



Executive Summary

Thailand Information and Communication Technology

Policy Framework (2011-2020)

ICT2020

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Ministry of Information and Communication Technology

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I. Preface

The Thailand Information and Communication Technology (ICT) Policy Framework (2001-2010) or IT2010 has guided the development of Thailand's ICT in the first decade of the 21st century until the present. IT2010 flagships, the "5 e's strategy", emphasize the development and application of ICTs in five strategic areas, namely, e-Government, e-Industry, e-Commerce, e-Education and e-Society, aiming to enhance the economy and quality of life of the Thai people and lead Thailand towards a knowledge-based economy and society. The ICT Policy Framework IT2010 set the long-term policy direction at the macro level. The Cabinet then issued a resolution to prepare five-year ICT Master Plans during the time frame of the policy framework, comprising the First and Second Thailand ICT Master Plans, in order to establish concrete short-term measures.

The IT2010 policy framework identified three main goals, as follows:

- Raise Thailand's ranking in the Technology Achievement Index (TAI), moving from its ranking in the group of "dynamic adopters" to the group of countries identified as "potential leaders".
- Develop Thai knowledge workers to account for a total of 30 percent of the workforce by 2010.
- Develop Thai industry towards knowledge-based industry by setting a target for the value of industries which are knowledge-based at 50 percent of GDP.

With a view to ensuring continuity at the policy level, the Ministry of Information and Communication Technology (MICT) has developed the ICT2020 Policy Framework for the next 10 years (2011-2020). In drafting the ICT2020 Policy Framework, the working group has taken as important inputs the previous policy framework and the current status as well as limitation of ICT development of the country. In addition, analysis was conducted on the context and overall

development direction of Thailand, along with various challenges that will be faced by the country in the 10-year span of the policy framework. This will allow the needs and role of ICT in the future to be anticipated. Furthermore, the development of the policy framework has also considered the technological changes that will occur in this period, in order to assess the impacts of these technological changes on individuals, economy, industry and social transformation in the country.

The development of the content of this policy framework is founded on the following principles:

- Use the key concept of sustainable development which has to consider balanced development in three dimensions, namely, the social dimension, the economic dimension, and the environmental dimension. Furthermore, both quantity and quality of development should be considered, along with social justice, in order to ensure sustainable and stable development.
- Use ICT in reducing inequality and providing opportunities for people to benefit from development in an equitable manner.
- Adhere to the “sufficiency economy” philosophy, that is, to focus on economic development that allows the country to keep up with modern times, while, at the same time, being mindful of sufficiency and moderation that is commensurate with national capacity, reasonable and has immunity from internal and external changes.
- Ensure linkage and continuity in policy and strategy with previous policy frameworks and master plans, in order to sustain momentum.
- It is assumed that public sector financing by itself will not be adequate, therefore, the private sector involvement is highly desirable.

II. Thailand towards 2020 as pertains to the Directions for ICT Development

1. Regional economic integration

It is expected that by the next decade, Asian countries will be a new economic powerhouse in the global economy. China and India will drive growth in the old industry and services. By 2015, the ASEAN Economic Community and the countries with which it has concluded free trade agreements, will be highly ranked in the global economic order.

ASEAN integration will impact ICT in many ways. With increased mobility of labor, businesses, industry, investment, education, language, culture and information and knowledge, ASEAN standards in various sectors will be created, similar to what occurred in the European Union. The ICT industry in Thailand and allied countries will grow in tandem with competition.

2. Demographic change

Associated with a rapid decline in fertility, Thailand is experiencing major changes in its age structure. The population aged less than 15 is continuously declining, while the proportion of the older ages has steadily increased. The working age population will accordingly decrease, which points up the urgent need to prepare policy for strategic structural adjustment in various aspects. In particular, education reform is required so that the capacity of the school age population and working age population will be on par with other countries. In addition, a framework for life-long learning needs to be developed in order to meet the needs of an ageing population. Opportunities for the elderly to work need to be created, while investment is needed to enhance the productivity of the working age population.

ICT will be part of managing the new societal structure which will result from the transformation of the Thai population. For instance, ICT will be used to enhance the productivity of the labor force and industrial enterprises. The use of ICT can reduce the gap and increase opportunities in education, or develop new entrepreneurs among the elderly cohort. ICT can also support longevity medicine, among other applications.

3. Energy, food security and environmental crisis

The environmental problems that affect the world and Thailand have long-term impacts on society, particularly by exacerbating global warming and fluctuations in the global climate, disasters, flash floods or desertification. This in turn has affected agriculture production, fishing resources, tourism destinations, ecological systems and biological diversity, along with water crisis. In addition, Thailand also faces risks in energy security, due to lack of diversification in energy resources that could help to manage the risk.

ICT will have an increasing role both directly and indirectly in dealing with the environmental crisis and the energy crisis. When energy savings becomes necessary at the national and individual level, it will create processes and innovations in lifestyle and work which reduce or eliminate energy use altogether. Furthermore, ICT can be applied towards managing public hazards, among other uses.

4. Administrative decentralization

Administrative decentralization from the center to the local level was an important issue in the 2007 Thai Constitution. It puts emphasis on promoting local governance, public participation and continuously increasing decentralization by giving power to local administrative organizations. The transfer of duties includes several areas such as public administration, human resource management, fiscal management, ICT infrastructure development and development of monitoring and evaluation systems. Public participation in the management of local administrative organizations has also been promoted, as appropriate.

