



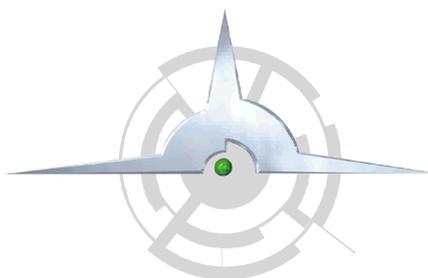
GOVERNMENT OF MALAYSIA

Telemedicine Flagship Application

MALAYSIA'S TELEMEDICINE BLUEPRINT

LEADING HEALTHCARE INTO THE INFORMATION AGE

*Ministry of Health (MOH)
MALAYSIA, 25 July 1997*



Multimedia Super Corridor

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Telemedicine Blueprint

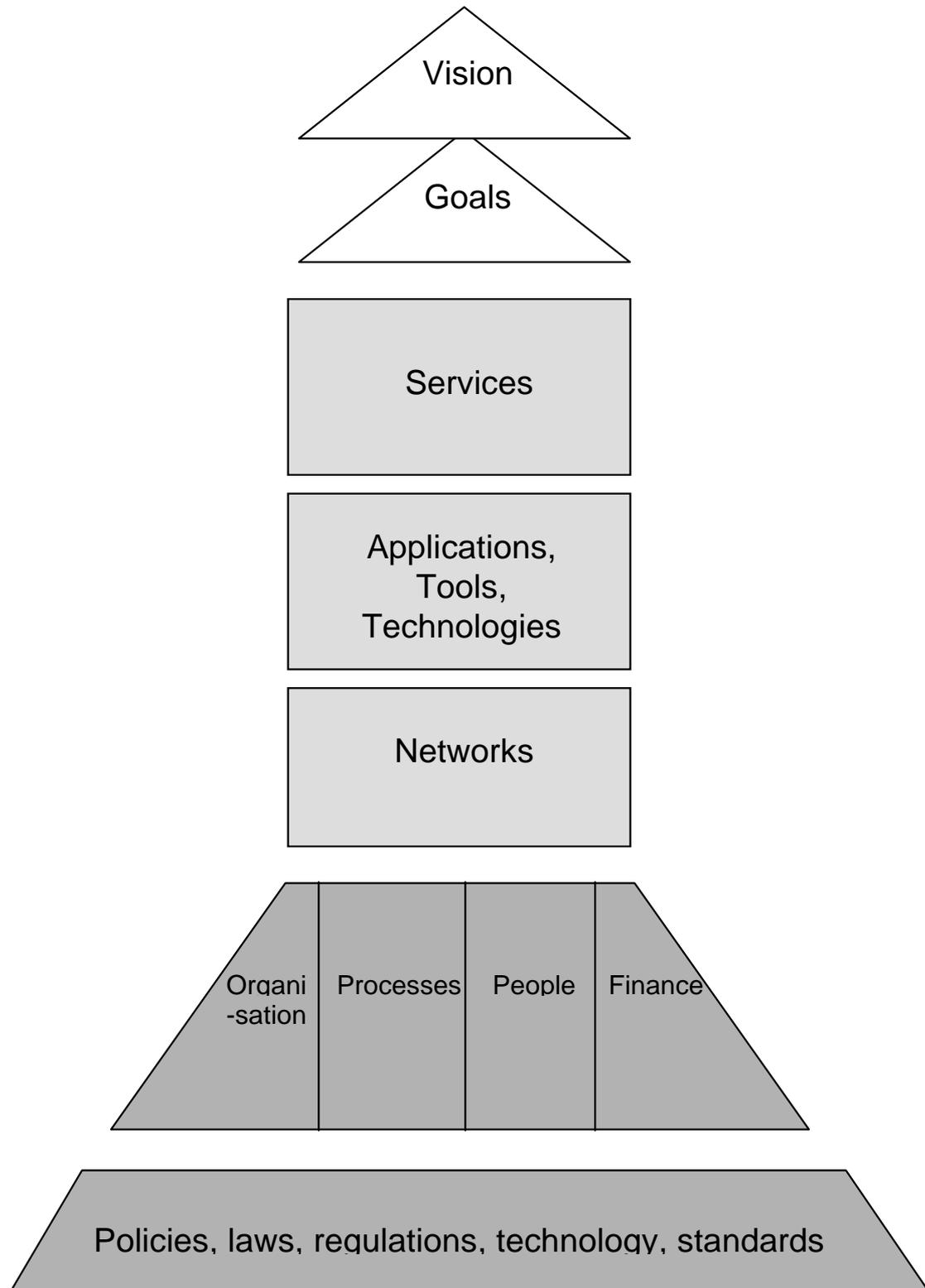


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EXECUTIVE SUMMARY

MALAYSIA'S VISION 2020

By the year 2020, Malaysia is to be a united nation with a confident Malaysian society infused by strong moral and ethical values, living in a society that is democratic, liberal and tolerant, caring, economically just and equitable, progressive and prosperous, and in full possession of an economy that is competitive, dynamic, robust and resilient.

Consistent with Malaysia's Vision 2020, the nation's healthcare system is to be transformed. Malaysia will develop one of the most advanced health systems of the world by harnessing the power of information and multimedia technologies to transform the delivery of healthcare and improve health outcomes.

- The healthcare vision of creating a nation of healthy individuals, families and communities will be realised by promoting a lifelong focus on wellness wherein individuals and families are empowered to play the major role in managing their health.
- The focus of the future healthcare system will be on *people and services*, while using technology as the *key enabler* to provide an accessible, integrated, high-quality and affordable healthcare system that is recognised as one of the world's best.
- The key emphasis of the future healthcare system will be on *wellness*. Services, resources and technologies will be structured to empower and enable people to maintain the highest possible state of health and well-being throughout life.
- Healthcare systems throughout the world remain largely in the industrial age and are unable to cope with global and local demands and challenges without major restructuring. Malaysia's *Telemedicine Blueprint* provides the framework to leap a whole generation from industrial age medicine to information age healthcare.
- Specifically this *Telemedicine Blueprint* provides the conceptual model and implementation road map for the roll-out of telemedicine across the nation, and links Malaysia into a global network of ¹virtual* health services.
- The future healthcare system will be supported and strengthened by *telemedicine* – the provision of healthcare services using telecommunications, information and multimedia technologies. Through the seamless and ubiquitous availability of information and other services, telemedicine will dramatically reshape the delivery of healthcare. Information and other services will become more virtual, more distributed and more integrated, resulting in better, more timely and more efficient healthcare delivery.
- Telemedicine links people and delivers services by utilising multimedia applications, tools, technologies and networks.
- Telemedicine should be considered to have the *broadest possible scope*. It encompasses any health, health-support or governance service that can be provided via a multimedia network and a range of network-based or network-linked information and multimedia tools and technologies used by people and health professionals to access, manage or deliver healthcare.

¹ *virtual: as opposed to physical refers to services where individuals and providers are not present in the same location.

Telemedicine Blueprint

- The implementation road map for telemedicine provides for the full nation-wide rollout of telemedicine by 2020, by which time Malaysia's healthcare system will be fully transformed into information age healthcare.
- The implementation road map describes the selection and implementation of initial pilot projects, the expansion of initial pilots, the selection, implementation and expansion of new pilots, with all telemedicine projects selected, implemented and rolled-out nationally by 2020.
- Telemedicine projects will be expanded and rolled-out along three dimensions: by functionality/features, by reach, and by healthcare programme/discipline.
- Four high-impact projects have been selected as the initial telemedicine pilot projects. These will provide the springboard for the national roll-out of telemedicine.
- The pilot projects are: Mass Customised/Personalised Health Information and Education; Continuing Medical Education; Teleconsultation; and Lifetime Health Plan.
- Concept Request For Proposals (CRFPs) for the pilot projects will be launched internationally in July 1997.
- The change-management challenges in national implementation of telemedicine are formidable. Implementation will be supported by a comprehensive change-management programme that addresses healthcare organisation, health model design/ process reengineering, people issues and healthcare financing. Telemedicine will also be supported by an enabling framework of policies, laws, regulations, standards and technologies.
- As Malaysia sets in place the building blocks for the healthcare system of the future, it will take on a role as a leader and international showcase in healthcare, recognised for its commitment, innovation and ability to boost services for people by harnessing the dynamic technologies of the Information Age. It will establish a virtual Centre of Excellence for Telemedicine, meriting international recognition for its unrivalled achievements in healthcare and the telemedicine products, services and expertise that it provides world-wide.

CHAPTER 1: MALAYSIA'S FUTURE HEALTHCARE SYSTEM

1.1 Overview

MALAYSIA'S VISION 2020

By the year 2020, Malaysia is to be a united nation with a confident Malaysian society infused by strong moral and ethical values, living in a society that is democratic, liberal and tolerant, caring, economically just and equitable, progressive and prosperous, and in full possession of an economy that is competitive, dynamic, robust and resilient.

In line with Vision 2020, Malaysia's healthcare system is to be transformed. The vision for healthcare is as follows:

"Malaysia is to be a nation of healthy individuals, families and communities, through a health system that is equitable, affordable, efficient, technologically appropriate, environmentally appropriate and consumer friendly, with emphasis on quality, innovation, health promotion and respect for human and community participation towards an enhanced quality of life."

