of linked datasets. In parallel an investment in IT software (including extract, transformation and Loading procedures; implementation of integration algorithms; on line analytical processing implementation) is needed.

The final chapter bears on the broader scientific, analytical and general aspects of policy and socio economic analysis. The perspective is on the soundness and strength of the analytical tools that are

used for policy impact analysis, on their properties and coherence between indicators and what they are supposed to measure. Analysis has displayed that PIA needs to be underpinned by anticipatory research - research concerning how and when to develop new data sources, and research on methodologies for the new model requirements. Data makes little sense without some theory supporting it. Moreover, the existing tools and methods have been analysed in an applied perspective. Research have explored "frontier" tools and methods that already exist and how they can be adapted for the EU, or tuned or developed within a period that spans over the medium term. Results make the case for looking through and beyond aggregates. At a time in which unprecedented systemic change is happening, the complexity and volatility that characterize real-world processes and the drivers of change cannot be uncovered unless the linkages between the global and "national aggregates", on the one hand, and between the latter and the firms level basic functions and features, on the other hand, are properly understood. The map prototypes which are described in analysis have been drawn using Italian data for large enterprises which have been integrated into a systematized information system. Unlike most of the information that is currently available, they are purpose-oriented and permit to gaze "scenarios" which are not just clear, but also very detailed. They permit to address a great deal of key issues, such as assessing performance in one- and in multidimensional spaces, competitive advantages, creating value, sustaining performance and so on.

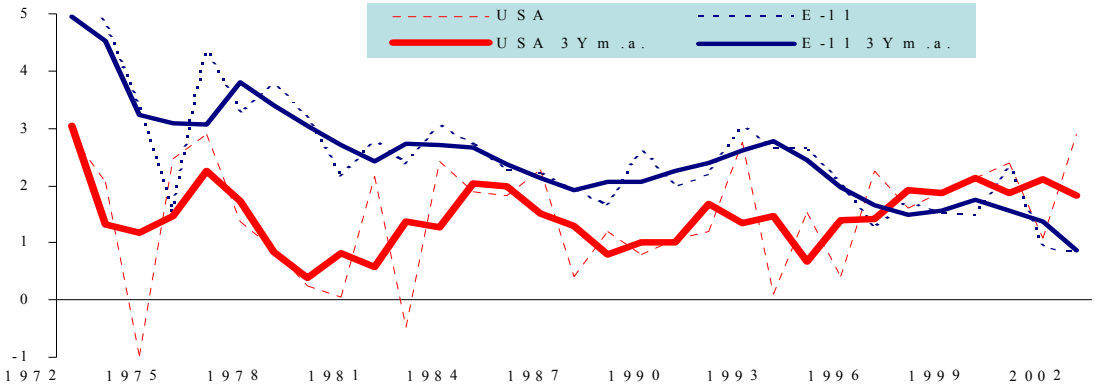
THE LISBON STRATEGY AND SUSTAINABLE GROWTH: MUDDLING THROUGH vs EVIDENCE BASED POLICY

The background

In March 2000, EU heads of state and government committed to the *'strategic goal to become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable growth with more and better jobs and greater social cohesion'* by 2010. Subsequently, this commitment has been reaffirmed in the October 2003 BEGs (Broad Economic Guidelines) *'A European Initiative for Growth'* and various other occasions, including summits and council meetings (notably the 2002 Barcelona and 2004 Brussels European Councils).

As yet, the Lisbon goals have proved challenging and evanescent. In almost five years since their adoption, neither the track record nor the prospects for output and productivity growth look any better. The EU-US gap has grown even wider and little progress can be claimed towards reaching most of the aggregate targets set in 2000 (such as R&D growth and labour force participation of women and the elderly). As Gros, D. and Mortensen, J. have recently remarked: '*The dismal growth and productivity performance of EU-15 over the first five years of the span of the Lisbon strategy represents a clear deterioration compared to the preceding five-year period and also contrasts sharply with that of the United States'* [2].

Graph 1: Productivity Growth in Europe and the USA, 1972-2002



Source: Eurostat

Graph 1 suggests that the gap with the USA has not responded to the Lisbon strategy, and has neither closed nor is about to close. This raises two key questions:

1) Do the trend figures suggest that Europe was wrong to commit to the Lisbon strategy?

2) Given that the mid-term conclusion that it has not delivered on its promises, what remedial options are open for the EU?

[2] Gros, D. and Mortesen, J., 2004.

For almost half a century the European economies enjoyed a leading position in the EU-USA productivity race, [3] and were not accustomed to run behind. Presently, the EU is concerned, just as the USA once was, to shrink the gap and regain her supremacy. Europe's complacency during the critical 1970s and 1980s meant that she did not foresee the implications of the policy gap that was already apparent, and a US investment climate aimed, quite deliberately, at fostering (i) an open, entrepreneurial innovation culture, (ii) rapid mass exploitation of the ICT revolution globally, and (iii) flexible labour markets.

Apparently unwittingly, it took the EU countries a long time to realize that not only was their supremacy in jeopardy, but that their performance could deteriorate to today's very low levels. Yet more worrying still is the view held in some economic circles that the situation will be aggravated for many years to come by the fallout from the NMS and ACC enlargement strategies. All along the integration process, economic benefits have been expected and indeed have accrued. With the latest enlargement, further benefits were foreseen in the wake of past experience but, so far, the performance gap with the USA has continued to widen. While the latter shows strength, Europe increasingly exposes structural weaknesses which hamper growth, especially among the 'core group' of larger and generally best-performing members (see Table 1).

Table 1: Decomposition of Labour Productivity Growth, 1995-2002

	Germany	France	UK*	Italy*	Spain*	USA
Labour Productivity	1.7	2.2	2.4	0.9	0.5	2.1
TFP	0.9	1.5	1.1	0.4	-0.7	0.3
Capital deepening	0.8	0.7	1.3	0.5	1.2	1.8

*1995-2001

Source: F. Daveri, *How to Reverse the Current Productivity Trends in Europe*, EU Workshop on Sustainable Growth, The Hague 2004 and OECD Productivity Database, January 2005

The Lisbon Strategy: A Framework not a Policy

It is against this problematic background, and to regain her supremacy that the European Union has adopted the Lisbon strategy with its ambitious goals. In spite of high hopes, however, the strategy has not delivered to expectations. Developments since 2000 have been particularly disappointing. Therefore, casting doubts on the Lisbon strategy has become an obvious temptation. Nevertheless, as the Kok group of experts has recently concluded, the Lisbon strategy is not an option but Europe's best response to overcome her problems. The main shortcoming is not in the strategy per se, but in the unrealistic expectation that all Europe needed to overcome her weaknesses was '*a **framework** of **ambitions** and **targets** which sets out the **broad direction** of change necessary to sustain a European Economy that is genuinely innovative, operates at the frontiers of technology and creates the growth and the jobs that Europe needs'*. [4]

The Lisbon strategy is characterised by:

[3] See US National Center for Productivity and Quality of Working Life, *The Future of Productivity, US Government Printing Office*, Washington D.C., 1977, especially in Part V the paper by A. Maddison, "*Productivity Trends and Prospects in Continental Europe*", 1950-90, pp.99-111.

[4] High Level Group Chaired by Wim Kok, **Facing the Challenge**, European Communities, Brussels 2004,p3.

(1) An integrated three-pillar ICT policy strategy, which envisages:

- **Stimulating R&D in ICT** to master the technologies that will drive future innovation and growth

- **Promoting** the widest and best possible **use of ICT-based products and services** by all citizens

- Creating a **regulatory environment** that ensure fair competition and eliminates obstacles to ICT adoption.

(2) A focus across five key policy areas:

- The Knowledge Society
- The Internal Market
- The Business Climate
- The Labour Market
- Environmental Sustainability.

(3) A system of governance aimed at fostering political ownership, which is founded on the involvement of all actors, that is: the *European Council* (with a leading role), the *Member States* (in an acting role and the commitment to draw up a *National Action Programme by the end of 2005*), the *European Commission* (with a reviewing role), the *European Parliament* (with a monitoring role) and the *European Social Partners* (in a participating role).

As a strategy, Lisbon was and remains valid. Its main weakness is that it has not evolved into policy. It has in practice remained just what it was - a strategy or, more precisely, a list of goals. As such, it can hardly be expected to make any mark until its objectives are translated into *policy* and a normative vision detailing specific choices and actions, legal norms and regulations. The essential ingredient is a clear, unambiguous vision of what Lisbon actually means in terms of budgets, legislation, regulations and more generally the rules that apply in the *playing field?* Until this happens, the strategy cannot deliver concrete results, nor can it be translated into action.
The Kok group of experts has rightly identified implementation as the weak point of the Lisbon strategy: *'Lisbon's direction is right and imperative, (but) much more is needed in its implementation'* [5]. The latter - i.e. the *'much more that is needed'*, may be resolved into (i) opening up and reinforcing the layers of political and managerial action that failed to germinate properly following the Lisbon commitment, and (ii) tackling the deadweight costs which have burdened those actions that have been launched. On these aspects, Europe has proven weak and urgently needs action.

As we weigh up the results of the mid-term Lisbon review, the key issue is less a question of whether Lisbon is right or wrong but, rather, whether it can be transformed into *policy* that can be implemented cost-effectively within a framework that takes due account that:

- The EU is not an optimal area for all policies, and

- One-size-fit-all-policies are unlikely to be what European countries need.

[5] High Level Group Chaired by Wim Kok, *op.cit., p.16.*

This, in turn, raises the issue of how policy can be designed to fulfill its objectives and cope with the heterogeneity and transitional needs.

Evidence based policy: A missing piece in the EU policy jigsaw

While the EU is well equipped to address macro development issues, it is much less equipped when it comes to tackling structural problems that may require discriminatory lines of action to deal with the local regional problems that proliferate throughout the Union. The latter props up several policy impact and design issues which require policy impact knowledge that in the EU is patently underdeveloped.

The conclusion is that, except for few countries (a notable exception is the UK) and policy areas (notably, personal income taxation and social protection benefits), the EU does not have an *evidence based* policy tradition. Focus is on macro, financial issues and cost-benefit analysis, not on impact. The hindrance is that the EU and its member countries do not have a way of assessing costs and benefits and, thus, distinguishing the effect of the various policy levers at the national, regional and supranational levels. The pioneering spirits are left to work it out for themselves, generally at the national level, and this is not in the best interests of the EU as a whole.

The paucity, if not the sheer absence of policy impact analysis in the EU defies rational explanation in view of the range of powerful analytical tools now available. But mindsets are changing, albeit slowly. Since the mid-1900s, policy makers have learned that the quality of policy making does not depend on beliefs or principles alone, but on knowledge about prospective policy impact, and outcomes. They have also learned that (i) there is no comprehensive 'reference manual' of conduct that offers guidelines for all circumstances; (ii) knowing what does not succeed can be as important as knowing what may succeed; (iii) controlling aggregates is only part of the job (e.g. a productive, fair and efficient tax system can be the cornerstone for sustainable growth); and (iv) policymakers can always choose from a menu which offers a wide range of possibilities and permit to ensure that more than one objective is met.[6] Moreover, they invariably have to decide in situations in which policies are selected under conditions of uncertainty in which impact can vary depending on tools, but also mix, packaging and other circumstances. Typically, these uncertainties centre on:

- Future outcomes – i.e. *forecast uncertainty*, which is independent of the policy tools
- The optimal of mix of goals and policy – i.e. *policy uncertainty* which depends from the mix and combination of more/less uncertain goals and tools
- The distribution of policy benefits among different groups, sectors and areas – i.e. *distributive impact uncertainties*, which depends on a litany of interacting factors, such as goals, tools, programme design, implementation, administration, behavioural responses etc.

Against this complex policy background, the Lisbon strategy and policy mix are seriously compromised by their neglect of the many differences, complexities and ambiguities that characterise the policy-making process at both the Community and national level.

[6] Dornbusch R., **Policymaking in the Open Economy**, World Bank, Washington D.C., 1993.

The need to invest in knowledge for Policy Impact Analysis

Twelve reasons can be selected on why EU Countries need to invest in knowledge for Policy Impact Analysis:

1) EU policies, such as the *Lisbon Strategy,* can hardly be expected to produce "their" effects, unless objectives are turned into *Policy*, i.e. Specific Choices and Actions or how would EU Countries know what Lisbon actually means in terms of legislation, budgets, regulations and, equally important, costs and benefits?

2) Policies can but be tailored to problems, "systems" and drivers. In no way, the latter can be assumed to be the same all over the EU.

   - The EU may be an optimal currency area (OCA), but not necessarily an optimal policy area for all or any policy;
   - The Costs-benefits associated to different policies cannot be expected to be evenly distributed among the EU;
   - If all Members look at what is good for them, no one will ever "see" what is good for the Union;

3) Without PIA knowledge, EU countries cannot expect to implement "best" policies;

4) Only in few EU Countries PIA has been taken seriously, or so it looks….

5) The current stock of PIA Knowledge in most European Union countries is underdeveloped and patently insufficient, not only at the national level but, especially, at the EU level. It is mostly carried out in university. It feeds only indirectly into policy;

6) There is a conspicuous US-EU "PIA Knowledge gap";

7) Connect Europe's citizens with Brussels;

8) Bridge what increasingly looks as a startling "democracy gap";

9) Open up and make policy processes more consultative and inclusive of stakeholder interests;

10) Support "best" Policies with appropriate information, tools and methods;

11) An increasing number of initiatives have been undertaken in the last few years to:

    - Develop, make accessible, implement, pool and use PIA knowledge;
    - Bridge the policy/research divide;

    Policy processes have been open up and gradually made more consultative and inclusive of stakeholder interests. The EU Governance White Paper has also pleaded for similar developments in the EU;

12) Cooperation in PIA Development Creates EU Value Added as witnessed by a number of Success stories, e.g. - Euromod – Diecofis – Euroky-pia; UK – Canadian - Australian and New Zealand Cooperation

An additional reason for a cooperative investment in EU PIA Knowledge is that national PIAs can no longer ignore what goes on in Brussels and the EU.
Though EU countries can be expected to increasingly belong to the EU "Optimal Policy Area", in a growing number of occasions national governments will need to shape their regional policies bearing in mind decisions taken elsewhere, as well as in Brussels

The Euroky-pia perspective

Many obstacles have constrained the development of cost-effective, evidence-based policy-making in the EU, but two have been especially relevant to this project. The first is conceptual and political, and concerns the need for a dynamic balance between tailoring vs. a one-size-fits-all policy approach. The second is the cultural bias on the part of the policy community, which favours muddling through to evidence-based policy. Redressing these imbalances is what Euroky-pia is about.

Policy analysis is about providing "facts", that is information that is reliable, trusted and used to support political choices with the best possible evidence. Ideally, the objective of policy analysis is to agree on "the facts", and disagree on choices only if that is justified and deemed desirable on the basis of differences in values.

In Europe, policy analysis has lagged much behind the USA. In the latter, policy evaluations has become standard practice. It is carried out by the government, but also by Congress (e.g. Congressional Budget Office). Private research institutions and pressure groups research offices also carry out their own independent evaluations.

Against this wealth of policy analysis initiative across the Atlantic, very little exists in Europe. A notable exception is the UK, where PIA has roots which date to the late 1800s. The recent UK "Adding it Up" initiative has provided a comprehensive overview of current practices, as well as an analysis of the issues and challenges at stake.

In the rest of the EU, nothing comparable is available. Specific and unexpected developments exist here and there. Brussels, policy analysis initiatives are in their early stages, which is surprising as providing "the facts" to support multilateral initiatives and decisions would appear to be a must.

Two notable initiatives financed by the EU IST Framework Programme on Policy Impact Analysis and evaluation are EUROMOD, for evaluating the impact of taxes and benefits on families; and DIECOFIS, for evaluating the impact of taxes on enterprises and their performance.

The aim of the EUROKY-PIA project is to build on these initiatives and foster the development of "critical research mass" on policy impact analysis across the EU, to scrutinize and support both EU and EU Member Countries national policies.

Section II

Workpackages

Making the Union the world's most competitive and dynamic knowledge based economy and bringing it much closer to the people it exists to serve will not just happen, it has to be fostered by appropriate policies. For the EU, the challenge implicit in these aims comes down to weighting the advantages of spelling out transparently and convincingly the effects (by sector, areas and social groups) flowing from each member's policies against the disadvantages of a "one size fits all" policy approach and distribution of costs and benefits. In order to translate the Lisbon strategy into a comprehensive package of actions[7], and to appraise progress[8] towards it, a great deal of documents, publications and initiatives have been generated by the Commission to expound and articulate it. In the meantime, concern has increased about governance, democratic accountability, coherence and, more generally, policy-related "quality" matters. Unsurprisingly, the two issues: (i) supporting the policymaking process and (ii) governance moved rapidly up at the top of the EU policy agenda, as witnessed by the **Governance White Paper** (see Box 1), the Commission decision on **Impact Analysis** (see Box 2) and by a host of other documents, including the European Commission report on "**European Competitiveness report 2002**, where the need for PIA knowledge is unequivocally recognized in that the report states that to optimize the links between enterprise and competition policies, the Commission intends to appraise national States regional aid decisions within a *'multisectoral' framework* and, on this basis, "*.. to select the sectors to be regarded as sensitive and…examine the impact of such policies. Good Knowledge and data concerning particular industries is of key importance both in determining and defending… the list* (of 'sensitive' sectors). (Ch. 4).

Box 1 - Better involvement and better policies and institutions

- "The territorial impact of EU policies …should form part of a coherent whole as stated in the EU's second cohesion report; there is a need to avoid a logic which is too sector specific. In the same ways, decisions taken at regional and local levels should be coherent with a broader set of principles that would underpin more sustainable and balanced territorial development within the Union".
- "If rules are not supported or inadequately enforced, the Institutions as a whole are called into questions. Apart from new, more inclusive approach to policy shaping, the Union needs to boost confidence in the expert advice that inform its policy. It needs to improve their quality, including implementation and enforcement".
- "In many areas, networking at European and even global level show clear benefits. Expertise, however, is usually organized at a national level. It is essential that resources be put together and work better in the common interest of EU citizens. Such structured and open networks should form a scientific reference system to support policy-making".
- "First, proposals must be prepared on the basis of an effective analysis of whether it is appropriate to intervene at EU level and whether regulatory intervention is needed. If so, the analysis must also assess the potential economic, social and environmental impact, as well as cost and benefit…."

*Commission of the European Communities, **European Governance. A White Paper**, COM (2001)428 final, pp.13-20*

Box 2 - Commission Action for "Assessing the Impact of Major Policy Initiatives"

By the end of 2002, the Commission will implement a *consolidate and proportionate instrument for assessing the impact* of its legislative and policy initiatives, covering regulatory impact assessment and

[7] Such as the *e*Europe 2002 and 2005 action plans.

[8] Such as, in the European Charter for Small Enterprises; the Council Decision on a Multiannual Programme for Enterprise and Entrepreneurship, in particular for small and medium-sized enterprises (2001-2005); the Commission's Communication on "Better Environment for Enterprises" which point to progress as well as the need for strengthening efforts in many areas of enterprise policy; and in the Green Paper on Entrepreneurship.

sustainable development (in the economic, social and environmental fields) and incorporating the existing instruments and methods. The impact assessment will make it easier to decide whether action should be taken by the Community level, having regard to the Treaty and the Protocol on the application of the principles of subsidiarity and proportionality.

The instruments will also make it easier to choose the most appropriate instrument or combination of instruments….from the wide range of options available….

In principle, all legislative proposals and all other major policy proposals for adoption…will be subject to impact assessment procedures…..

Alongside…steps should be taken to breakdown the divisions between the Community and national levels…by ensuring ongoing evaluation of how directives and regulations have been applied in practice; by improving feedback from Member States; and by exchanging good practice such as legislative impact assessments…In this respect, the Commission and Member States should work together with a view to… developing a joint approach to monitoring and applying Community legislation"

Implementation: gradually from the end of 2002 with a view to being applied in full in 2004/5; and 2003
Commission of the European Communities, Action Plan, Simplifying and improving the environment, COM(2002)278 final, pp.7-18

In line with the Lisbon objectives, the project was designed to (a) support the policymaking process (es); and (b) contribute to best design and tailor those EU policies that are required to *bring the best possible solutions to major societal and economic challenges in areas such as "inclusion of persons with special needs, environment…industrial competitiveness and employment*". In a nutshell, the project aims to generate inputs that are very important for policy-making in that it will (i) contribute at reinforcing EU policies priorities, as set in Lisbon, Stockholm and Gothenburg and (ii) have a positive influence on programmes' cost-effectiveness, efficiency and fairness and, more generally, on the "quality" of EU and national policies .

In order to achieve its declared goals, the project envisages a set of integrated and complementary activities focused on (i) assessing the existing situation; (ii) identifying the state of the art; and (iii) research tasks in the three major fields of policy analysis: (a) social policy; (b)short-term (business cycle) economic policy; (c) structural economic policy including, integration and market definition and sustainability), with a view to distil current best practices and help member and associate states institutions and research bodies to draw an agenda and prepare the ground for a fully-fledged project under the next FP6.

As recognised in the White paper on Governance in the field of Policy Impact Analysis three main challenges can be identified for the EU. The first concerns the information that is needed and the creation of reliable multipurpose, integrated and timely databases. The second, concerns the definition of a "model policy framework" that can serve as reference for the identification of systemic indicators of strength and weaknesses, which can serve to monitor socio-economic change and performance and to evaluate. And, the third challenge concerns the policies, the tools and methods that need to be developed or strengthened in the EU.

