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Emerging Growth Trends

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ICT-enabled growth in the Information Society

In today's economies, Information and Communication Technologies (ICTs) play an important and significant role in fostering the new business models and delivery systems that represent future growth and in driving the increased productivity and efficiency that support current growth. Business, as the owner and operator of the majority of ICT systems, including many that are part of national infrastructures, has been at the forefront of development and adoption of ICT systems. ICTs play a significant role in government as well as business services and a growing role in citizen and consumer services. With the advent of the Internet, there has been a greater deployment and use of ICT systems across and between governments, businesses and individuals which makes it an increasingly important element of growth.

Technologies, Change and Growth

Technologies and delivery systems are in some cases catalysts, and in other cases facilitators of new business models, citizen services and possible opportunities for growth, and social benefit. We must recall, however, that the role of ICT systems is to *support* rather than *define* internal processes of government or business. Technology is a means that needs to be used to address the problems of the enterprise or organization; strategic solutions that solve the problems should be the end result. New technologies, however, provide improved ways of contemplating tasks and create new potential for functions and workflows that enable greater efficiency, economy and effectiveness. As businesses and governments define their priorities, they should evaluate the possible beneficial impacts of the technologies that can support these end goals and utilize the technological means available to effect the change they desire. Thus as goals evolve and change occurs, processes, practices and procedures should be evaluated and revised to capture the potential benefits of the technologies that underpin the digital economy.

Failure to optimize processes for ICT and failure to learn lessons from operational trends will prevent economies from capitalizing on the full benefit of ICT enablement. Removing paper from a process may account for 10-20 % increases in efficiencies and cost savings, but the real flexibility and benefit comes from a review and optimization of the practices, processes and procedures. Benefits result from review of processes, application of technology and appropriate change management, not just automation of existing systems.

The utility and functionality of ICT systems has evolved from systems that organize and tabulate to systems that help plan, coordinate, communicate, manage, educate forecast and remediate. In the early stages of the information age, ICT was responsible for creating more data. Today, ICT is creating significantly greater benefits by providing actionable data. Actionable data is more valuable because it provides additional context and trending, enabling higher levels of decision-making and better analysis of risks, costs and benefits earlier in the business process. While the potential utility of information has increased, that potential can only be realized if an organization has optimized its processes to capture its value.

On a more global scale, ICTs, coupled with the digitization of information, has enabled the modularization of business processes based on resources, technical infrastructure,

skilled individuals, other business needs and cost efficiency. Workflows, job processes and entire job functions/departments are no longer geographically or temporally bound to the rest of the manufacturing, distribution or service delivery process. They can be sourced globally. This global sourcing enables a follow-the-sun service and support model, that can provide 7x24x365 global support and service to customers wherever they are located or are traveling to. This model may also cut service/outage times for support services and, when operating correctly can assure that the person with the greatest knowledge of the problem and solution is the one dealing with the problem. The ability to hand off a problem when the sun sets in one location to a team that is just starting the day creates an extended work day so that work can progress on an issue on a continuous rather than the more traditional 8/10 hour work-day cycle basis.

Today's business is thus more global and also more complex. Transactions are more likely between multiple parties and across multiple jurisdictions. Transactions may thus be a confluence of information exchanges within a company's various subsidiaries and across any number of suppliers and other businesses. These information chains can include upstream suppliers, downstream distributors, payment processors, banks, fulfillment service providers including shippers and carriers, and customer service providers. These chains can represent parts of a company or various associations of companies that are related by contract and previous relationships or joined together for the specific transaction. The Internet coupled with digitization of information has facilitated these more global markets and created the ability for greater interaction among government departments, between the government and industry, and governments and citizens.

These digitized information flows have increased market access and competitiveness by creating greater efficiency, 24 hour 7 day a week service, and global scope of sales and service. The global distribution of business processes has, by definition, led to substantial efficiencies and potential improved service, but also increased the complexity of some business transactions that are subject to multiple, sometimes contradictory, legal frameworks. This complexity is greatest where there is the least transparency or predictability in the legal and regulatory framework. Because ICTs function in an environment dependent on factors of law, culture, infrastructure, skills and resources, the predictability and flexibility of these factors plays an increasingly important role in determining both the success and value generated by ICTs.

