



**DIRECTORATE FOR SCIENCE, TECHNOLOGY AND INDUSTRY
COMMITTEE FOR INFORMATION, COMPUTER AND COMMUNICATIONS POLICY**

**DSTI/ICCP/IE(2002)19
For Official Use**

Working Party on the Information Economy

**GLOBAL FORUM: POLICY FRAMEWORKS FOR THE KNOWLEDGE-BASED ECONOMY ICT's,
INNOVATION AND HUMAN RESOURCES: BRASILIA 16-17 SEPTEMBER 2002**

SUMMARY REPORT

This document is for information and comments. After any amendments it will be circulated for further comment as document CCNM/GF/KE/DE(2002)4 and subsequently placed on the conference web-site, at www.oecd.org/sti/information-economy.

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JT00135968

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SUMMARY REPORT

Introduction

1. The Global Forum on *Policy Frameworks for the Knowledge-based Economy: ICTs, Innovation and Human Resources* was organised by the OECD in co-operation with the Ministry of Science and Technology of Brazil.

2. The main OECD contributors were the ICCP and STP Divisions of the Directorate for Science, Technology and Industry in conjunction with EDU/CERI as part of the outreach activities of the CCNM. It was organised in co-operation with the Inter-American Development Bank (IDB) and the UN Economic Commission for Latin America and the Caribbean (ECLAC), with additional support from the World Bank InfoDev Conference Scholarship Fund.¹

3. The OECD has extensive experience identifying factors and policies underpinning the knowledge-based economy in OECD countries through the work of the Information, Computer and Communications Policy Division (ICCP), Science and Technology Policy Division (STP), and the Directorate for Education/Centre for Educational Research and Innovation (EDU/CERI). This experience is now being shared with non-member economies through the Centre for Co-operation with non-member (CCNM) Global Forums.

4. The general objectives of the Global Forum on Policy Frameworks for the Knowledge-based Economy: ICTs, Innovation and Human Resources, were to:

1. Stress the importance of a comprehensive policy framework that integrates ICTs, innovation, and human resources as drivers of growth, drawing on recent Latin American and OECD experience, and
2. Share experiences on the development and future directions of policy frameworks for the knowledge-based economy, and advance this general policy agenda in the Latin American context.

5. The Forum provided an overview of policy developments reflecting the increased role of knowledge development and management. Specific attention was given to three inter-related policy clusters:

¹ This Forum also built on the Emerging Market Economy Forum on Electronic Commerce Dubai 2001, and work of the implementation teams of the Digital Opportunity Task Force.

- Information technologies including the communications infrastructure and e-business.
- Science, technology and innovation, and
- Skills, education and knowledge-based employment.

6. The approach linked policy development in these areas to broad economic and social goals. Individual sessions presented the experience and lessons of OECD and non-OECD countries. Discussion included the economic benefits of ICTs and innovation, the cost of non-participation in the knowledge economy, and the human resource and policy requirements for change.

Opening Session

7. The capacity of firms, industries and countries to develop and manage knowledge assets is a major determinant of competitiveness and economic growth. Recent analysis has underlined the importance of ICTs for efficiency and growth at firm, sector and national level, particularly when used in appropriate organisational structures and in conjunction with a skilled and learning-orientated workforce. Long-term growth also requires a business environment which encourages innovation and entrepreneurship, and business and government strategies for education, training and life-long learning.² These drivers of growth interact, and policy frameworks must take these inter-linkages into account.

8. *Mr. Pasi Rutanen*, former Ambassador to the OECD and Chairman of Wordliners OY, opened the Forum, speaking about the importance of maintaining knowledge as society gains information and wisdom as society gains knowledge. In the early days of evolving ICTs, rapid advances in technology and their economic implications threatened to broaden the gap between countries based on their ability to adapt. In response, the OECD took a leading role in examining effective ICT-based economic growth, and addressing structural issues related to the development of GII-GIS. Mr. Rutanen outlined the structural and policy changes that governments have to be prepared to make if countries are to compete on a global level. Business has already made such adaptations, and it is time to apply this experience with broader scope in order to nurture the future growth of the information economy and provide the continuing flexibility to experiment, improvise and learn. In illustrating the transition of economies to knowledge-based growth, Mr. Rutanen drew the example of an orchestra, where progress is made by the group under centralised direction, versus a jazz band, where the players are given boundaries within which they can improvise and discover new harmonious forms.

9. *Mr. Ronaldo Mota Sardenberg*, Minister of Science and Technology of Brazil, followed by describing Brazil's progress towards knowledge-based economic growth through consistent and integrated policy approaches, despite the socio-economic challenges the country faces. The relative status of nations and the social and economic performance of their populations depend upon their degree of participation in the knowledge revolution and in its applications and on countries' capabilities to effectively incorporate such advances into their development agendas and to disseminate them. Brazil has made progress in these areas, by linking federal and regional government efforts, and the expertise of government, academia and industry. Results have included the world's largest fully computerised elections, and Brazil's technology leadership of Latin America. Mr. Mota Sardenberg also emphasised the importance of international co-operation in the global information economy, highlighting Brazil's advances in space, astronomy, biotechnology and agriculture research, carried out with China, Chile, Cuba and the Philippines respectively. Such collaboration is increasingly important if developing countries are to continue progress

² This work is comprehensively summarised in: OECD (2001a), *Drivers of growth: Information technology, innovation and entrepreneurship*, Paris; OECD (2001b), *The new economy: Beyond the hype. The OECD Growth Project*, Paris.

through the new challenges posed by global financial and political environments. Brazil has affirmed its commitment to science and technology development with the issue of a White Book, outlining consensus-based national strategies for continued knowledge-based innovation and economic growth.

10. Finally, *Mr. Herwig Schlögl*, Deputy Secretary-General of the OECD, presented the Organisation's position that ICTs, innovation and human resources, addressed together through integrated policy approaches are the best way to optimise knowledge-based economic growth. This means broadening policy frameworks to encompass more than e-commerce, and focus on competition and liberalisation to the extent possible. National differences in the use of ICTs, application of innovation and development of human resources are wide and will continue to account for different speeds of development. But within these differences, ICT policies should encourage supply by supporting research and business initiatives, and they can boost demand by improving infrastructure access and quality, especially to under-served communities. National innovation systems should address and promote the inclusion of higher value economic activities, both by including new such activities and improving current processes. Education systems must meet demand for knowledge-intensive activities, particularly by improvement in the areas of life-long learning and training, and in co-operation with the enterprise sector. Integrated approaches to these three areas are necessary, but few countries have considered them with a "global vision" towards knowledge-based economic growth. The OECD's aim for this conference was to help develop coherent, forward-looking policies and provide a starting point for future policy development, prioritisation and sequencing.