Workpackages have been shaped around these challenges.

Work Package 1

As pointed above one important ***Challenge*** in the field of PIA concerns the information that is needed and the creation of reliable multipurpose, integrated, systematised and up to date information systems. As witnessed by US experience dating to the early1970s, policy impact analysis is heavily dependent upon the availability of high quality, highly disaggregated statistical information. Information can be made available in various forms. It can be made easily accessible or inaccessible, unless "appropriately treated". When original data-sets are not made available, less satisfactory data-sets may be produced. Additional problems can follow from the fragmentation of the information and the impossibility of integrating different databases.
In evaluating policies, access to primary rather than secondary data is not an irrelevant issue, since it can have an impact on scope and quality. Micro data are necessary to isolate the influence of different factors, to calculate decomposable indicators, to study sensitivity, to trace transitions and to map patterns. Indeed, the effects that policies have on different groups, sectors or areas cannot be estimated without micro data. What happens to specific (often small) groups, sectors and areas is often key for policymakers and the lack of adequate information has for long hindered the study of the impact of public policies on the economy. The form in which data are available tend to impact differently on key and non-key policy features.

Resting on these consideration workpackage 1 bears on the information that is needed to support the Lisbon Objectives and New Governance in the social and economic-structural/market definition. The NSIs group in the network has taken the lead and main responsibility for this activity, which is basically on facts finding and the state of the art. And in collaboration with the other groups, they delivered three deliverables:

D1.1 The Information we have (including also issues of quality and relevance);
D1.2 The gaps that exists and where the EU lags/leads compared to USA;
D1.3 Which information we need, and where action should be taken first to support the Lisbon process, sustainable growth, convergence and social inclusion (including quality and integration) and what needs to be done to get it in selected policy areas.

The main conclusions of the research undertaken can be summarised in the following statements:
PIA is hindered by Information/Statistics which are treated like:

- ► Pieces of puzzles
- ► Static snapshots
- ► Aggregates which hide far more than they could show
- ► "Hidden treasures" which in many instances are kept inaccessible

While they are

- ► Living things;
- ► Raw material that ICT can transform in "knowledge-wealth";
- ► Mines of Knowledge which are critical for the success and for the management of public policy, if made available in "systemic custom-tailored blocks".

The description of the results is organised by deliverables. We report a summary of the work done by focusing on those aspects that mostly contributed to the achievement of the key objects of the project.

The information we have

In the course of human history, the focus of socio-economic research has swayed backward and forward on the swing of the micro and macro research scales. The former, practically dominated until the mid 1800s. The latter, instead, began to attract momentous interest only much later, with a pace which was slow at first, and a lot faster from around 1930. This research scale became definitely predominant after World War II. However, by the end of the 1980s the pendulum begun to swing back again, as witnessed by the growing emphasis on the micro and meso analytical scales, and on the need to integrate all three dimensions within consistent, comprehensive analytical frameworks. At first sight, these swings may be interpreted as the consequence of an unremitting struggle, with alternate outcomes, between different visions and approaches. As it happens, they represent steps forward towards a better understanding of demographic and socioeconomic trends and a wide range of life phenomena and interactions which occur over time among manifold factors, including human, social, technological, institutional, policy and behavioural. All along, advances and setbacks plot the way ahead.

Social policy analysts have been the first to be bewildered and challenged by the pitfalls and shortcomings of aggregates. They have also been the first to move beyond aggregates and to engage into developing information *hyper* and *microcubes* that can be "*sliced*", "*diced*" and "*drilled"* in order to be able to navigate macro frames, horizontally and vertically; across dimensions and over time (to chain link indicators referring to different dimensions and characters; benchmark, monitor, simulate and assess; map socio-economic structures at different levels to identify best performers, gainers and losers, drivers, factors/areas of systemic weakness and strength and of progress and decline; and so on). Accordingly, good analysts have dovetailed macro, meso and micro research within an increasingly robust, integrated, multidimensional and topical analytical framework. Economic policy analysts, instead, have by and large continued to focus on macro and sector aggregates and relationships. Micro level research has been hindered by the databases available in both instances. However, mapping systemic economic features and change onto micro-systems remains by far and for the most part an under researched area. Progress in the social field has instead been impressive. The social indicators adventure of the late 1960s and 1970s established the limits of summary descriptive statistics for policy impact analysis (PIA). Since then social PIA has made advances which at the time were difficult to imagine. This is witnessed by the swelling availability and extensive use of households' micro data and microsimulation (static and dynamic) models, and by the development of a host of micro-founded (summary and decomposable) indicators. The tools developed for the analysis of inequality and poverty, and their high degree of sophistication provide notable examples of the developments that have occurred.

Presently, the focal point of social PIA has moved on from ratios and indicators to statistics that can assist in the unravelling of the complex and multi faceted social policy conundrum. This involves dealing with matters relating to severity, relativities, duration, causal links, delivery options, competing claims and choice between programmes which can differently impact on *persons* and groups.

One important finding is that if the European Union has made great progress in establishing the internal market and in achieving European Monetary Union it is now time to give social cohesion the same degree of political importance as economic goals. Economic growth makes the continued existence of poverty and exclusion even less acceptable in our societies. Policies to combat poverty and social exclusion are first and foremost the responsibility of Member States.

But the objective is the same:

- to combine a dynamic economy with social inclusion and protection of the most vulnerable. Social statistics and Social indicators have a key role to play in this.

Social Statistics appear to be less homogeneous than economic statistics since each country has its own social system, resulting in the existence of sources that might not be able to be used or even

exist elsewhere, thus making harmonisation difficult. Europe is less advanced in this domain than many of the non-EU OECD countries.

The creation of a coherent system of statistics on income distribution and living conditions has become a topic of increasingly growing importance in the European Statistical System. Sources of information for the social statistics are survey sources (National Statistical Institutes) and administrative sources.

The dominant survey in social statistics is the *Labour Force Surve*y, which has been developed through the last 30 years. During the years the survey has been extended both in contents and in frequency and the harmonisation process has been performed on the output side as well as on the input side, since the Regulation also harmonises with the methodological side. The labour force survey is a primary source for the national accounts estimate of employment.

Another pillar of a system of coherent social statistics is the intensive work carried out with respect to the harmonisation of the *Household Budget Surveys* (HBS) in the EU Member States. A great part of the work carried out by Eurostat and the Member States has involved attempts to harmonise the definitions, classifications, etc. to enable international comparisons.

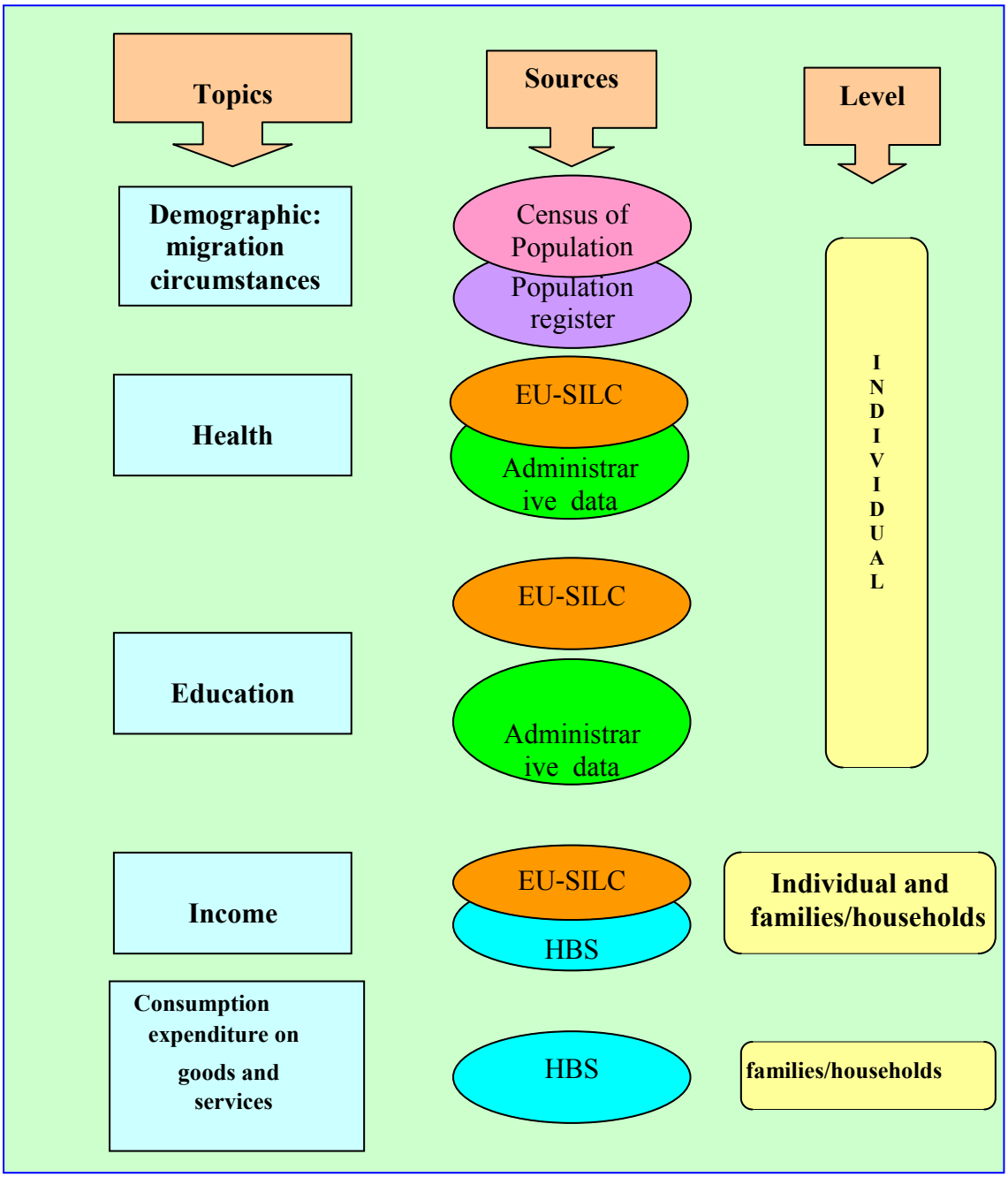
On top of these two surveys, a survey aiming especially at incomes, etc. was needed. The first big attempt was the *European Community Household Pane*l. The panel survey was introduced as a European Survey and has been financed by Eurostat. This survey was harmonised only on the input side. Data are comparable between Member States, but there is a problem of data comparability within the Member States. This problem was most severe for the income data..

The European Community Household Panel has been now replaced by the *Survey of Living Conditions, EU-SILC*. This survey is mainly harmonised on the output side, and opens up the possibility to create a European Survey, which will give comparable data – both between Member States and in the statistical system of each Member State. EU-SILC represents the new European instrument for measuring income and welfare.

The need for new European statistics on income and social exclusion followed from the conclusions at the meeting of the *European Council held on 23-24 March 2000 in Lisbo*n. At the meeting, the Council agreed, that is was essential to strengthen employment and social cohesion and to combat social exclusion and poverty. It was stressed the need to establish a common framework for the systematic production of Community Statistics on Income and Living Conditions (EU-SILC), encompassing comparable and timely cross-sectional and longitudinal data on income and on the level and composition of poverty and social exclusion at national and European levels. Accordingly, the objective is also to acquire information about non-monetary deprivation, physical and social environment, housing, labour market data, education and health. In the future, health information will be collected from ad hoc modules.

As to other statistical information about education and health most data are based on administrative data sources. However the statistics based on national administrative sources, reflect the country-specific way of organising education and health care, and may not always be completely comparable.

Chart 2: Main data sources, topics and information level



One important point in the discussion is that countries with effective population registers are able to do much more effective analysis on skills, employment, inclusion, migration and so on – as the information is collected from administrative systems and it tends to be timely, reliable, comprehensive (if it can be linked), and less of a burden on respondents. An effective linkage between registers and data sources is crucial. This should be structured in ways that ensure individuals cannot be tracked, but so that there is sufficient information to analyse and link data for statistical purposes. Administrative systems often only collect one particular type of information. This may be useless on its own but extremely useful when linked with other data.

As regards **Social Indicators**, a set of commonly agreed and defined indicators are essential to allow the Union to monitor progress towards social inclusion.
In December 2001, the Laeken European Council endorsed a first set of 18 indicators of social exclusion and poverty. These indicators measures the degree and persistence of poverty and income

dispersion and the associated risk of social exclusion in accordance with the Lisbon European Council's high priority on social cohesion. The indicators are organised in a two-level structure of primary indicators – consisting of 10 lead indicators covering the broad fields that have been considered the most important elements in leading to social exclusion – and 8 secondary indicators – intended to support the lead indicators and describe other dimensions of the problem. In fact they concern the distribution of income, the share of the population below the poverty line before and after social transfers, the persistence of poverty, the proportion of jobless households, regional disparities, low education, and long-term unemployment.
After the mentioned date, the Indicators Sub-Group has continued working with a view to refining and consolidating the original list of indicators. Actually, these indicators have been a valuable starting point, but there are important dimensions not covered (notably health, housing and homelessness, literacy and numeracy, access to essential services, financial precariousness and social participation).
Moreover, indicators may have some problems, for example an European aggregate level is a mean value but it doesn't consider disparity. In fact should be provided with breakdowns by most relevant variables, with a particular focus on gender and regional disparities.

- ***Business statistics***

The main areas of interest that structural business statistics cover are: i) structure, activity, competitiveness and performance of enterprises; ii) compilation of national and regional accounts according to the European system of integrated economic accounts (ESA).

The general scope of structural business statistics is to represent the evolution of economic system structure and its changes. In the last decades the conception of structural business statistics has been dealing with the radical change of technological paradigm determined by the dissemination of new technologies. The process has not completed yet and much work has to be performed in order to make structural statistics adequate to represent the e-economy change.

Generally speaking, the formulation, application, monitoring and assessment of new economic, competition, social, environmental and enterprise policies and guidelines call for initiatives and decisions based on valid statistics. That is statistics which are up-to-date, reliable, pertinent and comparable.

In particular, the needs expressed by policy decision making influence both the contents of the statistics to be produced on one hand and the type and quality of the data on the other hand.

As to the first aspect, various acts adopted by the Commission and the Council suggest that the following policy issues are paramount[9]:

1. Seizing the opportunities offered by globalisation and the new economy. This calls for statistics on business conduct, in particular concerning: research, development and innovation, environmental protection, investment, eco-industries, tourism and high-technology industries.

2. Enlargement of the Community and operation of the internal market. This increases the need for comparable data on the structure of earnings of employees, the cost of labour on internal trade.

3. Policies for small and medium-sized enterprises. This involves the need of comparable statistics for all sectors, on the national and international subcontracting relations between businesses and improved statistics on small and medium-sized enterprises.

[9] See, for example: Presidency conclusions of the Lisbon Council; The Commission's work programme for 2001. COM (2001) 28 final; Shaping the New Europe. Strategic Objectives 2000-2005. COM (2000) 154 final; Towards enterprise Europe. Work programme for enterprise policy 2000-2005. COM (2000) 771.

As to the type and quality of the data to be collected tools and methods used by policy analysts deeply influence data requirements.

More specifically, many issues are to be faced:

1. The use of model and indicators. During the last quarter of a century the increasing availability of micro data on individuals and families and the development of longitudinal and cross-sectional microsimulation models has brought tremendous progress in the analysis of the impact of public policy on households. Enterprise micro data and microsimulation models for the analysis of the impact of public policy on business have not known a similar advance. However there is a strong call for the use of such models and indicators in the field of enterprise policy analysis as well. The construction of a set of reliable and comparable indicators that can serve to assess policy effectiveness on different sectors, groups or actors, thus permitting to identifying areas for further policy actions. These indicators should rely on enterprise micro data. The use of micro data allow to investigate different situations and problems. In particular, these indicators permit to cover situations, such as the present, characterised by important structural change, in which the old economy structures continue to predominate and new economy structures gain rapidly momentum, though they are still difficult to discern and assess. Important characteristics of indicators/benchmarks are their consistency and their commensurability. In particular, they should be able to measure and map common things in different countries; this leads to next question.

2. Comparability. By comparing and combining national level indicators, more complex indicators at the trans-national level should be derived. These global level models and indicators might be used to measure public processes occurring at the trans-national level. For these purposes collaboration and co-ordination must be reinforced between those authorities which contribute to the production of statistical information at both national and Community level.

Another important question related to the collection of data on enterprises is the necessity not to impose an unreasonably onerous reporting requirement on enterprises. This need is also coherent with the new governance approach promoted by the Commission which aims at “ensuring wide participation throughout the policy chain - from conception to implementation” and wants “to create more confidence in the end result and in the Institutions which deliver policies”.

Basically, the question takes into consideration two partially intertwined aspects:

1. Data-capturing. Undoubtedly, our awareness of the opportunities offered by new technologies and developments has improved. Yet, the overall framework remains fragmentary, often incomplete and blurred, with overlaps, gaps and dark areas. Moreover, new technologies have not been fully exploited or put to best use. In addition, advances have not trickled down or spread effectively at the “production level”. As will be stressed in the following chapter, most of the advances made with FP5 financed projects have not yet translated into “better and faster statistics” and greater and better support to policy makers and, more generally, users.

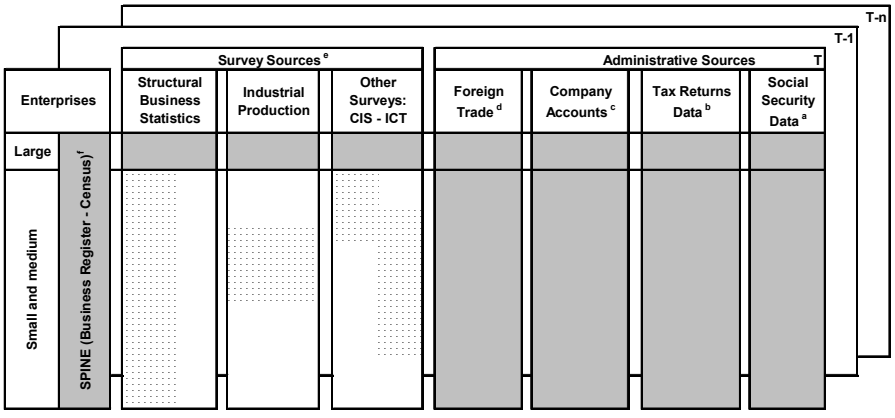
2. Use of administrative sources. There is a large amount of administrative type information which might be exploited for statistical purposes. The administrative data can be used for at least two levels. Ex-post: enterprises surveys might be substituted or integrated using those economic information which Public Administrations collect for their aims. Ex-ante: for integration of the administrative data in the design of surveys. However, the availability of more sources (both administrative and statistical) on the same unit of analysis implies the adoption of efficient techniques of integration and of transmitting and processing huge amounts of data.

Within this context, research undertaken has suggested a new approach to build the evidence base for policies affecting the business sector through the matching of micro-data on firms and the development of an Integrated and Systematized Information System (ISIS) for Enterprises. Research has displayed the importance and need for investment in the development of ISIS, and the additional value created when National Statistical Offices put policy users' needs and demands at the heart of their mission. They create new "value added information" and overcome the artificial wedges that presently hinder data access and research.

To this effect, Istat in Italy has taken the lead to develop the EU FP IST project DIECOFIS with the aim to search for the best way that can eventually lead to fill an increasingly patent gap in economic policy analysis through the development of an Integrated and Systematized Information System (ISIS) for Enterprises. The Italian contribution has approached the issue from the perspective of a producer of data. Research work has relied on both statistical surveys and administrative sources, including tax authority information. The integrated system has shown great potential.

The first step in the construction of the Integrated and Systematised System has been the selection of the "spine" information that will be used as a basis for the integration process. As the Chart shows at ISTAT the "spine" is constituted by the statistical register of Italian active enterprises (ASIA) [10].

Chart 3: General Framework



(a) Enterprise with employees only - This database is shaped by the National Social Security Legislation
(b) All enterprises - This database is shaped by the National Tax Legislation
(c) Incorporated enterprises only (Their account system is regulated by EU directives)
(d) Exporting enterprises only
(e) These Sources are governed by: (i) Council Regulations: no 3924/91 - survey of industrial production; (ii) n. 696/93 - statistical units for the analysis of the production system; (iii) n. 58/97 - structural business statistics; (iv) Commission Regulation: n. 1618/99 - evaluation of quality of structural business statistics;
(f) The Business Register is regulated by: (i) Council Regulation n. 2186/93 - Community Co-ordination in drawing-up business register for statistical purpouses.