This healthcare vision of a nation of healthy individuals, families and communities will be realised by promoting a focus on lifelong wellness wherein individuals and families are empowered to play the major role in managing their health. Malaysia will develop one of the most advanced health systems of the world by harnessing the power of information and multimedia technologies to transform the delivery of healthcare.

The focus of the future healthcare system is on *people and services*, with technology playing a key enabling role.

The future healthcare system requires reshaping a system that is largely focused on illness, facilities and healthcare providers, to one focused on wellness, people and the capacity to deliver services directly into people's homes.

This chapter provides background information on Malaysia's current healthcare system and describes the vision and goals for the healthcare system of the future. These set the context for the development and application of technologies that will help transform Malaysia's healthcare system from the Industrial into the Information Age.

1.2 Current Status of Health Services

Malaysia enjoys a comprehensive range of health services, the Government being committed to the principle of universal access to high-quality healthcare, which the Ministry of Health provides through a nation-wide network of clinics, hospitals and healthcare programmes. Overall approximately 3% of GDP is spent on healthcare services.

The public sector has provided a balanced development of both preventive/promotive as well as curative services through a network of primary-care centres and hospitals. Since 1956, the primary healthcare services provided by the Ministry of Health have expanded from provision of maternal and child health in a few outlets to more than 2,000 community nurse clinics and 600 health clinics. Over the years, the development of these services has contributed

significantly to the reduction of maternal mortality, perinatal, neonatal and toddler mortality rates, and reduction of morbidity due to infectious diseases.

In line with the rising public expectations and the need to reduce urban-rural differentials in the types and quality of service, the scope of services is being expanded. In the past, the scope had been confined to maternal and child health, family planning, and basic curative services.

In the Seventh Malaysia Plan, the scope of health services will be expanded to include programmes for adolescents, the elderly, well person's clinics, workers' health, while further improving the home nursing and rehabilitative services. To enhance the expansion of scope, some specialist services will be incorporated, such as Family Medicine and perhaps Occupational Medicine.

Inpatient services have largely been provided in the public sector through hospitals that also provide specialist outpatient services. In the past, these hospitals used to provide general outpatient services in towns, although these are increasingly being provided through stand-alone polyclinics. The cost of services provided through hospitals continues to increase, due to increasing demand for services, the introduction of new technologies and drugs, and the development of intensive-care services and subspecialty services.

Malaysia's robust economic growth, averaging 8.0% over the past 8 years, has resulted in rapid development of wealth and allowed the majority of the population to enjoy improved purchasing power and the capacity to make informed consumer choices. This is also true of the healthcare market. People are more informed about healthcare and have greater expectations for high quality and reasonably priced health services. Malaysians are increasingly looking to the private sector for healthcare services.

Amid the past decade's growth, private health sector developments have mushroomed, as increasing demand has been met by private providers focusing on high-return curative care.

There are now over 2,700 private practitioners operating stand-alone clinics providing mainly curative care with a sprinkle of preventive and promotive services, such as immunisation or pap smear screening. There has been a growth in private hospitals from 50 in 1970 to 197 in 1996, with more than 7511 beds, which represent 18.0% of acute beds in the country (compared with 119 government hospitals with 33,478 beds). These circumstances have resulted in the escalation of overall healthcare costs against a rising demand for private healthcare.

1.3 Trends and Challenges

Throughout the world, healthcare systems are facing major challenges as they struggle to meet rising demand with limited resources. Demographic changes, rising consumer expectations and new medical technologies are all fuelling demand. At the same time, considerable problems in the distribution of healthcare resources characterise many healthcare systems. In countries such as Malaysia, existing access and distribution problems are further compounded by rapid economic growth.

At a service-delivery level, inadequate integration of healthcare delivery and continuity of care is a major concern in most healthcare systems. Resources are concentrated in the highly expensive hospital sector although services are more cost-effectively and conveniently delivered at primary care or ambulatory care centres.

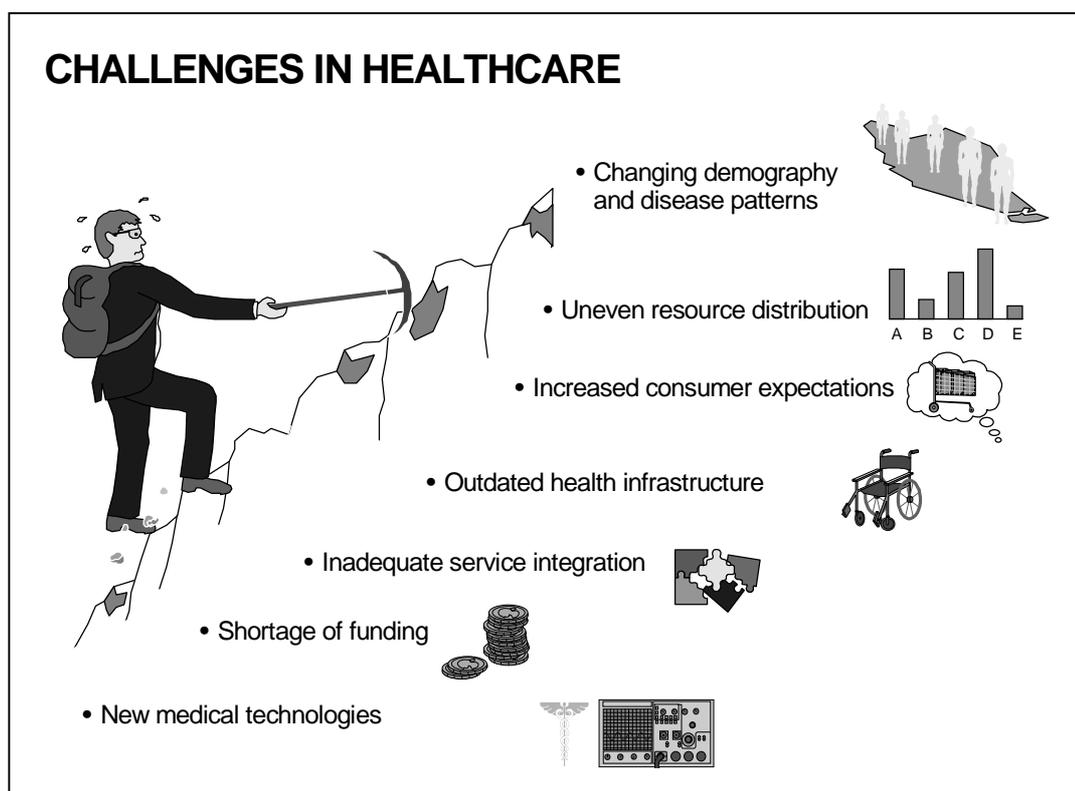


Figure 1 : Healthcare systems throughout the world face major challenges as they struggle to meet rising demand with limited resources.

Malaysia’s healthcare system faces the following major challenges as it prepares to restructure itself:

Changing Demographic and Disease Patterns

Malaysia’s demographic profile is gradually changing, as infant mortality declines and life expectancy increases. As a whole, the population is growing older. In the 1970’s the average Malaysian male and female life expectancy was 63 and 68 years. Today life expectancies are 69 and 74 years respectively. In developed countries, about 30 to 50% of the total healthcare spending goes towards the care of the elderly, who tend to develop chronic, expensive and often incurable diseases. One way to combat the high cost of curative care is to institute rigorous preventive measures at both primary and secondary healthcare levels.

The past decade has witnessed overall positive trends in mortality and morbidity. The infant mortality rate has declined from 41.0 per thousand in 1970 to 11.8 in 1992, while the neonatal mortality rate has fallen from 23.2 to 8.5 per thousand during the same period. The incidences of communicable diseases have declined, especially the immunisable diseases, with near eradication of polio, pertussis, and diphtheria. Unfortunately, AIDS is likely to cause considerable morbidity and mortality in future.

In addition, cardiovascular disease, cancers, injuries and accidents have emerged as leading causes of morbidity and mortality. These are costly conditions to treat. These conditions, as well as AIDS, are most effectively managed by enhancing the preventive and promotive care.

It is better to prevent these conditions than divert a large amount of money to treat them once they are established. In fact, these morbidity rates cannot be addressed solely by expanding the scope and depth of curative services provided by the health system.