The role of ICT as an important tool will expand in helping to ensure that public administration is transparent and accountable, with information that is accessible to the public. It will also help in providing a channel for the public to express itself and give input into decision-making by the government and local administrative organizations on various issues. This will have both positive and negative impacts on people's lifestyles, in accordance with the democratic approach. It will become a gathering hub that transcends limits and borders. Furthermore, it will also be a tool in strengthening individuals, communities and local areas, in matters related to politics, society and the economy. E-government will be a primary mechanism in moving Thailand towards becoming an information society, and will be an important tool in undertaking public administrative reform, allowing it to become more modern, more flexible and more effective.

5. Employment and the labor market in the future

The Thai economy has been evolving over time from an agriculture-based economy to the current situation where the service and industrial sectors are now dominant. The service sector accounts for 51.8 percent of Gross Domestic Product (GDP). Yet, employment in agricultural sector accounts for 48.53 percent of the workforce. Thus, in managing the workforce and human resources, Thai society faces future challenges in many dimensions. This includes the need to improve productivity of the entire agricultural sector. Innovation should also be promoted in service industries in which Thailand has high capacity and potential, as well as other fields in which Thailand is beginning to be competitive and that will allow Thais to use their capacity, creativity and Thai culture and identity. Meanwhile, many industries will see an expansion trend, while new industries will emerge, namely the creative industry.

In addition to technology, another important component of developing various jobs and industries is human resources. Youth in the post-modern or post-industrialization era are more individualistic in their work and career and tend to freelance more. It is increasingly common to have multiple careers over the course of one's working life. Work that requires various skills in an integrated way will also increase. The significant implication that follows is that there will be a more intense and widespread use of ICT. Education in the future will have to transform in terms of format as well as management, in order to ensure that graduates will be able to adjust to the future environment of work and labor, which will see less stability in any given job.

6. The second decade of educational reform

The National Education Act BE 2542 (1999) reflects the intention of Thailand to reform education on the basis of life-long learning, participation of society in education, and development of content and learning processes. Notably, the Act increasingly referred to the key issues of quality standards, learner-centered approach, the role of the private sector in education, and structural reform in decentralization of education to local administrative organizations. However, various evaluations continue to point to the weakness of the Thai education system.

The weak points and problems found in the first phase of educational reform have been identified as the key tasks facing the second phase of educational reforms, within the framework of the vision of "Thais will have quality lifelong learning". The guidelines call for the "Four New Factors" that include: (1) developing the quality of the new generation of Thais, (2) new generation of teachers, (3) new generation of educational facilities and learning centers, and (4) new educational

administration system which aims at decentralization, in order to ensure that school administration will be more dexterous and independent, along with improved governance.

The ultimate goal of the education reform is to instill learners with skills that are essential to thriving in the 21st Century society, i.e. creativity, higher-order thinking, and citizenship. Consequently, ICT will have a role in the second phase of education reform in various ways. For instance, computer equipment and internet will be a necessity in schools and at home. ICT may aid in developing academic content both formally and informally. It can also be used to help uplift the capacity of local education administrators in managing schools. Technology can help upgrade skills in producing quality vocational workers. It can enhance linkages among university information networks towards improved teaching, learning and research. Online education, distance education for the disadvantaged and technology-enabled education for People with Disability (PWD) in various ways can be strengthened. Finally, it can also help in enhancing knowledge and skills for youth so that they will become good citizens, by acting with wisdom, morality and ethics, and avoiding bad behavior.

7. Values and conflicts in society

The structural imbalance in society includes inequality in resource and wealth distribution, unequal access across the country to various state services and benefits, and problems arising from the conduct of state affairs which has led to mounting dissatisfaction over the years. Unless these issues are resolved in a satisfactory manner, the situation will only worsen, with increased confusion and violence. Globalization and the speed of communication have led to transboundary cultural movements, resulting in mixing with local cultures. In turn, this has led to both positive and negative impacts in the transformation of ways of living in various aspects, related to values in society, along with lifestyles of the new generation of Thais which is different from the traditional values.

When examining this phenomena from the technological and innovation perspective, it appears that ICT has a key role in facilitating positive values, reducing inequality in society and fostering reconciliation which will promote peaceful co-existence in the context of diversity in cultures, traditions, religions, ethnicities and beliefs. Yet, ICT can also create conflicts as well.

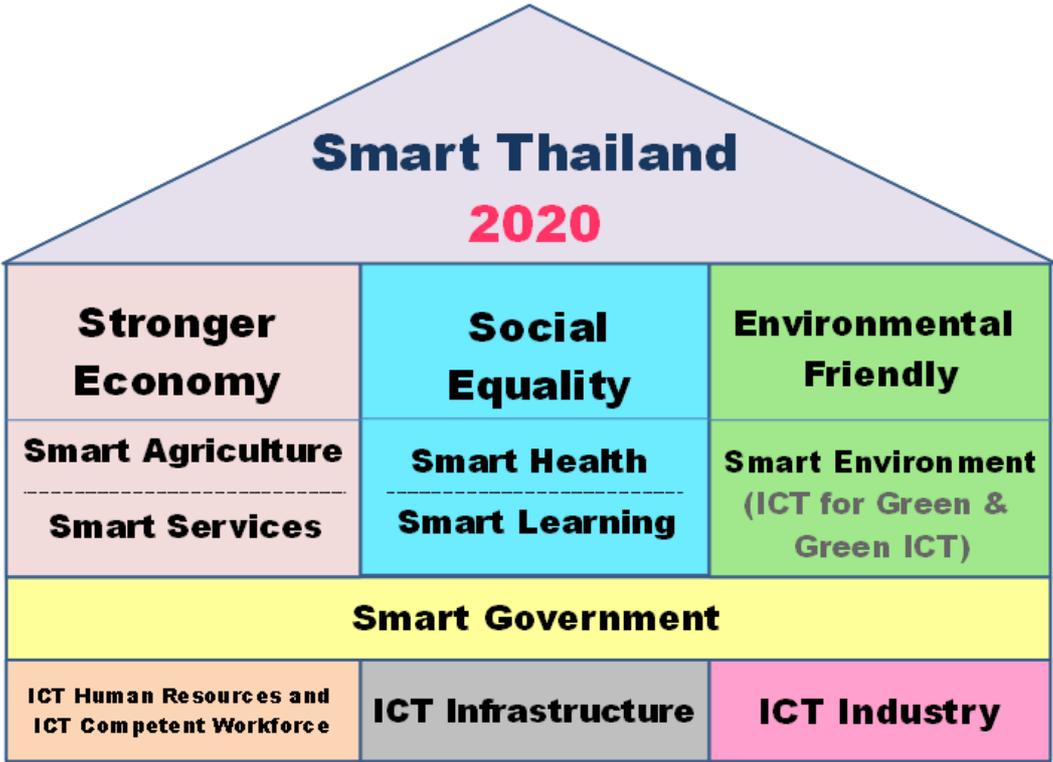
III. Vision and goals of the ICT 2020 Policy