The Register is the result of an integration process of different administrative sources and represents the best "hanger" for data integration purposes. On this hanger, information from the following sources can be put. Large Enterprise Accounts (*SCI*); Small and Medium Enterprise Survey with less than 100 workers (*PMI*); Manufacturing Product Survey (*Prodcom*); Foreign Trade Archive (*COE*); Other surveys such as the Community Innovation Survey (*CIS*) and the *ICT* Survey. All of the above ISTAT surveys are based on common EUROSTAT standards and classifications (as shown in chart 1). This implies that the integrated database can serve to simulate at a "micro level"

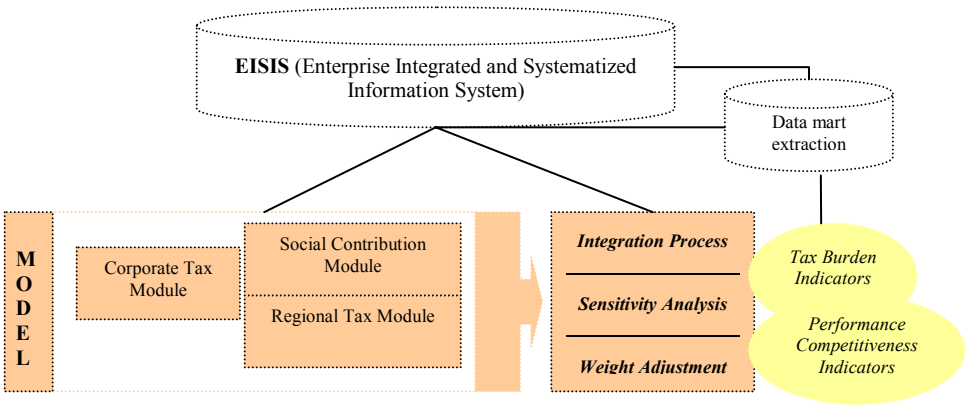
[10] The ASIA project started in 1995, its goal is to improve and update the register of all Italian enterprises. It is the result of the integration of external sources with ISTAT Archives (old Sirio-nai archive, 7° Industry Census and survey SK). External sources are: VAT Register of the Ministry of Finances; Chambers of Commerce; INAIL (National Institute of Insurance Against Accidents at Work); INPS (National Social Security Institute); Yellow Pages and other specific archives.

the impact of public policies not only in Italy but also in other countries and that a path for the creation of an EU statistical information system has been traced.

The information coming from the administrative sources that have been integrated in the database include[11]: Commercial Accounts (*CA*) data from the Chamber of Commerce annual report that complement ISTAT business survey of account system (*SCI* and *PMI*) for all corporate, co-operatives and consortium enterprises only[12]; Fiscal data (*FISCAL*) from the Revenue Agency annual tax returns; Social Security data (*SSD*) from the Italian Social Security Institute (*INPS*). These two latter sources permit to obtain precise information on tax and social contribution revenues, and thus to calculate the actual tax burden on enterprises, which can be used to test the model's output (e.g. "counterfactuals"). Looking at the quality of the available information, enterprise size seems to be a "key" variable. In fact, exhaustive information (which covers the whole universe) is available for large enterprises that have at least 100 workers, while for small and medium ones only sample data is available. A second characteristic that appears to be very important is the legal form, as the type of tax that an enterprise is required to pay depends on it.

The final result of the integration process has been the overall dataset, which is representative of the universe of enterprises. Data marts are extracted from this database to serve fiscal microsimulation analysis and to produce systemic analyses.

Chart 4: The Overall Structure



From the integrated data base the micro simulation model should estimate the taxable yield for every type of tax.

EISIS has confirmed that micro-data analysis, possibly linked with some macro-data, and microsimulation are certain to be fundamental for effective policy analysis in general, and for taxation and fiscal indicators in particular.

Experience so far suggests that the best strategy for the future is to develop a modelling "environment" that focuses on facilitating research studies, rather than providing one model that delivers the required output from a few menu-driven screens. At the national level, this environment would have to provide the following facilities:

- a core database and prompt access to a range of other databases with aspects of access, record linkage, consistency of variables already solved;
- the addition of further micro-data by the researcher, with suitable record linkage facilities;

[11] The Integrated and Systematised System on Enterprises has been realised within DIECOFIS project.

[12] CA data contains a sample of corporate enterprises which have a precise a legal form. The variable legal form assumes the following values: Sole proprietorship (legal form =0), partnerships (legal form =1), corporates (legal form =2), co-operatives (legal form =3), consortium and other legal entities (legal form >3).

- a library of macro-economic data that can be used in analysis;
- core modelling facilities including the capacity to design and establish new datasets for analysis;
- standard software for example tax calculators, standard reports, graphics, and access to already established models;
- some advanced modelling facilities, for example the ability to model using different hierarchies of data (global performance, UK and IT group, individual company), expected behaviours based on previous research, some feedback facilities for use in simulating changes, iterative solutions, and projection facilities for ageing the population taking account of the economic conditions and the diversity of the population;
- bespoke software development so that the researcher can modify and extend the core modelling and standard software to suit the specific needs.

The overall objective is to develop a highly flexible modelling environment to meet the wide range of requirements. Modelling must develop from the relatively static limited data models that served yesterday's needs to dynamic models using multi-sourced micro-data combined with relevant macro-data.

For business sector research, the complexity of the data and the extensive modelling needs indicate that the analysts must be extremely capable. Their role will not be to use a few menu-driven screens on a well-established and user-friendly model using a fixed clean dataset. Their role will be to first establish the key variables for their research from previous research and discussion. Then, they will need to form a relevant dataset from an *ISIS* or, if this is not available, from available core data, other databases, and by new data collection if necessary. Almost certainly they will use a subset of businesses of which some will have missing information; they will therefore have to reconsider aspects of non-response, sampling and grossing to population levels. Next they will analyse their data before considering the precise modelling to be undertaken which will probably involve coding specific changes, incorporating various assumptions and estimated relationships. Sensitivity analysis will be necessary. And the whole process will probably have to be repeated several times as various aspects are refined.

Reducing the gap between the EU countries and the USA

The deliverable debates the fact that policy analysis has developed later and is less used in Europe than in the United States. In an evolutionary context, however, what is important is not the size of the gap that can be observed, but whether this is shrinking or widening. To put it differently, what counts is whether there is convergence or not towards the frontier of the state of the art. The discussion focuses on tools and uses of policy analysis both in USA and Europe and how PIA related development issues and problems are perceived. Most of the analysis stresses the need of a robust knowledge or evidence base on which policy makers can draw. One of the main differences is the ease of accessing information in the USA compared with Europe. Thus, an important concern is how to maximize the flow of relevant and useful knowledge from researchers or statistical agencies to the people who have to evaluate specific alternative legislative proposals. The current information flow is not necessarily optimal. Many factors may often militate against providing the kinds of information that policy analysts most need. Moreover, whilst there is much PIA being carried out at national level within Europe there is very little at European Level. The diffusion, scope and use, and the resources allocated to policy analysis in EU countries should improve. More actors should be involved in the policy process. In Europe most policy analysis is carried out within public institutions. The USA experience witnesses the important contribution that may come from the involvement of independent centres.

Reducing the gap between EU countries and the USA requires (i) investing in research; (ii) developing and applying the tools and methods of policy analysis; and (iii) expanding access to administrative and survey microdata. Strengthening knowledge and capacity for policy analysis, with the support of new technologies figures at the very top of the EU agenda. Actually, there are important areas where EU countries lag vis-à-vis the USA. These tend to be associated with the difficulties encountered in accessing, merging and systematising large microdata bases. The use of highly powered analytical tools is also hindered. This suggests that important progress can occur if an effort is made to (i) provide more and better information; (ii) development multipurpose, integrated and systematised data-bases.

In the USA since the inception of the federal system in 1789, decision makers in the executive and legislative branches have sought information to help make choices among alternative public policies. Before 1960’s the supply of policy information has been limited and the demand for it sporadic and ad hoc in nature. Form 1960’s quantum improvements in data sources, socioeconomic research, and computing technology made it possible to supply information of much greater depth and breadth to the policy process. Today, the policy community in Washington takes for granted that neither the administration nor Congress will consider legislation to alter any of the nation's expenditure programs or the tax code without looking closely at "the numbers." In fact, in a world of constantly evolving technology and information where most social institutions, including markets and property rights, are also changing, new research and information must constantly be brought to bear if economic policy is to be made wisely. The quality of economic policy decisions affects the welfare of the nation's individuals, and is an important factor in the competitive position of our nation with respect to others. Government agencies charged with policy support responsibilities are some of the most important conduits from new research and information to public economic policy. To this effect, there are four attributes of research, information, and analysis that matter to public policy makers and other public- and private-sector clients. First, research, information, and analyses should be of high quality, meeting relevant disciplinary and professional standards. Second, research and analyses should be relevant, addressing the essential policy question and with consideration of the policy context in which decisions are made. Third, these services should be timely. Intermediate and long-term research conducted in anticipation of policy questions and concluded before political lines are drawn is a treasured resource, not only for clearly being independent of specific interests, but also for its availability at critical junctures, when

decisions must be based on what is known rather than what might be learned. Fourth, all of the services provided by agencies in support of public economic policy must be credible. The credibility of research, information, and analysis in support of public economic policy derives from its quality, relevance, and timeliness, and its established independence from the political decision making process.

Moreover, very important in developing and supporting an approach to policy making which draws on evidence has been the involvement of independent, non-partisan organisation devoted to research and analysis to support policy decisions[13].

In the USA there has been a growing attention to evaluate the utility and accuracy of the policy analysis tools employed and of the estimates they produce. In particular, it was stressed[14] that if policy models are to provide cost-effective information to the legislative debates of the future two major deficiencies should be solved: 1) underinvestment and consequent deterioration in the scope and quality of needed input data for policy models; 2) lack of regular and systematic model validation. These improvements took the form of recommendations that were proposed in the USA since the early 1990s. These recommendations applied to policy models generally and to microsimulation modelling specifically. They concerned the following issues: Better data; Validation (External validation and Internal validation); Microsimulation models.

Against this background the policy impact analysis in Europe could be considered an underdeveloped area. However, since the March 2000 Lisbon Meeting, things have started to move in Brussels. This is witnessed by the 2001 "Governance White Paper"[15] (COM,2001 n. 428), by the Commission decision on "Impact Analysis" and by a host of related documents. Research resources committed to the development of PIA knowledge and capacity in the EU area remain, however, scanty. Possibly because the need, the effort and the investment which are entailed are underrated. PIA is data thirsty and requires microsimulation models and other tools.

Recently the Commission has launched impact assessment as a tool to improve the quality and coherence of the policy development process. This should contribute to an effective and efficient regulatory environment and further, to a more coherent implementation of the European strategy for Sustainable Development. Impact Assessment is intended to identify the likely positive and negative impacts of proposed policy actions, enabling informed political judgements to be made about the proposal and identify trade-offs in achieving competing objectives.

Impact assessment helps structure the process of policy making. It identifies and assesses the problem at stake and the objectives pursued. It identifies the main options for achieving the objective and analyses their likely impacts. It outlines the advantages and disadvantages of each option as well as synergies and trade-offs. By this view, Impact Assessment is fundamentally a Cost-Benefit Analysis of the policy that will be adopted.

Pilot questionnaire

Starting from the USA experience where recommendation for PIA have been proposed since 1990's. The Consortium has deemed it desirable to gauge the situation that exists in the EU against these criteria. To this effect an e-pilot survey has been proposed to establish whether there is and how important it is in the selected country the concern

- for policy impact analysis (PIA), both inside and out side government;
  and, if the answer is positive
- for supporting it with high quality statistical and administrative information.

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[13] E.g. Urban Institute and The Brookings Institution.

[14] National Research Council (1991): Improving information for Social Policy Decisions: The Uses of Microsimulation Modelling, Vol. I: Review and Recommendations. Panel to evaluate Microsimulation Models for Social Welfare Programs.

[15] The White Paper proposes opening up the policy-making process to get more people and organisations involved in shaping and delivering EU policy. It promotes greater openness, accountability and responsibility for all those involved. This should help people to see how Member States, by acting together within the Union, are able to tackle their concerns more effectively.

The questionnaire was mailed to key representatives of European NSIs and to selected members of the research community and policy units. The small number of respondents (to now, only 14 in full) out of a minuscule universe has not allowed drawing any strong conclusions. In particular, the questionnaire was filled by representatives of the NSIs of Italy, the UK, Denmark, Malta, Austria, Chzech Republic and Portugal; the US view was represented by the Federal Reserve Bank of Atlanta, whose answers were kept separate in the analysis hereunder; the "counterpart" or control group by a few users in policy units and international research centres based in Italy, England and Germany: these answers were treated together to NSIs', apart from cases where a clear inter-groups difference was emerging.

Main results

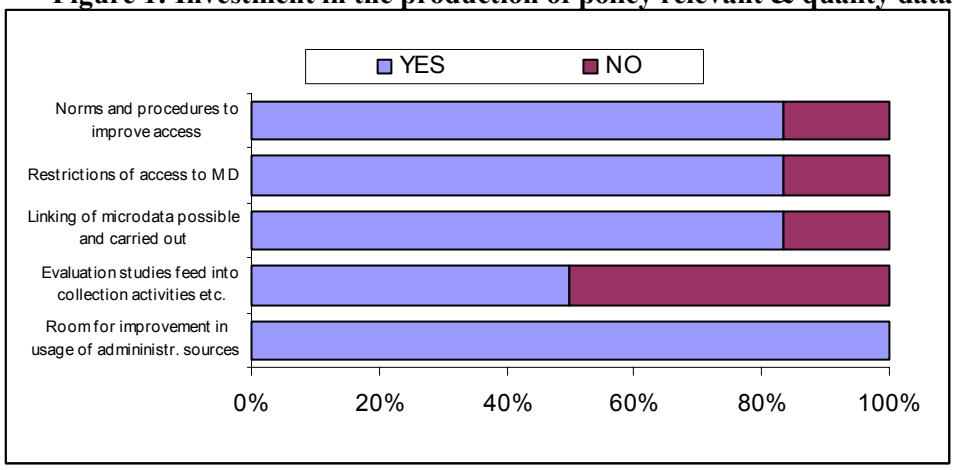
Responses conform to a priori expectations on the low degree of development of PIA and underlying tools, and provide some broad indications on (at least perceived) areas for improvement, and can be usefully integrated with the answers to the more ambitious special OECD questionnaire on the measurement issues of SME behaviour, and the ensuing analysis presented by the head of Trade and Structural Statistics at OECD, Lindner (2004), which highlights some points of general relevance, though focused on SMEs structural statistics issues.

A first set of questions of the questionnaire dealt with the issue of investment in the production of policy relevant and high quality data. About a half of respondents (& the US) declares that their institutions invest heavily on the enhancement of micro-data quality. The other half, however, declares that investment is small or insignificant. Coming to more specific issues:

1. All respondents (including US) agree on the fact that there is still room for improvement in the usage of administrative data, although a good number specifies that they already recorded many progresses to this end.
2. In half of the cases (not the US), there is no feed back from evaluation studies into data production.
3. Linkage of micro data is in most cases deemed possible, but only in a few cases this is carried out in an extensive and/or regular way.
4. Access to micro data is restricted in most cases (overall or limited to specific circumstances), especially on grounds of privacy and dissemination of sensible data. However, in all cases restrictions are also compounded by specific norms to guarantee access to researchers. These norms are in most cases already in place, although with different degrees of effectiveness, while in a few cases are still to be implemented. The EU situation appears overall pursuing the US, with most responding countries having a framework for enhancing the access to micro data, but a very different situation at the national level, especially with respect to its practical implementation.

A number of respondents stated the need to include the dynamic dimension (demography) into the more static (structural) dimension. A clear requirement is the possibility to link up statistical systems, in particular with respect to employment and finance.

Figure 1: Investment in the production of policy relevant & quality data



All respondents agreed on the desirability of a stronger effort by NSIs on both generation and coordination of policy supporting data series, including statistical activities to improve the quality and relevance of data for policy analysis. A majority of them thought that coordination should be assigned to NSIs, while some (including representatives from NSIs) declared that also other Agencies should be involved.

Respondents were unanimous also in suggesting a more active role of NSIs in data quality evaluation, notwithstanding the fact that in nearly all respondents' countries these activities are already in place. Indeed, data quality evaluation is said to be undertaken only marginally in about one third of cases, and that in more than a quarter of cases it is carried out neither in-depth nor regularly (both hold for the US). Further, in more than half the cases data quality evaluation is not structured to cover all stages of data collection and processing, and in more than 40% of cases both suggestions from and needs of users do not enter in the design of the evaluation process.

Information at work

In this deliverable analysis on information needs have been identified by working on a set of thematic studies covering:

- First, the general framework for PIA Information, as this can be gathered from the experience of a front runner in this field, the UK Office from National Statistics;
- Second, the best way to track the new economy and, once chosen the features that are believed to be worth tracing, the information needed to monitor it ;
- Third, sustainable growth and ways to monitor its development in a multidimensional and multilevel framework;

The UK experience in the field of PIA

Today's focus on PIA is partly a reaction to 'opinion based policymaking' at various points in the past, when major changes in economic and social policy were implemented based on theoretical models, without pilots or empirical validation of their effects. But it is also a major plank in developing the professionalism of decision making and management in the public sector. It is designed to be part of a culture in which the public sector policy makers and managers have access to 'the best analysis' to inform their work on the grounds that this will improve the chances of success.

With reference to the UK experience, the rise of 'evidence based policy' is now established as a firm principle in public policy debate. Any policy initiative proposed by a government department will be scrutinised prior to decision for evidence on a series of key points. Most important of these is that the policy will produce claimed effects for its those affected within the proposed resource budget, and that the policy's overall benefits (economic or social) outweigh its costs. These points need to be demonstrated with evidence drawn as far as possible from real data. If proposals are concerned with changes to tax, evidence should show that revenue will be raised without adverse economic effects. For tax concessions, the 'case' should show that alterations will change behaviour in ways which confer overall economic benefit.

The growing demand for policy impact analysis in the UK has driven change, and a greater role for the statistical office, while a similar pattern is evident in other countries. At ONS the creation of the Analysis Directorate, and the Neighbourhood Statistics and Integrating Analysis initiatives are part of this change, demonstrating the importance of NSI inputs.

Policy impact modelling can take place at a number of different levels:

- At a high conceptual level modelling and simulation can provide a useful guide to the effects of alternative policy changes. Conceptual models provide a framework for answering “what-if” questions in a controlled manner, and also for providing feedback on the plausibility of econometric results. Individual elements and assumptions in conceptual models can be calibrated using statistical evidence, and specific hypotheses proved or disproved. An example is recent analysis of firm entry and exit across the UK economy, and firm level productivity. This has provided evidence on the working of competitive market selection processes, suggested areas where market failure may be present, and helped stimulate the search for explanations.

- Modelling on a macro level - whether on economic or social issues - is an essential part of most policy assessment in order to quantify overall outcomes, but does not necessarily identify policy impacts on individual economic actors. The case for building up macro measures of outcomes

from micro analysis increases with the amount of detailed data on groups affected by policy, and on their different reactions to economic and social factors

- Micro-modelling of economic or social policy changes taking account of differential behaviour by different affected groups usually allows assessment of outcomes for different economic actors. It often permits detailed testing of the incentive effects of policy, of the robustness of predictions, and sensitivity analysis of the interplay between different policy levers.

Within the micro-context, the key elements of ex ante (pre-decision) policy impact modelling are:

- ❖ Enough data about citizens, communities or enterprises affected (numbers, identities, incomes, education, occupations etc.) to assess and model consequences

- ❖ Behaviour models or hypotheses about those affected by policy, expressed in a form that can be linked to individuals or enterprises, and therefore tested empirically

Official statistics can make a valuable contribute to PIA under both headings - as originators of data to test or develop models, and as the main providers of data on the population of economic and social actors to apply them.

Ex post policy impact analysis can be more complex - ranging from full micro-modelling based on survey tracking to test the behaviour assumptions behind policy, up to monitoring of key indicators at macro-level, as applied in the EU structural indicators.
In 'micro' ex-post modelling there are a number of limitations to use of official statistics which have been encountered. First, the introduction of reliable surveys to test the implementation of policy may take longer than the introduction of policy itself. Surveys of new phenomena often take a cycle or two to 'bed in', so that results are understood. Second, there are legal boundaries which can get in the way. For example, when it was suggested that firms receiving public support (e.g. for innovation) be identified and their performance tracked, it proved difficult due to the separation in UK law between data collected for statistical purposes and information gathered for administrative purposes.

The use of micro-data, and the ability to link sources is recognised as important element of statistical system. In particular, the advantages to researchers of having access to linked data are stressed, and government departments are encouraged to assist in identifying suitable data-sets and in developing suitable protocols for their use.

Looking at UK recent experience in the field of PIA, the decade to 2004 has seen a large increase in PIA work carried out in the UK. A particular feature is the increasing amount of cross-government work, recognising the need to 'join up' policy from different departments which influence the same policy outcome. Three drivers of this process can be identified:

-First, the creation of the Treasury's Evidence-Based Policy Fund (EBPF) which was set up explicitly to develop the evidence base, and its analysis, across and within government departments.

Among the initiatives we remind the financial support to Economic Research Centre for microeconometric analysis of business data.

-A second driver has been technological change, benefiting both back office operations and analysis. The increasing ability to integrate and analyse large amounts of data has led to a number of data integration projects - with an operational focus - which have provided policymakers with new opportunities to evaluate policies.

Among these projects significant for the research community and policymakers, has been the Business Data Linking Project at ONS. Starting in the late 1990s, the project initially concentrated on developing a

longitudinal micro-data set for research use from the UK's primary business survey. Since then it has expanded to include the linking of a wide range of business survey data produced by ONS and other government departments, with around 20 research projects making use of the data. Its results have so far fed into Treasury, Department of Industry and Education policy formation.
The project is still at the early stages. However, interest in the use of business micro-data is expected to increase rapidly with the formation of a Government User Group, and seed funding is being offered by a number of government departments for policy-related micro-data work.

- A final driver, more indirect but nonetheless relevant, has been a general desire to "connect" government.

