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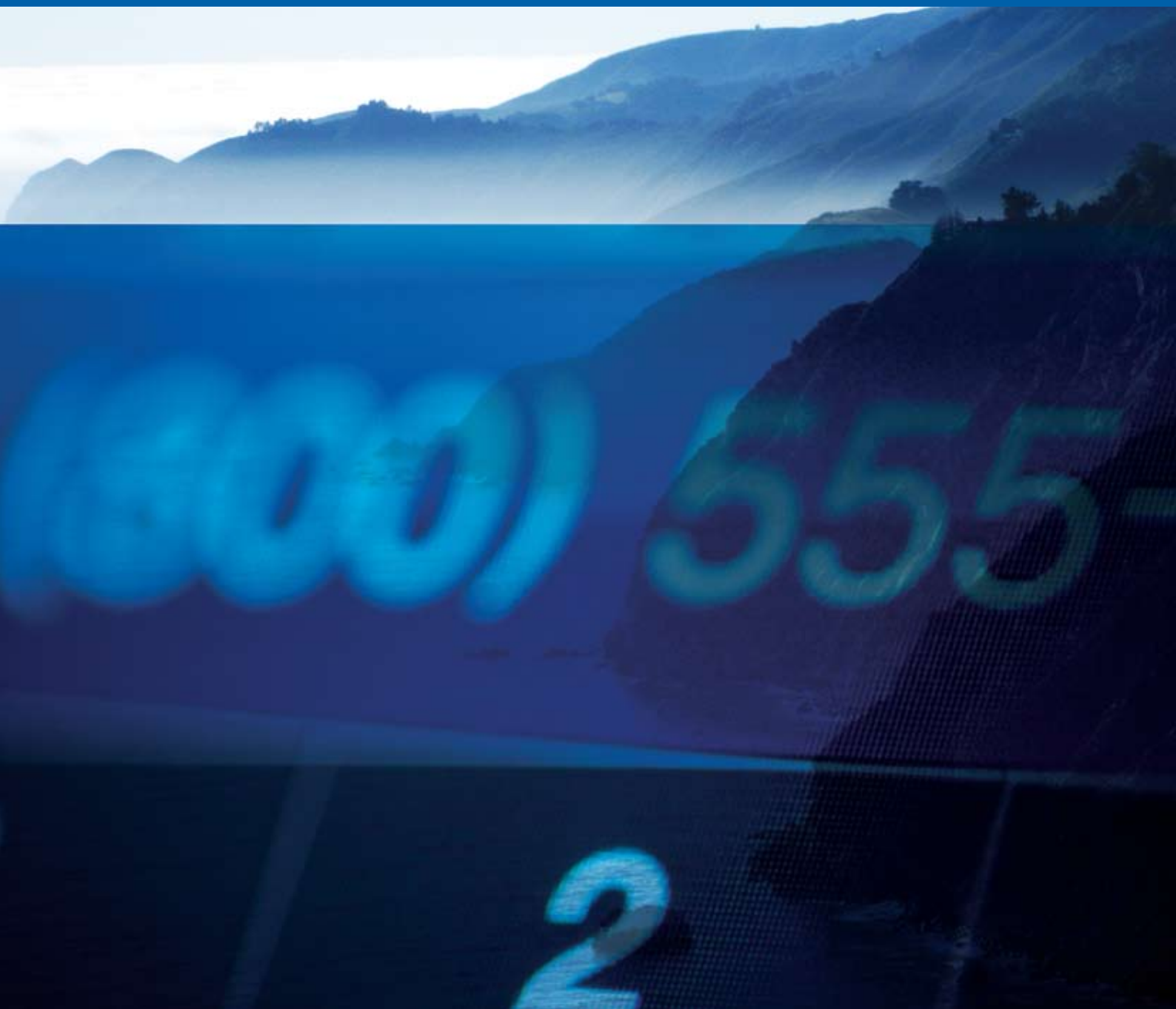
ICT for Economic Growth: *A Dynamic Ecosystem Driving The Global Recovery*



"With coordinated, conscientious leadership, new technologies will not only continue to fuel growth but if harnessed, such advancements will also enable a digital revolution that can uplift parts of the world hitherto not reached by the agricultural and industrial revolutions. Achieving this kind of inclusive growth requires new mindsets."