In 2020, Thailand will have smart development, with a knowledge- and wisdom-based economy and society. Every person will have equal opportunity in taking part in the development process, which will lead to balanced and sustainable growth. The “Smart Thailand 2020” vision states that “ICT is a key driving force in leading Thai people towards knowledge and wisdom and leading society towards equality and sustainable economy”. The main goals are as follows:

1. A universal broadband access to all people on an equitable basis, similar to accessing other basic public utilities will be in place. By 2015, 80 percent of the population will be able to access the broadband, which will increase to 95 percent by 2020.
2. There will be sufficient high-quality human resources to shift the economy towards a service economy and a creative economy in an efficient manner. At least 75 percent of the population will have information literacy. The proportion of ICT professionals will increase to at least 3 percent of the workforce.
3. The role and significance of ICT industries will increase in the Thai economy, with ICT value added (including digital content industry) accounting for at least 18 percent of GDP.
4. Enhance overall national ICT readiness so that Thailand will be in the top quartile of the Networked Readiness Ranking.
5. Increase opportunities in creating revenue and improving quality of life (especially for disadvantaged groups) by creating new internet-based employment.
6. All sectors in society will be aware of the importance and role of ICT in developing the economy and society in an environmentally-friendly and participatory manner. At least 50 percent of the population will be aware of the importance and role of ICT in environmentally-friendly growth.

IV. Development strategy

The ICT2020 policy framework has set seven development strategies in accordance with the following diagram and details.



ICT 2020 Framework

Strategy 1: Universal and secure ICT and broadband infrastructure

The main aim of this strategy is for ICT infrastructure to become a basic utility in Thailand by 2020, and will be accessible by all people, with high quality and world-class security. The strategic actions and measures are as follows:

- 1.1 Encourage investment in the fixed-line and wireless high-speed network in order to expand the ICT/broadband network to become universally accessible for people throughout the country. This will require creating an environment for free and fair competition. The National Broadband Task Force will be established to be responsible for developing the national broadband policy. The private sector should be come together to make efficient use of shared resources. Local entrepreneurs should be promoted to provide last mile access, both fixed-line and wireless. Investment in high-speed wireless networks such as LTE/4G should be encouraged, along with broadband or ultra broadband services.
- 1.2 Stimulate ICT provision, use and consumption in an holistic approach. A digital ecosystem should be created, paying attention to universal design, usage, program and devices. This will promote access of all groups of people and will stimulate the public sector market and consumption by the private sector and Small and Medium Enterprises (SMEs). It will require measures to increase knowledge and understanding about the benefits of broadband and new forms of transactions and businesses. Businesses need to be motivated to use broadband. Financial subsidies or incentives to acquire ICT tools or equipment should be provided. Consumer protection and confidence should be boosted. Agencies related to the real estate sector should stipulate that broadband must be bundled as part of the construction of new offices and housing.
- 1.3 Promote broadband access among disadvantaged groups to reduce the digital divide to ensure equitable access to ICT or broadband networks. Internet access in public areas and/or computers with internet access should be provided without charge or at low-cost, in urban zones and around the country. Learning centers should be provided with high-speed internet in all provinces around the country. Support the sustainability of community information centers, ICT centers and others with similar aims. Support the

use of wireless technology in remote areas by Universal Service Obligation mechanism. In narrowing the digital divide, universal design should be considered, along with the provision of assistive technologies as needed and appropriate. This will allow access to all groups, including the disadvantaged, elderly and PWD.

- 1.4 Improve the quality of the network in preparation for the Next Generation network and intelligent network of the future, following the lead of developed countries. There should be measures in place to promote investment by the government. Network standards should be set to allow for seamless connection so it will function like one network across the country. Related research and development should be supported.
- 1.5 Ensure network security in order to create trust and confidence among businesses and people in communicating and making transactions online. Awareness and knowledge should be raised about the policy and guidelines for information security targeting the Chief Information Officer (CIO) of public and private sector organizations, especially organizations in charge of critical infrastructure. A National Cyber Security Agency should be established which will be responsible for cyber security affairs. Multiple alternative routings should be developed to connect Thailand to countries in other regions of the world to avoid congestion in any route (geographically). Increase the number of specialists in national network security. A national information security roadmap should be drafted, then reviewed and updated on a continuous basis.
- 1.6 Ensure public security and safety in using the network and information systems, by requiring public sector agencies which set up CCTV networks in public areas to keep a video archive to aid law enforcement agencies in the justice process. There should be a mechanism in giving awards or financial rewards to businesses and/or ordinary citizens who set up CCTV networks and store data that is useful for law enforcement agencies. All agencies that have a data center should have an emergency plan and emergency protocols for telecommunication and information, to be prepared for various disasters both natural and man-made.
- 1.7 Create alternatives in sending and receiving information by accelerating the shift towards digital broadcast, by setting a target timeframe for 2015. Set a policy and clear regulatory guidelines for the infrastructure serving digital broadcast. Rights to

information and other rights enshrined in the Thai Constitution should be kept in mind. Comprehensive and equitable coverage should be stipulated as well.