Access, confidentiality and comparability are three main issues which have so far affected the ability of National Statistics Offices to make the most of their respondent level data for detailed analytical work. In all three areas a combination of legal constraints, and the confidence and continuity expected for official statistics, have played a part.
Access to business data in the UK is legally circumscribed by the Statistics of Trade Act, and all data , business or individual, is covered by privacy legislation . In practice statistical organisations may choose to interpret such legislation restrictively, because of the costs, both politically and in terms of public confidence (and with effects on survey response) of arousing controversy. Where NSOs are prepared to overcome such concerns, there remains the barrier of providing access to data while minimising the risk of disclosure. Technology solutions to containing data are being developed by a number of offices (for example the US, UK and Australia seem to be pursuing similar paths).
Data sharing, and linking data across surveys can increase the risk of confidentiality breaches, because linked data can raise the probability of identifying respondents, either individually or in small groups. Disclosure control of analytical results is therefore an important aspect of managing access and data sharing: ONS has introduced a set of protocols for access to tackle this issue. Such protocols also have to take into account not only disclosure considerations, but also legal constraints limiting the purposes for which data can be used. For example, data collected under the UK Statistics of Trade Act can be used only for statistical purposes, so access to any person working in administrative functions is restricted. In a similar way, data collected for tax purposes may not be disclosed for other applications (which results in additional respondent burden as different arms of government ask the same question two or three times!).
Data collected for different purposes or by different organisations within government may differ in the definitions and scales used, which can limit the value of data-linking. This makes the importance of good metadata to researchers a critical factor, and there is increasingly strict attention paid to this internationally.
A more insidious problem affecting some areas of work is the tendency of data-sets to contain data of varying quality. As a rule, data that is intensively used by its collectors tends to be of high quality, while data items within surveys which are used only occasionally may degrade over time. This is true both of statistical survey data, and of administrative data. Statistics organisations making data available to researchers for impact analysis need either to make them aware of the application and analytical history of data, or to ensure they have access to tools for checking data reliability.

The best way to track the new economy

This section focuses on the development of the "new economy" and the challenges that it raises, especially in terms of measurement. The focus is the "new economy" readiness of the individual member countries and a *New Economy Tracker Index* (NETI) is developed and piloted. The use of a single index, that sums up each economy's status, allows comparisons by developing an

evolutionary framework which will incorporate changes rather than levels per se. It is intended as a means of benchmarking against other economies which are similar in relevant ways.
The pilot covered five EU Member countries (France, Finland, Germany, Italy, the United Kingdom) and the United States. The inclusion of Finland - identified by the OECD as one of the few countries outside the United States to show some evidence of an ICT-related improvement in long-term productivity growth since the mid-1990s - is meant to provide a benchmark by which to assess the major economies within the EU. The US is also included as a further benchmark, as one of the key issues is how well European economies are performing compared to the technological leader. As to the other EU countries, it has been planned to complement this pilot study with an inventory of the information that is available. NETI indices will be prepared as soon as possible.
The aim of the pilot was not to provide a league table, used to rank countries, but rather to carry out a feasibility study that can serve to motivate and develop an evolutionary framework for monitoring year by year changes ─not levels per se─ in the long-term structure of the European economies.

As regards the methodology chosen for calculating the NETI, it is the same used in several other benchmarking indices, such as the Human Development Index and the Growth Competitiveness Index. The summary index is a simple average of indicators scaled between 0 and 1:

$$\left\{\frac{\text{Actual value} - \text{minimum value}}{\text{Maximum} - \text{minimum value}}\right\}$$

In the case of the HDI the maximum value is a pre-determined goalpost such as a reasonable number of years of life expectancy. In other cases it is the sample maximum, giving a potential index value of 1. In the case of the NETI the best performer sets the goalpost, and the measure for the other countries shows their proportionate distance from the best performer.
The following table presents the NETI values for the five sample countries for the latest year for which data are available and the following table shows the index values for each category of indicator.

Table 2: NETI for five EU economies and the US

France	0.399
Germany	0.404
Italy	0.191
UK	0.497
Finland	0.745
US	0.657

The overall NETI index confirms Finland as the leading New Economy country in this sample, as intended by its inclusion as a benchmark. Surprisingly, perhaps, Finland edges ahead of the US. The fact that the two technological and productivity growth leaders also score highest on this index helps to underline the validity of the NETI approach. So too, in fact, does Finland's slight edge over the US, as the NETI deliberately includes a wider set of measures of economic capabilities than are conventionally taken account of in New Economy debates. Amongst the four big EU economies,

the UK is slightly ahead of Germany and then France, but Italy lags well behind. The table showing the component values indicates that the UK and US combine real strengths in some categories with weaknesses in others, performance by France and Germany is more even, and Italy displays a startling across-the-board weakness in what ought to act as clear warning to its policy-makers. However, one of the areas of US weakness is in the openness category, where lower ratios of trade and FDI to GDP simply reflect the size of the US economy. On these two components it would compare with the figures for the EU as a whole. This should be kept in mind in making the comparison of the US with Finland, which is of course a very small and therefore open economy. In reality, the two will be close in terms of their New Economy capabilities.

Table 3: NETI component indices

	Technology	Human **capital**	Finance	Enterprise **& Innov**.	Openness	Adaptability
France	0.251	0.525	0.250	0.466	0.519	0.382
Germany	0.493	0.479	0.047	0.464	0.652	0.290
Italy	0.219	0.028	0.154	0.269	0.245	0.232
UK	0.690	0.424	0.543	0.208	0.440	0.677
Finland	0.827	0.887	0.644	0.557	0.667	0.890
US	0.716	0.801	0.532	0.743	0.333	0.817

Each country's performance in the different components of the index is to some extent consistent with some of the well-known stylised facts about national economic strengths and weaknesses, such as the UK's long-standing shortfalls in education and training or Finland's outstanding technological capacity. However, there are many surprises in the table. What's more, the benchmarking approach makes the scale of the shortfalls very apparent, such as the relative lack of openness in France and Italy or the lack of, adaptability in Germany and Italy.
Summarising the results of this study, it appears possible to conclude that the NETI has potential and can serve to monitor change in the long-term structure of the European economies. It provides information beyond that given by either existing economic aggregates or any of its components. The combination of the overall NETI ranking, and the detail on specific areas of strength and weakness provided by the component indices, paints a picture which ought to be of interest to policy-makers concerned about their economy's structural resilience and potential long term productivity growth.

Admittedly, the limited number of countries included in the pilot, together with other problems, such as those discussed below, suggests caution before the results reached in this deliverable can be generalized (e.g. they might prove sensitive to country coverage or time period).
It appears desirable to expand coverage and build up times series data on NETI to test formally its robustness and its explanatory power for long run growth. There would be availability issues involved in expanding the number of countries and in taking the data back very far at this stage; and of course it would not make any sense to look for New Economy impacts any earlier than the late 1990s on the reasonable assumption that any European countries will lag a little behind the US, where the structural break in productivity performance occurred in 1995. It might be of interest

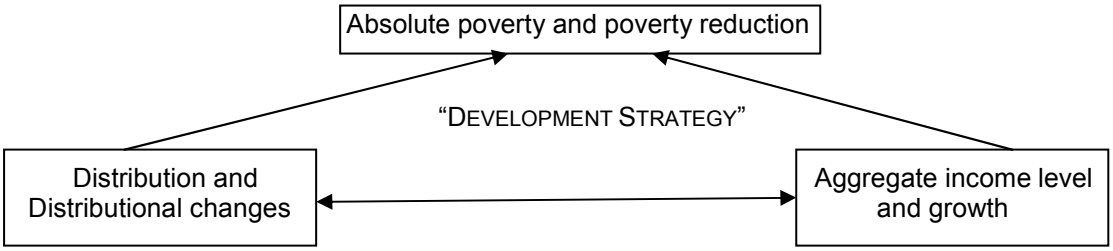
meanwhile, though, to present time series data on some of the key variables included, such as R&D spending, or composition and skills of the workforce.
As stressed in the pilot report, a number of issues would need to be resolved in future work. One general issue is the data edge and also timeliness. Most of the figures used in the report are available through to 2002, but not all. In those cases, the illustrative calculations used 2001 figures. In each case forecasting the final year using an autoregression or vector autoregression would be appropriate; for capacity reasons the short cut of using the previous year's data (equivalent to assuming the variable follows a random walk) was used in the deliverable. This is clearly a methodological question to address in future, but one which offers an opportunity to generate a complete set of timely data for all the variables. Thus in addition to filling in the gaps for 2002 for a few variables, it would be possible to generate a 2003 data set consisting of actual data for some variables and estimates for the rest. It would certainly be desirable to update the results to calculate a preliminary 2003 NETI. Estimating the missing elements would be one possible approach. Another would be to search for non-official data sources, with the potential drawbacks of lower quality than official statistics, non-comparability between countries and perhaps also cost, for the use of some industry data sources. While both approaches have drawbacks, the preference would be to use official sources where possible and calculate estimates up to the most recent year for all component indicators in order to derive a provisional NETI. This does raise the question, however, of whether national statistical institutes should not be more willing to undertake further work themselves on the development of timely data in the new economy area, even if it is far from certain at this point what statistical framework will ultimately have replaced the existing SNA by the end of this century.
Further issues to be considered include the choice of variables to include in the NETI. Certainly the selection here is not definitive. For example, additional technology variables might be included (e.g. penetration of 3G mobile, use of mobile internet or VOIP). Similarly, the human capital measures are highly selective and alternatives could be considered. Of particular interest would be indicators of changing working patterns, such as non-standard hours, tele-working from home and mobile working, part-time work amongst professionals, and so on. Finally, consideration should be given to including some business environment indicators such as regulation and tax structures.
One way to address some of these potential gaps in a framework of regular reporting would be to incorporate a special subject in each NETI report. That would offer an opportunity to focus on a particular aspect of the analysis and collect information on it without the need to include a variable which might be problematic in terms of the comparison between countries.

Sustainable growth in a multidimensional and multilevel framework

The important message that emerges from the analysis proposed in this section is that good policies cannot be based on evidence consisting of national aggregates and averages. What they show may not only be an incomplete picture, but an irrelevant or a bad proxy of what happens. Behind aggregates significant differences may appear and may show that there are winners and losers, laggards and fast movers. In the proposed distributional analysis what matters for policy is to know who loses and who wins.
Research moves from the Bourguignon's suggestion that for the purpose of development policy the adoption of a three-dimensional poverty (the goal), growth (the means) and inequality (the driver) reference framework or PGI-Triangle may prove convenient. His suggestion stems from a vision of growth in which the real challenge "lies in the interactions between distribution and growth, and not in the relationship between poverty and growth on the one hand and poverty and inequality on the other", since – he maintains – the latter are essentially arithmetic.
According to the Poverty-Growth-Inequality Triangle framework development strategies are (i) "fully determined by the rate of growth and distributional changes"; and (ii) "..poverty is a function

of aggregate growth and income distribution and may therefore change as a result of income growth and/or distributional changes (see Chart 5).

CHART 5: BOURGUIGNON'S POVERTY-GROWTH-INEQUALITY (PGI) TRIANGLE



Bourguignon's PGI-Triangle portrayal of development rests on formal analysis which contend that changes in poverty between any two periods can be studied with the help of (i) an identity in which they are a function of growth, distribution and variations in distribution; and (ii) growth decomposition analysis[16] which allows to distinguish between changes associated to distribution-neutral horizontal shifts in incomes (or pure income growth effect) and/or variations in the shape of the density curves (or distributional effect).

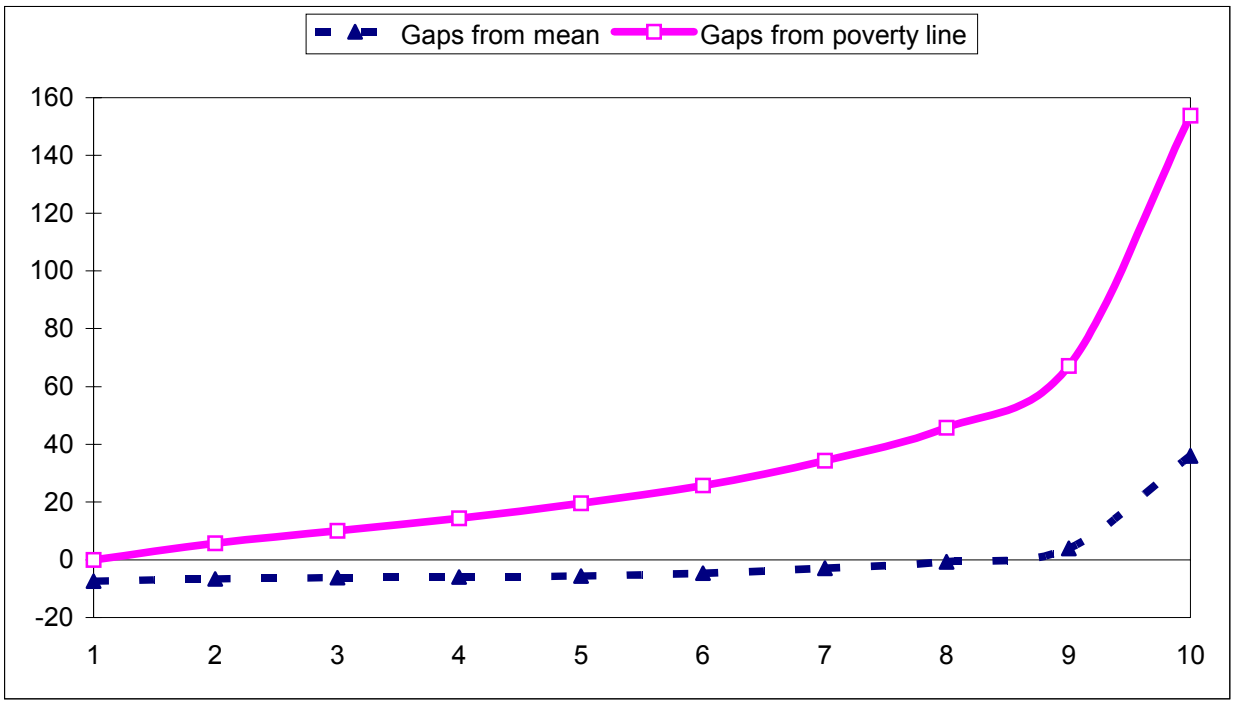
At the outset, Bourguignon's proposition seems attractive. Upon closer scrutiny, however, it no longer looks as promising as it does in the beginning. First, PGI complexities appear to be underestimated. Second, the answers to development questions that come from the theory (and empirical evidence) on the relationship between the factor and personal distributions of income are far less definite than implied by the PGI Triangle. Finally, processes (i.e. production and distribution) seem to be confused with outcomes (i.e. growth, inequality and poverty).
The PGI-triangle vision of development policy proposed by Bourguignon seems to have left unanswered too many buts, it seems to have conspicuous drawbacks.

The development process appears to be more complex, subtle and, at the same time, more pragmatic than under this vision. A variety of factors ―ranging from history and initial conditions to behaviours, social stratification, the political context, political institutions, redistributive mechanisms, transition processes and so on― are at work all the way through a country's development process. These can interact in complex and undependable ways, thus making outcomes far from predictable. Others doubts arise. First, the PGI-Triangle vision hides behind aggregates what actually counts and is crucial for policy. Second, growth, poverty and distribution are end results. Policy can be prompted by poor end result, but not shaped on them. It has to attack causes, and be customized to have a bearing on them. Third, growth, distribution and poverty are part and parcel of the same process or problem: the production and distribution of national wealth. They do not form a "triangle".. Rather they denote two ends of a continuum, or two sides of an identity. Both subsume a complex web of relationships and activities. Formally, they are described by density curves[17] that can shift (as production/income grows) and modify their shapes (as the distribution of production/income changes).

[16] That is, graphic investigation in which the initial income distribution density curve is compared with the new income curve and with a hypothetical curve which shape matches exactly that of the initial curve, but is otherwise shifted to the right and has the same mean of the new curve.
[17] Individuals inside firms in one instance and individual and their families in the other.

Stimulated by Bourguignon's article, analysis in the deliverable proposes an alternative approach to the assessment of PGI performance. The perspective is tri-dimensional and multi-layered. Development is appraised by means of standard aggregate indicators complemented with a distributive chart that permits to gauge how poor and non poor fare, and whether "distances" among groups shrink or widen.
The way suggested to grasp the arithmetic relationships that exist between growth, distribution and inequality at a moment in time, is to transform each point of a distribution (i.e. individual incomes) into ratios or deviation from the mean or other benchmark. In turn, these can be graphically represented in Schutz's type graphs[18] (see Graph 2), which permit to judge how total income and the benefits of growth are shared between unders and overs or other groups.

Graph 2: Schutz's and Roberti's income gaps curves



If, instead, the focus is on poverty, iso-income inequality curves (which uses the poverty threshold as reference income), as proposed by Roberti,[19] permit to ponder changes in distance between the poor and non poor. Basically, this is equivalent to placing individual or grouped data along a sort of Pen's parade —which opens up with "dwarfs" and ends with "giants" — in which "heights", that is each individual's income is re-scaled on the mean or on the poverty income, respectively. Transformations such as these, allow to associate growth and distributive records (over time and, if deemed desirable, across space or other dimensions) and, concurrently, to monitor distributive "misalignments" and "biases" within and between "unders" and "overs"; or poor, non poor and rich. At the same time they foreshadow the way towards the development of an "equitable growth framework" which can be used to judge the "quality" of growth.
Unlike the aggregate PGI-Triangle vision, this approach permits to create a multidimensional monitoring/reporting framework (MMG-IP) which allows to judge growth (G), inequality and poverty (IP) developments and performance in a multidimensional and multilevel overall and distributive perspective grounded on "comparators", such as groups with mean or poverty income not on aggregates. Unlike PGI triangle, the MMG-IP framework permits to identify, focus and

[18] Schutz R.R., (1951).
[19] Roberti P., (1982).

capture those areas in which problems may be emerging and likely to be located, with a good degree of precision; and, consequently, to zoom into the aggregate picture by connecting the income information with that on the circumstances of the groups that, say, appear to be under performing or lagging behind. This makes it possible to give a "face" to groups and individuals which, albeit blurred and difficult to discern, permit:

- To put human beings back into the limelight of statistics;
- To identify potential target groups and accurately profile them and, thus, be able to answer questions such as "what are their circumstances? and "what makes them weak?"
- To conduct a tailored search for the determinants of different groups' strength and weakness, in order to answer questions such as, "why are certain segments of the population weak and faring differently from others?" or "why do certain groups not share the benefits of, say, economic growth?"
- To understand needs, e.g. what exactly is required and what can be done to overcome problems (e.g. investing in human capital or providing various types of incentives and which options might be feasible;
- To spell out and assemble the policy package, e.g. set program objectives (i.e. to do exactly what), means (e.g. what and how), target groups and access (e.g. who can claim and how) and other parameters (e.g. for whom and how much).

From this analytical viewpoint, the MMG-IP framework appear to open up new vistas for development policy, since aggregates can be re-connected with individuals and families who will, eventually, appear with a "face" and be associated with an activity, a source of income (such as wage or pension income) and so on.
Similar frameworks can be developed to evaluate other policies for which the distributive dimension is a critical feature (e.g. taxation and its incidence).

Workpackage 2:

This workpackage has been designed to exploit the opportunities that New Technologies can open up for the development and management of information systems. In particular, the ICT group has investigated the development of a strategy for *improving policy support through the imaginative application of new technologie*s. The perspective has been forward-looking and has focused less on leveraging technology to do the same faster, but on technological innovation and novel application of ICT to provide more, better and faster information in support of policy-making.

In a more general context, Euroky-PIA has been asked to cope with the great **challenges** facing the information society. These challenges are:

- The various actors in the Union want more and more information, of higher and higher quality, faster and faster, more and more comparable, at lower and lower cost;
- There is constant pressure to lighten the burden on data providers and to protect confidentiality;
- Advances in information technologies have resulted in an explosion of databases but not a commensurate increase in knowledge.

In facing these challenges, solutions have to be:

- Both technology-driven, in the sense of customising generic advances in technology for statistical developments; and user-driven, which might mean the NSI groups Commissioning specific software developments to provide a better service to customers;
- Have an actual or an identifiable potential application , with a clear take-up plan in terms of:
    1. prototyping,
    2. demonstration,
    3. assessments, culminating in incorporation of research results into the routine production operations of NSI's and other bodies;
- Rest on clear partnerships between national groups and those at European level, with value-added, the creation of synergy, critical mass and institution-building;
- Recognise that any IT oriented research must be an ongoing activity in order to keep abreast of rapidly changing technologies.

Till now, IT tools would appear to have opened vast new opportunities for collecting, accessing and disseminating information, especially micro data-bases, either through recourse to (a) developing socioeconomic information systems; (b) creating multi-purpose, interrelated and integrated data bases; (c) evolving towards a concept of *"virtual data-warehouse and data extraction tool*s", that is a network of coherent and homogenised e-data-bases which can be e-inter-linked, e-systematised and e-managed according to specific needs. However, producers and disseminators of statistics have their own good reasons for modernising their IT infrastructures. The traditional production and dissemination systems were based on expensive mainframe technology, closed operating systems, non-standard interfaces and tailor-made in-house software. Greater efficiency is being achieved by replacing this archaic philosophy with an architecture based upon:
- Open systems
- Integrated processing environments
- Communication through standardised interfaces or re-usable modules and making use of inexpensive, widely used commercial software components
- Modern distributed database management and analysis concepts and systems.