11. Desired outcomes of the conference were to agree on ways of developing policy frameworks that integrate ICTs, innovation, and human resources as drivers of growth, to assess likely future policy directions and priorities, to advance this policy agenda in the Latin American context.

Session 1. Economic growth and the knowledge-based economy

12. Harnessing the potential of ICTs, innovation and enhancing human resources are essential for growth in the knowledge-based economy. New technologies have the capacity streamline economic and social systems bring productivity gains and improved public services. These in turn are driven by innovation and the development of human resource capabilities, which allow countries to harness and further encourage technology's potential gains.

13. Growth is also driven by other complementary factors, including openness to ideas, trade and investment as well as well-functioning economic and social institutions. Such an environment encourages risk-takers to explore new business opportunities and improvements that come with new technologies and economic change.

14. This session discussed the economic, regulatory, institutional and social circumstances and policy reforms that encourage the development and use of technology to lead to knowledge-based economic growth.

15. The session was led by *Mr. Pekka Lindroos*, Head of the Information, Computer and Communications Policy Division of the OECD. *Mr. Mario Cimoli*, Economic Affairs Officer of the Economic Commission for Latin America and the Caribbean (ELCAC), presented an overview of economic and trade issues in Latin America, tied to the development and diffusion of ICTs. Following, *Mr. Reynaldo Treviño*, Public Policy Advisor to the Office of the President of Mexico, presented Mexico's strategy in encouraging inclusive economic growth through widespread participation in the digital economy and the equitable distribution of knowledge-generated wealth. *Mr. Celso Pinto de Melo*, Director of the National Council for Scientific and Technological Development of Brazil (CNPq), spoke of the

diversity of conditions in Latin American countries as they approach the question of knowledge-based growth, and the underlying success factors. *Mr. Akhtar Badshah*, Executive Director of Digital Partners, emphasised the need to focus on market-based processes and concrete goals to close social and digital divides. Then *Mr. José Vargas Niello*, Latin American and Caribbean Regional Director for Consumers International, discussed the consumer benefits and challenges of an effective information economy. Finally *Mr. John Mein*, Executive Vice President of the Brazilian Chamber of E-commerce, spoke about the necessary socio-cultural conditions to foster improvements in human capital and spark innovation.

16. The session was designed to address the following issues:

- The development of knowledge-based activities in circumstances of slower growth and external capital market constraints, given current financial pressures in Brazil, Argentina and other Latin American economies.
- Encouraging the growth of domestic high-value activities while maintaining and expanding openness to international networks.
- Setting the right strategies and economic conditions to promote competitiveness along firm and industry value chains.
- Linking FDI and foreign knowledge-based activities to domestic innovation and entrepreneurship as a key to deriving competitive, market-based solutions.
- Practical application of knowledge-based development strategies to current circumstances and needs in Latin America and other emerging economies.
- Connecting the information economy to broader societal values and ensuring broad-based contributions to and benefits from the growth of knowledge-based industries and activities.

17. Policymakers, citizens and countries have to invest time and effort in meeting these challenges. Many of the countries that achieved higher growth rates in the 1990s reaped the fruits of earlier efforts, including macroeconomic and structural policy changes of the 1980s. In countries where economic, business and institutional conditions have been conducive to growth, ICT use has led to considerable increases in productivity. In the OECD these include countries as different as Australia, Finland and the United States. For developing countries especially, fostering the right conditions to take advantage of ICT advances linked with innovation capacities and human resources is a key to competitiveness and future economic development. Latin American countries have shown slowing growth rates since the debt crisis of the 1980's. As *Mr. Mario Cimoli* described, this is due in part to lacking or late implementation of reforms in Latin America that allowed more developed countries to benefit from technological advances. Manifestations of this effect are highlighted, for example, by a growing gap in productivity rates between Latin America's leading economies and the United States, whose regulatory structure allowed rapid adoption of new communication technologies. Examining the Latin American region internally, individual countries show diverse levels of ICT development, stemming from differences in regulatory environments, income and economic conditions and infrastructure capabilities.

18. But ICT is not the only factor explaining growth, and policies to bolster only these technologies will not alone steer countries to a higher growth path. Other factors central to policy reform – innovation and human resources combined with competition, openness and flexibility – are important in driving the uptake of new technologies and encouraging firms to use them in productivity-enhancing ways. It is important that the economic environment provide competitive incentives for firms to develop and adopt new technologies, and use them to transform business, develop new products and raise productivity. *Mr. John Mein* emphasised that innovation was not meant to replace, but rather to improve upon existing frameworks. This point was echoed by several of the panellists, including *Mr. Celso Pinto de Melo* who

said that growth should be tied to current knowledge, using expertise to meet the actual needs of companies and create greater growth in the immediate-term.

19. Innovative and knowledge-based practices add more value along value chains. Looking forward, bringing high-end activities of the value chain into the domestic economy depends on improving the quality of human capital and responding to the changing workplace and social demands. As Mr. Reynaldo Treviño pointed out, there is an interactive relationship between the information economy and society's broader values. Other members of the panel reiterated this approach and its significance for dynamic change. Continuing innovation means a constant state of evolution of public policy regarding technology and information access, regulation, security and privacy issues. Also, it is necessary to develop trust and co-operation between and within social institutions, including government, enterprise and academia in order to foster the development and of knowledge and its transfer between the fields of research, regulation and commercial implementation. In this multidisciplinary way it is possible to foment the right cultural conditions for innovation, beginning with education and training in science and technology, but also drawing on society's innate capacity for developing creative solutions. Mr. John Mein brought the example of Brazil, where the daily "way of life" of negotiating through bureaucracy and the ability to deal with change stemming from political and economic uncertainty of past decades creates an environment encouraging of individual creativity and innovation.

20. For innovation to be expressed through ICTs, broad access is a primary concern in the formation of a knowledge-based economy. Without the widespread integration of ICTs into all levels of the community, the information economy threatens to widen the digital divide by benefiting only those who already have resources and access to technology. Mr. Akhtar Badshah warned against accentuating existing social inequalities and proposed strengthening the use of technology to improve skills and empower at the bottom of the social pyramid. This suggests exploring new approaches for access at the local level including: working with trusted community leaders to overcome social and, subsequently, digital divides; providing government services online through publicly accessible electronic kiosks; getting more computers into schools; and developing technology that meets the real needs of poor communities. Technology creates a change in opportunities and a more effective way for individuals to participate in global markets. This would allow communities to move beyond plain subsistence and on to enterprise and the creation of wealth.