ICT-enabled Growth

An economy where information is readily available is one that is better positioned to be competitive. There are issues of access to technology, investment, skilled labor and infrastructure, physical, technical, and legal. There needs to be a recognition that economies will have to gauge their preparedness across all of those factors and develop plans to take actions appropriate to where they are in terms of technical infrastructure, skills development, resources and regulatory framework development. These development plans must of course be appropriate to the legal and cultural basis of the country, but should also take into account ways of regional cooperation to facilitate regional trade and information flows.

Today, economies compete for business (creation of local industries, employment and investment) in order to foster economic growth and help drive social benefit. These benefits result directly from increased local employment, skills development and

investment as well as tax revenues and other collateral spending in the economy. Over time, programs of local development can also result in the development of local support industries, and with the proper support, higher-level industries. For these possibilities to become a reality, however, an economy must provide the proper environment that can promote and capitalize on beneficial change and growth.

The Five “I”s

The proper environment for growth may be dependent on many factors. These may include:

- A liberalized trade regime including market access for ICT goods and services, and a non-discriminating, predictable, and transparent regulatory regime;
- A balanced and credible regime for the protection of intellectual property rights;
- Open and competitive government procurement policies;
- A favorable climate for investment
- An educated and technology-savvy workforce
- A developed transport and logistical infrastructure
- The availability of technical infrastructure including high-bandwidth and technologies to support logistics, trade facilitation, and supply chain security;
- A balanced, flexible, and transparent approach to privacy, security, and content;
- An environment that encourages data accessibility and interoperability; and
- A regulatory environment that promotes voluntary and open standards and promotes private sector consultation.

The list of detailed requirements would continue beyond the ones set forth above, but it provides an idea of the types of issues that are the determining criteria. These concepts are more accessible when grouped together and can be referred to as the Five “I”s:

Infrastructure: *The need for an appropriate legal/regulatory, technical and physical/logistics infrastructure.*

Investment: The ability to promote and support a range of investment opportunities from Foreign Direct Investment to microfinancing.

Innovation; *The ability to foster and support innovation, including the ability to protect innovation.*

Intellectual Capital: The ability to foster the appropriate skills and training from technological to linguistic to entrepreneurship.

Information Flows: The ability to use, transfer and process information, which is the currency of the digital economy.

The Five “I”s present the environmental factors across which economies may compete for development, investment and knowledge transfer. There are a variety of levels across the “I”s where economies may find themselves and each must determine how best to optimize their environment. In some cases, an economy may be best positioned right now to attract call centers based on language skills and technical infrastructure. Others may be able to compete on professional skills, whether technical, legal, medical or accountancy (to name some of the popular ones). In other cases the economy may already have an emerging or competitive industry and it is looking to grow that industry in broader markets. Whatever the positioning and environment of the local market from least- to less- to most- developed economy, there is relevance in the five “I”s and their

use as \guideposts for promoting growth and enhancing social benefit in both the near and long term.

An increasing number of economies have or are in the process of developing domestic frameworks to compete for this investment, foster innovation, develop intellectual capital, deploy infrastructure and access information. The most successful economies are those that have understood how best to tap the potential of converging processes, workflows, organizational models and ICTs. Importantly, these economies have also recognized the need to develop and maintain a policy and regulatory environment that enables access to the five “i”s and keeps pace with technological change. The APEC region is well positioned to capture the potential of the five “i”s, and thus enhance growth and competitiveness on a regional and national level. But it will require policy and regulatory foresight and flexibility, a willingness to work collectively on a plan of action and a commitment to develop public-private sector consultative partnerships to determine and help implement measures that would provide the optimal policy and regulatory environment.

When considering environmental factors, economies and businesses should examine both the direct and obvious impacts of ICT as well as some of the less direct and less obvious aspects of the use of technology. From a regulatory perspective, the impact of policy and regulation on technology needs to be reviewed in a comprehensive and consultative manner to avoid the potential of unintended consequences. Even well meaning legislation can result in unintended consequences or result in an unintended barrier. This may be especially so in the case of policies and regulations developed or adopted before ICT technologies were in broad use. A prime example of such vestigial results is the myriad reference to paper, ink and handwriting in policies and regulations that may impact the ability of parties to use electronic means of communication. This has been a frequent issue when considering the use of digital or electronic signatures. The following examples and concepts may help flesh out some of these other less obvious consideration factors and applications of technology.