2009 World Economic Forum Annual Meeting Report

Introduction: ICT as a transformative economic catalyst

The global economy is experiencing one of its most complex and comprehensive challenges in history. The recent credit crisis has led to record unemployment and economic hardship in both developed and emerging countries. Focusing on the transformational opportunities posed by the global economic turmoil, leaders from industry, government and civil society attending the 2009 World Economic Forum Annual Meeting in Davos, Switzerland agreed that information and communications technologies (ICT) can play a vital role in the pathway to an economic recovery. A digital revolution can form the foundation of a sustainable global economy.

Leading academics, global organizations and industry analysts agree that there is a direct correlation between the use of ICT and positive macroeconomic growth. This evolving global communications fabric is intelligent, adaptive and highly innovative and its impact can be felt at both the micro and macro economic levels. ICT represents our collective nervous system—a platform for helping to solve some of our greatest economic, social and environmental challenges.

A fluid and ever changing *ecosystem*, ICT touches nearly every industry sector with innovative, personalized and efficient solutions. Along with the growing impact of individuals, the ecosystem includes fixed and mobile network operators, Internet service providers, chipset design firms, device manufacturers, application developers, content owners and infrastructure providers.

Without question, there are challenges ahead in the evolution of the ICT ecosystem. As business paradigms change, the issues of privacy, security and quality of service are becoming increasingly important. Continued commitments to open standards and interoperability are essential for "bottom up" innovation so entrepreneurs can offer new competitive services and applications.

Yet in spite of these challenges, ICT's ability to deliver an economic growth dividend is motivating. For every dollar invested in broadband (fixed and wireless), the U.S. economy is expected to see a tenfold return[1]. Faster broadband deployment in Europe could create one million jobs and growth of up to €850 billion through 2015[2]. Raising broadband penetration in emerging markets to levels currently in Western Europe could add $300 to $420 billion in GDP and create 10 to14 million new jobs[3].

Yet to meet this potential, real-world economics must be applied to the ICT ecosystem. ICT infrastructure projects are some of the most capital intensive in the world and require a

Key pillars of the ICT ecosystem

The ICT ecosystem is a complex and interdependent series of technical, social and business relationships. The system functions when multiple underlying factors align to reinforce one another[12].

1. Infrastructure investment.
The need for sustained investment in the ICT infrastructure is vital for the health of the overall ecosystem. While the bulk of the investment will have to come from private capital, public funding can play a supplementary role when the economics do not allow for private investment in rural regions.

2. Applications and content.
IP networks are best utilized when the ICT sector consists of fluid structures with clusters of localized content and applications and has access to global content and applications. Despite the economic downturn, many individuals view their broadband connections as essential for their personal and professional lives. Many individuals particularly value access to lawful content and services related to government, education, healthcare or sources of income.

3. Markets and competition.
Monopoly environments are typically less innovative with lower levels of investment than markets with robust competition. Best-practice countries promote diversity in platform technologies and services that promote widespread usage, and ensure affordability.

4. Policies and regulations.
Regulations should be stable and predictable, and promote competition and investment. Excessive regulation can have the unintended effect of discouraging innovation around the development and deployment of next-generation networks and applications. Particular areas for innovative policy frameworks include the areas of security, privacy and quality of service.

5. Government budgets.
Strategic use of the government procurement can accelerate the commercial viability of ICT services, promote entrepreneurship in the sector and create an opportunity for promising business models—particularly those embracing the principle of open trade—to flourish. Additionally, governments should focus on ensuring renewed research and development amongst private industry, academia and civil society organizations.

6. Skills and education for IT.
Best-practice countries have a solid base of ICT technical skills and a good level of broader science and math education. Interventions to improve ICT-relevant skills include focused training, certification and pipelines to university graduates in engineering and IT fields.

stable regulatory environment to ensure capital flows. Absent this regulatory stability, investment risk rises, the price of capital increases and investment levels decline.

Macroeconomic Impact: ICT investment as an enabler of global recovery and trade

Although the global economic downturn has had an impact on business growth and individual consumption, it has also sparked opportunities. Several recent studies have examined the effects of ICT investment on economic performance in varying regions throughout the world. One recent study, "Socio-economic Impact of Internet in Emerging and Developing Economies" estimates that when Internet penetration rises by 10 percent in emerging economies, it correlates with an incremental GDP increase of one to two percent[4]. Similarly, another study found that the comparative GDP growth rate of a developing country can be boosted by 0.59 percent per annum for every 10 mobile telephones added per 100 inhabitants[5]. "ICT is a harbinger of productivity and growth in developing nations," notes Leonard Waverman, Dean of the Haskayne School of Business at the University of Calgary. "ICT must be used to accelerate the global recovery. It's the key infrastructure for the 21st century."