21. Governments are faced with a new economic environment. Policy-makers in all countries are recognising the importance of knowledge-based economies, and are increasingly adopting knowledge-based strategies. Transformations resulting from development, production and use of ICTs coupled with product and process innovation and continually enhanced human resources are as important as those associated with previous major technological innovations. Governments need to take action to maximise potential benefits, manage the adjustment process and contain social costs. Policy can provide incentives to accelerate ICT diffusion, encourage business and household adoption, and build confidence amongst consumers. Looking ahead, growth prospects will also depend on the impacts of other major innovations such as biotechnology, and of broader social changes such as ageing of populations and international migration.

22. Most of the economies in the Latin American and Caribbean region have taken the basic policy steps necessary to begin realising gains from technology. At the same time, progress is hampered by lingering economic and political uncertainty and by barriers to affordable access to ICT goods and services and to network infrastructure. Further major steps still need to be taken towards an integrated regional approach to knowledge-based development. In planning these, it is necessary to focus on meeting the real priorities and needs especially of traditionally bypassed communities if there is to be meaningful improvement in their condition.

23. Mr. Pekka Lindroos concluded the session with a summary of the four key principles underpinning growth of the knowledge-based economy.

- Structural reforms are necessary to create and adapt new technologies to the economy's and the society's current needs. These reforms cover communications policies, and also infrastructure development, investment policies, social programs and other measures that drive innovation and the development of human resources.
- It is important to foster linkages throughout the economy to share the resources of business, academia, government and social institutions.
- It is up to government to take an active lead by developing partnerships with other sectors and offering services online to act as a catalyst for technology-based activity in other spheres.
- No measures can deliver tangible results without broad-based inclusion of society in the technological revolution. Investment in human and social capital must be a priority to ensure that society has the skills to effectively implement these new technological tools.

Session 2.1. ICTs and e-business: policy frameworks and new issues

24. The ICT supply side is a major source of innovation and entrepreneurship and an important factor in growth performance and business dynamism. Furthermore, diffusion and use of ICTs are increasingly recognised to have major impacts on efficiency and productivity performance at firm, sector and national level. Many countries have developed broad ICT policy frameworks, which include encouraging innovation in the ICT sector, building ICT skills and improving access to and use of ICT, and in some cases ambitious plans to improve relative ICT rankings and enhance their contribution to growth.

25. Policy frameworks on the supply side cover for example, support for basic research and development, improving information supply to businesses, and raising specific and generic ICT skills. On the use side, policies have focused on improving IT equipment and network access for businesses and households (e.g. for rural areas and socially excluded groups), supporting the IT environment in areas such as security, authentication and intellectual property rights, and moving government services online to improve distribution and efficiency. Government policy has increasingly shifted to improving diffusion mechanisms and enhancing uptake conditions to contribute to productivity growth.

26. The focus of this session, moderated by *Mr. Tadao Takahashi*, Head of the Information Society Program of the Ministry of Science and Technology of Brazil, was the policy context for developing ICT networks and electronic business. In his opening address, *Mr. Richard Simpson* of the Canadian government and Chair of the OECD Working Party for the Information Economy, highlighted the importance of e-business as the engine for innovation, leading to growth and competitiveness. *Mr. Simpson* also described Canada's internationally recognised efforts to create a policy environment supportive of e-business development. During the following panel discussion, *Mr. Joe Richardson* of the U.S. Department of State presented policy frameworks for infrastructure development as the keys to expanding ICTs and e-business. Driven by private investment, this necessarily requires policy frameworks for cybersecurity to be successful. *Ms. Beatrice Rangel*, Senior Advisor to the Chairman of the Cisneros Group of media companies then spoke about the private sector working together with public authorities to expand telecommunications infrastructure and use excess capacity for educational initiatives. Finally, *Ms. Jody Westby*, President of the Work-IT Group, discussed opportunities and strategies for developing countries in expanding technology through a business-plan approach.

27. Discussions covered:

- The evolving policy balance between ICT supply and ICT diffusion and use in Latin American.
- The mix between focused programmes in ICT areas such as R&D and advanced skills, and framework policies in capital, labour and product markets that promote competition, openness and flexibility.
- Network liberalisation, competition and confidence building (security and trust measures).
- On the supply side, the business strategies and public policies proving successful in developing ICT goods and services, including content and multimedia applications.
- From the demand perspective, the areas of diffusion and use that have priority and policies for lagging groups and regions.
- The role for e-government applications to stimulate e-business uptake as well as increasing government efficiency.
- Private and public roles in providing ICT training and education.
- Priority setting and sequencing for public and private sectors to continue building sustainable knowledge-based activities.

28. In the area of communications networks, pro-competitive market liberalisation policies have been pursued to enable rapid diffusion and widespread use of new and dynamic technologies to the majority of users. As an example to other countries, Mr. Richard Simpson spoke in detail about Canada's experiences with enterprise lead ICT growth. The Canadian government has used e-business as the engine for innovation, encouraging the private sector to take initiative with favourable fiscal policies and security, privacy and consumer protection laws. Complementary policies that focus on investing in people and skills and on access, especially via broadband, implemented on a national level, ensure that all segments of the population and geographic areas have access to these technologies. Though more geographic and sectoral decentralisation is still needed, these policies have improved the conditions of access to local communication infrastructures. Examples of effective policies include regulating unbundling and shared access to the local loop and interconnection frameworks.

29. Flexible but effective frameworks established for security, privacy and consumer protection strengthen trust and build confidence on the consumer side of electronic business, with governments needing to work with business and civil society. Mr. Joe Richardson emphasised the dual role of trust incorporated into the fundamental principles behind ICT development, namely: liberalisation and competition; rule of law; private sector-led innovation; and human capacity building. With a global emphasis on the private sector to handle investment in and deployment of ICTs, it is necessary to create an environment that encourages confidence in facing the associated risks. This translates to systems that build user confidence online, such as trust infrastructures, cybersecurity strategies, and international cybercrimes conventions. Only with information flows protected at an international level, can a global expansion of e-business be expected. Since most Internet infrastructure ownership is in the private sector, this suggests an important role for public-private partnerships.

30. In encouraging enterprise-led growth, it is especially important to address risk issues for smaller firms, which may face information and resource gaps compared to larger enterprises. These are usually more pronounced in new technologies, including ICTs. Private and public efforts to improve information flows to lagging sectors and smaller firms may help overcome these gaps and provide positive network benefits. Network infrastructure, transaction security and regulatory issues may need addressing to the

extent that there are disincentives to small firms. Also, training and skill development strategies are crucial in government policies for the small-firm sector.

31. Many initiatives have been undertaken to increase the supply of professional ICT skills and to improve the level and spread of basic generic ICT skills. Short-term initiatives need to be business and market-led. Ms. Beatrice Rangel provided an example of this in the work of the Cisneros Group. One of Latin America's leading multimedia companies, the Cisneros Group has developed considerable satellite, digital and fibre-optic communication infrastructures. They are now working to employ the unutilised capacity of these systems to provide educational services such as teacher training and distance learning. They seek partnership with the public sector as there are important inputs from government in long-term development of a flexible and adequately trained work force. This applies both in primary/secondary education and in the broader policy context of encouraging lifelong learning and professional education, and adapting the content of education and training to new demands and the development of ICTs.