The Less Obvious Information Revolution:

Information is an essential element to the success of today’s global economy. Information is essential to offline as well as online transactions. Information in the form of transaction records, payments, contracts and customs forms has been the basis of international trade. More and more of today’s trade and transactions both within and across borders involve electronic flows of information, in many cases in ways that are not obvious to many of the transaction or interaction participants.

At the outset the use of computing technology was more apparent and the causal interaction between technology and service was more readily discernable by the end user. Today technology and the Internet are part of the very fabric of our social and economic life and interchange.

Planes are heavily technology oriented and passengers are used to hearing that flights are delayed due to malfunction or issues with the technology in traffic control. But how many passengers consider that a plane can’t take off until computer in a remote location provides the flight crew with a calculation of plane weight (passengers, baggage, cargo, fuel), flight conditions and other factors to suggest what speed is needed for take off, what speed is optimal and even the amount of fuel that should be loaded onto the plane.

Keeping the food supply safe would seem to have some technical components; some kind of technology to analyze or screen food would be natural assumption for food safety inspectors. Labs would also be obvious users of technology, for instance to isolate a suspected bacterial infection through spectral analysis. Recent cases of Mad Cow infections help illustrate the less visible role of technology. The suspected cows were identified by Radio Frequency Identification tags, which enabled their breeding and herd affiliations to be searched against a database that identified their origin and potential sources of infection and potential other cows/calves to be tested. Records were also searched electronically to discover who supplied the feed for the herds. Feedlots were consulted to see what combinations of ingredients were in the feed at that those times. Other food safety cases have involved e-coli outbreaks where National centers were able to identify outbreaks by collating disparate state cases from nearby counties. Once identified, patient interviews helped investigators discover the common food groups and further searches allowed the tainted food to be traced back the retailer, supplier, distributor, packager, farm/ranch to trace where the problem occurred. These would all be significant if not insurmountable challenges in the era of paper records. Today the answers are a few keystrokes away, but that simplicity of the access masks the complexity of the system and the technology and the number of players that stand behind it.

In a more day-to-day, non health related application, many people are aware of the technology they are using (the browser, the website...) purchasing an item on the Internet but how many are aware of the back end technology or complex supply, distribution and payment relationships that stand behind the portal or online storefront that is the shopping interface? Today those transactions often represent a global supply and distribution chain, RFID enabled logistics for tracking and inventory management, shippers who are also warehouses, logistics partners service delivery agents, aggregators, banking institutions, clearing houses and other payment processors. Again all of these functions are enabled by ICTs.

ICT and Transformation: concepts and applications

Supply chain management and ICT

Supply chain concepts that have been the basis of trade and commerce for many years have been revolutionized by ICT. ICT has enabled players in the supply chain to play different and expanded roles. In the recent past, concepts such as just-in-time inventory have created the need for faster and more efficient supply chains. Recognition that inventory was tied up capital has lead to thinner on site inventory and the corollary need for supply chains that can address need issues more quickly and efficiently. These concepts have also required better market modeling to determine consumption habits and time frames. Requirements information must be shared more effectively across the supply chain in order to develop such planning and market models.

By broadening markets, the Internet has in many cases increased competition and created pricing pressure to cut costs. Some savings were also generated through more effective use of inventory, supply chain and logistics. Technological improvements in the supply chain have included the introduction of bar code labeling and more recently the growing adoption of RFID. Both of these ICT technologies have in common the facilitation of product identification and tracking. RFID brings a new dimension because it can collect more granular information, does not need direct line of sight for product

identification and with tags that can broadcast location can facilitate finding products within reasonably large warehouses. Even higher value tags can provide evidence of tampering or temperature fluctuation and even be associated with geographical positioning systems for location tracking along a delivery route. But the greatest innovation of these tracking technologies is the creation of a flow-through information path that allows the greater automation of supply chain and logistics systems.