- 1.8 Establish an appropriate legal infrastructure which should be modern and responsive to technological changes. Laws that are currently pending promulgation should be adopted immediately, while new laws that are necessary or related should be drafted, for instance, laws related to consumer protection in telecommunications or online transactions. Existing laws should be evaluated and personnel in all steps of the judiciary process should be developed on an urgent basis.
- 1.9 Promote and support research and development, along with upgrading domestic entrepreneurs, in order to develop technology knowledge and capacity in the country. There should be appropriate mechanisms in disseminating technology among entrepreneurs, so technology can be applied in a real setting and for commercial purposes. This will reduce the imports of devices and technology from abroad in the long term.

Strategy 2: ICT human resources and ICT competent workforce

The important aim of the strategy is to allow Thailand to have sufficient high-quality manpower that is capable of developing and using ICT efficiently in order to be prepared for national development in the era of the service economy and creative economy. This includes ICT personnel as well as personnel in all fields. The strategic actions and measures are as follows:

- 2.1 Develop a framework for developing ICT personnel and personnel in general fields in order to have knowledge and skills that are in tune with the changes in the economy, society and technology in the 21st century. There should also be an ICT professional development plan which is systematic, concrete and continuously updated, in order to respond to the advancements in technology and the needs of the ICT industry which are rapidly changing. In addition, a National ICT Competency Framework should also be developed to stipulate the level of knowledge and skills which are needed for personnel in various levels; these guidelines should be used in supporting personnel development. A National ICT Skill Certification Center should be set up to be responsible for planning and coordination to ensure that ICT knowledge and skills

standards are on par with other countries. Furthermore, a database of ICT personnel and labor force should be set up.

- 2.2 Promote the development of new ICT knowledge and skills which are aligned with the needs of the industry and the economy. This includes knowledge and skills to generate service innovations in ICT, knowledge and skills to create value-added for Thai ICT goods and services, and multi-disciplinary knowledge and skills. The number and quality of highly-skilled ICT personnel should be increased to ensure meeting international standards in knowledge and skills. The number and quality of existing university ICT curricula should be increased, with an emphasis on real-world applications to complement theoretical knowledge. In addition, new universities or specialized institutions in ICT should also be set up.
- 2.3 Promote the development of ICT personnel working in the industrial sector to have the knowledge and skills which are needed in expanding the overseas market, knowledge about the mechanisms of international trade, along with requisite language skills. Competency testing should be carried out in ICT professions in various fields, in line with the personnel development plan and the National ICT Competency Framework.
- 2.4 Prepare national readiness to make use of the transboundary movement in ICT personnel that will result from free trade and investment, which will facilitate the entry of ICT personnel with the necessary skills who choose to move from overseas into the country. Technical networks should be fostered for organizations and personnel and their overseas counterparts in order to exchange new knowledge and skills, including joint research and development.
- 2.5 Create opportunities in accessing and using ICT in education for children and youth in order to prepare the future workforce to have knowledge and skills in using ICT. ICT infrastructure should be developed comprehensively which are needed and suitable to connect schools at all levels. Training in necessary ICT skills should be carried out, as appropriate. ICT for learning should be developed and applied for education personnel. Schools at the basic level should use ICT more as a tool in teaching and learning. Content or curricula should be improved at the primary and secondary level. Increase content which builds skills in using ICT in a manner suitable for learning, living and

working in the 21st century. Three skills should be emphasized, namely, IT literacy, information literacy and media literacy. Curricula and content concerning values and ethics of ICT usage, along with knowledge, understanding and awareness about the impacts of ICT on the environment should be introduced in all grades. Secondary and tertiary educational institutions at all levels should have testing in basic ICT literacy as well as English language before students graduate, to ensure that all secondary and tertiary graduates have a command of ICT and English at an acceptable level that is comparable with international standards.

- 2.6 Encourage basic knowledge about ICT and opportunities for employment for entrepreneurs and workers at all levels, in order to increase employment opportunities and use ICT at work efficiently. Raise awareness at business establishments about the benefits of using ICT and provide them incentives in developing employees' knowledge and skills in ICT, in line with the National ICT Competency Framework. Suitable incentives should be provided in order to stimulate new hiring in ICT in industries which have strong linkage to ICT. Personnel in other fields who are interested to switch their careers into ICT fields should also be encouraged and supported to get training in ICT knowledge and skills through various curricula, as appropriate.
- 2.7 Create opportunities in accessing and making use of ICT for people, especially the disadvantaged, the elderly and the PWD by using telecenter or community ICT centers in providing ICT training for the community. Curricula and training in ICT knowledge and applications in daily life for the elderly should be developed.

Strategy 3. ICT industry competitiveness and ASEAN integration

This strategy aims for the Thai ICT industry to strengthen and grow continuously, becoming a leader in the ASEAN region and one of the top generators of economic value and foreign revenue, through the following measures:

- 3.1 Promote continuous human resource development in the ICT industry, including existing and new personnel, in order to have the requisite knowledge and skills, including high-level skills. They will serve as the important foundation for driving the growth of the national ICT industry. The mechanisms and measures which are laid out in Strategy 2

should be used, along with promoting the development of ICT personnel to have knowledge and skills that are necessary for expanding international markets, as well as language skills. At the same time, marketing personnel should be encouraged to become knowledgeable and understanding about technology-based industries. Promote technopreneurs who have knowledge about technology combined with business and marketing skills that are needed to develop products to compete in the domestic and international markets.