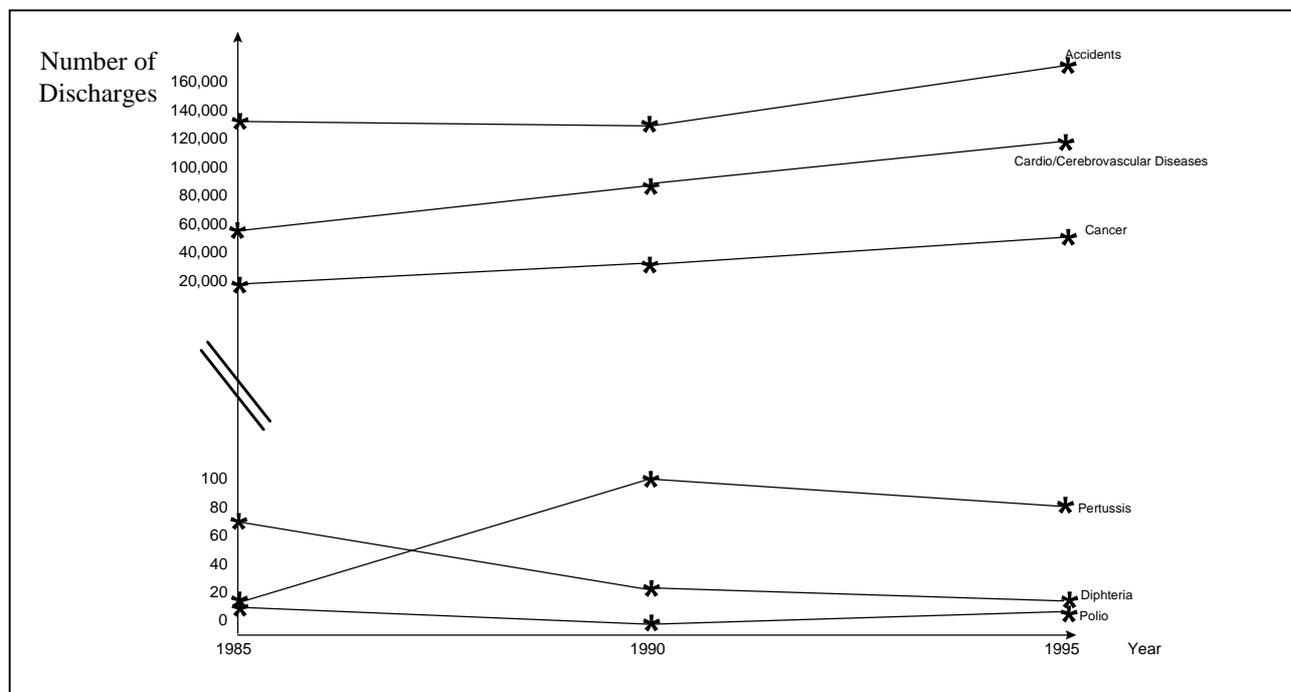


Figure 2 : Number of Discharges per year for Cardio/Cerebrovascular diseases, Accidents, Cancer, Diphtheria, Polio and Pertussis.

Rapid Economic Development

Rapid urbanisation has also contributed to the demographic changes, which are further complicated by rural-to-urban migration. The percentage of the population living in urban areas in Malaysia has increased from 34.0% in 1980 to 50.6% in 1991. With greater opportunities for work in urban areas, further increases are expected in the future.

Industrialisation cum urbanisation has not only attracted locals to the city, but foreign workers as well. Malaysia has about 500,000 legal foreign workers and another 500,000 of illegal immigrants. Most of them come from Bangladesh, Indonesia, Philippines, Thailand, Myanmar and Pakistan. Their presence is not without health threats, especially from communicable diseases.

Increased levels of education, combined with improved communications, including telephones, radios, transport and information technology, have shrunk distances and reduced waiting time where information or physical transportation are concerned. In addition, the resulting interactions of these factors have brought about changes in life styles, nutrition, traditional social and family structures, values and even expectations. Detrimental outcomes include drug addiction, juvenile delinquency, abuse and violence, early sexual exposure among adolescents and teenage pregnancies.

Shortages and MalDistribution of Expertise

The expansion programme for public-sector primary healthcare may be compromised by a lack of personnel. The exodus of medical doctors and nurses to the private sector has been inevitable. Already there is a shortage of doctors, dentists and nurses. Expanding the scope of services will require double the present staff numbers. But will these personnel be available?

On the other hand, the number of private-sector primary-care doctors who provide predominantly curative services is increasing. This lucrative business is pulling away resources, especially trained medical personnel, from government service, resulting in serious understaffing in some facilities, especially those in less attractive rural areas.

While the rural clinics are faced with poor response from takers to work in such places, the urban centres are subjected to heavy workload and constraints of space. Both will have effects of quality of service. The former may suffer from lack of expertise while the latter may compromise on waiting time or quality of service due to high patient load.

Although there is a referral system for treatment in the public sector, as many as 70% of visits to hospitals are self-referred, and many admissions are 'unnecessary'. Patients do not see the need to be assessed by primary-care practitioners. Failure to halt these cases at the first point of contact strains the hospitals limited and high-cost resources.

At the same time, sending referrals and cases for post-discharge follow-up care from the hospital to the primary-care level also faces challenges. Patients are kept long in the hospital in part because support services in the primary-care centres are not well developed.

Rising Healthcare Costs

The world over, there is no ideal healthcare system. Existing healthcare systems are facing the challenge of escalating healthcare costs. In the US, for example, at the present rate of growth, healthcare costs could reach 37% of GDP by 2030. Canada, United Kingdom, Australia and New Zealand, among others, have changed or are changing their healthcare systems to contain costs, and are facing various crises in their efforts to do so. In developing the future healthcare services for Malaysia, the experiences of these developed economies can be very instructive.

It is clear that the focus on curative services provided through tertiary-care institutions is increasing health costs, placing intolerable strains on many nations' economies. Most mortality and morbidity in future will be due to degenerative or life-style diseases. In Malaysia, cardiovascular and cerebrovascular diseases cause 25% of all deaths. Another 25-30% of deaths are due to injuries, perinatal conditions and cancer.

Table 1 : Principal causes of deaths in government hospitals in 1995

Principal causes of deaths (government hospitals) (1995)	Percent
Cardio- and cerebro-vascular causes	26.18
Accidents	10.14
Perinatal conditions	10.08
Neoplasms (cancer)	9.23

1.4 Malaysia's Health Vision

Malaysia's Vision 2020 sets out a visionary and achievable agenda that sees Malaysia in 2020 as an advanced and socially cohesive society with a standard of living and quality of life comparable to the leading economies of the world.

Health status is one of the key pillars of national advancement and is considered fundamental to Malaysia's social and economic well being. The national health vision states:

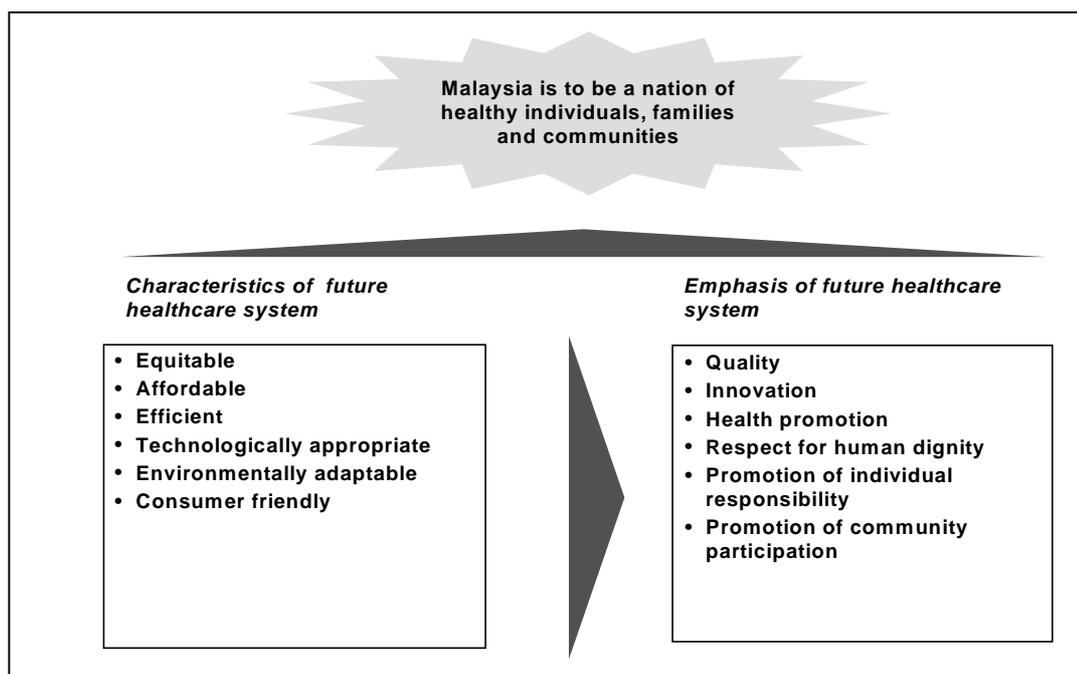


Figure 3: Malaysia's Health Vision

The vision is the beacon for the development of health services in the nation and provides the framework for the development of the Telemedicine Flagship Application.

1.5 Malaysia's Health Service Goals

From Vision 2020 and Malaysia's Health Vision, it is possible to derive a consistent set of health service goals for the future. Their achievement will ensure the realisation of the vision.

Table 2 : Goals of Future Healthcare Services

Goals of Health Services	Description of Goals
Wellness Focus	Provide services that promote individual wellness throughout life
Person Focus	Focus services on the person and ensure services are available when and where required
Informed Person	Provide accurate and timely information and promote knowledge to enable a person to

Goals of Health Services	Description of Goals
	make informed health decisions
Self Help	Empower and enable individuals and families to manage health through knowledge and skills transfer
Care Provided at Home or Close to Home	Provide services into rural and metropolitan homes, health settings and community centres
Seamless , Continuous Care	Manage and integrate healthcare delivery across care settings, episodes of care and throughout life
Services Tailored as Much as Possible	Customise services to meet individual and group needs and special circumstances
Effective, Efficient and Affordable Services	Provide enhanced access, integration and timely delivery of high-quality services at reasonable cost

Focus on Wellness and Empowerment

The best approach for healthcare is one that focuses on personal and community responsibility for health. Health systems will have to be changed to support the individual and community in making the right lifestyle choices, which is possible only if the individual and community are well informed and have access to the right information at the right time – information related to the risks associated with particular lifestyles and habits.