These systems are playing ever more important roles as they have gone from merely tracking and counting systems to forecasting and planning systems, providing better, more detailed, real-time information across the supply chain. The information can be controlled as needed to protect sensitive information or to assure that competitive entities within a supply chain do not get confidential information concerning each other's processes. They are improving flows by increasing the lead-time, which enables earlier receipt of information that is useful in planning and optimization to alleviate bottlenecks, delays and shortages. This enables those players to process the information more quickly and with higher levels of confidence. In the case of customs check points, the ability of these systems to provide better information earlier, with higher assurance of integrity allows faster processing of product and, where security technologies are properly deployed, with fewer manual checks. The forecasting nature of these systems also allows better resource planning across the chain, including customs.

Increasingly, any country, business or agency that is not "enabled" to participate electronically in such systems will be viewed as a bottleneck and as such may lose competitive positioning to other more technologically enabled players. This of course is only one of a number of factors in the weighing, location and desirability of the port/location, access to other transportation resources, populations served, cost of using facilities vs. alternatives will all be factors in the decision-making process. Less developed players in this space should also not confuse the concept of participating in the system with the concept of running the system. Participating in the system involves the ability to receive and process electronic information. In many cases, assistance in deploying the systems and training the personnel is available from international sources, for example in the form of grants, or because the benefits outweigh the costs to trading communities. What international assistance cannot provide is the desire to accept change.

A corollary benefit of these systems is the increased transparency provided by such systems. There is greater ability to track products and payments and find aberrant behavior in audit trails. Such systems can help provide significant savings from increased efficiency, lowered operating costs and reduced shrinkage. The other advantage from such ICT-enabled systems is the transformation of information from data points to a 360 degree view of the supply chain; transformation from data to actionable information. It enables scenario planning and testing as well as a better way to review and analyze the business processes supported by the system.

Government Administration

Governments have a significant role to play in the use and deployment of ICT to enhance growth. Governments are important users in two major ways. Governments are significant purchasers of ICT to meet their fundamental operational requirements that are predicated on information processing and exchange. Governments are also important users of technology in moving from paper-based to e-government services.

These e-government services include both citizen-services and well as process improvements in government services. Many of the benefit and lessons of business use of ICT are applicable to government use. Benefits come from process optimization, not just removal of paper from the process. One time data entry, self-service applications, 24x7 online access, ability to cross link and provide supplemental information, electronic communications across devices of multiple form factors, using ICT to turn data into actionable information

Trade facilitation

This section focuses on the role of ICT in trade facilitation. When addressing supply chain issues, we highlighted the importance of the ability of government agencies involved in trade to participate in the electronic flow of documents. At a minimum this includes the ability to receive and use electronic communications. As one explores where even greater competitive advantage may be realized, ICT use and digitization of trade documentation becomes more pronounced. These advantages may come from: participating in the drafting and use of multimodal transport and clearance documents; being able to use RFID scanners to read cargo shipments inside sealed containers, being able to accept signed documents; and accessing repositories of international information.

The relative complete advantages that can be captured from effective deployment of ICT have become trade-influencing factors. The ability to receive, use and benefit from information flows can thus be a competitive advantage that economies may use to attract trade. These trade issues are often translated into local economies as issues related to commitments to trade liberalization and domestic legal and regulatory frameworks. Foreign investment and domestic market development are often predicated on broad and effective service commitments coupled with facilitating and predictable legal frameworks. These issues are dealt with more comprehensively in subsequent sections.

The use of information and communication technology for automation of customs services and data sharing helps reinforce the member economies' customs legal reforms and simplification of customs procedures, and improve transparency and efficiency of customs services. ICT also improves governance and reduces corruption by reducing direct interfaces between customs officers and traders in customs clearance. Adequate ICT infrastructure is essential for introducing modern customs practices such as risk management, post-entry audit, and single window. However, the realization of a fully integrated economic community requires implementation of both liberalization and cooperation measures.

The common factor among all of these issues is to provide better and more actionable information earlier in the process in order to facilitate and streamline customs clearance and processing. The ability to have products clear customs efficiently and effectively is important to investment and facilitates both import and export. The information can be controlled as needed to protect sensitive information or to assure that competitive entities within a supply chain do not get confidential information concerning each other processes. They are improving flows by increasing the lead-time within which critical to alleviating bottlenecks (places where constrained resources may interrupt flows) in the process receive information earlier and in electronic form. This enables those players to

process the information more quickly and with higher levels of confidence. In the case of customs check points, the ability of these systems to provide better information earlier, with higher assurance of integrity allows faster processing of product and, where security technologies are properly deployed, with fewer manual checks. The forecasting nature of these systems also allows better resource planning across the chain, including customs.