- 3.2 Promote building brands and developing the quality of ICT goods and services which aim at the international market. This will upgrade the quality of Thai ICT goods, by making use of ICT service innovations along with the established credibility and the image of Thailand which already produces other goods and services that are able to compete in the international market. The industry should be developed through clusters and tiers. Research and development related to service science should be supported in order to enhance Thailand ICT service capability. Mechanisms for the standards-setting process, as relates to international standards and approaches, should be promoted. Social media should be promoted to connect client groups and as an open forum for exchanging knowledge and promoting innovation concepts.
- 3.3 Promote regional cooperation in developing the ICT industry and support Thai entrepreneurs to cooperate with other ASEAN countries in investing, developing goods and services and marketing. Leverage the various strengths of different ASEAN countries to strengthen the Thai industry. The movement of skilled and specialized ICT personnel at all levels should be facilitated. Investment in the Thai ICT industry from other ASEAN countries and/or allies should be encouraged. Cooperation in research and development and innovation should be supported within ASEAN, and between ASEAN and allies.
- 3.4 Promote and support Small and Medium Enterprises (SMEs) and new entrepreneurs to be able to compete in the future, by emphasizing the following industries: software and new IT-enabled services, new digital content, hardware and software, embedded systems which produce specialized devices for smart systems in various fields, and telecommunications and network devices.

- 3.5 Develop the system or mechanisms to support entrepreneurs, including financial support, readiness of infrastructure for industrial development, and universal broadband service, along with other needed infrastructure for production and/or development, which may differ for each industry. In addition, entrepreneurs providing new technology services should be promoted and supported, which will be useful for creating the technology environment and/or national infrastructure which is stable, safe or environmentally-friendly. Laws and regulations should be in place which facilitate the development of entrepreneurs and industry, along with enhanced knowledge and awareness for entrepreneurs, concerning new concepts and approaches to protecting intellectual property. Intelligence unit should be developed or improved, including essential information for entrepreneurs to use in planning or setting marketing strategy, along with information on mechanisms of public sector procurement, which will help to develop the domestic market.

Strategy 4. Smart government: ICT for government service innovation and good governance

This strategy aims at smart government that is characterized by intelligence, integration, inclusion (offers opportunities to all sectors to participate in setting public policy and format of government service in order to ensure that benefits accrue equitably to all), and good governance, through the following:

- 4.1 A central agency should be set up that will be responsible for driving e-government, by drafting a plan that will guide e-government and design the government ICT architecture. This will be used as the development framework for ICT systems of government agencies. It will also set ICT standards and implementation guidelines, with an emphasis on open standards, in order to allow different technologies to work together. Stipulate approaches in developing and providing common services which are needed for government agencies, to optimize resource use and participation in budget allocation for ICT and large ICT government projects. Approaches and methods should be set in encouraging cooperation between public and private sector in delivering government services.

- 4.2 Set up and strengthen the Government CIO Council, which will be composed of CIOs from various government agencies at the central and local levels.
- 4.3 Promote government agencies to develop e-services in accordance with the “open government” approach, based on transparency, accountability and cooperation among the public sector, private sector and civil society. Open government data will be emphasized, so that people and businesses can access and make use of this data, by using Web 2.0. Develop services which people and beneficiaries can access from all locations, at all times and using all devices. Promote the use of social media to be a platform in accessing and disseminating information and receiving comments from the people and beneficiaries. Best practices should be shared between the central and local levels. A security system to reinforce confidence and credibility in using information services and electronic government transactions should also be developed.
- 4.4 Promote the design of a system that emphasizes service results, which is reusable, especially Service-Oriented Architecture (SOA) in order to achieve a service level that can serve the people.
- 4.5 Develop government personnel in line with the evolution in service innovation. For ICT personnel, focus on developing skills in designing and accessing ICT infrastructure and/or skills in procuring ICT systems, in line with the new approach which emphasizes out-sourced ICT service. For civil servants and/or general staff, skills should be developed in using basic ICT in a smart way, with good judgment and astuteness. In addition, they should also be equipped with the specialized knowledge and skills required for each job profile, along with skills and capacity needed to work with civil society, and for studying and researching information to use in developing services for the people.
- 4.6 Develop capacity and promote research and development that concerns service science, in order to create understanding about demand, conditions and other aspects that will impact consumer/user satisfaction. This will lead to applications to support innovation in government service that will make astute and well-chosen use of appropriate technologies and will cooperate with the private sector and social enterprises.

- 4.7 Raise capacity of local agencies and local administrative organizations in order to be able to provide e-government services at the local level. Resources should be allocated and necessary personnel should be trained in local government agencies to meet the needs of the communities or the local area. Local administrative organizations should take part of the responsibility in finding the financial resources in developing ICT services to use in local affairs. ICT staff should be provided to coordinate with the central agencies. There should be mechanisms in guiding ICT use of the communities by people in the community for the benefit of the community and local society, which will allow them to access e-government services in a comprehensive and equitable manner.
- 4.8 Develop or build up on the geographic information infrastructure of Thailand to be able to respond to local information needs of all sectors in a correct and efficient manner. The public sector, business sector or people who need this information should be able to access and use data which is unified, accurate and up-to-date.
- 4.9 Promote ICT use in order to strengthen the national security system by raising capacity and potential of agencies involved with security and monitoring systems. Promote research and development in order to be able to keep up with ICT and the effects of technology. Create perception and awareness about the dangers which might impact on national security and interests. Promote participation by civil society at the policy level and in implementation.