32. In devising and implementing an ICT strategy, countries should take a priority-based approach. The knowledge-based development path that a country chooses to follow will have implications for the legal and regulatory frameworks necessary to reach its goals. Ms. Jody Westby suggested following a business-plan model, based on engaging in those knowledge-based activities to which an economy can contribute significant value. This then becomes a guiding principal for policy formulation that accelerates deregulation, encourages enterprise and develops the necessary human resource capabilities. It should draw on existing available resources, and offer value to potential investors who would help augment those resources. Finally, such an approach should keep the customer in mind, supplying a product proposition that is mindful of demand and of global legal and competitive frameworks.

33. The session concluded by highlighting the importance of developing policy frameworks that encourage private sector leadership of ICT-led economic growth.

- E-business is the driving source of innovation, but needs a friendly policy environment to invest in the necessary systems and resources.
- Policy should engender the financial and market incentives that drive firms to invest, while also establishing a trust infrastructure that will mitigate the risks of these investments.
- A collaborative dynamic between private enterprise and public authorities will nurture the development of technical and human resources through the expansion of technological infrastructure and knowledge and skills needed for the transformation to a knowledge-based economy.
- Keeping core competencies and long-term objectives in mind will help determine the sequencing and shape of regulatory activities.

Session 2.2. ICTs and e-business: national strategies and regional challenges

34. This session built on previous discussion of principles guiding knowledge-based economic growth and the policy frameworks necessary to encourage such growth. Within these broad and common policy frameworks, there is a wide range of individual national strategies and approaches based on economic and social structures, infrastructure development and availability, business networks, institutional capabilities, and government structures and roles. It is important to recognise that there is no "one size fits all" approach to economic growth and countries must adopt these principles to their own needs and capabilities. Furthermore, these national strategies have to be placed in the broader context of regional capabilities and the opportunities to gain economies of scale and scope in the context of infrastructure, business and social networks.

35. OECD analysis has demonstrated that policy approaches can be broadly grouped among OECD countries into an English-speaking market focused group, a European broad-based consensual group (with differences between Northern and Southern Europe), and an Asian consensual grouping.³ Given some shared historical, cultural and demographic characteristics, it may be tempting to see Latin American and Caribbean nations as one homogeneous group. But this would be inaccurate. History, institutional and social structures and current economic circumstances combine to lead different countries to adopt different national strategies within this wider framework. There are common elements in all approaches, but the emphasis, priorities and sequencing differ. Thus this session focused on the different issues and approaches affecting ICT growth found within the region.

36. This session was moderated by *Mr. Fredy Bentancurt*, the Latin American regional representative for the SDS/ICT activities of the Inter-American Development Bank. In the opening speech, *Mr. Graham Vickery*, Head of the Information Economy Unit of the OECD, discussed how underdeveloped supply and diffusion are hampering the adaptation of knowledge and technology into value-added activities, and how policy can be used as a catalyst. *Mr. Martin Hilbert*, of the UN Economic Commission for Latin America and the Caribbean (ECLAC), then spoke of high costs as a propagator of the digital divide in Latin American countries, short of rising income levels. *Mr. Alberto Oliart Ros*, Academic Co-ordinator of the National Laboratory for High Information Technology of Mexico, outlined the country's efforts to boost ICT use through public-private co-operation and support for research, development and education activities. *Mr. Renato Guerreiro*, the former President of Anatel, Brazil's agency charged with regulating telecommunications markets, explained how Brazil implemented liberalisation and regulation to improve the national telecommunications system. Finally, *Mr. Cecil Bartholomew*, Director of development of Information Technology activities for Grenada, discussed how the Organisation of Eastern Caribbean States (OECS) is using knowledge to transform economic activities through business, government and cultural application.

37. The session brought into focus:

- The national challenges to expanding the adoption, use and benefits of ICTs. The challenges faced by Brazil, the region's leader, are very different from those faced by the smaller countries of the OECS.
- Challenges have changed over time as political and economic circumstances have altered legislative and financial environments.
- The narrow policy approaches to ICTs and e-business seen in a regional Latin American context to date, both in terms of ICT policy functional areas and in terms of regional co-operation.
- The scope for more integrated regional approaches to and prioritisation of ICT and e-business.

38. In the Latin American context two distinctly different models are possible with structured government-led approaches stressing equality of access to ICTs, and more market-oriented self-regulating strategies. For example all countries have adopted regulatory initiatives to enhance competition in network infrastructure and the supply of ICTs. These approaches are necessary but may not be sufficient to ensure wide access, and policies aimed at overcoming differences in the distribution of access within countries and regions are an important complement. As Mr. Graham Vickery explained, to the extent that differences persist, country and region-specific initiatives may be aimed at: *i*) improving diffusion to individuals and households via access through schools and other public institutions; *ii*) improving diffusion to businesses

³ See OECD (2002), *Information Technology Outlook 2002*, Paris, Chapter 8.

via ICT training and information diffusion for small businesses; *iii*) ICT education and training in schools, vocational training, teacher training; and *iv*) judicious use of government services on line, and government procurement to provide demonstration effects and improve government effectiveness.

39. Competition-enhancing policies can contribute to diffusion efforts by reducing costs, cited as a main barrier to ICT diffusion by Mr. Martin Hilbert. The direct correlation between per-capita income levels and Internet penetration show that Latin American countries are lagging far behind wealthier nations. And though Latin American countries are spending a disproportionate percentage of GDP on ICTs relative to higher income countries, this spending is still inadequate due to the high costs. Competition is the best way to bring down prices, requiring a proactive government approach to market liberalisation and complementary policies.

40. Such competition promotion was one of the objectives of Brazil's liberalisation of the telecommunications market in the late 1990's, placing priority on improving coverage and quality of service. Mr. Renato Guerreiro described the government's efforts to foster competition and universal application as forces to maintain quality through expansion of services. The government used competition and fiscal incentives to lower costs in the short term and profit enhancing policies for telecommunications firms to create longer-term incentives. The result was a rapid expansion in fixed and mobile telephone services and consequently of Internet access, though regional and economic concentration still clearly favours the wealthier segments of the population. Government has taken an active role to spur the demand side through e-government initiatives, which can provide important public demonstration and diffusion effects.