The efforts to prevent the lifestyle-related morbidity must start early in life, before lifestyle choices are made. These efforts cannot be ad hoc, and cannot rely on chance to obtain the desired results; they must be incorporated into a prospective health plan for each individual, supported by information and educational activities that go beyond generic material wherever possible, targeting the specific needs of individuals and communities.

The emphasis should be on maintaining individuals in a state of health as long as possible. Health services should be organised to provide information and education to individuals, and to provide access to a wide range of preventive/promotive activities, such as immunisation, cardiovascular and cancer screening, directed at reducing disease morbidity.

An individual may choose to receive care from a primary-care centre, a general practitioner, a specialist, a government or private hospital. At different times he or she is likely to use different institutions for care. In such circumstances, good care is dependent on access to previous medical records, which should be a feature of future healthcare systems. Care should not be episodic, but should take into consideration a patient’s entire health history, taking a long-term outlook.

Seamless continuity of care

The provision of medical care should be seamless wherever possible, and continuity should be the rule. Any care provider should have access to a patient's longitudinal medical record, including past treatments, allergies, and the like, subject to the patient's permission, so that this history can be taken into consideration in organising management of the present condition. Access to the entire medical record also increases the likelihood of using preventive and promotive strategies, especially if these are included in the record and can be used to trigger action by the individual or care provider.

Management strategies during illness should be to return the individual to a state of health as quickly as possible, to use early intervention to prevent or reduce future episodes, and to provide such care at home or as close to the patient’s home as possible. Not only is such a strategy more convenient for the individual, but it is less costly for the healthcare system. If many services can be made available at home or at a primary-care centre close to home, such services are likely to be accessed early in the course of illnesses with the possibility of shortening the episode or reducing the severity.

Managing Health and Lifetime Risk

Healthcare systems in developed economies have tried a variety of approaches to controlling escalating costs: e.g., setting up “gatekeepers” who control access to specialised services, or setting up health-maintenance organisations. These approaches have been accompanied by increased health administration costs, but have not always contained costs or maintained the previously available level of care. Health administrators have also resorted to shifting more of costs to individuals who can pay, to health insurance companies, to employers or to healthcare providers.

As a result of many of these measures, large numbers of people remain uncovered or undercovered by healthcare services in developed economies. And many individuals are simply unable to bear the costs of chronic or catastrophic illnesses. The elderly often find large amounts of their savings or pensions going towards payment of medical care for illnesses that are often inevitable with age.

It is clear that controlling access to healthcare is not a satisfactory solution to controlling costs. The only truly cost-effective strategy is one that concentrates on the preventive and promotive aspects of healthcare, supporting an individual and family in making lifestyle choices that best maintain health and providing services during a state of wellness to support maintenance of health.

Healthcare providers must work towards “inverting” the healthcare pyramid. Resources – financial and human – should be shifted from tertiary-care institutions and curative services towards supporting preventive and promotive management at the primary-care level, and services should be provided to individuals at home or as close to home as possible, where they are likely to be most cost-effective.

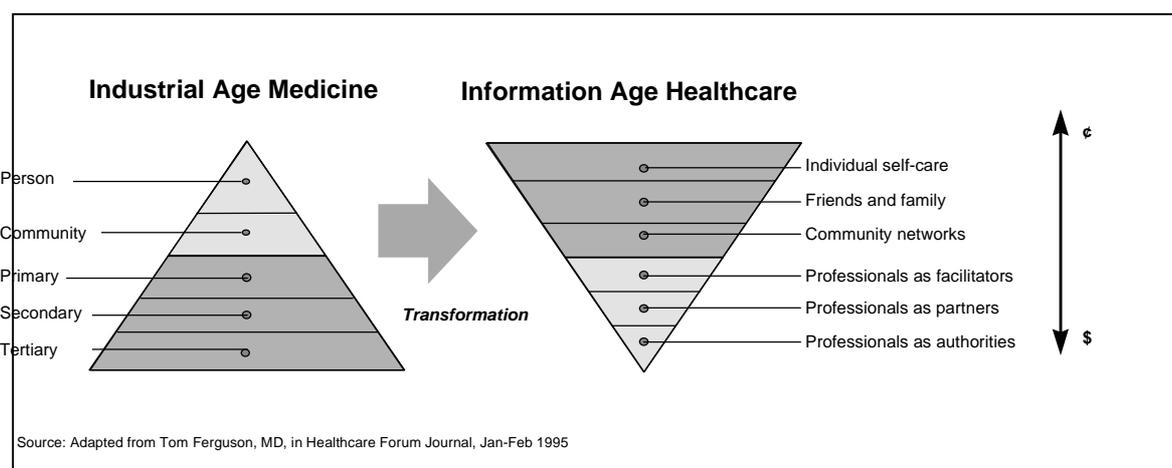


Figure 4: Transformation from Industrial Age Medicine to Information Age Healthcare

Professionals as Health Facilitators and Partners in Healthcare

Medical professionals will play a more important role as facilitators and partners in supporting individuals to maintain health than as directors managing illness services. In the past, the individual’s contribution towards his own healthcare was not supported sufficiently. In the future, the individual will be the focus of health services, which should support and guide his efforts to stay healthy.

Primary-care practitioners can provide holistic healthcare and early treatment of illness at the community level, and efforts to keep the patient well can be supported by community health facilities, community nurses, ambulatory management teams and ambulatory care centres.

The essential services in a future healthcare system are therefore information and education for individuals to support the wellness paradigm, consultations to maintain health or to provide early treatment of illness, all underpinned by a life-time health plan and life-time health record that should be accessible to all of a patient’s healthcare providers, with permission.

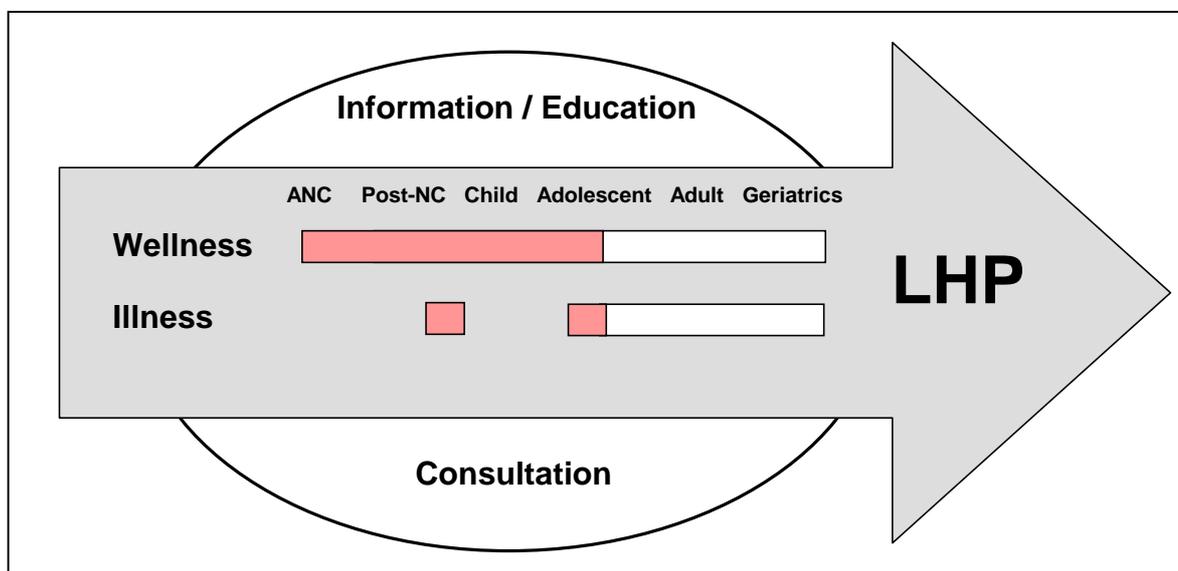


Figure 5 : Essential Future Healthcare Services and their relation to the Lifetime Health Plan (LHP)

Getting individuals to accept that this is the only way to provide healthcare services in a sustainable way and getting all health providers, especially those who now provide largely curative services, to support this type of health system will be a challenge, but that must be tackled by sharing the vision.

CHAPTER 2: HARNESSING THE INFORMATION AGE TO BUILD MALAYSIA’S FUTURE HEALTHCARE SYSTEM

2.1 Overview

Malaysia’s future healthcare system will be created by harnessing the dynamic technologies of the Information Age and by applying them to directly support the achievement of national healthcare vision and goals. The technologies will enable a more person-focused, integrated and productive healthcare system that will be recognised as one of the world’s best. The intelligent application of information technologies will accelerate changes in the system, allowing Malaysia to leap a whole generation of healthcare practices.

The future healthcare system will be supported and strengthened by *telemedicine*. Through the seamless and almost universal availability of information and virtual services, telemedicine will dramatically change the way the general public and healthcare professionals interact with the healthcare system in the future. People will access healthcare services and manage their personal health in an empowered and knowledge-rich environment. Telemedicine will also significantly reshape the working environment of healthcare professionals, as new technologies and services are introduced to directly support front-line personnel.

2.2 Definition of Telemedicine

Telemedicine literally means “*medicine at a distance*”. While there is no internationally accepted definition of telemedicine, at a practical level it refers to the provision of healthcare and health-related services using telecommunications, information and multimedia technologies to link the participants in the healthcare system.