Trade liberalization has often focused on the removal of non-tariff barriers as an impediment to trade. Economies must likewise consider that an inability to access and benefit from information flows may also be an impediment to trade.

The role of ICT in fostering investment and the development of local markets is not limited to government functions at borders. Infrastructure, human capital development, general IT literacy in the population and workforce and predictable and transparent legal frameworks are all essential elements in facilitating trade.

Networks, Markets and Sourcing

The factors of infrastructure, human capital development and predictable and transparent frameworks are essential elements to the development of markets. Improved network capacity and connectivity, coupled with digitized information and modularized business process has created an enabling environment for global sourcing. Global sourcing refers to the ability to locate business function based on business needs and available resources. These sourcing decisions are predicated on a variety of factors including: trained workforce, broadband network infrastructure access, legal and regulatory frameworks, ability to make appropriate technology choices, effective protection of investment and IP, and availability of cost-effectiveness labor and services.

Global distribution of functions across these sourcing models also enable companies to develop effective “follow-the-sun” service models. These models are based on the developing requirements of global customers and global customer bases. In these situations services and support can be provided in a more planned manner allowing more efficient and maximized use of resources across the globe. Service and support locations can thus be distributed across geographies to assure that customer issues and corporate development priorities can be addressed in an organized fashion on a continuing 24 hour basis by organizing work across the various geographies. In this way service, support and corporate development are allocated across the regions during the normal working days of those geographies to best serve business needs and customer requirements. Government may be less able to adopt such models, but may benefit from these improved service and cost efficiencies through appropriate arrangements with vendors.

Legal and regulatory frameworks are also important to such sourcing and local market development. As sourcing becomes more varied, differing aspects of business process may be relocated to capitalize on the availability and cost-effective use of resources and infrastructure. These decisions are made in the context of a risk as well as cost benefit analysis. Jurisdictions that do not have: transparent and predictable legal frameworks, limit technology choices by users, and fail to appropriately protect investment and intellectual capital may not be attractive locations for sourcing. Sourcing brings benefits to the local economy through providing employment, workforce experience and exposure to technology and advanced business process. These short-term benefits

form the basis of longer-term benefits including enhanced workforce skills, local entrepreneurship and domestic industries and consumption markets.

Protection of Intellectual Property Rights

Innovation is an essential driver of growth and the digital economy. New products, business models and delivery systems are the engine of growth that relies on innovation. While the information economy has increased the need for ICT and technical infrastructure, it has also created the ability to enter and expand markets at lower cost through the Internet. Service, price and innovation have become the major differentiators on the Internet. The ability to foster and support innovation is thus a key element to participating in the digital economy.

Innovation in market-based environments, as opposed to academia, is not undertaken only to advance the state of the art in the particular topic, but also to provide economic and competitive advantage. An environment that fosters innovation must recognize and provide for the need to reward and incentivize innovation through the appropriate respect for and enforcement of intellectual property rights. Intellectual property should not be considered a constraining concept or a benefit to only developed economies. This concept extends to various development models including both proprietary and open source. While proprietary models of intellectual property licensing are well understood, it is important to recognize that open source is a licensing model that exists within the framework of intellectual property regulation and is not at odds with intellectual property rights. Developing economies can help promote innovation in nascent local industries by providing appropriate protection to allow innovators to benefit from their innovation. Lastly, innovation and intellectual property are also consistent with, and can benefit from open standards. In some cases local industries may not yet be in a position to develop complex technical systems, but may be able to immediately add value to those systems by developing complementary applications. Open standards allow for easy access to program interfaces and are also created in processes that enable broad participation in the development of the standard. These qualities of open standards enhance access to technology that can be the basis for developing local industries, and new innovation driven intellectual property.

The protection of property, including intellectual property, is also often a requirement for investment decisions in all sectors and a key element of the business climate that determines the location of investment. As economies develop their own intellectual property, including research capabilities and the potential for commercialization of research outputs, IPR protection domestically and abroad becomes increasingly important.