Strategy 5. ICT for Thailand competitiveness and vibrant economy

This strategy aims to use ICT as an important driving force for creating knowledge, creativity and innovation in goods and services for which Thailand has an advantage. This will transform the economy from being based on manufacturing to one based on service and creativity. The strategic actions and measures are as follows:

- 5.1 Strengthen the manufacturing industry by developing the use of ICT for the manufacturing process throughout the value chain, managing logistics and the supply chain in all manufacturing sectors, managing risk in the manufacturing process and quality control to achieve standards and traceability. Merge ICT with the creative

industry in transforming the manufacturing industry from being original equipment manufacturing (OEM) to becoming original design manufacturing (ODM), and advancing towards production and selling under our own brands or original brand manufacturing (OBM).

- 5.2 Improve the quality of goods and services by supporting the establishment of an agency that would be responsible for developing potential and support research and development concerning service science. Support the development of ICT knowledge and service science for entrepreneurs and employees. Organize competitions for innovation that come from the merging of creativity with ICT in the process of producing goods and services. Support the application of social media in connecting various groups in order to create communities that demand similar goods and services. This will lead to participation by consumers in the design process, and create an open forum for exchanging knowledge and promote innovation concepts. Promote the creation of “virtual cities” which will create models of important tourism destinations in Thailand in order for tourists from around the world to visit online through virtual reality.
- 5.3 Expand the market and create opportunities in business for entrepreneurs by promoting and developing the use of ICT and e-commerce among SMEs, social enterprises, enterprise networks, agricultural cooperatives in improving the business process, trade, service and market access, with a view to improving competitiveness and creating networks. In addition, strengthen confidence in electronic transactions by enforcing the law efficiently. Strengthen mechanisms for protecting consumers and conflict resolution. Increase the efficiency and security of electronic payments, while consider reducing the conditions or regulations which are blocking the use of these systems. Promote and support the use of social media technology for business management and marketing.

In any case, in developing ICT for strengthening the production sector within the scope of the ICT2020 policy, special attention should be paid to the production sectors in which Thailand has an advantage, namely the agriculture and service sectors. The trend is moving towards “smart agriculture” and “smart service” as follows:

The drive towards “smart agriculture”

- Increase productivity in the production process and increase the potential of agricultural products through ICT-enabled innovations that are user-friendly for farmers, with a view to increasing potential in production at all stages of the value chain. For instance, this includes automation, e-agriculture which can function with a sensor network, and Geographic Information Systems with a forecasting system for future outputs. Strengthen agricultural cooperatives, smallholder farmers and young farmers to be able to make use of information and knowledge, including basic ICT. Promote research and development about using ICT to improve the efficiency of the agricultural sector, along with developing and applying ICT in conjunction with technology in other fields.
- Improve efficiency in agricultural quality control and product standards with a view to increasing export potential. Develop the national agricultural information system which will comprehensively connect important data concerning agriculture from all government agencies. At the same time, national agricultural data standards will be developed, along with National ID for agricultural products using the same standard. This will allow agricultural data to be connected and integrated for the purpose of production, decision-making and resource allocation planning, traceability and exports. An e-Certification system will be developed to link documents that are required for international trade.
- Develop a risk management system for the agricultural sector to protect against or reduce losses, by promoting research and development to build up knowledge that can be used to mitigate risk.
- Develop a knowledge management system for the agricultural sector by using ICT in managing and disseminating knowledge which can provide useful data to farmers on a “knowledge-on-demand” basis or using an alert system on various devices. Develop a system to deliver agricultural data which can provide knowledge and data that is suitable for each locality and product. Create online communities to serve as forum for exchanging agricultural knowledge, experience and wisdom and to create a platform for participation by individuals and communities.

The drive towards “smart service”

- Develop skills of entrepreneurs and employees in businesses, especially in SMEs, community enterprises, clusters, agricultural groups and cooperatives. Promote offering various online training curricula, including curricula aimed at entrepreneurs, employees and management. These should cover content, knowledge and skills which are needed for service innovation based on ICT and foreign languages. Promote access to and exchange of varied knowledge and experience through social networks.
- Promote ICT and non-ICT infrastructure which is required for creating service innovations, especially high-speed internet and necessary services. Promote research and development about business process and revise or improve rules, regulations, and legal requirements that are an obstacle to developing service innovations and to cooperating with other countries in the region. In addition, create service standards that are on par with developed countries, to ensure that Thai services meet international standards, which will boost confidence for both domestic and international entrepreneurs and consumers.
- Add value to products from the manufacturing sector, agriculture sector and creative industry, ensuring that service is an important component for each product. This can be achieved by using ICT and connecting communities in a wider circle through social media, with a view to enhancing cooperation among entrepreneurs, consumers and others in the value chain.
- Promote research and development which is related to the service industry and businesses. Allocate resources and set up an agency which will be responsible to study and promote research and development concerning service science, which will require multi-disciplinary knowledge and careful study of the relationships among those from all sectors and all steps of the service process. This will lead to research and development in service innovation. In addition, studies should also be carried out about the laws or systems related to service businesses, including the mechanism of facilitating investment in industries related to service businesses.