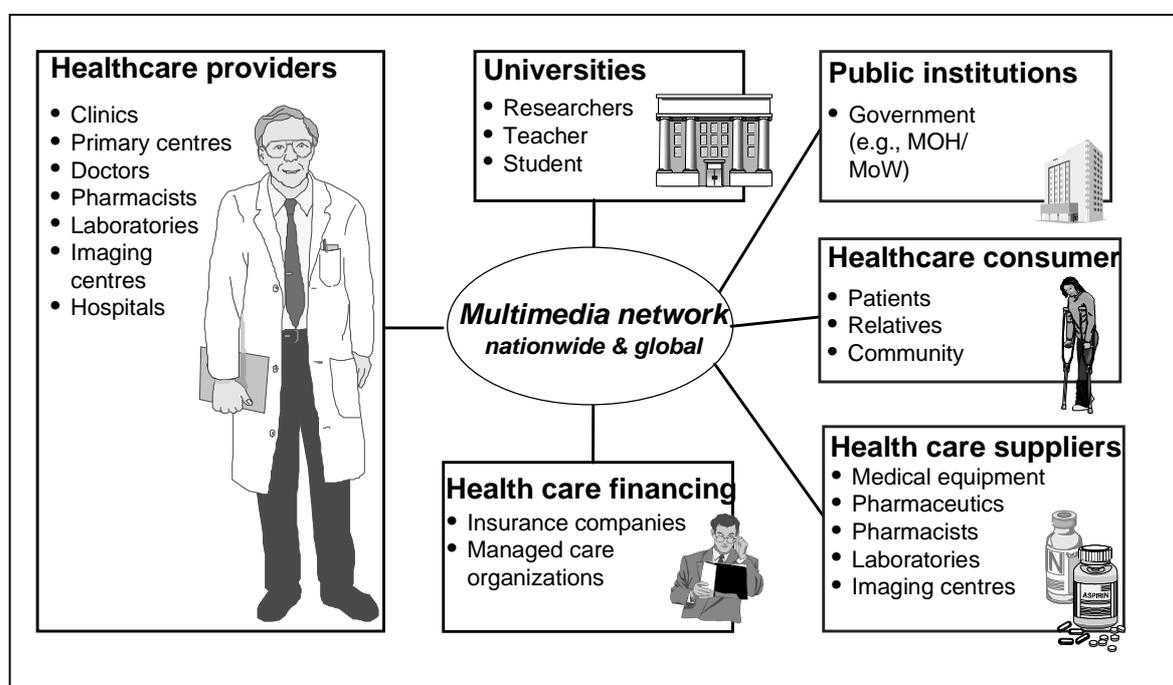


Figure 6 : Telemedicine refers to the provision of healthcare and related services across a multimedia network linking consumers, healthcare providers, suppliers, consumers and other agencies

It should be understood that the domain of telemedicine in the Information Age is potentially unlimited. Both the distance or remoteness suggested by the prefix “tele” and the illness or clinical connotation of the word “medicine”, are misleading. The distance involved may be vast, or just a few feet. The service involved may well be non-medical, focusing on wellness not illness, and delivered in a domestic rather than a clinical setting. Progressive recognition of this new understanding of telemedicine will lead to the increasing development and/or creative application of healthcare solutions that can be implemented as “telemedicine” in the future.

Telemedicine can be used to deliver a range of services: information, education, consultation, diagnosis, treatment, support and governance. Personal health management and patient-care delivery will be aided by a number of network-based intelligent tools, that help users access, navigate and interact with services provided on the network.

As telecommunications networks and multimedia technologies develop, health-related transactions will increasingly be provided virtually, maximising the benefits of the new technologies in providing fast, cost-effective services directly to users regardless of time or place. The dynamic information environment is also expected to create a whole new range of healthcare and health-related products and services, which will be delivered directly to users via multimedia networks.

2.3 Objectives of Telemedicine

Telemedicine must be aligned to support the goals of Malaysia’s future healthcare system. Through the targeted approach, telemedicine will act as a springboard to achieving national health service goals as shown in the table below.

Table 3 : Telemedicine's Role in Achieving Health Service Goals

Goals of Health Services	Role of Telemedicine
Wellness Focus	Promote wellness throughout life through network based services and health management tools
Person Focus	Provide user-friendly virtual services when and where required
Informed Person	Provide accurate and timely information and promote knowledge through personalised information and education services delivered via multimedia networks
Self-help	Increase the ability of individuals to manage health through knowledge transfer and interactive network-based health management tools
Care Provided at Home or Close to Home	Provide distributed multimedia network to deliver virtual services into rural and metropolitan homes, health settings and community centres
Seamless, Continuous Care	Integrate personal health and medical information across episodes of care throughout life through computerised health plans and records
Services Tailored as Much as Possible	Customise and integrate services and information for individual and group needs
Effective, Efficient and Affordable Services	Provide enhanced access, integration and timely delivery of high quality services at reasonable cost.

2.4 Managing the Shift to Virtual Health Services

In shifting from physical to virtual delivery, Malaysia must ensure that telemedicine services are

- ***Appropriate to achieve national healthcare vision and goals.*** The virtual delivery of health services must be directly linked to and accelerate the achievement of the national healthcare vision and goals.
- ***High quality in terms of content and delivery mechanism.*** The content of the services and their method of delivery must be of the highest possible quality. This will require redesign or re-engineering of services and processes to achieve world-best practice benchmarks and maximise the benefits of new technologies.
- ***Tailored and sensitive to needs of target populations and groups.*** Services, their content and delivery mechanisms must be tailored to individual or group needs, and be user friendly to ensure that people who need services get them, with subsequent improvements in health and illness management and overall health status.
- ***Cost effective in achieving healthcare outcomes compared to existing health services.*** Virtual health services must be at least as cost effective as the direct delivery of health services and should provide measurable benefits in improved and more timely service delivery and improvements in health outcomes.
- ***Integrated with and complementary to existing healthcare services and programmes.*** Virtual health services should be seen as a natural extension of existing direct health services, enabling increased reach and efficient utilisation of healthcare resources.

2.5 Addressing Stakeholders' Needs and Expectations

Key stakeholders in the healthcare sector must play a major role in reshaping healthcare. Their needs must be met and their talents and energies channelled in a co-ordinated manner if Malaysia is to create a world-leading healthcare system. The priority-setting, planning, implementing and evaluating of telemedicine projects must address stakeholders' needs and expectations and be shaped accordingly.

The Telemedicine Flagship Application has identified four key stakeholder groups whose needs and expectations must be addressed:

- ***Consumers.*** Individuals and families wish to be kept in a state of wellness and expect a more responsive and caring healthcare system that is person focused rather than facility and provider focused. They expect best-quality health services that will restore and maintain their health, regardless of their economic situation. Telemedicine aims to raise the quality of healthcare, but must be seen as good value by consumers and not an expensive option.
- ***Healthcare Providers.*** Healthcare professionals require a telemedicine service that will enable and support them to provide the best possible health services to people. They need technological training and organisational support to enable them to provide more accessible, higher quality, more efficient and more integrated healthcare. At a practical level, they require a suitable consultation interface, the ability to make accurate diagnoses, prescribe the best treatments, remove the drudgery of paperwork and access medical knowledge to enhance their role as knowledge workers.

- **National and Community Leadership.** Telemedicine should be seen as strengthening the healthcare pillar that helps uphold Malaysia’s status as an advanced nation. Telemedicine must address the national health vision and goals at a practical level by making healthcare expertise more widely available, especially to underserved areas at reasonable cost, and in a way that gains widespread community acceptance and support.
- **Telemedicine Industry.** The Telemedicine Flagship Application must provide opportunities for Malaysian and international multimedia and information technology companies to create innovative solutions that will contribute to the transformation of healthcare. Telemedicine should provide the business impetus to create a range of new healthcare and health-related products and services to enrich and energise the healthcare industry.

2.6 Scope of Telemedicine

Telemedicine should be considered to have the broadest possible scope, encompassing the actual *healthcare services* provided, *applications* used, *multimedia tools* and *technologies* that support and help to integrate service delivery and the *multimedia networks* that will link two or more individuals in telemedicine interactions.