41. Online government information and services and online government procurement are part of broad government knowledge management strategies to improve internal government efficiency and increase external reach to citizens and businesses. This was a key point of the presentations by Mr. Alberto Oliart Ros and Mr. Cecil Bartholomew, who spoke of roles for government in ICT diffusion, working with enterprise on research, education and social integration. The Mexican experience on a national level, and the countries of the OECS on a regional level, demonstrate the value of government efforts to promote technology education and access, and to add value to all levels of economic activity from enterprise and innovation processes to public services and cultural activity. The focus is also to

42. On the other hand, to the extent that there are very large income and regional differences in access to ICTs and the Internet, such measures will accentuate the digital divide among different socio-economic groups. The need to avoid exacerbating this gap places even greater importance on providing ICT resources and services to society's lower levels. An effective and wholly national approach can only be considered when access and the skills necessary to take advantage of it are available to the entire population.

43. The session concluded that ICT access and training are key to implementing national level strategies.

- Though high costs and infrastructure limitations continue to be the biggest challenges, market-based solutions can begin to address these through policies that enhance competition and provide incentives for industry action, including investment in equipment, and new organisation and human capital development.
- However, the policy approach needs to also focus on all levels of society and ICTs should serve as a conduit for public services and practical information, as well as a cultural medium.
- Economies can then begin to apply knowledge-based solutions to the problems of social and digital divides and adding value to economic activities.

- The momentum needs to happen on a national scale, though there is ample opportunity to explore cross-border synergies, particularly in the areas of standards, interoperability and legislation on security, authentication, privacy and consumer issues.

Session 3. Innovation

44. Innovation in products, processes and organisational structures is a major source of growth, and the way that economies develop. However, the ability to harness the potential of science, technology and innovation to improve growth performance varies. Innovation is not always based directly on research and development (R&D). It often involves organisational as well as technological change and complementary investments in other areas (*e.g.* worker training, manufacturing, marketing). Nevertheless, higher levels of R&D intensity are correlated with higher levels of economic performance. R&D appears to be growing in importance, as economies become more knowledge-based and fast-growing new industries become more science-based.

45. This session was lead by *Mr. Jean Guinet*, Head of the OECD Science and Technology Policy Division, who opened by speaking about the changing emphasis of innovation systems to favour more dynamic and interactive processes. Following, *Mr. Mauro Marcondes Rodrigues*, President of FINEP, the funding agency of the Brazilian Ministry of Science and Technology, discussed Brazil's growing innovation output, stemming from the government's encouragement of links between research centres and companies the foster solutions to the country's social and economic needs. *Mr. Engelbert Beyer*, Head of Economic Aspects of the Federal Ministry of Education and Research in Germany, provided a European country case study of government support for innovation through policies that encourage private sector investment and risk-taking. *Mr. Carlos Vogt*, of FAPESP, the State of São Paulo Research Foundation, described São Paulo State's programs for funding technological innovation, providing resources to SME's and creating a culture of innovation that brings about the collaboration of professionals and academics. Finally, *Mr. Sujai Shivakumar*, of the U.S. National Academy of Sciences, spoke of the Academy's findings in investing the success conditions for partnership between public authorities, private enterprise and research centres in innovation systems.

46. Discussion covered:

- The applicability of innovation development strategies for Latin American and other emerging economies.
- The private and government roles in supporting innovation.
- Achieving a better match between policy objectives and support mechanisms and new directions, for example in the area of support to small business.
- The balance between basic and long-term mission-oriented research compared with applied development.
- The extent to which public laboratories and universities need restructuring and different funding arrangements to strengthen knowledge transfer to the private sector.
- Particular issues related to the mobility of S&T workers within and among sectors and countries.
- Increasing regional and international R&D and innovation co-operation and priority setting.

47. In the rapidly changing economic environment for innovation many adjustments are taking place, for example in business support for R&D and the role and functioning of public research institutions. These changes require adjustments in policies and public financing. The collection of new data and development of new R&D and innovation indicators are needed to benchmark innovation policies and performance and increase their contribution to economic growth.

48. Mr. Jean Guinet explained that the result of these trends in innovation systems is to bring dynamic relational aspects to the forefront, in contrast with the more directional approaches known before. It means a greater role for business, particularly SMEs, and networks that interconnect efforts of enterprises and research centres. Deregulation has distributed the implementation burden to more of the private sector working in consultation with public authorities to meet national innovation goals. But it raises important questions that must be considered when framing innovation policy:

- What “high leverage” instruments should be used for public financial support of R&D?
- What are other means to boost business R&D and innovation?
- How to reconcile the search for excellence with the need to narrow regional gaps in innovation capabilities?
- How to make public research more responsive to evolving social and economic needs?
- How to give a chance to those new firms/nascent technological fields that are not yet there or powerful enough to lobby for support ?
- What are the different priorities and sequencing in different countries?

49. It is clear that in areas such as the management of innovation and science systems, public funding of R&D, industry/science relationships, development of high-tech spin-offs and management of IPRs countries that have performed best are those that have successfully adapted their science and technology (S&T) systems to evolving patterns of innovation, enhanced interactions between the private and public sector, and improved framework conditions for innovation.

50. Mr. Mauro Marcondes Rodrigues began to address these in describing how Brazil provides fiscal incentives through tools like long-term credit and R&D subsidies through associations at both state and federal levels. These tools complement the growth already seen due to stability in the economic and competitive environments. Analysis of the distribution of these incentives shows that most go to telecommunications, followed by university and company research programs, the petroleum-gas sector, and the research infrastructure, revealing Brazil’s priorities for technological development. The implementation of these tools has helped reduce risks for and mobilise venture capital, partnerships with universities and research centres, as well as technology parks and incubators for start-up businesses.

51. Although much depends on the specific characteristics of national innovation systems, there are important general policy lessons. For the most part, these require more refined use of existing policy tools rather than more government action. All of the presentations emphasised the point by presenting government’s function as one of facilitator to provide incentives for private sector action and linkages between industry and research. Mr. Engelbert Beyer’s discussion of the German government’s policies clearly demonstrates this catalyst role by both raising incentives and protection for patented inventions and the associated intellectual property rights. Though the government does set national research goals, it also encourages co-operation on open-purpose research. Finally, as does Brazil, Germany focuses on using private capital to encourage small businesses and spawn high-tech start-ups off of larger firms and research institutions. Thus, industry has an important role to play in adapting R&D investment and sourcing, knowledge management and industry/science relations. Furthermore, in so much as government guidelines

reflect social needs, innovation facilitates the fulfilment of goals in areas such as improved health and environment protection.

52. Greater formal and informal knowledge-sharing among R&D-conducting firms, as well as support to SMEs by targeted research organisations, are critical for boosting innovative effectiveness. The effectiveness of R&D appears to be greater where the number and variety of R&D performers is greater and where the scope for market transactions (e.g. through licensing, mergers, and acquisitions) is larger. Informal networks are vital components of innovation systems. However, important efficiency gains can be derived from increased market-based transactions of codified knowledge and effective regimes of IPR protection. Policies that facilitate patenting and lower its cost can improve countries' ability to innovate.