For developed nations, the impact of fixed-line broadband penetration is equally important to economic growth. A recent study, "Economic Impacts of Broadband, Information and Communications for Development 2009," states that an increase of broadband access in developed countries of 10 subscribers per 100 inhabitants corresponds to a 1.2 percent increase in per capita GDP growth[6]. Additionally, multiple studies also point out that rankings in national competitiveness and network readiness are directly correlated. For example, future broadband investments could generate a total of 968,000 new jobs and result in more than 170 billion Euros of additional GDP (0.60 % GDP growth) by 2020 in Germany alone[7]. These significant economic returns on broadband investment amplify the need to move ahead with ambitious broadband plans through growth and innovation-geared political and regulatory frameworks which foster large-scale private investment. By stimulating both upstream capacities (R&D, product design, application development) as well as downstream services (logistics, transportation, etc), ICT acts as a multiplier for economic growth[8]. This can be seen most clearly in the area of trade. By making supply chains more efficient, collaboration richer, financial transactions faster, pricing more dynamic and processes transparent, ICT can accelerate the flow of goods and services across national borders. Underpinned by effective competition, ICT stimulates and improves trade by connecting people and places previously not connected and by bringing velocity to the progress of new ideas.

Likewise trade protectionism can diminish the impact of ICT. The recently published 2009 Global Enabling Trade Report states that in the current economic situation protectionist measures can constrain growth with the cumulative impact causing damage to all nations[9]. The report's co-author, Robert Lawrence, Professor of International Trade and Investment at Harvard University, notes, "The current challenge is to ensure that countries do not pull each other down by restraining trade. History shows that while inward-looking policies may lead to temporary growth, they are not compatible with sustained long-run prosperity."

Finally, just as important as promoting trade, it is crucial that policy makers promote investment in the ICT sector. One way to foster investment is to create an environment with investment-friendly policy frameworks, regulatory certainty and fair competition.

Collaborative Business Models: Market-based relationships that generate innovation, investment, and adoption

The ICT ecosystem is a rare combination of complex and dynamic relationships, where competitors can collaborate to push the envelope of innovation. Unlike traditional industries with well defined structures and competitors, the ICT sector simply doesn't behave in that manner. The boundaries are fluid and the equilibrium constantly changes. Stakeholders grow, adapt, specialize and innovate constantly.

One of the best examples for how the new emerging structure of the ICT industry is evolving can be seen with the rise of social networking and the Web 2.0 environment. Web 2.0 solutions empower individuals to utilize the Internet for global collaboration, innovation and information sharing. Not only has it empowered and changed the lives of individuals, the Web 2.0 world has spawned new business models and disrupted the way goods are sold, content is provided, and value is created.

For the promise of the Web 2.0 collaborative applications to emerge, it is important to recognize that the underlying networking infrastructure needs to adapt in a dynamic fashion. For services to be delivered in a secure, real-time and personalized manner, network bandwidth needs to scale cost effectively and have the intelligence to understand the performance and security requirements of the applications that ride on top of it as well as the devices that connect to it.

Multiplied Benefits: ICT as a high-efficiency enabler for essential sectors

As the global economy recovers, the ICT sector will continue to unlock new efficiencies and capabilities across a range of key industry sectors. Healthcare, education, finance, and e-governance are just some of the vertical industry sectors where the impact of ICT is felt most significantly.

Eco-sustainability:
The efficiencies of ICT can serve to help meet the challenge of low-carbon global economic growth. A recent study states that the ICT industry could deliver approximately 7.8 GtCO2e of emissions savings in 2020, significantly below recommended standards and with cost savings of approximately €600 billion[13].

Education:
ICT has enabled tremendous growth in the online-education sector and thousands of libraries across the globe can now be accessed online. The New Zealand Digital Library Project has developed open-source, multilingual software to help universities, libraries, and public service institutions throughout the world build digital libraries[14].