End Goals

To take full advantage of both the direct and indirect benefits provided by ICT, Governments should adopt a development strategy that integrates ICT into the overall plan. Key elements that promote competitiveness in the sector include a liberal trade and investment regime, an ICT friendly legal and regulatory environment, and a national strategy that recognizes how the intelligent integration of ICT can be an enabler for further economic development. Objectives or guiding principles for these programs should include:


Economic Growth – Economic growth is the overarching goal of the creation of policy aimed at enabling access to the 5 “i”s. Policy architects must question the impact of any regulation on facilitating economic growth.

Technology – ICTs have been identified as a key element in enabling growth, by allowing access to the global economy, facilitating communications, cutting costs and creating greater efficiencies for governments. Policy architects and implementers should evaluate both the impact of any regulation on the use of technology across all sectors of the economy as well as the utilization of technology to improve implementation of policy objectives. Stakeholder consultation is also important to understand the complexity of the scope and possibility of unintended consequences.


Trust – Regulation is only effective when it is developed and applied in a manner that is credible to all stakeholders involved. Local stakeholders, global companies, foreign investors, consumers and citizens may all be stakeholders who either must comply with regulation or rely on its credible enforcement. Policy architects should undertake stakeholder consultation to foster transparency in the promulgation of the regulation and also develop credible oversight mechanisms to assure accountability in its proper and non-discriminatory implementation and enforcement.

Predictability – Economic growth can only be nurtured in an investment environment marked by certainty and stability. Failure to create a predictable business environment for investors will ultimately limit access to the 5 “i”s. Policy architects must ensure that regulation is drafted with clarity, and that consideration be given to potential impacts on other legislation or the creation of possible unintended consequences.

Feasibility – If regulation is unenforceable due to a lack of resources, or because it requires a disproportionate responsibility from stakeholders, it will not be effective, and will not create a positive business environment that enables access to the 5 “i”s. It is important that policy architects ensure that regulation is narrowly tailored to address the problem it seeks to solve, that enforcement mechanisms are available, and that there is some level of buy-in from stakeholders to implement regulatory changes.



ICT- enabled growth in the information society



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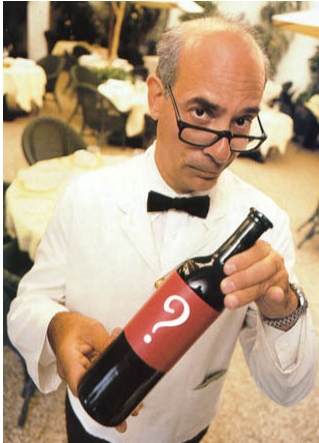
The impacts of digitization

- The Information Economy has enabled business to distribute functions across geographies (payment processing, credit verification, customer service, support, data centers, follow-the-sun models)
- Supply and distribution chains are becoming more globally integrated
- Businesses-to-business and business-to-consumer and consumer-to-consumer interactions are becoming more global
- New services are driving even more increased information flows and customers may enter the system across multiple media from many jurisdictions

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The Less Obvious Net

The Server...