53. Complementary private and public R&D investments are a prerequisite for sustained innovation performance. Government financing of R&D remains critical in ensuring the generation of the fundamental scientific and technical knowledge, and correcting for other market failures that impede business R&D, especially in SMEs. However, considerable variation exists in the performance of countries with similar levels of R&D investment. The ways in which this funding is channelled are crucial (e.g. the types of institutions supported, the mechanisms used to finance R&D), the ways in which public research organisations are structured and managed, and how these contribute to the development of high value-added activities.

54. To illustrate this Mr. Carlos Vogt described the programs developed by the State of São Paulo in support of: technological innovation, development of innovation systems in SMEs, and centres for the research and diffusion of innovation. Guidelines for all of these programs specify that research goals should lead to technical innovation and that enterprise should carry 30-70% of the collaborative costs. These programs provide funding for all phases of product development, from feasibility studies to delivery to market, while the firms and research institutions define their own evaluation assessment terms and treatment of intellectual property rights.

55. Historically, government has played a more proactive role, though this is now changing. These were some of the findings of the U.S. National Academy of Science studies of innovation systems, as described by Mr. Sujai Shivakumar. The study found that in the U.S. innovation has typically benefited from co-operation between government and private firms to overcome investment risks and obstacles to co-ordinating knowledge-based activities, such as protection and enforcement of IPRs. These public-private partnerships have helped stimulate the economy by encouraging the emergence of new processes. Currently, associations such as collaborative research consortia and national laboratory-centred, knowledge-based clusters, work with the help of favourable legislation and other help from government to promote innovation-lead growth. As an environmental condition for success, the federal government shapes enabling fiscal, education, trade and other policies. As an operational condition for success, industry takes a leadership role, sharing the financial commitment and controlling for quality. These partnerships accelerate the progress of technology from laboratory to market. And of course there is a very important role for international benchmarking in terms of best practices, multinational collaboration, and mobility of researchers and technical and managerial professionals.

56. Openness to international flows of knowledge is increasingly important. As the innovation process becomes more global, firms and research institutions draw more on international pools of scientific and technical expertise. This is particularly relevant for smaller countries that rely on external sources of knowledge to supplement their narrowly focused domestic R&D efforts, but is also of growing importance for larger countries. National policies must attempt to both strengthen the domestic R&D base to augment its absorptive capacity and develop international linkages throughout the science and technology system.

57. Countries have different objectives and starting points for reform and differ in the particular initiatives that can most effectively boost capacities and growth potential. Countries with low levels of R&D may find it more effective to strengthen incentives to boost public and private R&D expenditures. Economies with higher levels of R&D may benefit more from reforms to public research institutions (universities and public laboratories) that enhance worker mobility and industry-science linkages. Of key importance in Latin America are the development of small-business R&D, venture and risk capital and updating regulatory frameworks governing publicly financed research. These should aim at increasing the share of high value-added activities in Latin American economies.

58. The panel discussion emphasised a change in the role of the public sector from one of innovation administrator to one of innovation enabler.

- The larger part of technological advancement comes from a partnership of the research and private enterprise sectors, functioning within an encouraging legal and policy environment. It will ultimately be the collaboration between research institutions and industry that combine the technical and professional skills which accelerate development and transfer of innovation to market.
- Some governments may choose to take a more active role in setting national research goals and supporting specific sectors, such as SMEs and technology parks.
- It is important to keep national social and economic goals in mind, and look to benefits that can be derived from joint regional and international efforts.

Session 4. Human Resources

59. Human resources (the skills and competencies embodied in workers) are a central pillar of development and growth. There is a well-established relationship between human capital and labour productivity. Improvements in one lead to increases in the other, and empirical studies have found that human capital is a significant determinant of economic growth. With increasing recognition of the importance of the knowledge base, there is renewed interest in the productivity-enhancing role of human resources, and equal access to education and learning are crucial for expanding human capital and increasing its contribution to growth. One of the factors behind the good growth record of some countries has been the availability of a large pool of qualified personnel. And for ICT and other new technology to be developed and used effectively, the right skills and competencies must be in place.

60. The shift towards knowledge economies has resulted in rising "knowledge-intensive" employment. And because skilled labour shortages are a growth constraint, many OECD countries have been using foreign sources to fill shortages of qualified personnel, presenting challenges for the home countries supplying the personnel and for the host countries that increasingly rely on foreign sources. If strategies to boost growth via ICTs and other new technology are to succeed, policies to enhance human resources must be prioritised. Properly managed, many of these policies will also help to narrow the digital and knowledge divides.

61. This session was lead by *Mr. Lauritz Holm Nielsen*, Senior Advisor for Post-Secondary Education in Latin America for the World Bank, who spoke about improving education trends in Latin American and World Bank efforts to help countries invest in people in order to improve living standards and economic conditions. *Mr. Richard T. La Pointe*, Senior Advisor to the U.S. Deputy Secretary of Education, opened the session by speaking about the integration of technology into education reform in order to revolutionise learning processes. *Mr. Eduardo Krieger*, President of the Brazilian National Academy of Sciences, highlighted the importance of incorporating the research and human resources

produced by higher education into the business sector in order to benefit from their expertise. *Ms. Maria Helena Castro*, the Brazilian Deputy Minister of Education, explained the need to include training and life-long learning into a more flexible and responsive approach to higher education. *Mr. Gabriel Casaburi*, Economist with the Fundación Mediterranea, stressed that ICTs cannot be nearly as effective for productivity and economic growth on their own as they can in combination with organisational reform to take advantage of knowledge-based human resources. And finally, *Ms. Marie-Paule Verlaeten* from the Belgian Ministry of the Economy, reminded the conference of the importance of including implicit knowledge in education policy, as it is the mixture of implicit and explicit learning that forms civilisations.

62. The session addressed the following key issues:

- How Latin American countries can develop national education systems and human resources to respond to the challenges of the knowledge-based economy.
- What strategies are successful in increasing access and improving equity related to education and human resources.
- Setting priorities between investing in high-quality primary and secondary education, raising completion rates for primary and secondary education, expanding vocational education (secondary and post-secondary), and tertiary (university) education, and improving system quality.
- Public and private sector approaches that have strengthened the links between education, labour markets and business, and the role of ICT training and human resource development.
- Approaches that are being adopted in Latin America to provide training and life-long learning opportunities.
- Obstacles to workplace changes and ensuring worker participation.

63. It is necessary to invest in quality at primary and secondary stages of national education systems. These investments help boost labour market participation and are more cost-effective than later interventions to remedy school failure. Dropout rates from primary and secondary education also have to be lowered. Apart from fundamental concerns regarding basic literacy, ICT literacy has become part of basic competencies and also has to be improved, which in OECD countries has involved better recruitment of qualified teachers and making pay more competitive.