E-government:
As more government services become available online for businesses and citizens, these public agencies promote a virtuous circle of adoption and investment and become conduits of technology, users of ICT infrastructure and promoters of ICT services. Further, as government usage stimulates demand for ICT solutions, it helps promote investment in the supply of additional infrastructure and services.

Finance:
The adoption of mobile money services is quickly emerging as a fundamental tool for financial inclusion. In terms of the addressable opportunity, approximately 1 billion people currently have mobile phones but no access to banking services[15].

Healthcare:
E-health has evolved as an innovative solution for transforming the delivery and cost structure of healthcare. Local officials in emerging markets, such as Rwanda, now use mobile phones to input health data that provides real-time information on potential disease outbreaks and medicine shortages[16]. Since 2005, a small village clinic in Peru has served more than 55,000 patients and conducted more than 600 surgeries via networked communications technologies[17].

With this flexible, interoperable and highly reliable underlying networking environment, an array of business models can emerge. One example of a new business model can be found with smart electric grids. Comprised of wireless and wireline technologies, complex and cooperative relationships are emerging among energy meter developers, network service providers, software developers and energy companies. Each of these ecosystem members work in an open and innovative manner that delivers electricity from suppliers to consumers. Digital technology is leveraged to measure and control use, save energy, reduce cost and increase reliability.

Cloud computing represents yet another example of multiple players collaborating with disruptive forces to create new ways of delivering services. Companies traditionally seen to operate in either software or network sectors are both competing with one another and working in tandem to provide cost-effective, scalable solutions that meet business and consumer needs. Not long ago, these companies focused solely on their own applications and distribution. Now, their collaborative efforts create dynamic relationships within the ecosystem to benefit all participants.

To ensure that the potential of all these new opportunities is realized, policy decision makers play an essential role. First, they can support the underlying conditions for investment and interoperability. Second, they can ensure fair, competitive markets with adequate protections to prevent anti-competitive conduct. Finally, they can encourage the incorporation of ICT investments into other physical infrastructures (smart roads, electricity grids, alternative transportation, schools and natural disaster-prevention programs) in a way that fosters fair and open markets with incentives for investment, open and transparent procedures, collaboration and innovation.

New Web 2.0 collaborative business models

New Web 2.0 collaborative business models are often community based, uniting people with common interests and purpose. Key examples include:

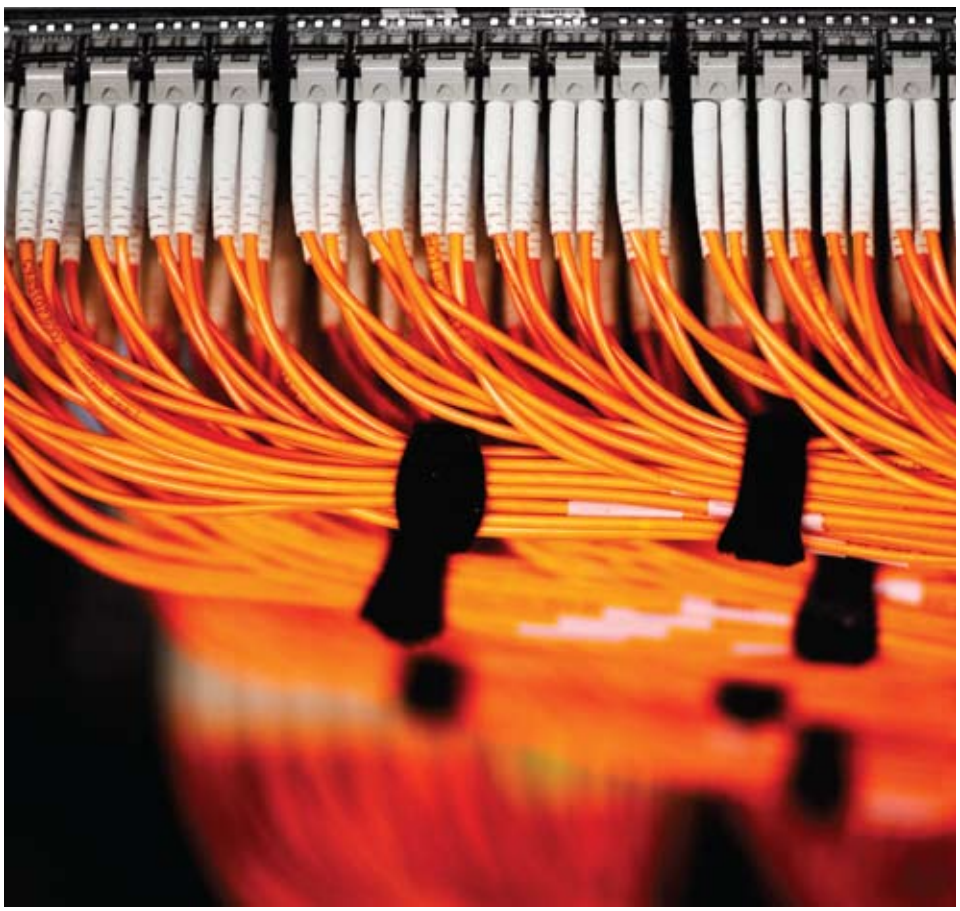
- *Software development where a global community of programmers share code openly and profit from related services, such as integration, customized applications and product support.*
- *"Open Innovation" in which companies tap global communities of innovators to develop new products, solve problems, or improve existing products for a fee, through profit sharing or prizes. This has significantly broadened the sources of innovation across the planet and creates opportunities for more people to have an impact on the evolution of the Internet, products and services.*
- *Social-networking services in which organizations connect people with common interests for advertising or subscription revenue. The impact of this is significant in creating momentum for change, the ability to mobilize people and transparency of information.*
- *Open framework development brings people together to create industry frameworks that encourage interoperable, open-source applications and platforms.This should accelerate the pace of innovation and create more productive ways of addressing key societal challenges[18].*