Strategy 6. ICT to enhance social equality

This strategy aims to allow people to have secure rights in accessing and making use of telecommunications services and information in order to create economic, social and cultural opportunities in a comprehensive and just manner. The strategic actions and measures are as follows:

- 6.1 Provide information infrastructure which is distributed equitably, in order to narrow the digital divide, by aiming to disseminate ICT as a basic utility needed for ICT work as well as the high-speed internet network. In addition, promote and support research and development in ICT technology, tools and devices at affordable prices, along with assistive technologies for the PWD. Support technology transfer for production and service.
- 6.2 Reinforce knowledge, understanding and skills in using ICT for the general public in order to create knowledge and skills in the development and use of ICT that relates directly to the ways of life of people, various communities and to ensure astuteness about information. This is with a view to apply ICT to meet the needs of individuals, communities and localities, which will give rise to opportunities for increased employment and income.
- 6.3 Promote digital media which can be used in daily life and learning by the people. Communications resources should be allocated for educational television, developing electronic content in local languages, translating content or books, and creating content in sign language for the deaf. In addition, accelerate the definition of national standards for the format of electronic document archive modules. Support voluntary work in creating content that is suitable for communities, by using online social networks as the collaboration platform.
- 6.4 Provide electronic government services through various access channels and ensure that these services meet the needs of people in their daily life. This in order to facilitate people's access to information and social services and increase their participation in public administration and services. In any case, appropriate ICT standards should be used, for instance, standards for web accessibility that allow the PWD and elderly to access the government information and services on an equitable basis.

- 6.5 Promote the creation of online creative communities or learning society, web portals, diverse electronic content, and social groupings that are robust. Learning networks should be set up among educational institutions, temples, libraries and community learning centers in order to facilitate access to useful learning and information resources. They will also stimulate the dissemination, exchange, learning and enhancement of local wisdom with modern science. This will lead to a lifelong learning society, along with the creation, enhancement, transfer and integration of knowledge that is suitable for the development of communities. Promote people to access, be aware of, understand and respect social and cultural diversity that exists in the country.
- 6.6 Strengthen trust and confidence as well as security in using electronic media by accelerating the development of laws or regulations that are necessary for using electronic media safely. Encourage the people to have knowledge and understanding about existing laws and self-protection from online threats. Organize activities to disseminate knowledge or training activities to develop knowledge, understanding and wisdom about information and to become astute in using media. This is with a view to people being aware of risks and dangers that might occur in the online community. Promote the use of social mechanisms to build online communities or society in a creative manner, in line with the approach of self-monitoring.

In any case, in developing and applying ICT to reduce socio-economic inequality, the ICT2020 framework pays special attention to creating opportunities or reducing gaps in accessing critical basic services. It will see a drive towards “smart learning” and “smart health”.

The drive towards “smart learning”

- Provide equitable information infrastructure, by emphasizing access to ICT tools and high-speed internet. Promote the dissemination of the information infrastructure that is necessary and suitable for education into classrooms in educational facilities at all level, ICT learning centers and/or electronic libraries for people and communities, libraries for PWD associations, schools for students with disabilities. In doing so, the concept of universal design needs to be taken into consideration. Develop ICT tools and devices that are affordable and easy-to-use, along with assistive technologies.

- Enhance knowledge and understanding about using ICT for learning among people at all levels, by offering on-going skills training in using and applying ICT and developing ICT content for learning aimed at education personnel. Set standards for ICT knowledge and skills that are suitable for education personnel at each level, and carry out testing as stipulated. In addition, set the proportion of class that uses ICT. Develop curricula about ethical use of ICT, as one of the required curricula starting from the primary level. In parallel, adjust the content or curricula of teaching and learning at the primary and secondary level, by adding content that strengthens skills in using ICT that is suitable for learning, living and employment in the 21st century. Three important skills should be emphasized: ICT literacy, information literacy and media literacy. People should make use of telecenter or community ICT centers in ICT training. Curricula and training should be organized about ICT knowledge, including use of ICT for daily life for the elderly.
- Encourage the creation and application of innovation and digital content for learning at all levels, including informal education. At the same time, create e-books to disseminate in learning centers which can be accessed by all learners. Promote the creation and dissemination by teachers and students of e-content or lessons for education at all levels in diverse formats. The creation of content, database, online content which promotes lifelong learning, the development of school websites and other digital content should follow the web accessibility standard. Promote creation of e-content or lessons that are related to languages and cultures of ASEAN, in preparation for the ASEAN community and becoming an ASEAN citizen.
- Stimulate the creation of creative Thai online communities and learning society, dissemination and exchange of knowledge and enhancing local wisdom with modern concepts and knowledge. This will lead to a lifelong learning society, exchange, learning about content or experience for communities and household groups, and those doing home schooling. Manage local learning in order to transform tacit knowledge into an electronic format, in order to stimulate learning and collect knowledge about Thailand

The drive towards “smart health”

- Develop the National Health Information System (NHIS) as the key foundation for integrating overall national health data and information, by developing data standards and management system. Link and integrate data from different hospitals, offices/agencies which keep the data about public health insurance, department and other related agencies. Use this data for in managing medical and health care services at all levels, from the primary care level up to secondary and tertiary care levels. In addition, manage proactive, reactive and preventative care. A Health Information Security Act should be promulgated in order to stipulate standards about keeping, transferring, exchanging and disseminating information about health using uniform criteria.
- Apply ICT in the complete cycle of managing and providing medical services by providing medical information management curricula in university. Promote applying ICT in improving the system for management, administration and services of hospitals and clinics in a comprehensive manner. Develop the capacity in using or applying ICT devices of medical personnel and promote the development of medical services innovation so as to make ICT a tool in creating more value added in the form of personalized services. At the same time, develop or carry out research and development for tools or devices that could provide “smart” medical services. A unit is to be set up to be responsible for quality inspection and testing the standards of electronic medical devices which were imported or produced in the country. There would also be a study and evaluation of the impact of technology and electronic medical devices on health.
- Apply appropriate technology to support preventative care services by developing electronic health records of patients. Develop a health monitoring and warning system to provide health warnings. This would be achieved by the utilization or innovation of medical devices that could detect or send signals to provide warnings about diseases in time. ICT should be applied as an efficient tool for responding to or disseminating information for new or old diseases.