64. But it is not sufficient to teach ICT skills. *Mr. Richard T. La Pointe* explained that ICTs have to be comprehensively integrated into teaching and education, which means access to technology from the classroom and appropriate teacher training. The way ICTs are incorporated into education will determine achievement outcomes, and thus must be a factor considered in education reforms that are currently under way. It is also important that standards be set and maintained at challenging levels in order to over-ride the acquiescent expectations of school systems that have emerged in developing countries. These standards must be applied along the entire educational framework, from primary to graduate levels and to professional training and life-long learning.

65. In order to transfer learned skills into the labour market, it is important to create or strengthen pathways that combine education with workplace experience. *Mr. Eduardo Krieger* spoke of a hiring problem in Latin America with few holders of advanced degrees putting their skills to work for business and industry. Rather, most PhD's, for example, work in academia, the opposite of the situation found in the U.S., where the majority works in private enterprise. Mechanisms of co-financing between employers, trainees and government can ensure cost-effectiveness. And indeed, in Brazil, funding and policy has tried to bridge the gap between education and enterprise. This has already shown some effects, particularly in the areas of biotech, petroleum and agriculture, though progress has not been even across sectors and still

lags behind other countries. Performance-based financial incentives, and involving firms in the definition of curricula and funding have been valuable in some countries, as underscored by Mr. Gabriel Casaburi, in helping align demand for and supply of skills in the labour market.

66. However it is not enough to focus on future generations of workers. In periods of rapid technological change, it is important to increase adult and worker participation in further education. New and innovative instruments such as systems of recognition of competencies and tax reform to ensure that firm training is not penalised can enhance incentives to engage in further training while controlling costs. As Ms. Maria Helena Castro pointed out, the currently seen high rate of job changing during professional development raises important issues for training and life-long learning programs for current workers. This is partly addressed by growing enrolment in secondary and tertiary education programs, but more diversity and flexibility are still needed, along the lines of, for example, the U.S. community college system, which allows students to enrol in courses and certification programs on an individual basis. There is also a role for the growing number of private institutions, drawing their faculty and their academic standards from the public education systems.

67. Within the workplace, it is important to foster employee involvement and effective labour-management relationships and practices for change to raise productivity. There are a wide range of institutional structures and relationships, but it is important to ensure that employment regulations and collective bargaining institutions do not hamper knowledge-based organisational change and adaptation to the new economic environment. Mr. Gabriel Casaburi spoke about these issues, providing a labour-market view of human resources in the information economy. He reiterated the point that human capital development and ICTs are inseparable to fully realise knowledge-based productivity growth. But in labour markets in general, and in Latin American countries particularly, traditionalism and rigidity have been hampering an effective dynamic between labour supply and demand. Over-centralised labour policies do not serve demands on local and regional levels. This is exacerbated by frequently adversarial relationships between unions and government, which block collaborative problem solving. And the high level of labour market regulation causes a divide between formal, very rigid markets at one end, and informal, fluid markets on the other, where labour rights and working conditions are frequently sub-par. Organisational changes are needed to adapt labour supply to optimise knowledge-based growth. This means opening educational institutions to collaboration with the community and business, deregulating labour practices to increase market responsiveness, and encouraging a more co-operative dynamic between labour, management and government.

68. Ms. Marie-Paule Verlaeten, closed the session by speaking about the importance of reinforcing the role of implicit knowledge with society, as the cornerstone to societal development. Though most education and human resource policies focus on formal education systems, thus explicit knowledge, it is perhaps more informal and tacit cognisance that ultimately shapes the way society evolves. Emphasis on productivity and profits means we have to identify and implement the knowledge-based competencies that already exist. This requires innovating the social contract that exists both with and within the firm, and consistency in promoting education reform and life-long learning. In this way Policies can reconcile economic growth with the development of societies as a whole.

69. The session highlighted several important human resource factors that together can help countries reach their potential in a knowledge-based economy.

- Technology must be a fully integrated part of education systems, including teacher competencies and student access.
- Education systems should be adapted to develop human resources all along academic and professional trajectories, with flexible options for vocational training and continuing education.

- Links between business and academia must be developed to share resources and help higher education prepare candidates for the actual needs of the labour market.
- Structural and institutional reforms are necessary to encourage innovation and experimentation in educational and labour systems.

Session 5. Concluding Session: Policy Round-table

70. This session aimed to identify the policies that are needed, and help to prioritise them, taking into account the wide diversity of experience and institutions in different countries. The previous sessions discussed the different elements of strategies to develop knowledge-based economies and how they can contribute to long-term growth. They also examined some of the barriers to developing such economies and the kinds of incentives needed to achieve the objectives of deepening and widening the knowledge base and linking it with growth-enhancing mechanisms.

71. This session was moderated by *Mr. Richard Simpson*, Chair of the OECD Working Party for the Information Economy. *Mr. Carlos Pacheco*, Brazil's Deputy Minister of Science and Technology gave the opening speech, covering the country's progress in and challenges to knowledge-based economic growth. *Mr. Graham Vickery*, Head of the OECD Information Economy Unit, then spoke about how policy frameworks must interlink knowledge elements to add value to industrial processes and improve competitiveness. *Ms. Catherine Mann*, Senior Fellow at the International Institute for Economics, emphasised transformation as the key to improving industrial and international competitiveness, and the role of structural policy changes in enabling such changes. *Mr. Samuel Gleiser Katz*, President of the Peruvian branch of the International Chamber of Commerce, spoke of Peru's initiatives in knowledge, technology and economic policy to be a part of the global information society. *Mr. Régis Guimaraes* of the Genius Institute of Technology, a technology think-tank, suggested policy goals for Brazil's future technological trade competitiveness. Finally, *Mr. Lauritz Holm Nielsen*, Senior Advisor for Post-Secondary Education in Latin America for the World Bank, presented the vital link between technology and skills in growing the information economy.

72. Topics for discussion included:

- The experience in developing policy frameworks that better integrate ICT, innovation and human resource strategies and policies, the lessons learned and future directions.
- Setting policies priorities in developing the Latin America knowledge base and linking this with growth strategies.
- How individual policies and approaches can be integrated into regional Latin American approaches.
- How global integration shapes the development and use of the national and regional knowledge base.
- The future policy priorities and sequencing at national, regional and international levels.