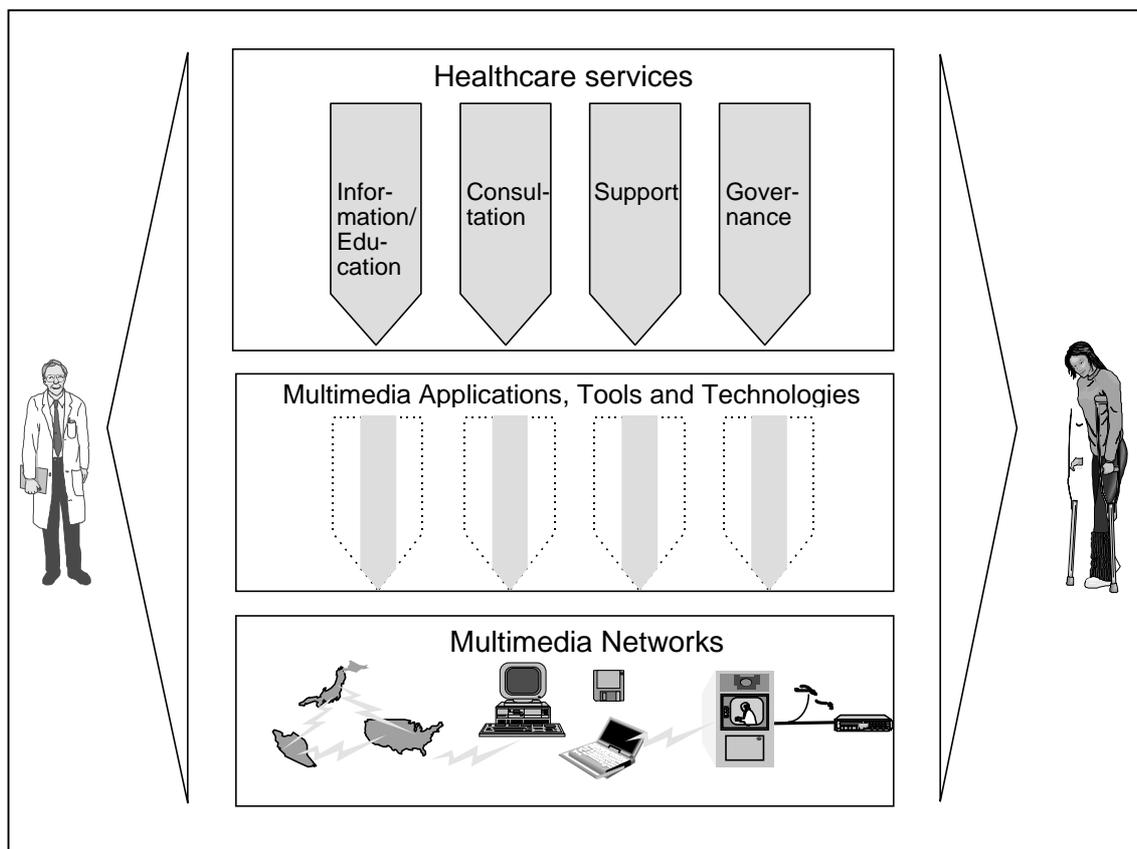


Figure 7 : Telemedicine links people and delivers services. Individuals and professionals use network-based or network-linked applications, tools and technologies to help them manage health and to access a comprehensive range of services. The focus is on people and services, with technology playing the key enabling role.

2.6.1 Healthcare Services

Malaysia's healthcare system of the future will consist of a comprehensive range of high-quality health services and programmes, which to varying degrees will be delivered virtually. These cover the full spectrum of clinical disciplines and public health programmes, as well as health services provided by pharmacies, complementary medicine and other providers. In the broad telemedicine landscape, the Telemedicine Flagship Application has included any healthcare or healthcare-related function that can be provided via a multimedia network, including

- **Information and Education Services.** General or person-specific information, education and training on healthcare issues, services, wellness or illnesses aimed at raising community and individual awareness, and deepening healthcare knowledge and skills among individuals and individuals. Includes *Continuing Medical Education* – education and training for healthcare professionals aimed at enhancing and updating knowledge and skills required for healthcare practice.
- **Consultation, Diagnostic and Treatment Services.** Consultation, diagnosis, treatment and rehabilitation services provided to individuals by health professionals, or consultation services conducted between healthcare professionals.
- **Support Services.** Any other health or health-related services that can be delivered via a multimedia network, including electronic commerce (pharmaceutical and medical supplies, insurance and payment systems), electronic government services and electronic data interchange associated with and supporting the cost-effective delivery of healthcare.
- **Governance.** Health policies, laws, enforcement, accreditation, standards, benchmarking, practice guidelines, health financing systems and industry advisory services provided to the healthcare industry that assist in the delivery of high-quality health services.

2.6.2 Multimedia Applications, Tools and Technologies

The technology component of telemedicine is comprised of a number of health-management, diagnostic and treatment applications, tools and technologies that will help individuals and professionals access, utilise and manage healthcare. These include

- **Lifetime Health Plans.** These are network-based lifelong personal health management tools designed to help users plan and manage their health, access health services and record health and illness transactions. The LHP is linked to longitudinal *electronic medical record* (EMR) systems, which record detailed patient information held by healthcare providers. The LHP is considered the key health management and integration tool used by an individual to promote life-long health and well being.
- **Teleconsultation.** Face-to-face consultation between individuals and/or healthcare providers over a multimedia network, supported by network-linked medical instruments and imaging systems will enable front-line clinical personnel to deliver high-quality healthcare irrespective of location. Such consultations could be supported by automated care pathways, clinical resource-scheduling systems and clinical decision-support (or expert) systems that will assist clinicians in determining diagnoses, developing treatment regimes and monitoring an individual's progress.

- **Information and Education.** Knowledge databases, multimedia courseware, interactive training programmes, electronic textbooks, journals and magazines can be made available through these same networks to inform and educate individuals and families, and healthcare professionals.

2.6.3 Multimedia Networks

A multimedia network is a telecommunications network linking two or more sites with user-friendly interfaces for accessing or providing services. Services can be provided on a network within the same facility, locality, state, or nation, or from across the world. Adequate bandwidth is essential to ensure efficient delivery of telemedicine services.

2.7 Lifetime Health Plan

Telemedicine aims to promote the health of the nation by focusing services on individuals and families through the use of information and multimedia technologies. From an individual viewpoint, telemedicine must be seen to promote wellness through personal empowerment and responsibility for healthcare management. Through a proactive lifelong approach, individuals and families can help reduce the risk of premature disease and disability – resulting in longer and healthier lives, which will contribute significantly to personal, family and community well-being.

To achieve this outcome, individuals and families must have greater knowledge of health issues, the capacity to make informed health decisions and the ability to play a central role in both health and illness management. While services can be delivered directly to individuals via multimedia networks, the Lifetime Health Plan is considered a vital tool to ensure effective integration of services and personal healthcare management over a lifetime. The ability of telemedicine to provide individuals and providers access to personal Lifetime Health Plans has the greatest potential to make a significant difference to the health of individuals and communities, because it will foster an approach to healthcare that focuses on lifelong wellness.

The interrelationship between health services and the Lifetime Health Plan is represented below:

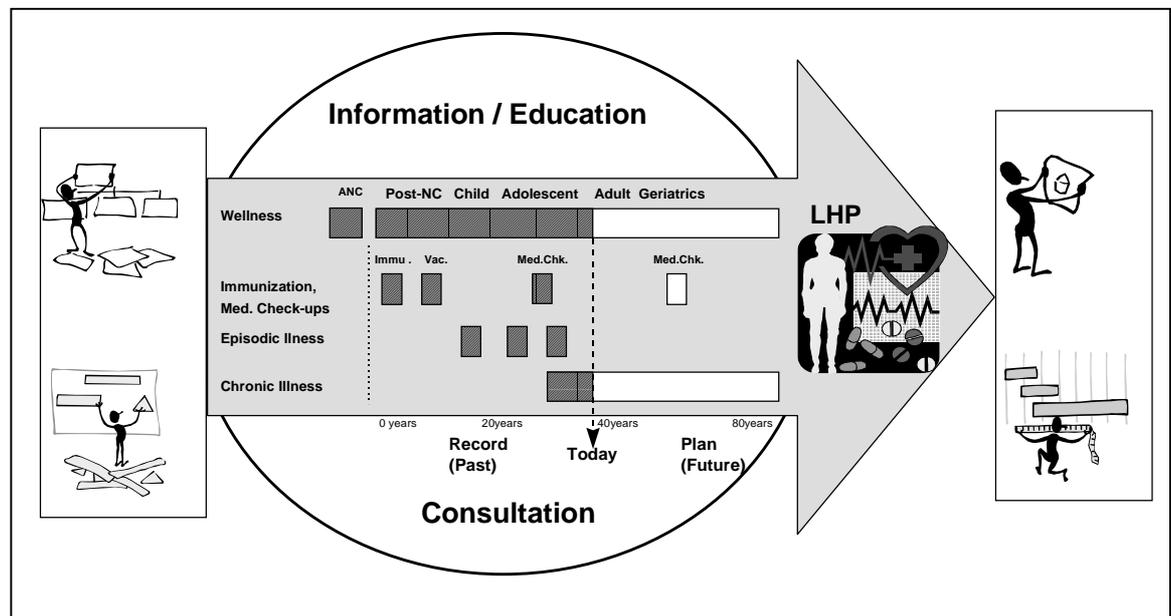


Figure 8 : The Lifetime Health Plan provides the individual with a powerful tool to access health services and manage their health throughout life.

While the telemedicine vision calls for creating informed individuals and families who take responsibility for their own health, there is no guarantee that an informed and knowledgeable individual will necessarily bring about wellness-oriented behavioural change. Telemedicine services and tools must be designed to enhance motivation and bring about wellness-oriented behaviours throughout life.

As an interactive tool, the Lifetime Health Plan not only helps people access knowledge and services, it also helps organise and schedule services that will enable services to be accessed and delivered when required. The LHP might also incorporate various behavioural and motivational triggers. Establishing long-term patterns of health management and role modelling also should entrench wellness habits in individuals and families.

A key challenge in the design and implementation of telemedicine projects is the promotion of behavioural change to ensure the full benefits of multimedia are utilised to improve individual and community well-being. In promoting behavioural change, the following factors should be taken into account:

- **Availability of user-friendly interfaces/access points.** Access points should be available in homes or convenient community locations.
- **Attractive LHP design.** The LHP should be functional and easy to use and seen by the individual as a valuable tool for personal health management.
- **Delivery of Services.** Virtual health services should be easy to access, of high quality and perceived to improve wellness and illness management, compared to current physical service provision.
- **Use of Incentives.** Various non-monetary incentives may be incorporated to promote the use of the LHP. Financial incentives might also be provided to help households gain access to the network.
- **Implementation Strategies.** Family- and group-based implementation strategies can help marshal family/ peer support for the use of the LHP in promoting wellness behaviour.