- Develop health knowledge management as a two-way communication for all groups, including the disadvantaged, the elderly and the PWD so they can access and participate in the exchange of information. Promote knowledge about using ICT in the community by encouraging each community to have its own website on health. Encourage the people, or those who are interested, to exchange and share information or knowledge on health or share their experiences with those in need of help who suffer from the same sickness. Provide a “smart” channel to give health information, advice or preventative warnings to people without the need to go to the hospital. This will reduce congestion and save time as well as energy in travelling to and from hospitals.
- Improve the efficiency of emergency medical service system by developing information system to link information among medical establishments with ambulances, patients’ homes or venue of incident. This could be based on the intelligent transport system (ITS) or other systems already in use. Develop ICT innovations like sensors, RFID, location-based system, or warning system in order to provide emergency medical services that cover from the site of the incident or event, the transfer of patient, and patient referral so that the patient or the victim gets appropriate medical services in a timely and complete manner.
- Develop tele-medicine which includes tele-consultation, tele-radiology and tele-rehabilitation in order to reduce the need to refer to the mother hospital in the network. This is also to provide home health care as needed and in accordance with the level of readiness in accessing the infrastructure.
- All health facilities that have health information systems and electronic medical devices that are connected to the information systems of hospitals, particularly at large-scale or medium-scale hospitals, must follow the policies and guidelines in maintaining security of public sector information systems in accordance with the Royal Decree Electronic Transactions in the Public Sector,
- Develop an appropriate management or support mechanism for efficiently attaining the goals, along with the requisite institutional mechanisms and appropriate personnel, including high-level CIOs in the hospitals who are responsible for all ICT work of the

hospital. Hospital staff at all levels should possess the ability to use ICT equipment and devices effectively and astutely. There should be an appropriate legal structure such as a law on the data protection.

Strategy 7. ICT and Environment: the Green ICT

The main aim of the strategy is to make ICT an important driving force in green economic and social development. The strategic actions and measures concerning greening of ICT as well as greening by ICT are as follows:

- 7.1 Promote the use of ICT in energy saving and environmental protection measures. This is to reduce the level of energy consumption and promote sustainable development by promoting research and development so as to increase innovation in the form of devices, equipment or ICT systems leading to lower energy consumption and environmental protection in the longer term, both at the local and national levels. Stipulate requirements to change the behavior of people in order to reduce energy consumption, such as the reduction of paper use in government agencies, increase in teleconferences and working from home by using ICT. Also, support investment in the smart grid in order to promote renewable energy in a concrete manner. In addition, promote the development of “green cities”.
- 7.2 Promote environmental awareness at every step of ICT product life cycle by issuing design regulations for eco-design. Develop ICT products that have greater production potential, reduce costs and lower natural resource use at every step of the manufacturing process. Develop eco-label for ICT products manufactured in the country. Undertake public relations and build up awareness of the people about eco-labels before purchasing ICT products. At the same time, promote knowledge, understanding and awareness of ICT impacts on the environment. Set conditions for purchasing ICT goods and services by the public sector with due consideration to environmental sustainability.
- 7.3 Promote highly energy-efficient use of ICT. Due importance is given to higher energy efficiency of the ICT system and devices. Create suitable incentives under the “Green Data Center” to induce development, efficiency and reduce energy use within data

centers. Link up all data centers. Set minimum standards for efficient energy usage and environmental-friendliness of ICT devices, in order to serve as the standard for inspecting ICT products available in the market in an equitable and fair manner.

- 7.4 Create an information system about energy, environment and natural resources that can demonstrate the overall condition of ecosystems around Thailand on a real-time basis, which will link up with geographic information systems. In addition, create a way to present information to the public in various formats so that the people and all business sectors can access and apply the knowledge widely. Build up information and communication system for public administration and promote creating social networks to promote participation and create awareness about conserving energy, environment and natural resources.

V. Critical Success Factors (CSF)

In order to achieve the established goals and realize the vision of the policy framework, it is necessary to stipulate various key policy directives as follows:

1. The country's leadership must have strong political will and make ICT development an important national agenda, as it is the foundation of economic and social activity that will enhance national competitiveness in economics, trade and industry. It would also lift the well-being and quality of life of the people, and can help bring about equality.
2. There must be a structure for leadership and supervision in driving the ICT national agenda that is clear and operational. The leadership in driving ICT must come from the highest level in the country. Also, there must be a re-structuring of the various components. A Government Chief Information Office (GCIO) should be set up in the Ministry of ICT which will also serve as the secretariat of the National ICT Committee. There will also be agencies responsible for work with strategic significance, like the National Cyber Security Council, along with a Government Information Technology Services. A mechanism is to be set for coordinating and linking the National ICT Committee with other national committees that are responsible for related work. Work should be coordinated to ensure that moving forward the agenda and the overall implementation will be unified and make effective use of national resources.
3. There must be a mechanism in coordinating work across agencies effectively, leading to lateral integration. This will allow delivering services in a seamless manner, keeping a user-centric approach. National resources would be used effectively, eliminating duplication, with a Government CIO Council in place. The Government Chief Information Office will be the central body in coordinating across ministerial works. It will cooperate with the Government CIO Council and/or CIOs of government agencies in different areas, including in the preparation and review of the ICT budget. This will ensure that the budget will be allocated efficiently, in consultation with the ICT council, as appropriate, and in accordance with the principle of good governance in management.
4. The Government Chief Information Office (GCIO), Ministry of ICT, should be responsible for the preparation of the two ICT master plans, each covering a period of

5 years during the timeframe of the policy. At the mid-point of this policy framework (in 2015), there would be an evaluation to monitor the work progress. The result of the evaluations would be used in the management review or adjustment of the policy framework and/or the master plans, so that they would be suitable and fit in with the future situation.