73. Brazil is a technology leader among Latin American and Caribbean countries. *Mr. Carlos Pacheco* described how this was a result of the government's giving knowledge a strategic role in economic and social development. Institutional changes and a nurturing regulatory environment have established a clear role for ICTs, placed an emphasis on innovation and on education towards the development of human resources. ICTs importance is reflected both through the spreading infrastructure, as well as through practical application to serve government and the public needs. National innovation systems are working to overcome historical imbalances, through collaboration between industry and

education and through new industrial policies. Globalisation has brought advantages through international co-operation, but also challenges including the instabilities of global finance and the effects of trading blocks that accentuate inequalities. Look forward, the focus is on bridging digital divides and aligning international industrial policies and regulations.

74. In many cases, the information society has served to accentuate social inequalities. This is because world markets are dominated by those with access to new technologies and intensive information exchange. Mr. Samuel Gleiser Katz illustrated Peru's efforts in promoting ICT's for citizen-government interaction, cultural expression, regional communication. Access issues have been partly overcome through the growth of public use terminals, but concentration is still very heavy among higher-income and urban groups, and it is a questionable long-term model for sustainable development. Current plans focus on better integrating technology into education, helping both teachers and students develop the necessary ICT skills. Also government initiatives include emphasising procurement systems that support SMEs, and engaging international funding for developing countries to help bridge the digital divide.

75. Policy frameworks must inter-link diverse knowledge elements, as Mr. Graham Vickery pointed out. Governments must co-ordinate ICT policy with innovation and human resources policies, linking the efforts of different sectors and getting priorities, implementation and feedback from evaluation right. This means aiming for universal access to ICTs and combining the appropriate mix of support for development of ICT applications, encouraging diffusion, enhancing the ICT business environment and prioritising within these areas. This must happen in a conducive policy environment, the specific priorities and characteristics of which will vary from country to country. Given the current status of the information economy in Latin American countries, this policy agenda must emphasise equality of access and use by the public as well as adoption by small firms, using training, education and infrastructure to meet actual needs.

76. For countries to sequence policy priorities it is useful to look at national and industry trade patterns in determining how to implement ICTs most effectively. A country can then begin to enable a transformation towards greater productivity and trade competitiveness. Included in this transformation, Ms. Catherine Mann listed financial policy that encourages investment, global engagement and transfer of knowledge, and pro-competitive policies that span across business, product and labour markets. In reforming structural policy it is necessary to have collaboration between political leaders who promote national goals and agenda, and entrepreneurial leaders who are able to communicate from and act at regional and local levels.

77. This point was reiterated by Mr. Régis Guimaraes, who said that policy should take account of the current industrial and technological basis of a national economy. Brazil, for example is in the dual position of being an ICT producer and consumer, leading to an estimated \$7 billion ICT trade deficit on annual sales of \$20 billion of ICT products. This is partly because historically, Brazil has been an assembler of components developed and manufactured abroad. Thus the national ICT productivity is doubly hampered by engaging in lower value activities and by taxes that raise the costs of imported components. Some advocate lowering trade barriers on imported ICT goods and focusing on lower-cost assembly at the expense of domestic ICT production. But as Brazil's level of development is already too high to surrender its competitiveness and domestic productivity, long-term growth may be better realised by reducing the production costs of ICTs and encourage innovation processes to develop new technologies domestically.

78. Finally, it is important to remember that technology and skills are "Siamese twins." The World Bank performed a series of paired-country studies, which Mr. Holm Nielsen presented to the Forum. Brazil and China were compared for their regional economic importance and inward foreign direct investment. Mexico and Korea, both have manufacturing-oriented export strategies. Peru and Spain, share an emphasis on skill upgrades and a growing export share of GDP, but continuing high unemployment and economic

and political legacies. Costa Rica and Singapore, both represent small but dynamic economies with industry clusters that focus on exports and on foreign investment for technological development. Lastly, Chile and Finland favour strong outward growth and clustered industrial activities. The study highlighted the importance of international openness, education and skill upgrades, research and development, and specialisation of activity clusters as keys to knowledge-based economic growth. In contrasting Latin American countries with their counterparts, the study found that Latin American countries showed lower productivity growth overall. This was attributed to slow skill development, a legacy of poor past investment in education and low ICT penetration. The findings suggest encouraging the interaction between technology and skills through national technological upgrades, and increased demand for ICT skills in the labour markets.

79. Mr. Richard Simpson concluded the Policy Roundtable by highlighting the common denominators shaping the knowledge economy.

- It is necessary to have a long-term vision for innovation, building frameworks that address real social and economic needs in a sustainable way.
- Strategies must be inclusive and economy-wide, impacting the supply of and demand for ICTs, innovation and improved human resources, and these strategies must be a result of collaboration between the public and private sectors.
- Strategies must encourage and enable structural and organisational changes that lead to innovation and productivity gains.

Conclusions

80. The concluding points of the Forum were:

- Policies and analysis for the knowledge-based economy are structural and microeconomic. Building the knowledge-based economy requires long-term investments with long-term outputs, impacts and consequences.
- International structural, institutional and business linkages and the international policy context are increasingly important for knowledge economy policy.
- Policies for the knowledge economy are not about pushing from the supply side, and/or from above by governments. Public goods and services and content have to be shaped by the user side in conjunction with the supply side.
- The Forum stressed the importance of pulling together policy for the inter-related drivers of growth -- ICTs, innovation and human resources.
- The digital divide is not only a hardware and equipment problem. The key issues are access, use and outcomes from the use of ICTs and associated technologies.
- Key ICT policy issues include greater emphasis on equality of access and use by small firms and citizens, ICT training and education, co-ordination of government on-line efforts, greater emphasis on IT services and content, and security and trust infrastructures.
- Innovation is a market- and business-led process that is dependent on efficient collaboration between public and private research. Conducive framework conditions, including regulations governing public/private partnerships, are key.

- Financial incentives to innovation have a role to play but existing support instruments need be better integrated, with priority to those that have the highest leverage on business R&D. International co-operation in S&T policy need to be enhanced.
- Education key issues in the Latin American context are attaining universal access (e.g. at secondary level), raising average attainment levels, improving quality, and increasing involvement in training and life-long learning strategies.
- There are very different economic structures, economic potential, industrial activities and institutional capacities across Latin America and Caribbean countries and there is no “one-size-fits-all” formula for policy priorities and sequencing.
- Policy dialogue must continue and intensify globally on these issues to find a common set of core policy principles to ensure national policies are compatible within regional diversity.
- Knowledge policy frameworks are the first step. Of crucial importance are priorities, sequencing, implementation, outcomes and evaluation.
- Time frames are long. Policy frameworks adapt over time, and policy frameworks have to fit economic and structural realities.

81. The OECD will continue to develop and review changes in ICT policy frameworks and policy priorities. The OECD-APEC Global Forum: *Policy Frameworks for the Digital Economy* to be held in Honolulu, 14-17 January 2003 will look at these and other issues, including security, privacy and consumer protection, trade and digital inclusion, globally and in the Asia-Pacific region.