Research should include:

- The establishment of common platforms for IT strategies, which should facilitate flexible and inexpensive exchange of statistical data between the various actors concerned and which can make a contribution to the promotion of statistical comparability;

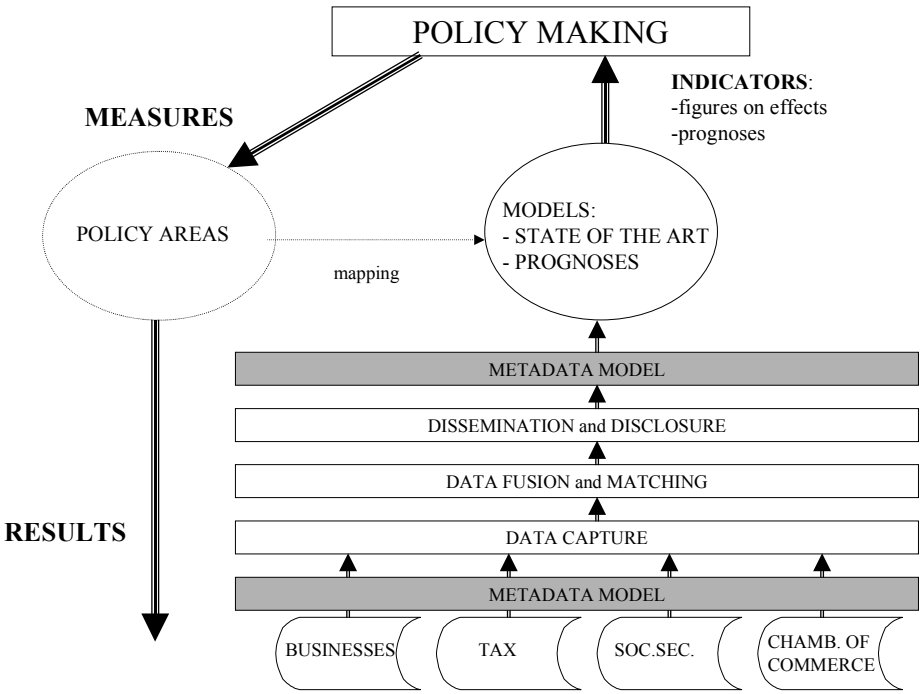
- Customisation of general software products or development of "hybrid" software for statistical purposes in selected areas, with NSIs cooperating with software houses.

Resting on these consideration analysis in this workpackage focuses on the support that can come from New Technologies and how these can help. It describes the use of existing technologies and the exploitation of the new opportunities that IT developments are opening up. Then analysis addresses the issue of the comparison between Europe and the USA with respect to the ICT applications in the policy making process. Finally, attention is drawn more on inter-institutional cooperation and less on technologies.

The Support from New Technologies

In answering the question if we are making the best use of existing technologies and exploiting the new opportunities that IT developments are opening up, analysis provides some insights with regard to the main steps in the process of statistical data creation. In particular, it deals with data capture, with the focus on the use of Internet and some developments in standardizing metadata; it discusses the state of the art in statistical data fusion and distributed data base technologies and, finally, it describes developments in the dissemination of statistical data, with the emphasis on the use of metadata and proposals for standardization.

Chart 6



The importance of above mentioned steps of analysis can be perceived from the above chart which shows the cycle of the decision making process. Within this context, the process of the creation of statistical data consists of at least three steps:

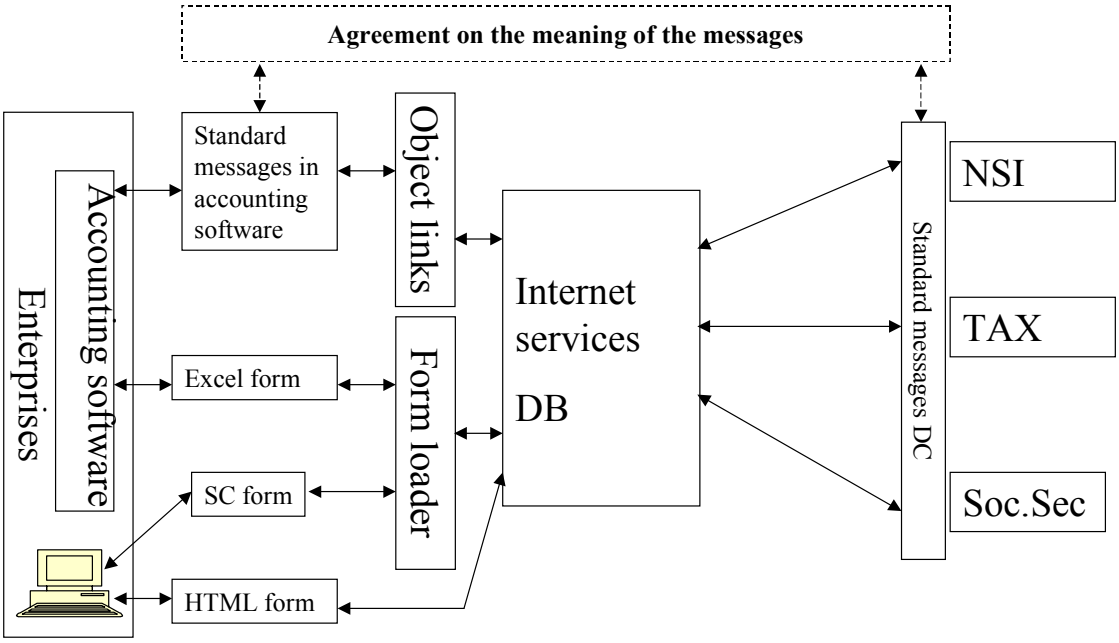
- Capturing the data
- Data fusion and matching

- Data disclosure and dissemination

In **data capture** electronic forms and the possibilities to get the data directly from the source (the information systems at the enterprises) should improve the quality of the data partly because quality checks would be embedded in the forms. Whereas in the past, data were (and partly still are) captured through paper forms, with resulting manual checks, currently data can be captured by ICT in different ways. Data fusion and matching, distributed databases and data fusion techniques provide important benefits to the efficacy of the process. They allow the expansion of the data available at lower unit costs. Similarly, data are more and more available through Internet, with similar benefits, though one of the main problems is how to avoid the illegal use of data: especially of microdata relating to a single person or individual company.

Metadata play an important role in these statistical processes, especially when that process is or will be highly automated. With the increase of the computer in the statistical process, the significance of metadata has increased. There was no need to make the metadata explicit, when the metadata were only in the mind of the statistician. Today the use of a correct set of metadata is necessary to design and implement an automated data capture system that serves the data collector, the respondent, the policy-maker and the layman. Metadata have to fit the requirements of the data collector as well as the requirements of the respondent. Both sides of the chain have their own automated information systems that should communicate with the data capture system. Different kinds of metadata are required for dissemination of the statistical data to different stakeholders. The receiver of the data should know exactly what the sender of the data (the NSI's) means with it. Especially if the receiver of the data is not a human being but an automated system (for example a model to extrapolate the data in order to make prognoses) the meaning of the data should be unambiguous and explicit.

Chart 7: General architecture for a data capture system



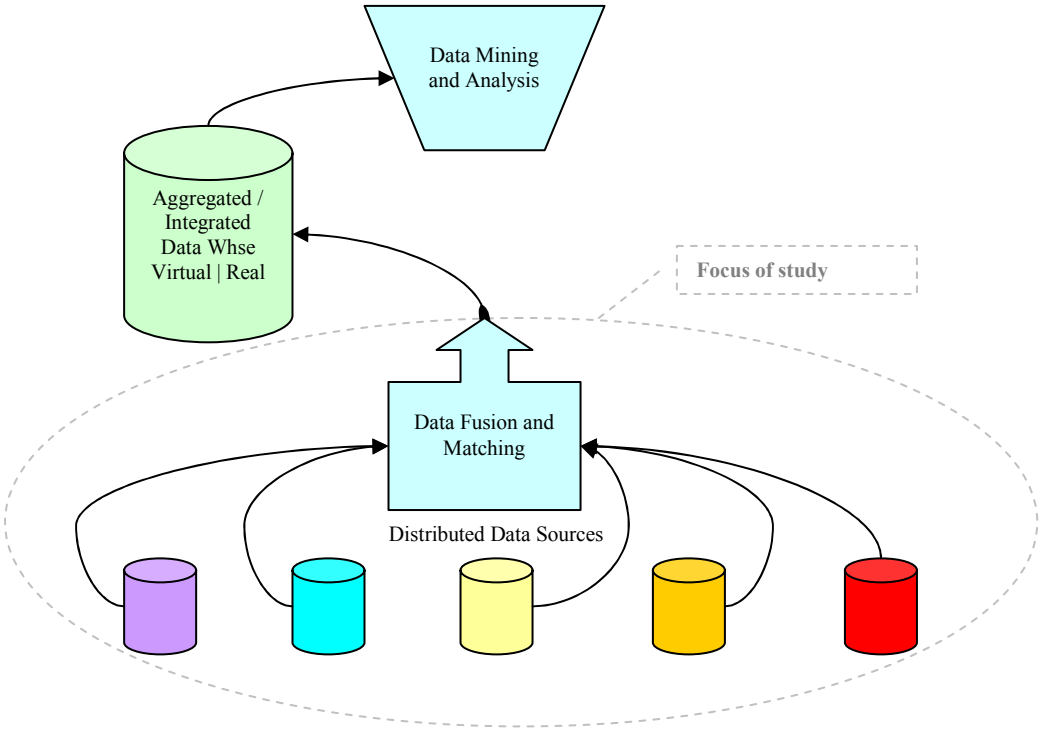
A related problem is that of security. In fact, the use of Internet in the data capture process means that the confidentiality and integrity of the system have to be guarantied. Confidentiality is the concept that information should be available only to those who are authorized to access it. Strict rules and controls have to be implemented ensuring that only those people who need access to certain information have that access. Integrity measures should ensure that information couldn't be modified in unexpected ways. Loss of integrity could result from human error, intentional

tampering, or even catastrophic events. The consequences of using inaccurate information can be disastrous. In the system, optimal results can be achieved on confidentiality and integrity with:

- Digital certificates: The collector and provider identify themselves with a digital certificate. All data will be digitally signed. This process should be automated, so neither the collector nor the provider of the data is aware of these preventive measures.
- Encryption: Different kinds of encryptions should be used, each with respect to a specific situation.

Data fusion with statistical matching and distributed databases are often the first steps in the process of a larger data mining effort. First, distributed data sources need to be integrated with reliable and compatible connectivity technology. Second is the data fusion effort. The output of the data fusion effort is often a data warehouse, either physical or virtual, with several data structures that are then optimised for analytical processing. Finally, this data is exploited through a structured data mining and analysis effort. Due to the massive volumes of data and the geographical dispersion of systems, virtual data warehouses have become a necessity; however, they pose several significant research problems in the areas of parallel distributed query processing and distributed knowledge discovery algorithms.

Chart 8: Data consolidation and fusion process



Data fusion is difficult to implement in practice due to the lack of common meta-data models and references. Several researchers have begun to work in this direction, especially within the research concerning improvements in distributed database query algorithms. Furthermore, this is compounded in data sets that have poor quality data, i.e. the meta-data is not well defined or the values have not been checked for errors. New technologies in thesaurus management, meta-data modelling and data cleansing algorithms are beginning to solve these issues.
In the best systems, there is an effort to validate the data prior to using it in a fusion operation. This validation can include several checks, such as running a defined dictionary of meta-data against the

dataset or could include value checks on the data values, all with the goal of revealing any errors or anomalies.

Relying on these findings we can say that technology has and continues to evolve at a rapid pace. The analysis has shown that there are several adequate technologies and abundant processing power available for statistical matching today. The barrier to compilation of large and distributed data sets has passed through several phases. Prior to the 1970's the barrier was processing power, through the 1980's storage and network transmission were bottlenecks. In the 1990's abundant and inexpensive network bandwidth made distributed systems a possibility, technically overcoming the geography dispersion barrier. Today, storage, bandwidth and processing power are available at very low cost in large quantities.
The bottleneck has moved from the hard problem of tools and technology to the softer issues surrounding the statistical matching process. Skills required to implement, integrate and exploit technology are often unavailable. One could blame the technology for its complexity; however, leading edge technology, like any other scientific profession, is not simple to exploit. Policy often precludes the creation of mega-data sets that might provide a "big brother" government with detailed information on each citizen that is so valuable and so detailed that the temptation to use it for direct administrative purposes, as opposed to statistical and policy analysis uses, is irresistible. Availability of specific sample data is often less than optimal due to either the high cost of collecting the data or the resistance of data owners to share valuable data due to policy, cost-recovery or confidentiality concerns.

Dissemination of statistical data seems to be easy if the data fusion and distributed data bases are used in a proper way.
Increasingly users want data not just through the traditional printed paper but also through interactive electronic publication, including the WWW, on-line access to micro databases coupled with CD-ROM disks, creative multimedia techniques, virtual information parks and other electronic means that would allow the widest possible and user-friendliest dissemination of know-how, of good practice and of research results.
Data providers would also require tailor-made, electronic feedback from data collectors. All these services are required with computerised metadata descriptions and associated documentation sophisticated but clear enough to permit the re-use of the information for purposes not originally intended and to permit also the formulation of independent interpretations and judgements. As there are many types of users, at different levels of statistical expertise and computer literacy, on-line interfaces must be flexible and adaptable.
These demands represent a formidable challenge. The response to them includes the development of appropriate harmonised output database architectures and data warehousing, interactive access tools and powerful, user-friendly intelligent search engines, including OLAP (On-Line Analytical Processing) for statistical purposes.

• Applicability of virtual reality to improve the man-machine interface and the understanding /visualisation/dissemination of information;

Nevertheless, for policy impact analysis the data made available through National Statistics Institute websites are not sufficient.

1. In the first place more detailed data are needed to make prognoses and to analyze the effects of policy measures.
2. Secondly one should be able to compare data from different sources and to combine them.

The obligation of the statistical offices to keep data on individual companies and people confidential conflicts with policymakers' need for more detailed data.

Research activities in this area are:

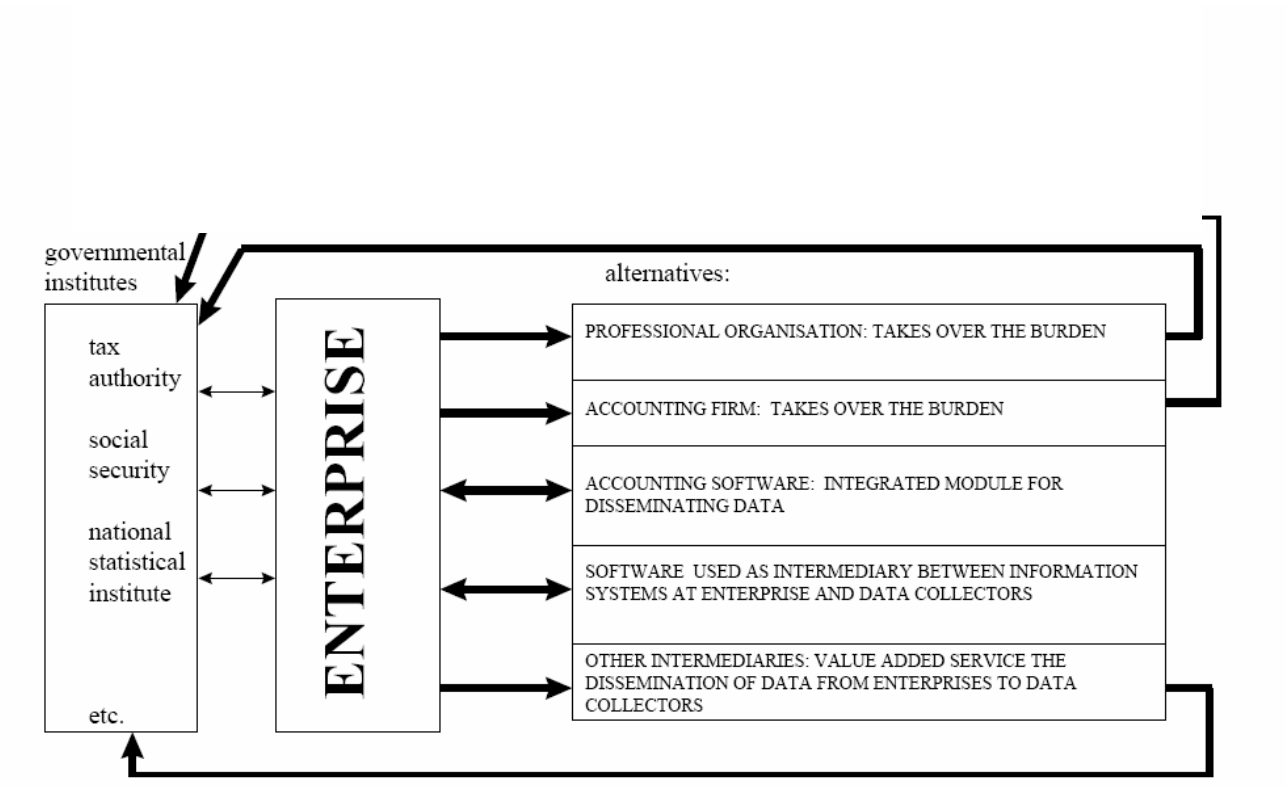
- Developing software to hide cells in which data are confidential (see Hundepol, Amrads [16] for an overview).
- Development of remote access systems to select microdata. Non-confidential microdata are made available by statistical institutes by analyzing queries from the researchers, selecting the data and checking the output on confidentiality. (See also Schouten [17]).

An important development in the second area is represented by "the Statistical Data and Metadata Exchange initiative" of BIS, ECB, EUROSTAT, IMF, OECD, UN, and the World Bank. The initiative aims at a more efficient process for exchange and sharing of data and metadata by defining common e-standards in the field of statistical information.

ICT applications: how does EU compare with the USA

On the specific issue of data collection analysis focuses on the comparison between Europe and the USA with respect to the ICT applications. Actually, within the policy making process the e-data capture causes not only a more cost effective way of gathering the data, but also improves the whole chain of the process.
The analysis shows[20] that there are several ways to capture data in an efficient way for the governmental data collectors as well as with a minimal administrative burden for the enterprises.
The following model shows the various alternatives:

Chart 9: Alternatives ways of data capture



[20] The deliverable contains a brief summary of the main conclusions of European research projects on data capture and integration (Teler, Datamed, Codacmos, Amrads, Viros).

By collecting the data about the economical activities of the enterprises by professional institutes the burden for the enterprises disappear. The professional institutes take over the burden by collecting and sending the data from their members to the governmental data collectors.
Also the accounting firms can play a role (and in some countries they already do, especially for the small and medium enterprises) in lowering the burden for the enterprises by collecting the data from their clients and send them to the governmental data collectors.
Other intermediaries can offer their services by which data are electronically collected and sent to the appropriate governmental data collectors.

Two technological solutions are:

- Built in modules in standard accounting software (compare the CCMX solution in TELER).
- Software used as intermediary between information systems at the enterprise and the governmental data collectors.

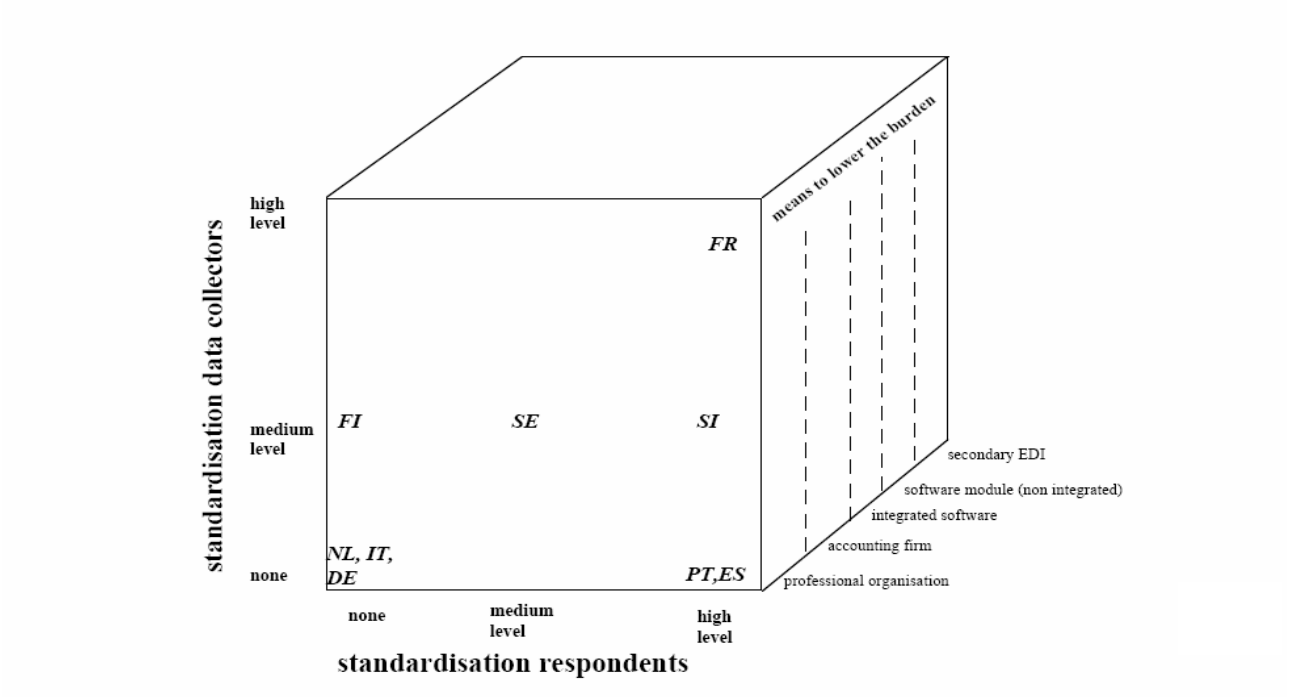
Other alternatives to lower the administrative burden on the enterprises are:

- Co-operation between the governmental agencies in data collection (avoid overlap in asking questions to the enterprises) as well as the use of data collected by other governmental agencies for statistical purposes. This is called secondary EDI.
- Simplifying the administrative rules.