Behind the Screen

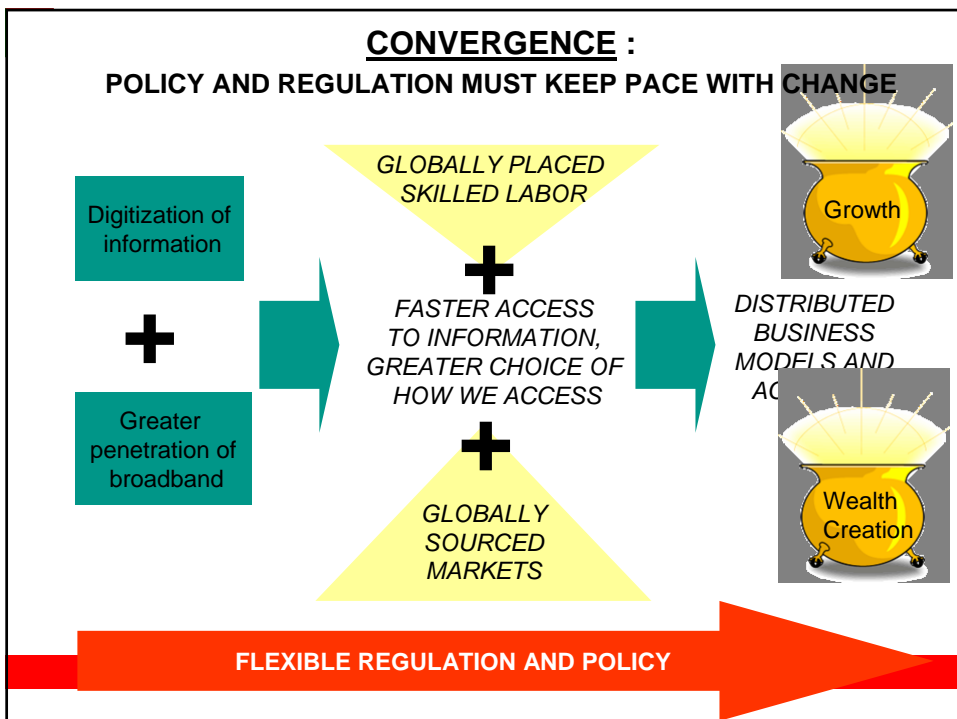
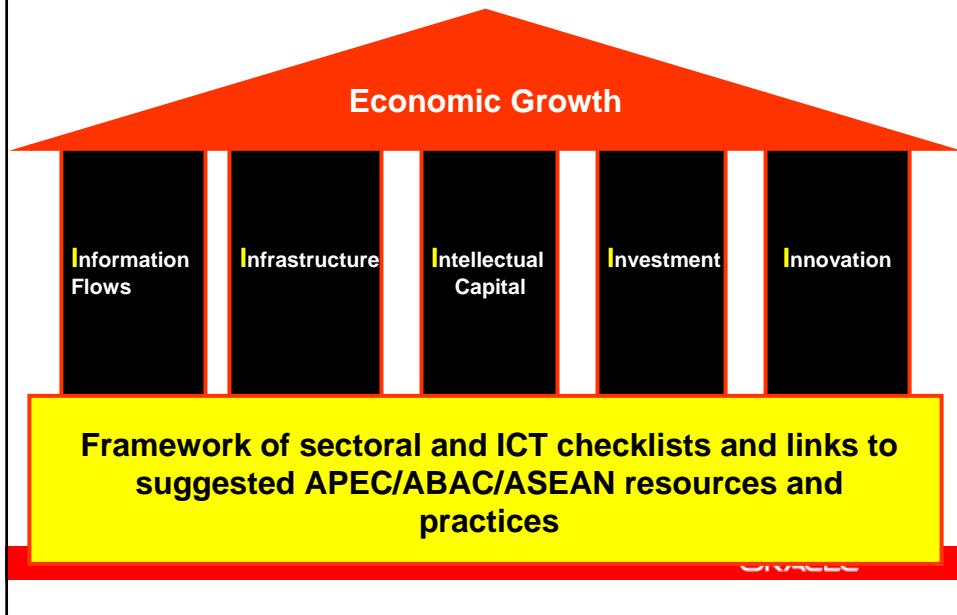
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Developing Policies and Regulation for the Info Society

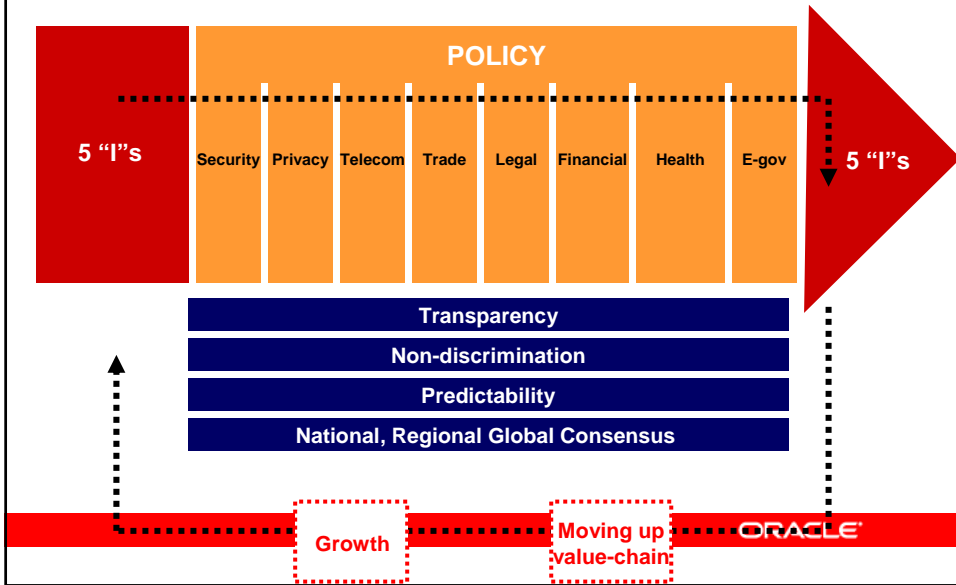
- Economies Compete for Business as part of growth of Digital Economy
- The 5“l”s are the basis of competition
- Developing tools to help regulators and policymakers – via case studies
 - Checklists
 - Resources
- ROI: Help avoid unintended consequences, non tariff trade barriers and vestigial legislation