In particular, key issues for policy makers to consider include:

- **Ubiquitous broadband:** Expanding both the access to and the adoption of the digital ecosystem. This holds tremendous promise for delivering on the transformative potential of the digital economy. It is a critical priority for national economic growth and recovery plans that broadband access be ubiquitous, available and affordable to consumers.

- **Appreciation for the dynamics of the complex ICT ecosystem:** As the growth and adoption of networked ICT services expand, policy makers must appreciate the unique behaviors of complex ecosystems. The behaviors of networked economies are non-linear. They are marked by increased velocity, systemic interdependencies and hyper-personalization. As such, policy adjustments should be made with detailed industry knowledge and care. In the rapidly evolving ecosystem, legacy definitions and rules may either not apply or they may have the unintended consequence of stifling investment and innovation.

- **Innovative political and regulatory frameworks**: In such a dynamic sector environment, it is essential to fully embrace the concept of innovation. Innovation in the sector should not only be rewarded (and incented) as a policy output, but it should be embraced as a way to address key policy issues. Along with the enormous investment challenges, such topics as open trade, effective competition, privacy, security and quality of service will all require innovative approaches and policy frameworks for meeting their unique challenges.



Conclusion: Ensuring that the ICT sector will foster sustained growth and stability

While the global economy experiences a period of extreme difficulty, the ICT sector presents a tremendous opportunity for economic growth. Without a doubt, ICT is a critical foundation upon which the global economic recovery will occur. But to ensure this potential, all parties must uphold their responsibilities to ensure healthy market-based relationships, where parties both compete and cooperate.

Make no mistake, the ICT industry sector is strong and economically healthy. The ICT sector has set aside significant amounts of private capital to invest in next-generation infrastructure and services[10]. This digital infrastructure will not only leverage and enhance the value of other private and public infrastructure investments, it also has the potential during the next five years to directly impact the worldwide creation of 1.2 million new jobs and indirectly 25.3 million new jobs[11].

However, rolling out ubiquitous modern broadband networks requires huge investments. The sheer size makes it obvious that the bulk of the investment will have to be supplied by private capital, with public funds playing a fundamental, but supplementary, role in rural and remote geographic areas where there is no business case for private investments. Therefore, when considering direct funding for service providers, the focus should be on expanding broadband availability in unserved or underserved areas (with limited or no access) in order to maximize the impact and avoid competitive distortions. However, government interventions should largely focus on lowering investment costs through investment-friendly regulatory principles while ensuring fair competition.

As an ecosystem, the ICT sector is an ever-evolving constellation of players who interact to ensure balance, collaboration, interdependency and sustainability. Because the ICT sector thrives on rapid innovation and the introduction of new technologies, it encourages a collaborative spirit for all other sectors with which it interacts. With clear government action at local, national, regional and global levels, ICT can continue as a dynamic driver for sustainable global economic growth.

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