The latter alternative cannot be solved with Information Technology.

The choice of the most effective means to lower the burden is among other things dependent on the following two factors:
1. The standardisation of metadata within the information systems at the respondents (for financial information systems: standardisation of the chart of accounts).
2. The level of standardisation in the metadata of the governmental institutes (more or less harmonisation of the data collected by the governmental institutes).

Chart 10: Level of standardisation in EU countries



The above chart shows the position of the EU countries with the respect to the standardisation. The more standardisation, the more possibilities to use the ICT means in data capture in an effective way. Therefore, in France it is much easier to implement modules in standard software packages to report data from enterprises to governmental agencies than in countries like the Netherlands, Italy and Germany. For the latter countries, software used as an intermediary between the automated information systems at the enterprises and the questionnaires or form of the governmental agencies is the best solution.

One of the main conclusion of the analysis undertaken is that there is no difference in the availability of technology between the USA and Europe as far as the ICT means (to be) used for Policy Impact Analysis are concerned. The Internet, the standards (protocols, XML, etc) are equally available for the USA and the EU. Therefore, the use of Internet for data capture should not be different. The same holds for the technology available for data matching and data fusion. Hardware and software are used in the EU as well as in the USA. Nevertheless, it seems that a difference exists in the large-scale application of the ICT in the production process between the USA and the EU.

The table below shows the development in the field of electronic data capture in the EU against the timetable of the developments in the USA (BEA, Bureau of Economic Analysis, US Department of Commerce).

Table 4: Development of electronic data capture in EU and in USA

	EU	**USA (BEA)**
1997	Last year of TELER project; start DATAMED project	
1998	Second year DATAMED	Start development electronic data capture system
1999	Third year DATAMED	Pilot 1 questionnaire, 10 respondents
2000	Last year DATAMED	Initial production (1 questionnaire)
2001	Start CODACMOS project	Production 2 questionnaire
2002	Second year CODACMOS; start AMRADS	Full production
2003	Third year CODACMOS; second year AMRADS	Full production
2004	Last year CODACMOS; third year AMRADS	Full production

Of course, the relevant ICT means have been improved during the last 5 years. In EU the developments have been taken into account in research projects, whereas in the USA these developments caused adaptation and maintenance of the production system.

To sum up, the following general conclusions can be drawn on the differences between EU and the USA concerning the application of modern ICT in PIA:

- There are no significant differences in available technology.
- The current technology is well known in the EU and in the USA.
- EU started research earlier than the USA
- The USA implemented current state of the art ICT as soon as is was applicable
- EU deals with the changes in technology by continuing starting research projects.
- Most of the results of the EU research projects have not be implemented (in real production).

In the implementation of technology like the e-data capture system, technological and organisational challenges play a role. In the EU research projects, the emphasis is more and more on describing those organisational issues. In the USA, the emphasis is on solving the organisational issues by introducing the new technology, evaluating the use, improving, etc. Moreover: in the USA current *de facto* standards are used, whereas in the EU open source software seems to be preferred, with all the attendant problems of implementation in the production environment, maintenance, continuity, etc.

In conclusion, the analysis stresses the fact that the real implementation of research results proved generally to be difficult in the EU. The emphasis of the recommendations is on organisational issues such as the responsibilities of governmental agencies and the public sector as well as the cooperation needed for implementation and the sustainability.

The importance of co-operation in the data creation process

In the last part of the analysis on IT opportunities to support the policy making process, attention is focused mainly on inter-institutional cooperation and less on technologies. The aim is to answer the question "h*ow and which co-operation is possible between IT and NSI groups to improve on statistical quantity, quality and timeliness"*.

Implementing modern ICT solutions in Policy Impact Analysis is a difficult, multi-disciplinary task. It is not just a matter of adding a new client to the existing ones of the NSI. Besides that, policy makers are already users of the statistical results of the NSI's. Implementing Policy Impact Analysis means that data have to be available sooner and in more detail than otherwise. Considering this and knowing the method of working at the NSI's, who are forced to produce official statistics in the way they do, one can consider creating inter-institutional, international and multi-disciplinary task forces to implement the necessary ICT infrastructure needed for an effective Policy Impact Analysis.

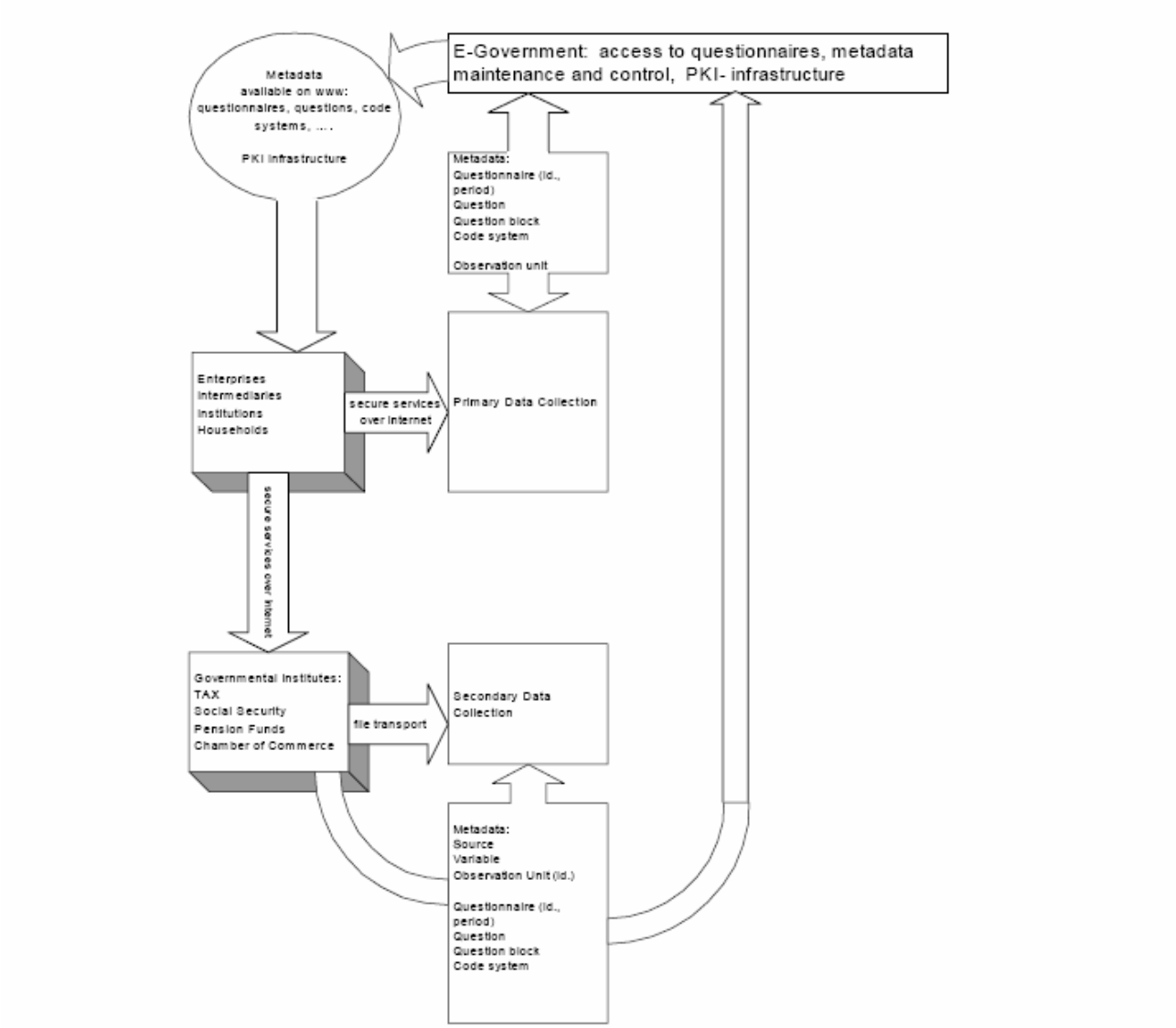
It is clear that even in one EU-country a great number of stakeholders are involved in realising the basic dataflow supporting the PIA process.

The following stakeholders are involved:

- The NSI.
- All governmental institutions responsible for the production of the data that will be matched with the primary data.
- The suppliers of standard software, with built-in modules to fill the questionnaires for the primary data collection.
- The suppliers of the intermediary e-data capture software, taking care of the translation of the data in the automated systems at the enterprises (the respondents) to the variables asked for in the questionnaires of the NSI.
- The national coordinator (being a private firm – like in Finland – or a governmental agency) responsible for the publication of the metadata on the WWW, so that enterprises can download questionnaires and other metadata in order to produce the data needed for PIA.

The chart below shows an elaborated framework for secondary and primary (electronic) data capture) in which the main technological and organisational issues are combined in one scheme.

Chart 11: A framework for primary and secondary data collection supporting the Policy Impact Analysis



Task forces with the expertise can help NSI's, together with the other governmental agencies involved in PIA, in implementing their role in the PIA cycle.

In sum, the discussion has shown that IT contributed and will contribute to the improvement of the statistical quantity, quality and timeliness. As far as a gap exists with the USA in implementing the results of ICT research, this can be stopped by better cooperation between IT-groups and the NSI-groups in the EU. In this cooperation, the mutual expertise of both groups should be respected. Complex IT-solutions should be realised by IT-groups, whereas the NSI's should define the requirements.
Multi-disciplinary task forces can play a major role in the implementation of the necessary ICT infrastructure needed for an effective Policy Impact Analysis.

Workpackages 3-4:

Going on to examine the main ***Challenges*** suggested to be applied in the field of PIA, attention is drawn on the tools and methods that need to be developed or strengthened in the EU. In fact, the development of an impact assessment methodology and, specifically, of the tools and methods which are required, together with good and extensive information, to support EU and national policy making is a key issue for the Union.

The analysis deals with a description of the various types of micro and macroeconomic models and indicators that have been developed and how they can be adapted to fit better in the policy making process. The aim is to review the "state of the art", draw panoramas and sketch out a whole, new and evolving world of PIA choices.

The data and models used in Policy Impact Analysis (PIA) even just a few decades ago have followed an unsurprising process of rapid obsolescence in parallel with the major changes that the economies of the European countries have undergone in the last few decades. A few examples:

1. the need for individual country models has been over the years accompanied to that for a Europe-15 model while today there is an increasing perception of the need to build a Eurozone model or a Europe-25 model;
2. with the progressive removal of national borders, the regional dimension is taking on more and more relevance, and so are regional models;
3. while traditional macroeconomic short-term models were focused on evaluating developments which could be expected over the next several quarters or years, the today stronger interrelation between the financial economy and the macroeconomy makes it more important to have models which allow to look at developments taking place in the current or next quarters;
4. microeconomic policy action is taking on more and more attention as state intervention is being generally minimised – policy action which however necessitates to be integrated in a macroeconomic framework to ensure the overall consistency of the microeconomic measures;
5. on top of this, new and better econometric and modelling methodologies have been developed, most of which are mastered only by a restricted group of experts at the frontier of theory or applied research.

At the same time, technological progress is allowing to build increasingly large and complex models with the newest methodologies at lower and lower costs, making them affordable without having to resort to huge and expensive computers.

There are many areas of PIA which may require quantitative tools in order to assess the impact of policy measures. However, among them, the need appears more urgent for those that refer to:

1. ease and speed of use as well as compactness;
2. capital and labour market, productivity and competitiveness both of individual industries and of the industrial system as a whole;
3. new policy items, such as shift to regional focus, environment, etc.
4. new policy needs, such as more timely responses to economic and monetary developments, as well as incorporating the impact of micro policies.

In such areas the gaps in applied research for tools/models is more drastically evident – Euroky-PIA has proposed to move in the direction of filling some important gaps.

The analysis undertaken in this workpackage does not show the solutions, which will be dealt with at a later stage, but review existing models in view of preparing an agenda of the research work/developments which appear to be necessary to face current challenges.

Micro and Macro Modelling

In reviewing the state of the art in the field of Policy Impact Analysis attention focuses on the main aspects of microeconomics and macroeconomic modeling.
Economic models are simplified and artificial versions of reality that are used by economists to help them understand the functioning of the economy, to identify the essential economic mechanisms and to forecast its future behavior. Models also provide a common language and framework through which economists can discuss different point of views, encouraging a fruitful debate. Of course, they cannot provide a complete picture of reality and each model will highlight certain characteristics of the economy, while ignoring others, and are thus used to examine different aspects of the economic dynamics.

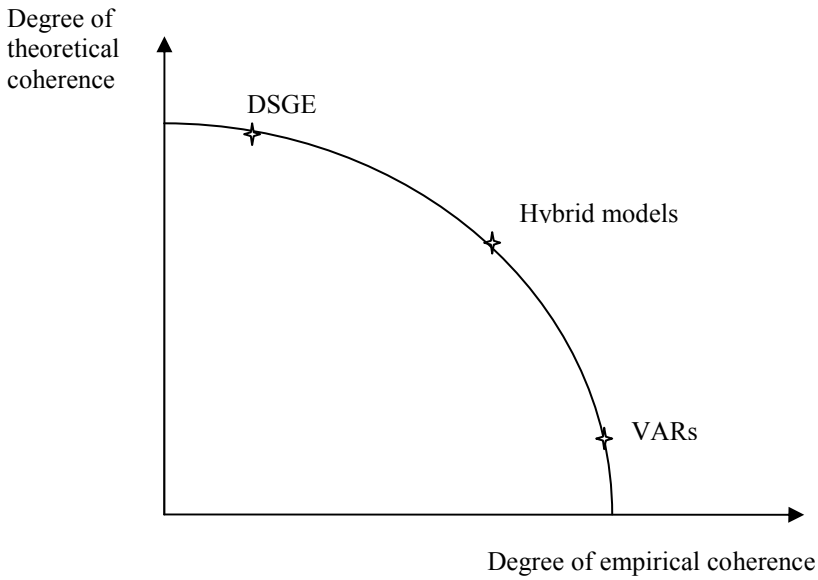
Macroeconomic Models

A first important classification of Macroeconomic Models is that between *structural models* and *forecasting models*.
Throughout the 1940s and up to the 1970s the "Cowles Commission" approach to macroeconomic modeling, proposing the use of over-identified linear dynamic systems of structural equations, was dominant. These *structural models* used a Keynesian systems of equations approach and could consist in several hundred equations and identities. In particular, in older structural models, such as the Federal Reserve's MPS model, the forward-looking aspect of the model's structure, the expectations, was either not considered or usually assumed to be a function of past behavior. These kind of models were deeply criticized for the lack of theoretical foundations and for the scarce capacity of dealing with data. Sims (1980) critique attacked the empirical and forecasting properties of the MPS models, proposing a new systems of equations approach, employing just a few equations to forecast future dynamics of the variables describing the economy. These models, which are also known as time series models, instead rely on established statistical correlations between current and previous observations (hence the name time series) of one or more economic variables.
The most popular of these are plain vector autoregression (VAR) models and VARs that employ an error correction process. An example of the latter is the Vector Error Correction Model (VECM) developed by researchers associated with the Federal Reserve Bank of St. Louis.
Unlike structural models, forecasting models like VARs regard all variables as simultaneously determined and, hence, have an equation for every variable in the model. In other words, they do not assume a unique behavioral relationship like a consumption, investment or money demand equation, which is assumed by structural models. In terms of sheer forecasting power, forecasting models generally do better than structural models. Conversely, forecasting models are not useful for evaluating alternative monetary policies, for example, looking at what would happen to the growth of real GDP and inflation if the federal funds rate were raised or lowered 25 basis points.
On the other hand a deeply theory-based attack to the MPS and the Cowles Commission approach came from Lucas (1972,1976) and became known as Lucas' Critique. Within this strand, the Real Business Cycle (RBC) approach, first proposed in the seminal article by Kydland and Prescott (1982), is of great importance: it is based on the principle that macroeconomic modeling should consist of aggregating into a single macroeconomic model the many choices made by the individual economic agents, whose behavior is governed by rational expectations. This modern approach to

macroeconomic analysis led to Dynamic Stochastic General Equilibrium (DSGE) models, which have acquired a permanent status in the toolkit of macroeconomists in the last 15 years.

Macroeconomic and econometric models are fundamental for understanding the dynamics of the economics and for forecasting. As briefly analysed, many approaches to macro modeling have been proposed, some more careful in representing the theory (DSGE models, in particular), some other in representing the data (VAR models). Academia today clearly inclines for the use of DSGE models for represent the economy, while using more empirics-based models like VARs to compare and discriminate between different competing economic theories. Central Banks and research centers have still not inclined for such a clear cut position and use models that combine features of the two approaches.
Given the trade-off between theoretical and empirical consistency, there is still some controversy regarding which models should be used. Pagan (2003), for example, proposes the use of hybrid type of models.

Figure 2: Trade-off between theoretical and empirical consistency



Pagan uses an efficiency frontier like the one in Figure.. to evaluate the performance of different types of models and suggests that hybrid models, that is models in which the top-down approach of DSGE models is adapted to large-scale model and a variety of different strategies are employed when matching the models to the data, are the most efficient. Hybrid models are what most of the central banks and international institutions currently use. Pagan suggestions are in contrast with the opinion held by many economists that there should be a total shift towards DSGE modeling within economic institutions: the question on exactly which model is better is still open, but there is total consensus over the fact that models should incorporate at least the main features of DSGE modeling. The core organizing principle of hybrid models is the segmentation of the representation task in two stages: first, defining an equilibrium path and, second, the short run dynamics. Many economic institutions and central banks, like the Fed and the Bank of Canada, seem to be doing exactly what Pagan proposes. They have changed their models from the traditional structural models to models that comprise the basic notions of the DSGE approach, like rational expectations, intertemporal optimization and equilibrium conditions, but have not shifted completely to DSGE models.

In combination with the above analysis of new methodologies in macro economic models, a set of macroeconomic models has been analysed with the aim of outlining advantages and disadvantages

which certain models may bear with respect to the specific aims of the project. In fact, in Euroky-PIA, which is a project aimed at analysing micro policies and therefore focused on micro models, the role of macroeconomic models is to assure consistency across the micro policies which might be implemented either at regional/national level or in a set of European countries. Thus the objective of a macro model in this context is not to analyse the impact of macro policies, but rather to make sure that the advantages incurred by a policy affecting the economy through the impact on individual agents (or on a set of agents) are not outweighted by its downstream effects

The structure of macroeconomic models depends on the purpose for which they were built. Some economists are skeptical about the relevance of macroeconomic models for Policy Impact Analysis. A lot of such skepticism, however, depends on the mis-use of macroeconomic models which many users venture into when they try to bend well-structured models to their immediate analytical purposes.

A preliminary result of the analysis indicates that macroeconomic models have been built so far with the objective to either simulate macro policies or to forecast the developments of an economic system - no model exists which formally links a micromodel with a macromodel, and none can be adapted to the purpose of analysing the impact of policies at the micro level. Therefore, several questions remain open for further debate in order to define which would be the best structure for building a macroeconomic model aimed at assuring consistency of micro-policies.

Analysis suggests a list of areas of investigation to fill such specific gap in existing macroeconomic models:

1. how to structure the formal link between micromodels and macromodels;
2. what is the right level of geographical aggregation: regional, country, Eurozone or EU as a whole;
3. what are the data issues relative to each of the geographical aggregations;
4. should an interindustry approach be considered;
5. what time horizon should be considered as optimal, also in the light of the increasing interdependence between monetary/financial conditions and consumer's behaviour - also on the basis of the experience on very short-term models already made both in the EU and outside of the EU;
6. how can the impact of environmental policy be fed through a macromodel.

In order to answer these questions the analysis has presented a comparative assessment of 12 multi-country macroeconometric models – the interest in such models derives from their applicability to modelling the European economy, either because of their multi-country European structure or because their theoretical approach may give relevant indications for the purpose of building a new model of the European economy. These models are analysed with respect some characteristics that are the following:

1. Advantages and Disadvantages of Geographical Aggregation: both area-wide/aggregate and multi-country/disaggregate modelling approaches have their advantages and disadvantages, the second approach's net advantages probably outweigh those of the first. One major disadvantage of area-wide models is their inability to display component causes and differential effects across countries. Indeed, in general systems theory it is a given that as the level of aggregation in a model increases, its separate components or sub-systems become obscured, the model loses flexibility, and its ability to track the real world diminishes. Another problem with the area-wide models is that their aggregate data often display distributional biases that are very difficult to detect when using aggregate data alone. Furthermore, regional entities, such as the Eurozone, usually do not have sufficient data at the aggregate level to allow the construction of a comprehensive macroeconometric model.