- **Support Programmes.** Various promotion programmes sponsored by Government, media, sports and community agencies can help entrench health-related behavioural changes.
- **Provider Personnel.** Personnel directly involved in delivery of virtual services to consumers should be encouraging, friendly and professional and adopt interaction and follow-up strategies that promote positive behavioural changes.

2.8 Telemedicine Scenario

The following scenario illustrates the way in which consumers and healthcare professionals might interact in the healthcare system of the future:

A.N. turned 40 years old in 2009. She had kept pretty much to her Lifetime Health Plan, and it indicates through her health management approach that she has stayed close to her ideal body weight, maintained a moderate level of physical fitness and throughout life kept to the MOH recommended schedule for immunisation and screening. The LHP life expectancy calculator indicates a higher-than-average projected life expectancy of 87 years, based on her current lifestyle and family history. This wasn't the case 10 years, before the time when LHPs were introduced in Malaysia. She had been a smoker, but gave up 9 years ago, before the birth of her first child, after undertaking an innovative virtual program for quitting smoking that enabled her to interact with a matched international peer support group. The LHP is currently flashing a reminder to attend the clinic for a Pap smear and breast examination. Upon her direction, the automatic scheduler will make an appointment at the clinic. With the assistance of the family-wellness nurse, A.N. has successfully established her three young children on their Lifetime Health Plans.

A.N.'s husband, T.M., is aged 42 years and has a lifelong history of asthma. Under his doctor's supervision he largely manages the condition himself, taking daily peak flow readings and adjusting his medication accordingly. Previously, he attended the doctor's clinic on a regular basis. Nowadays his condition is better controlled, and three-quarters of his "visits" to the doctor take place virtually via the videophone, with physical visits occurring when he is not able to stabilise his condition. T.M.'s asthma management plan was developed with his doctor and is set out on the LHP. All his medical consultations and hospital-based records can be accessed by his doctor. When he fell ill on a recent visit to Australia, he was able to consult with his doctor on the videophone. He was advised to attend the local hospital, where his Malaysian records accessed using his LHP unique identifier and Smartcard. The Australian doctor also liaised with his local doctor via the videophone and his most recent Malaysian chest X-ray was compared with the one taken in Australia using digital analysis to spot changes. T.M. is also provided with a range of updates and education programmes by the Asthma Association via the LHP. The doctor knows she has to keep abreast of the latest on asthma and undertakes an annual Continuing Medical Education Programme on asthma management that is delivered via the health network.

The family and the doctor believe that telemedicine has had a major positive impact on family health and well being and has improved the medical practice enormously. Family health has improved and the family now plays a major role in managing its own health and illnesses, supported by the local doctor and wellness clinic. Furthermore, the whole system functions more efficiently, with more timely access to services and better use of everyone's time.

CHAPTER 3: TELEMEDICINE IMPLEMENTATION STRATEGY

3.1 Overview

The Telemedicine Blueprint delineates the Government’s vision for the future of Malaysian healthcare and outlines the role multimedia technologies can play in achieving that vision. An inaugural portfolio of four telemedicine applications chosen for their high potential impact and feasibility will provide the springboard for nation-wide rollout.

Of pivotal importance to the effective launching of these and future applications and to ensuring steady progress towards the nation’s health goals is a “road map” describing how this is to be accomplished. This chapter, together with Chapter 4, outlines the implementation process. Its focus is twofold, tactical and strategic. At the tactical level, the road map provides details about implementing and testing individual pilot applications, including rollout schedules. From the strategic perspective, it delineates the requirements for overall success of the Telemedicine Flagship Application and outlines how the initiative will be managed as a whole.

These, together with the associated processes, procedures and structures (enabling strategies) for managing implementation, will steer development and maintain the pace and strength of the Telemedicine Flagship Application into the future.

The road map thus addresses the need to define a pathway for realising the vision and outlines a high-level strategy for successfully navigating the path. The figure on the following page illustrates the overall concept.

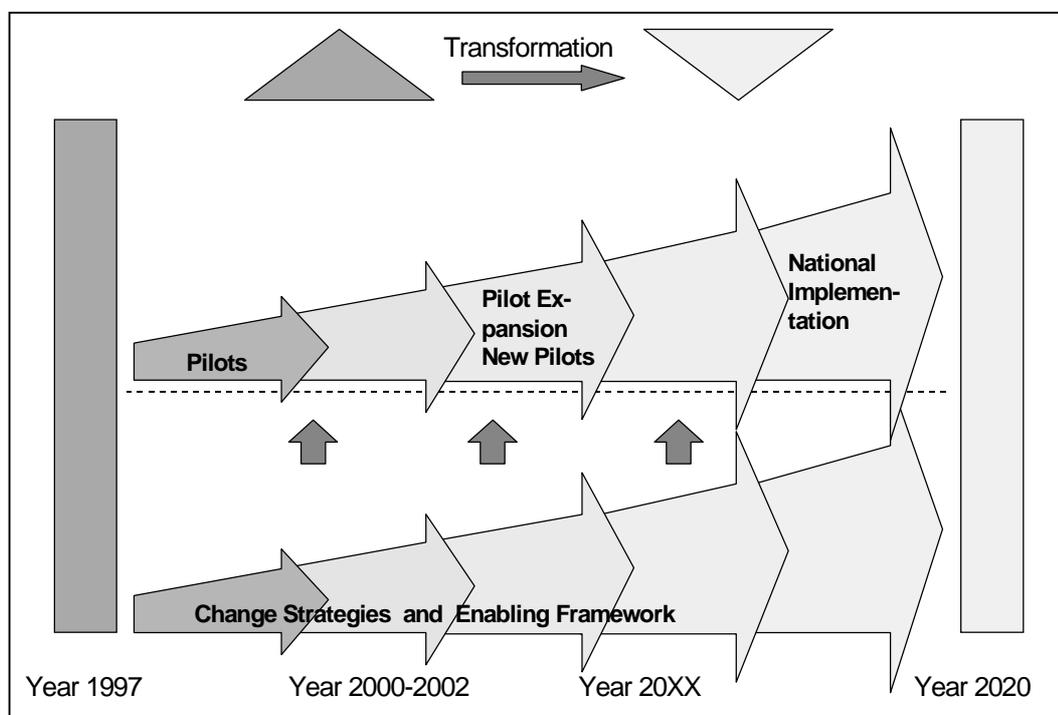


Figure 9 : Telemedicine projects will be implemented according to a clear road map whereby initial and successive pilot projects are identified, implemented and rolled out nationally.

3.2 Dynamic Scope

Malaysia's healthcare goals have been defined and the first confident telemedicine steps have been determined. The steps in the more distant future are somewhat less certain. This is especially so, given the 23-year time frame over which the complete Telemedicine Flagship Application will be undertaken.

While the Government attaches a high degree of certainty to its current decisions regarding telemedicine, it acknowledges that various factors may, at any time in the future, affect its plans, programs and priorities and the management of them.

Because of this, the Government's perspective is that the scope and coverage of the *Telemedicine Blueprint* and implementation strategy should be viewed as dynamic. The document will be continuously monitored for its relevance *vis-à-vis* its purpose and will be reviewed and revised in response to significant developments, ensuring its currency, completeness and usefulness. Sustainability and cost-effectiveness of the solutions will determine future directions.

The main factors that could or will affect the blueprint and road map are summarised below:

3.2.1 New Technologies, Health and Socio-economic Trends

Future developments in technology are inevitable. To an extent, these are predictable, for example increases in computer processing power, but the practical possibilities that may result from technological developments cannot be reliably determined. New and enhanced technologies may unexpectedly present opportunities to develop and implement multimedia healthcare solutions that are not now considered technically, geographically or economically feasible.

New diseases, changing morbidity and mortality trends; emerging public health concerns; demographic changes; and social, organisational and economic factors may present challenges and opportunities that could warrant a change in plans for the Telemedicine Flagship Application.

3.2.2 Implementation Problems

From a more practical point of view, it is impossible to anticipate all potential problems associated with implementing telemedicine applications, but it is inevitable that they will occur. Problems arising during the course of implementation will necessitate a quick and effective response commensurate with the degree and importance of the problem. As a result, the road towards the vision may require some detours, improved signage, maintenance engineering or, in the unlikely extreme, reconstructive work.

3.3 Strategic Considerations

3.3.1 Determinants of Success

It is possible to identify a number of high-level determinants necessary for Malaysia's successful transition to Information-Age healthcare using multimedia technologies. These are

- Proving pilot applications, evaluating and refining them before wider rollout.

- Maintaining the initial impetus provided by the pilot applications.
- Adhering to implementation schedules for rollouts of future telemedicine applications.
- Exploiting technological advancements appropriately in the solutions and applications.
- Responding to changing health imperatives, ensuring that telemedicine initiatives are on target.
- Encouraging private-sector healthcare providers to participate fully in all initiatives.
- Designing and managing the application as a complete, integrated and coherent undertaking and co-ordinating with other MSC flagship applications so that it supports and draws support from them.
- Creating a virtual Centre of Excellence that can serve as a “one stop” medium by which Malaysia’s expertise in telemedicine can be shared internationally.