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**HARNESSING THE POWER OF THE FIVE “i”s:
THE KEY TO SUSTAINABLE ECONOMIC GROWTH**

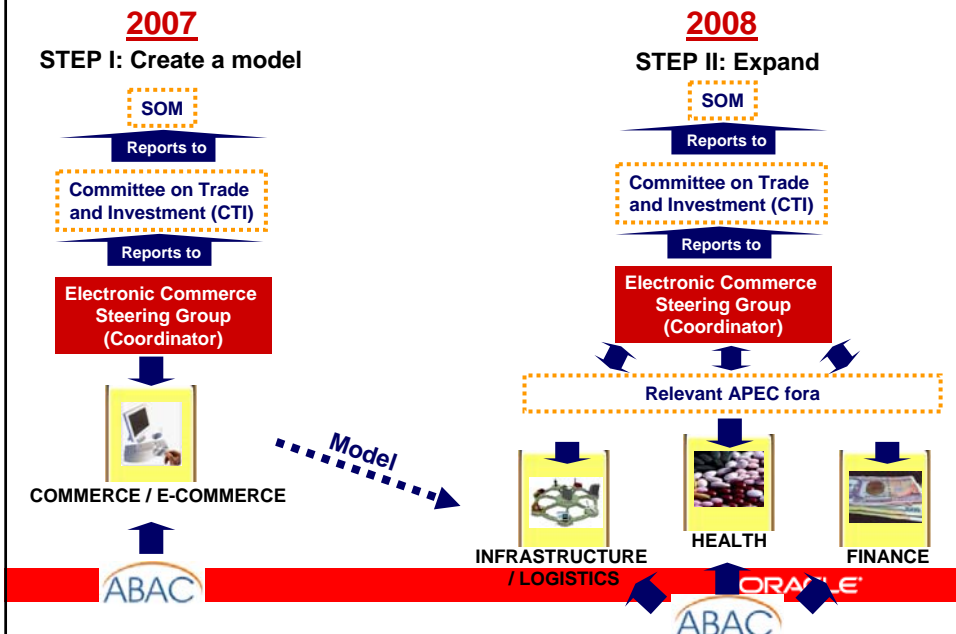


Carefully created, flexible policy attracts and facilitates access to the 5 "I"s

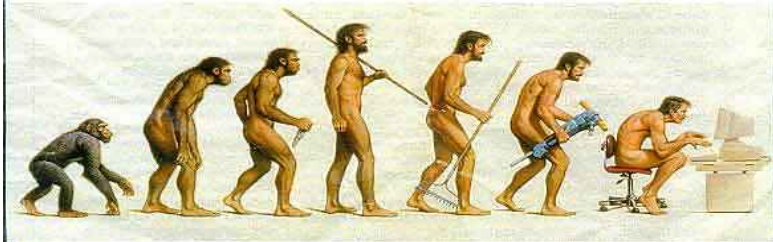


THE ICT-ENABLED GROWTH INITIATIVE:

A PARTNERSHIP BETWEEN GOVERNMENTS AND THE PRIVATE SECTOR



Transformation Examples



- **IP and Open Standards pathways to local growth**
- **Supply chain**
- **Customs**
- **E-government**

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5 key considerations for policy-makers:

- **Economic Growth**
 - The role of policy and regulation in creating the proper environment
- **Technology**
 - Technology as a facilitator and enabler
- **Trust**
 - The need for stakeholder consultation and acceptance
- **Predictability**
 - The need for certainty
- **Feasibility**
 - The need for enforceable and credible solutions

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