2. Global Linkage: Most models combine individual countries and regions (groupings of countries) to cover the entire global economy at a considerable level of disaggregation and in most cases possesses significant granularity in their international linkages. International linkages of most of these models include capital flows, as well as export and import flows and exchange rates.
3. Manageability: it refers to the number of equations. INTERLINK is by far the largest global model with about 6,000 equations. Each of its larger country models has 200-250 equations, of which 100 are behavioural. NIGEM is also relatively large-sized with 3,000 equations. While capable of offering depth and scope, the size of these models may pose a challenge in an environment where quick turnaround is a production requirement. QUEST and MULTIMOD offer a fairly manageable size with 1,030 and 600 equations, respectively. With less than 100 equations each, AWM and MZE are rather parsimonious models, making them appropriate tools for quick prognosis and analysis of the aggregate Eurozone economy.
4. Policy and Time Horizon Orientation: Some of the twelve models are quarterly models, suggesting that they are more suitable for short- to medium-term forecast and analysis, rather than long-term. INTERLINK is built on data of semi-annual frequency. Models can be designed primarily for the purpose of policy analysis and simulation studies while other models are oriented more toward forecasting, although they are also capable of conducting analyses. In this respect, however, it is likely that simulation properties of the latter models are not as robust as those of the former.
5. Theoretical Foundation and Quantification: All models are built on the common theoretical paradigm currently prevailing in the modelling community: a macroeconomy growing on a neoclassical steady-state path modified with a short-run New Keynesian dynamics. These models specify either explicitly or implicitly both long-run equilibrium (or steady-state) and a mechanism by which the equilibrium is ultimately achieved. In their models, long-run real growth is independent of inflation, and nominal equilibrium is typically anchored by a nominal target, which in turn is achieved through a feedback rule involving nominal interest rate. No trade-off exists between wage inflation and unemployment in the long-run. For explaining consumption decision, these models commonly adopt a life-cycle model of infinite inter-temporal optimization within their framework, where behaviours of forward-looking and liquidity-constrained consumers are distinguished by wealth and disposable income. For investment, some models use Jorgensonian approach in specifying their equations, whereas others adopt *Tobin's q* theory. Although theoretically elegant, the latter approach often proves to be difficult to implement empirically. As to quantification, it is not an inconsequential issue. Sometime, theoretical rigor and attractive model properties come at the expense of empiricism. Explicitly identifying the steady states of all variables requires a heavy dose of calibration, which inevitably introduces elements of arbitrariness.

Microsimulation models

Over the past 30 years, microsimulation models have come to play an important role in policy analysis, especially for assessing the impact of fiscal and social policy reforms on income distribution and poverty. They can capture the range of variations at the household level in the correct proportions (who gains and who loses from a policy variation) and estimate the aggregate effects. Moreover, microsimulation models can identify the effect on disposable income of policy measures that governments can administer and can provide distributional analysis focusing on particular socially-defined groups of interest (e.g. low-income family, taxpayers or health care providers). Finally, they can also capture interactions between different policy's interventions. Such models are able to answer important needs of the policy formation process. They enable policy makers to get information about the conjoint effects of changes that involve complicated

interactions among different government programs. Thus, microsimulation models are an indispensable tool for Policy Analysis and Evaluation. The microsimulation approach to evaluating alternative legislative proposals involves modelling the impact of government programs at the level at which they are intended to operate. That is, instead of modelling the impact of program changes on aggregates, such as the national economy or demographic subgroups of the population, microsimulation looks at the impact on individual decision units.
Such models have proved to be very powerful tools that allow the possibility to deal with complicated interactions between institutional, economic and technical factors. They permit a systematic approach to policy formation and implementation, which would otherwise not be possible. The success of microsimulation models can be gathered by their success and development in terms of both numbers and types. Their potential is unparalleled and they are a fast-expanding activity and an internationally accepted cornerstone in PIA.

A first set of microsimulation models are static in the sense that they look at economic agents at one point in time. Models of this kind are simply accounting mechanisms and do not consider behaviour over time. They tend to be based on representative samples of a population and are primarily used to investigate the first round impact of government policy reform. Simulation of this type is used to disentangle the complexity of government policy rather than simulating behaviour.
Predicting the impacts of policy reforms (and changes in the population structure) over time is another object of microsimulation models; forecasting tax yields over the next three years for example. In order to simulate government policies in the future, one needs to know the structure of the population at different times. One method for forecasting with static models is to use ageing techniques. Static ageing involves applying adjustment factors to account for changes in the population structure, inflation, the distribution of income and changes in policy rules. Adjusting for changes in the population structure uses a similar method to that which deals with non-response bias in surveys. Static ageing accounts for changes in the population structure by assigning weights in such a way that the external control totals represent forecasts rather than describing the situation in the year in which the survey was collected. The second and third adjustments, which account for inflation and changes in the distribution of income, use differential 'uprating' factors applied to income by source. Lastly, tax and benefit rules have to be adjusted for planned or forecast changes.
In order to simulate many taxes or benefits, one year of data is sufficient. However, certain benefits, such as social insurance pensions, require information from a number of years, sometimes as many as forty. This type of simulation therefore requires time series information which is typically unavailable for most countries. For this reason, simulations of this type are either avoided or carried out using approximate methods.

If actual behavioral results are required, it is necessary to extend the modelling process by interacting the results of a tax and benefit with a statistical model capable of simulating such responses.
Dynamic models can be used to look at future behavioral adjustments of the population to a policy reform and at the effect of different economic, social and demographic scenarios. This features are obviously appealing for policy makers who are very interested in inter-temporal and adjustment issues. Modelling at the micro level means to analyse complicated individual decisions such as when to work or when to retire and to study some of the complex interactions between these choices and policy instruments.
There are different types of dynamic MMs. Models can be probabilistic or incorporate behavioral response, they can differ whether they run in discrete or continuous time, whether they are open or closed, the extent to which static or dynamic ageing should be used, the decision to run the models in a steady state and the distinction between cohort and population models.

Dynamic MMs may be very complex, in fact if they have to project the characteristics of a population over time, they have to include demographic, educational, labor market and income processes and have to model how each process interacts with each other. Dynamic models are mainly retirement income policy models. They simulate changes in the structure of the population through demographic forecasts. These models use a process called dynamic ageing to project the households forward through time. While static ageing changes the weights of a single cross-section, dynamic ageing simulates transitions at the individual level and thus produce hypothetical sets of panel data. Simulated transitions include changes in demographic characteristics, educational qualifications, labour market patterns and income mobility. Like static microsimulation models, the rules for government policies and use of state services can be applied to each of the waves of the generated panel. Even where the data does exist, these data sources are generally subject to period, cohort and age effects and may therefore be unsuitable for forecasts. Typically however, this data is not available at all and so dynamic microsimulation is confined to a small number of countries.
Two types of models have been developed: dynamic population models and dynamic cohort models. The former type takes a cross section of the population at one point in time and projects it forward over a number of years, creating new cross-sections at intervals (generally annually). Population models thus produce hypothetical panel data sets which correspond to household panel surveys. Typically, these models have been used to study pensions and the impact of changing demographic and economic patterns on pension and long term care expenditure. Cohort models, on the other hand, generate panel data sets which cover the entire lifetime, but generally for only one cohort. Simulating transitions over the entire life cycle, these models have been used to look at intra-personal redistribution over the life cycle, to produce estimates of lifetime income and to compare these with distributions based on measurements of income over shorter periods such as a year. In addition to the distinction between cohort and population approaches, models can be classified as using statistical or behavioural methods: statistical models use transitions which are designed to reproduce existing (or expected) mobility within a population.
Dynamic MMs only incorporate economic behavior in a limited way. Typically they are not sufficiently flexible to incorporate more detailed behavioral modules because of their limited ability to include feedback loops, or link to other models such as overlapping generations models
Although behavioural and dynamic models have been developed over the last twenty years, their use has been quite limited in policy analysis by governments. Many governments simply use estimates of first round effects taken from static models. The reason is that there is concern about the level of uncertainty associated with more sophisticated models. So far there has been little published work on the validity of these models, nor has much work been done to estimate the degree of error associated with microsimulation results.

In the case of enterprises, estimation of tax revenues as well as of behavioral responses to tax policy requires forecasts of profits/losses of the companies. For *forecasting* estimates of tax revenues, as well as for inferring behavioural responses of firms to tax policy, the key to microsimulation would be projecting forward estimates of firm level trading/investment income as well as losses. The key difference from household models, from this point of view is the inherent randomness in the earnings of companies, one year to the next. A greater effort in modelling will be required to explain a larger proportion of the income.
Moreover the variety of dimensions to consider in enterprises dynamic MMs should be wider than in household models, because it includes labor demand, the distribution of taxable income across controlled or affiliated enterprises and across different fiscal years as well as investment and technological decisions.

Indicators

In considering the tools and the methods that have been developed in the policy making process, attention focuses on the specific issue of measurement of economic performance in selected areas of interest in accordance with the priorities arising from the Lisbon process. This work represents an attempt to overcome some of the main limits that have been characterizing the system of Social Indicators proposed in the 80s and in the 90s such as the lack of theoretical foundation and their static nature.

Continuous efforts in monitoring economic and social performances and harmonizing policy analysis impacts across countries within the EU are absolutely instrumental to the Lisbon strategy.

Consistently with the needs of renewed analysis and monitoring instruments for studying economic performances, the present paper aims at reviewing the current tools, especially synthetic indicators that effectively support policymaking. Through good quality indicators policymakers should be able to assess whether a proposed program or operation is likely to meet its social and economic objectives and to recommend measures that will ensure that these objectives are met. Some of their main drawbacks are outlined and new methodologies to overcome the extant indexes limitations are proposed.

The identification of the main areas in which synthetic indicators can be used for policy analysis is in accordance to the guidelines indicated by the Lisbon goals as follows: (1) Cohesion, fighting social exclusion, unemployment, and reducing poverty; (2) Modernizing and adapting social protection programs; (3) Stimulating investment in human capital and knowledge; (4) Convergence and disparities between European regions and territories; (5) Constraint to growth and removal of barriers to growth (especially financial and legal), strengthening firms (6) Competitiveness and performance; (7) Taxes, incentives, State aids and performance (8) Sustainable development; short-term policies, monetary and non-monetary indicators (including data challenges such as quality, comparability and EU requirements); and, linked to this, the additional subject (9) Information requirements at the macro, meso and micro levels. The attention is drawn on synthetic indicators that refer to groups (1), (6), and (8).

The analysis reviews the main types of traditional indicators and highlights related limits and problems. Following Fanchette (1974) six levels of statistical measurement are considered: 1) raw statistical data; 2) key series of data; 3) statistical data systems; 4) composite indices; 5) synthetic series of measurements; 6) data series that fit explicitly into social models. This last level is the most sophisticated and allows to express indicators as a result of some structural estimation. Thus firstly it is stressed the lack in the use of this latter type of indicators for policy analysis, despite the several advances made by the major Statistical Institutions in Europe (Eurostat, European System of Social Indicators) and US (US Census Bureau, index of poverty) in building sophisticated version of synthetic indicators.

Furthermore it is emphasized that social dimension could be relevant to account for in explain growth rate differentials across countries. The possibility of an interaction between political and social conditions and growth poses new potential sources of heterogeneity between countries. This is a real concern in Europe as the European Union is still characterized by high heterogeneity both across countries and across regions, within the same country. Synthetic indicators are unable to display how the underlying phenomenon is structured with respect to the relationship between social and economic aspects. Moreover they don't show which factors could have determined changes in the economic or social performance. Also they are characterized by a static representation of the reality. These kind of drawbacks related to traditional synthetic measure of economic performances are stressed, besides the traditional critique on social measurement.

The description of the state of art is accompanied by the indication of *guidelines* for reducing and/or overcoming the main measurement heterogeneities – responsible for jeopardizing the cross-country comparability – and, therefore, for improving harmonization of indicators in the different areas.

A further issue relates to poverty and social exclusion documenting how the recent development of economic and statistical literature in this field has somewhat enlarged and modified the focus and

the definition of poverty and exclusion. The issues of social capital and relational goods, the dynamics of poverty and exclusion itself through the definition of the concept of social risk and the computation of a dynamic index of vulnerability are addressed. The result is a multidimensional definition of poverty and social exclusion where, to the traditional aspects of lack of food, education and basic services the new dimensions of lack of voice, lack of community network relationship are added. In particular, the study proposes a new measure of poverty which is able to capture both the underlying determinants of the being poor and the dynamic vulnerability on falling in a poverty state being not poor today. It is suggested that this indicator is also an instrument to account for unobserved heterogeneity between countries.
Furthermore, analysis explores the vast dimension of competitiveness and productivity in the knowledge and IT society, a dimension which is probably central for the achievement of Lisbon goals. There is a description of all risks and pitfalls of relying on simple descriptive indicators. The fundamental need here, crucial in cross-country comparison, is to disentangle pure productivity effects, from differences in market power and rent extraction and from differences in quality of production across different industries, markets and countries. In particular the study reviews traditional methods for measuring firms' side productivity and highlights how measuring productivity at firms' level is a necessary step to go through when trying to assess the state of the production side at a macroeconomic level. In fact, a macro indicator which is built by aggregating micro level indicators presents several advantages with respect to indicators which are built using directly macro data. For example, it permits to run diffusion analyses and, therefore, to have a better understanding of the dynamics lying beneath the observed phenomenon. The work presents a new index built according to these principles. The index aims to overcome the limitation of previous measure and to assess the vulnerability of the productive structure of a country. In particular its foundations avoid the researcher to make explicit assumptions on the technology and on the shape of the production function and use only observable data and not potential ones.
In the perspective of the Lisbon goals environment represents the squaring of the circle which should reconcile economic growth and preservation of the environment and of natural resources. Analysis reviews the measures and concepts of sustainable growth as a relationship between environmental depletion and economic growth. To this purpose, it shortly illustrates methodologies and advancements in the important field of empirical studies on the relationship between various types of pollutants and per capita income which are recollected under the comprehensive label of the *Environmental Kutznets Curve*. By presenting result of a research at country level the study documents the well known *U-shaped* relationship between CO2 and per capita income, illustrating the concurring impact on this relationship of some important factors such as different sources in the industry use of power. It is argued that the new advancements on the Kuznets curve can be considered as a benchmark to generate an important framework for the development of new, cost-effective and easy to use indicators of environmentally sustainable development. It will be crucial extending the proposed analysis to different sources of pollutants and trying to extract from these findings information about criteria on the endowment of trading rights in the framework of international agreements, such as that of Kyoto. Thus, as in the previous sections, an innovative indicator of environmental sustainability and vulnerability of the country under the ecosystem integrity aspect is proposed.
Finally, it is discussed the feasibility of implementing the indicators proposed, as well as data requirements and availability.

Relying on these findings further analysis in the workpackage addresses problems related to dynamics and in particular on the evaluation of differences in patterns.
Some national features are fixed in the short time. In particular, poverty, productivity and pollution emissions are aspects that change slowly over time since only more awareness of policy-makers can improve the living standards or ameliorate the firm environment or finally impose emission standards.

In this contribution, it is shown that indicators currently available in some specific fields (poverty, competitiveness and environment) generally lack systemic features, this being due to their static nature. In fact, in order to provide good forecasts of business cycles, it is necessary to understand whether (and what kinds of) structural causality links exist among the variables that we want to track. This result cannot be achieved in a satisfactory way if we rely only on static indicators since they usually lack a theoretical background and therefore cannot be used to run data simulations.
Thus, the economic indicators on which we focus our attention, in general, reflect and measure the direction of the economy and the capability of an economy of growth without neither using all the natural resources nor depleting the environment. Therefore, both economic statistics and sustainability growth indicators allow policy-makers to think in terms of the whole systems, with all their interconnections, consequences, and feedback loops. They play a key role in the process of forecasting, describing and monitoring the behaviour of the economic system, identifying trends, and contributing to the process of policy formulation. In this respect, indicators are important for informing the public and decision-makers about some key and more specific aspects of the reality, and about the actions required for their management.
The goal of this study is to propose three new indicators that allow us to study economic dynamics and fit better to business cycle analysis. In particular, synthetic indicators which try to address the following guidelines among those indicated by the Lisbon goals are presented: (i) Cohesion fighting social exclusion, unemployment, and reducing poverty; (ii) Competitiveness and performance; and (iii) Sustainable development.
For analyzing the poverty risk, the goal was to obtain a unique dynamic indicator associated to static and traditional poverty indexes (e.g. GINI coefficient and GDP per-capita), which would be able to capture new dimensions of poverty and to allow for cross-country comparison. The dynamic indicator proposed is obtained by borrowing the rating approach used in traditional risk assessment models in order to get an estimate of vulnerability and poverty risk. This indicator takes also into account households and country specific unobserved heterogeneity.
To analyze competitiveness and performance a dynamic indicator of economic firm inefficiency is proposed. After applying a rating procedure quite similar to the one proposed for the poverty risk, the dynamics are introduced with the construction of transition matrixes which provide estimates of the probabilities that firms with a certain level (rating level) of inefficiency move to a different level (rating level) in the future. Such probabilities can also be conditioned on the specific business cycle phase or to a specific technological group or geographic area.
As to sustainable development the fixed effects of Environmental Kuznets Curve estimation are principal inputs of the indicator (ESI). After obtaining all the fixed effects for several rolling estimations we can calculate the Environmental Sustainability Indicator in different times. The ranking system and the two methods of transition matrices construction allow us to describe the probabilities of changing position in the ranking system for European countries with respect to environment and growth. Moreover, transition matrices are calculated conditioning to specific variables such as sector structure and business cycle.
To conclude, it is worth stressing that even though much is still to be done in order to achieve all Lisbon goals, we believe that the implementation of good economic analysis tools, and specifically of good composite dynamic indicators, is certainly the way to go and, to some extents, a necessary step.

Tools and methods from an applied perspectives

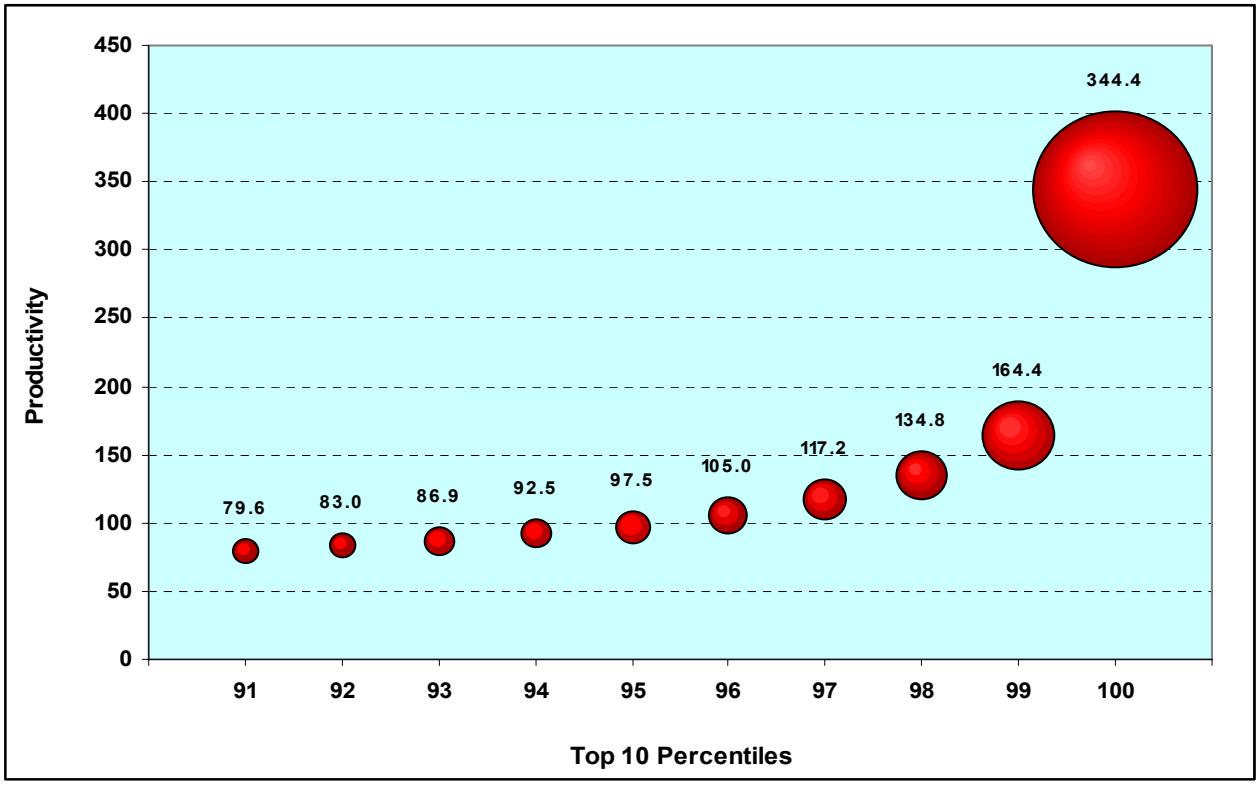
The last part of the workpackage reviews of the existing tools and methods from an applied perspective, and focuses on how the existing systems, techniques and tools can be improved in the short term to provide better support for policy making. This will include the spread of best practice and ‘frontier’ tools and methods that already exist, and how they might be adapted for the EU over the medium term. The analysis highlights the importance, and indeed need, to change the “macro

lenses" used so far, in order to look beyond aggregates and means, and focus on the myriad of micro systemic traits and changes that are transforming the social and economic landscape. Macro aggregates not only hinder the observation of the latter, but also of the intricate webs of interdependencies and relationships that at the global level exist between and within different economic units that may belong to the same, to distinct or to several aggregates or levels of analysis. Inevitably, valuable information on the drivers of change and on performance is lost, if the focus remains on aggregates alone. Heterogeneity can only be observed with micro-level data. Keynesianism got us accustomed to focus on macro aggregates, and this was what was needed at the time. Enterprise performance is linked with different aspects of firms life, that is sustainability, performance, value creation and, no less important, policy impact.
The integration of data in systematised and integrated database has opened unprecedented new vistas. It allows to compare aggregate and sector specific enterprise performance from different perspectives, such as by main categories and ICT content and reveals a great deal of differences across the different sectors and a rather complex economic texture which normally remain hidden underneath aggregates. Depending on the perspective, strengths and weaknesses can be located and appraised in a framework in which the aggregate information is complemented by sector/area specific information, such as on sectors that are expanding, stalling, lagging or shrinking; or are driving or being pulled..

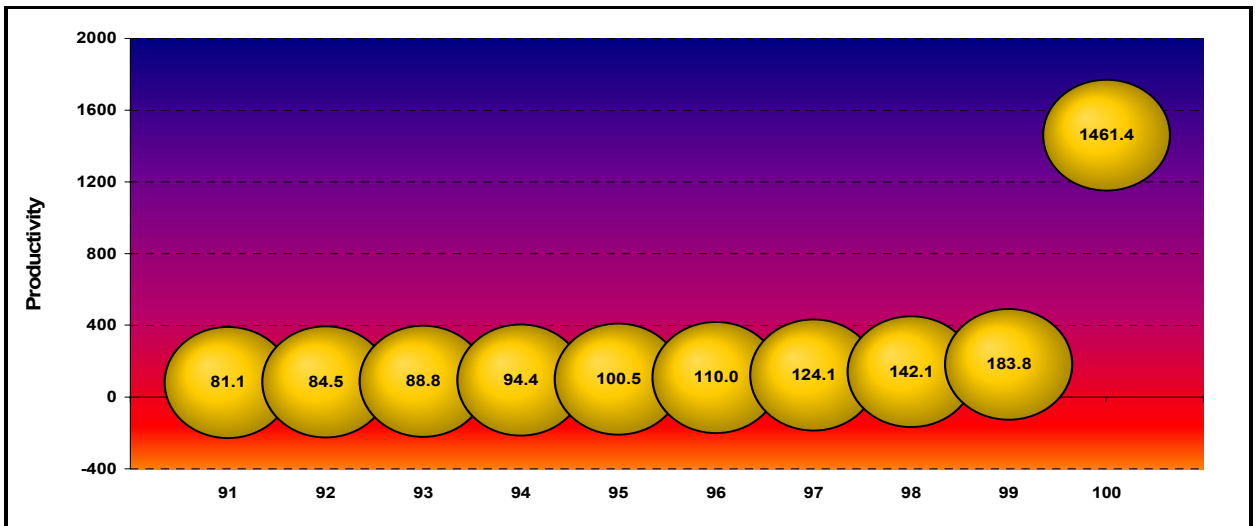
The aim is to show the potential of integrated and systematized information systems (ISIS) and the value added that can ensue from them for both research and policy uses. First, ISIS can be used to draw systemic maps (small and large scale, aggregate and fine grained) that permit to unveil strengths and weaknesses of different economic textures. Second, ISIS can support "intelligent benchmarking" at the sector, area and firm level (against the best performer or other level/group). Third, ISIS permit to navigate information hypercubes *à la carte*, that is "top-down", "bottom-up", across- and within-dimensions. In addition, they permit to move and jump from one to another dimension without loosing the linkages that exist among each different dimension. Thus, analyses can be macro-micro constrained when, either aggregate is "drilled" to get down to the micro level or vice versa. In the first instance, top-down linkages are kept, so that macro aggregates provide a useful reference for micro level analyses and policies that are to be investigated. Similarly, in the second instance, 'bottom-up' linkages are kept, so that micro level analyses can provide a coherent input into macro models and policy analyses.
Systemic strength is not just about productivity growth over one year or shorter period of time, but is about having the talent for sustained productivity growth over the medium/long term. EISES data permit to map enterprise performance at the micro and aggregate level, in single years and over longer periods of time. Longitudinal analysis of performance is therefore possible.

A new tool of analysis is suggested: it is a benchmarking PERFOR-METER$^{@}$ (cfr. Graph 3 and Graph 4) which can be used by enterprises to know how far below from "best" and top performers levels is their level of productivity. By thus doing they can benchmark their performance against that of their competitors.

Graph 3 : 2001 PERFOR-METER© FOR TOP 10 PERCENTAILES OF LARGE ITALIAN ENTERPRISES,ALL SECTORS ***(The size of the spheres is proportional to the Max-Min range of performance of the enterprises in each percentile).***



Graph 4 : 2001 PERFOR-METER© FOR TOP 10 PERCENTAILES, BEST SECTORS WITHIN EACH PERCENTAILE, LARGE ITALIAN ENTERPRISES



91	DK	Other bearings, gears, gearing and driving elements
92	G	Wholesale trade services of office machinery, e.g. typewriters, photo-copying apparatus and calculating machines
93	DM	Motor vehicles
94	DA	Processed and preserved fruit and vegetables n.e.c.
95	DG	Other basic organic chemicals
96	G	Wholesale trade services of clothing and footwear
97	DJ	Powder metallurgy
98	I	Other supporting services for land transport
99	DK	Weapons and ammunition
100	O	Motion picture and video production services

Moreover it is possible to link value chains and performance. The macro glasses and the macro aggregates used to depict a world of stock and flows, and of aggregate income and production, unveil only a part of the whole picture and do not permit to catch the whole spectrum of change. They only permit to look into pre-determined fragments of the "movie" of firms life and performance. Like with icebergs, however, what is not shown is no less important than what appears. Along the spectrum of performance there are various measures of success. These may focus on aspects relating to size (such as firm's sales and market shares), output, returns (such as return on equity, on investment or sales) and so on. Increasingly, adding value has become to be seen as the central purpose of any business activity. Henceforth, "added value, that is the difference between the (comprehensibly accounted) value of a firm's output and the (comprehensively accounted) cost of the firm's inputs is the measure of its achievements.

To sum up, evidence from micro level data and from the use of a systematised and integrated database system has allowed to unveil different strengths and weaknesses of different economic textures, at a point in time and over time. This would appear to suggest that different national "enterprise textures" cannot be measured in the same way, since each has its own attributes and develops with along paths and patterns that can be very different and changeable. Thus, an effort is required to develop models and indicators capable of measuring systemic strength and weakness, e.g. enterprise texture robustness, endurance, vitality, turn over, depletion, core and transient export performance, etc. Within this context the proposed prototype mapping approach for the Italian large enterprises has opened new vistas and lead to policy-relevant conclusions by taking further the policy analysis already performed at the macro level.

Appendix

The Table below presents a list of demographic and social statistics in EU countries.

Table 1: Demographic and social statistics in EU countries

EU-Countries	Sources				
	Population register	Census of population 2000/2001	European Union Labour Force Survey EU-LFS	Statistics on Income and Living Conditions EU-SILC*	Household Budget Surveys HBS
Belgium	YES	YES	YES	YES	YES
Czech Republic	YES	YES	YES	YES	YES
Denmark	YES	YES	YES	YES	YES
Germany	YES	NO	YES	YES	YES
Estonia	YES	YES	YES	YES	YES
Greece	NO	YES	YES	YES	YES
Spain	YES	YES	YES	YES	YES
France	NO	YES	YES	YES	YES
Ireland	NO	YES	YES	YES	YES
Italy	YES	YES	YES	YES	YES
Cyprus	YES	YES	YES	YES	YES
Latvia	YES	YES	YES	YES	YES
Lithuania	YES	YES	YES	YES	YES
Luxembourg	YES	YES	YES	YES	YES
Hungary	YES	YES	YES	YES	YES
Malta	YES	YES	YES	YES	YES
Netherlands	YES	YES	YES	YES	YES
Austria	YES	YES	YES	YES	YES
Poland	YES	YES	YES	YES	YES
Portugal	NO	YES	YES	YES	YES
Slovenia	YES	YES	YES	YES	YES
Slovakia	YES	YES	YES	YES	YES
Finland	YES	YES	YES	YES	YES
Sweden	YES	NO	YES	YES	YES
United Kingdom	NO	YES	YES	YES	YES

* EU-SILC - EU 25 - year 2005

The list of common indicators as approved by the Social Protection Committee in July 2003, together with their definition, is included in the table below. Those indicators that have been re-defined can be identified thanks to the * sign that has been added in the first column. Similarly, new indicators can be identified thanks to the mention “new” that has been added in this column.

Table. 2: Definitions: the primary indicators

	Indicator	Definition	Age breakdown	Gender breakdown	Data Source

1a	At-risk-of poverty rate	Share of persons with an equivalised disposable income below 60% the national equivalised median income. Equivalised median income is defined as the household's total disposable income divided by its "equivalent size", to take account of the size and composition of the household, and is attributed to each household member.	Yes. Age groups: 0-15; 16 and over; 16-24; 25-49; 50-64; 65 +;	Yes. (Applying to people aged 16 years and over)	ECHP
1b	Incidence of poverty risk by most frequent activity status	Share of individuals in each activity status group who are at risk of poverty. The most frequent activity status is defined as the status that individuals declare to have occupied for more than half the number of months in the calendar year. The status categories are: employment (broken down by wage and salary employment and self-employment); unemployment; retirement; other inactivity.	Yes	Yes	ECHP
1c	Incidence of poverty risk by household type	Share of individuals in each household type who are at risk of poverty. Households with no dependent children: - Single person, under 30 years old - Single person, 30-64 years - Single person, 65 years and over - Single women - Single men - Two adults, at least one person 65 years and over - Two adults, both under 65 years - Other households Households with dependent children: - Single parent, 1 or more dependent children - Two adults, one dependent child - Two adults, two dependent children - Two adults, three or more dependent children - Three or more adults with dependent children Dependent children are individuals aged 0 – 15 years and 16 – 24 years if inactive and living with at least one parent.	Already specified in the typology of households	Already specified in the typology of households	ECHP
1d	Incidence (and distribution) of poverty risk by	Share of individuals in each accommodation tenure status who are at risk of poverty (distribution: share of the population at risk of poverty by accommodation tenure	Yes	Yes. (Applying to people aged 16 years and over)	ECHP

	accommodation tenure status	status). Accommodation tenure categories: - Owner-occupied or rent free - Rented			
1e	At-risk-of poverty rate threshold (illustrative values)	The value of the at-risk-of-poverty threshold (60% median national equivalised income) in PPS, Euro and national currency for two illustrative household types: - Single person household - Household with 2 adults, two children	NO	NO	ECHP
2	Income quintile ratio (S80/S20)	Ratio of total income received by the 20% of the country's population with the highest income (top quintile) to that received by the 20% of the country's population with the lowest income (lowest quintile). Income must be understood as equivalised disposable income.	Yes	Yes. (Applying to people aged 16 years and over)	ECHP
3	Persistent at risk- of poverty rate	Share of persons with an equivalised disposable income below the at-risk-of poverty threshold in the current year and in at least two of the preceding three years.	Yes	Yes. (Applying to people aged 16 years and over)	ECHP
4	Relative median poverty risk gap	Difference between the median equivalised income of persons below the at-risk-of poverty threshold and the threshold itself, expressed as a percentage of the at-risk-of poverty threshold.	Yes	Yes. (Applying to people aged 16 years and over)	ECHP
5	Regional cohesion	Coefficient of variation of employment rates at NUTS (Nomenclature of Territorial Units for Statistics) level 2.	No	Yes	EU-LFS
6	Long term unemployment rate	Total long-term unemployed population (=12 months; ILO definition) as a proportion of total active population aged 15 to 64 years.	Yes	Yes	EU-LFS
7a*	Population living in jobless households: children	Proportion of children (aged 0-17 years) living in jobless households, expressed as a share of all children.	No	No	EU-LFS
7b*	Population living in jobless households: working-age adults	Proportion of all people aged 18-59 years who live in a jobless household as a proportion of all people in the same age group. Students aged 18-24 years who live in households composed solely of students are not counted in either numerator nor	No	Yes	EU-LFS

		denominator.			
8	Early school leavers not in education or training	Share of persons aged 18 to 24 who have only lower secondary education (their highest level of education or training attained is ISCED 97 0, 1 or 2) and have not received education or training in the four weeks preceding the survey. ISCED 97 is the 1997 International Standard Classification of Education.	No	Yes	EU-LFS
9	Life expectancy at birth	Number of years a person may be expected to live, starting at age 0.	No	Yes	Eurostat Demographic Statistics [21]
10	Self-defined health status by income level.	Proportion of the population aged 16 years and over in the bottom and top quintile of the equivalised income distribution who classify themselves as in a bad or very bad state of health.	Yes	Yes	ECHP

Definitions: the Secondary Indicators

	Indicator	**Definition**	**Age breakdown**	**Gender breakdown**	**Data sources**
11	Dispersion around the at-risk-of poverty threshold	Share of persons with an equivalised disposable income below 40%, 50% and 70% of the national equivalised median income.	Yes	Yes. (Applying to people aged 16 years and over)	ECHP
12	At-risk-of poverty rate anchored at a moment in time	In year *t*, share of persons with an equivalised disposable income below the at risk- of-poverty threshold in year *t-3*, updated by inflation over the three years.	Yes	Yes	ECHP
13	At-risk-of poverty rate before social cash transfers	Relative at-risk-of-poverty rate where equivalised income is calculated as follows: - excluding all social cash transfers - including retirement and survivors pensions and excluding all other social cash transfers. - including all social cash transfers (= indicator 1)	Yes	Yes	ECHP

[21] The source of data for this indicator is the periodic census (currently 1991, given that 2001 results are not yet final), which is then adjusted for available information on subsequent births, deaths and migration. Data are collected for males and females: figures for the total population are estimated as a weighted arithmetic mean. The EU-15 estimate is calculated as a population-weighted average of the individual national values.

		The same at-risk-of-poverty threshold is used for the three statistics, and is set at 60% of the national median equivalised disposable income (after social cash transfers).			
14	Gini coefficient	Summary measure of the cumulative share of equivalised income accounted for by the cumulative percentages of the number of individuals. Its value ranges from 0% (complete equality) to 100% (complete inequality).	Yes	Yes	ECHP
15	Persistence of at-risk-of poverty (50% of median equivalised income)	Share of persons with an equivalised disposable income below 50% of the national median equivalised income in the current year and in at least two of the preceding three years.	Yes	Yes	ECHP
16 new	Incidence of in-work poverty risk	Individuals who are classified as employed (either in wage and salary employment or self-employment) according to the definition of most frequent activity status (indicator 1b) and who are at risk of poverty. This indicator needs to be analysed according to personal, job and household characteristics.	Yes	Yes	ECHP
17	Long-term unemployment share	Total long-term unemployed population (_12 months; ILO definition) as a proportion of the total unemployed population.	Yes	Yes	EU-LFS
18	Very long term unemployment rate	Total very long-term unemployed population (_24 months; ILO definition) as a proportion of total active population aged 15 to 64 years.	Yes	Yes	EU-LFS
19	Persons with low educational attainment	Share of the adult population (aged 25 years and over) whose highest level of education or training is ISCED 0, 1 or 2.	Yes. Age groups: 25-34; 35-44; 45-54; 55-64; 65 years and over.	Yes	EU-LFS

This table lists tools and methods which have been used over time in policy related research. They are grouped by stages of development, distinguishing between those put to use before the 1970s, during the 1980s and since 1990. Admittedly, the criteria upon which the staging is based are rough. Reference is to utilisation not to when the different tools were first formulated. Moreover, the listing is incomplete and does not include the higher powered approaches, such as econometric analysis, that have been made since the mid-1900s.

Table 3: Stages in the Development of Descriptive Tools and Methods

	NOTES
STAGE 1 (until late1970)	
Single survey data	
Integrated data bases	Have been used since the late 1960s in the USA. (e.g. the Brookings 1966 MERGE Data file). Still unavailable in most European countries
Tables and graphs	
Averages, measures of central tendency and quantiles	
Measures of deviation, dispersion, variation (e.g. range, mean deviation, quartile deviation, standard deviation, variance, coefficient of variation and standard scores)	
Overall coefficients of dispersion/inequality/concentration (e.g. Gini)	
Aggregate indicators/specific indices (e.g. Rowntree, 1901; Orshansky, 1963; Abel-Smith and Towsend; Theil's (1967) and ratios (e.g. tax burden)	
STAGE 2 (1980s)	
Standardized, ethical, weighted and decomposable indices and coefficients (e.g. R.R. Schutz, 1965: Paglin, 1975; Blackburry and Donaldson 1980; Chakravarty, 1990)	key research area especially for business indicators
Synthetic indices and coefficients - typical (e.g. referring to family types) - specific (replacement ratios) (e.g. OECD, 1984) - incidence - severity (e.g. Poverty gap) - mobility (Duncan et al.,1984; Schiller, 1977) - efficiency/performance (e.g. Beckermann, 1979;Weisbroad,1970) - disparity/discrimination (e.g. Phelps, 1972; Cain, 1977) - disincentive - structural (e.g. hindrances) - spatial - Subjective (e.g. Goedhart et.al. 1977; Van Praag, 1982)	
Generalized, and Well-behaved decomposable indices and coefficients (e.g. Shorrock, 1980,1983; Foster, Greer and Thorbecke, 1984; Atkinson, Sen)	key research area especially for business
Tools for the analysis of causation and causal relationships	
"Snapshots" and "maps"	key research area
STAGE 3 (1990s)	
microsimulation: factuals and counterfactuals (static and dynamic)	key research area
Longitudinal	key research area
Multipurpose Systematised Integrated data bases	
Composite and multi-dimensional (e.g. UNDP 1990, 1996; Maasoumi, 1986; Tsui, 1995; Atkinson and Bourguignon, 1982; Kohlm, 1977)	
Impact/powerfulness (e.g. Yitzhaki, 2001)	
Weighted, Needs-adjusted well behaved indicators (Atkinson, 1970; Bidani and Ravallion, 1996; Kakwani and Roberti, 1995)	key research area
Indicators of: -Benchmarking; Performance; Inhibition (World Bank 1996)	
Scoreboards and Cobwebs (e.g. EU, 2000; OECD, European Competitiveness Report, 2001)	
top-down	
bottom-up	key research area

Table 4: Publication of major economic indicators for the Eurozone and the USA: frequency and delays

Indicator	EURO				USA			Europe/USA diff.		
	Delay (days)			Freq	Delay (days)		Freq.	Delay (days)		Freq.
	2000	2002	2005		2000	2005		2000	2005	
Economic Activity										
Consumer confidence	*7*	3	0	*M*	-3	-3	*M*	10	3	*12 / 12*
Industrial confidence	*7*	3	0	*M*	2	0	*M*	5	0	*12 / 12*
Order intake	-	-	52	*M*	26	26	*M*	n/a	26	*12 / 12*
Building permits	-	-	-	-	18	18	*M*	n/a	n/a	*0 / 12*
GDP, real	*73*	59	45	*Q*	28	28	*Q*	45	17	*4 / 4*
Private saving	-	-	-	-	28	30	*M*	n/a	n/a	*0 / 12*
Industrial production	*59*	49	48	*M*	15	15	*M*	44	33	*12 / 12*
Retail sales	*65*	53	34	*M*	13	13	*M*	52	21	*12 / 12*
Unemployment rate	*37*	33	32	*M*	5	5	*M*	32	27	*12 / 12*
Price climate										
Consumer prices	*20*	0	0	*M*	16	15	*M*	4	-15	*12 / 12*
Producers/wholesale pr.	*36*	33	33	*M*	13	15	*M*	23	18	*12 / 12*
Wages / Labour Cost Index	*95*	81	75	*Q*	5	15	*M*	90	60	*4 / 12*
Import prices	-	-	-	-	12	12	*M*	n/a	n/a	*0 / 12*
External economy										
Trade balance	*60*	50	50	*M*	50	42	*M*	10	8	*12 / 12*
Balance of payments	*60*	56	52	*M*	76	76	*Q*	-16	-24	*12 / 4*
Official reserves	*30*	30	30	*M*	4	4	*W*	26	26	*12 / 52*
Money creation										
Cash in circulation	*30*	27	27	*M*	1	1	*W*	29	26	*12 / 52*
Money supply (M3)	*30*	27	27	*M*	10	10	*W*	20	17	*12 / 52*
Bank lending	*30*	27	27	*M*	9	9	*W*	21	18	*12 / 52*
Public finances										
Budget balance (total)	*100*	75	75	*Y*	29	29	*Q*	71	55	*1 / 4*
Debt (total)	*100*	75	75	*Y*	29	29	*Q*	71	46	*1 / 4*

Source: Authors' calculations.

- Original sources are: for the EMU: Eurostat, except Money creation, official reserves and Balance of payments (ECB), and confidence indicators (Commission services on national data); for the US: Federal Reserve on national data; for Japan: Bank of Japan, except wages (NAPM report);
- Delays are calculated in days from the end of the reporting period (when negative, before the end of the period); figures for USA, Japan and EMU (2000) refer to the latest available data on the 12th of July, 2000; figures for EMU (2002) refer to the December or the latest issue reported in release calendars of Eurostat and the ECB.
- For some indicators missing European data exist at country level, while in other cases national data have shorter delays than EU/EMU. The latter can be considered as anticipatory of further timeliness progresses in community level estimates for the near future: in the case of real GDP, by far the most relevant of all STEI, while Italy, Germany and France are now publishing flash/preliminary estimates at about 45 days from end-quarter, the UK first estimate has a <30 days delay.

Contributi ISTAT(*)

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7/2004 – Roberto Di Giuseppe, Patrizia Giaquinto e Daniela Pagliuca – *MAUSS (Multivariate Allocation of Units in Sampling Surveys):*

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