3.3.2 Management

The determinants for success present a formidable challenge to those managing the development of the Telemedicine Flagship Application. Managing the initiative in a co-ordinated and comprehensive manner will require establishing specialised committees or advisory groups with appropriate expertise and defined responsibilities for

- Anticipating and/or identifying issues and obstacles
- Responding quickly and effectively to, problems, needs and concerns
- Driving, co-ordinating and prioritising project implementations
- Monitoring and controlling performance
- Evaluating outcomes
- Defining and re-defining strategy, including the road map.

The Ministry of Health will need to leverage its internal resources to substantially contribute to the composition and work of these committees. Membership of the committees will also consist, as appropriate, of

- Professional consulting personnel to provide domain expertise
- Representatives from the healthcare professions and private healthcare organisations
- Information technology industry representatives
- Senior personnel from other government agencies and corporations, such as Treasury, EPU and SIRIM.

As the lead agency with stewardship of the Telemedicine Flagship Application, the Ministry of Health must ensure that pilot applications and future multimedia healthcare projects are managed so that

- Implementation of telemedicine applications is sufficiently flexible to accommodate value-adding developments in technologies, business models and service delivery approaches.

- Projects are innovative in achieving desired changes. They must be evaluated objectively against intended outcomes, benchmarked against the world's best and backed by research and development efforts that promote product and service improvements.
- Projects are achievable and have long-term sustainability. This requirement will help ensure consistency and compliance with the long-term nature of Malaysia's healthcare and 2020 visions.
- Projects should maximise the benefits obtainable in improving health services and outcomes by utilising available information technology infrastructures (including those provided under the MSC umbrella) at the lowest possible cost.

In consultation with the MDC, the Ministry of Health will establish the structures and working arrangements and locate the capabilities needed for the management of the Telemedicine Flagship Application.

Until implementation of the pilot applications has commenced, the Ministry of Health will establish the necessary interim working groups to evaluate proposals, clarify requirements, respond to RFP queries, brief consortia, and so on. Once pilot implementations begin, more permanent structural arrangements described above will be put in place.

A similar arrangement will also be required from time to time, as there will be a need to prepare CRFPs for new applications and to evaluate the respective proposals.

3.4 Tactical Road Map

A high-level schematic of the implementation road map is provided below. The discussion that follows elaborates on the concepts underlying this “map” and highlights the most significant issues and signposts along the implementation path.

3.4.1 Significance of Pilot Applications

The four (4) pilot telemedicine applications are significant undertakings, and their success has many operational or tactical requirements. This section of the road map describes the implementation arrangements intended for these and future applications and demonstrates the role and importance of the pilot applications in the context of the Government's overall telemedicine strategy. While there is an obvious practical focus to the implementing of the initial pilots in the short term, the significance of these becomes increasingly strategic beyond that time.

The chosen pilot applications constitute the foundation of the telemedicine strategy. Although their initial implementation is a practical exercise within a finite period, adding value in the future by increasing their scope, coverage and functionality suggests that implementation of the pilots is best considered on a continuum. This view is strengthened by the fact that the definition, development and implementation of additional pilot applications will be initiated in a timely manner, notwithstanding whether the initial pilots are (concurrently) still being in trial, or if they have been rolled out nationally.

Throughout the Telemedicine Flagship initiative, there will be continuing (though not continuous) development and rollout of new pilot applications. Similarly, a continuing effort will be made to add value to existing pilots.

3.4.2 Basic Principles

Practical requirements for implementing telemedicine necessitate the use of some guiding principles.

In general, the design, development and use of telemedicine applications or multimedia healthcare solutions should be consistent. While the unique characteristics and features of individual pilot applications are specified in the documentation for the concept RFPs, there are, nonetheless, some recognised advisory or regulatory ideals that will guide the development of telemedicine applications. These are

- Agreed and (wherever possible) common technical and non-technical standards.
- Efficient business models involving smart partnerships between the Government and private sectors both for the development and the delivery of telemedicine applications.
- Access to and use of common infrastructure services, including leveraging facilities available under other MSC flagship applications.
- World's best practices and quality products and services.
- Needs- and service-driven, rather than technology-driven, healthcare solutions.

3.4.3 Pilot Portfolio Selection

Many possibilities were considered and evaluated in deciding on the pilots applications. The major assessment criteria included:

- **Impact** – need, demand, availability, access, effectiveness.
- **Feasibility** – technical, financial, social, legal, operational.

On the basis of their high potential ability to impact positively on healthcare needs and their feasibility, four (4) Pilot Telemedicine Applications were selected as priorities for implementation. The following figure shows the pilots derived from the telemedicine landscape of possible applications.

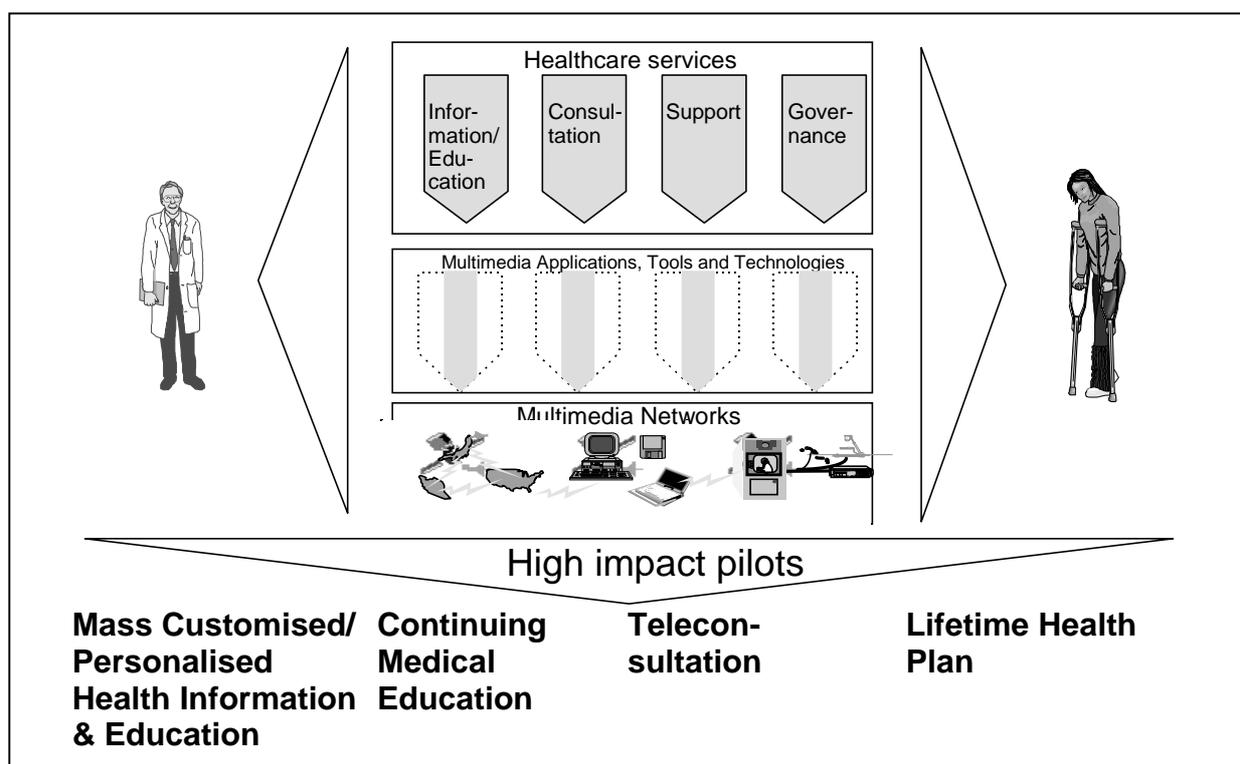


Figure 10 : Telemedicine Pilot Projects

The concepts behind these pilots are referred to elsewhere in the *Telemedicine Blueprint*, and the full functional requirements and operational capabilities are provided in the respective CRFPs. In summary, the applications, their key objectives, the scope of work and the time-frame are as follows:

Mass Customised/Personalised Health Information and Education

The Mass Customised/Personalised Health Information and Education pilot project is about creating and delivering high quality health information and education content to the person using information technology particularly multi-media technology and telecommunication.

The **objectives** of the pilot project are the following :

- To enhance the preventive and promotive approach of MOH to manage the nation’s health.
- To motivate individuals to maintain/lead a healthy life.
- To empower and encourage the individual to take responsibility of his state of health.
- To provide affordable, reliable, up-to-date and high-quality health information and education in a user-friendly and easy accessible way at home or close to home.
- To improve health information and education outreach nation-wide.

The overall scope is to create a virtual health community providing individuals with quality health information and education. The **scope of work** for the responding organisation therefore includes the following:

- Develop customised/personalised and value added information and education content
- Store the packaged information in a content database
- Guarantee access to content database via multiple delivery channels
- Equip and maintain MOH selected end-users with the necessary equipment to access the content database

The following is the proposed time-frame for the pilot project:

- Pilot Project duration: 5 years
- First Stage of Implementation: July 1998
- Infrastructure/system set up and content creation
- Delivering of customised information/education to individuals and communities
- Second Stage of Implementation: July 2000
- Expansion of existing content to include personalised information/education
- Update and develop customised content based on users' requests and needs
- Deliver additional value added health services to users

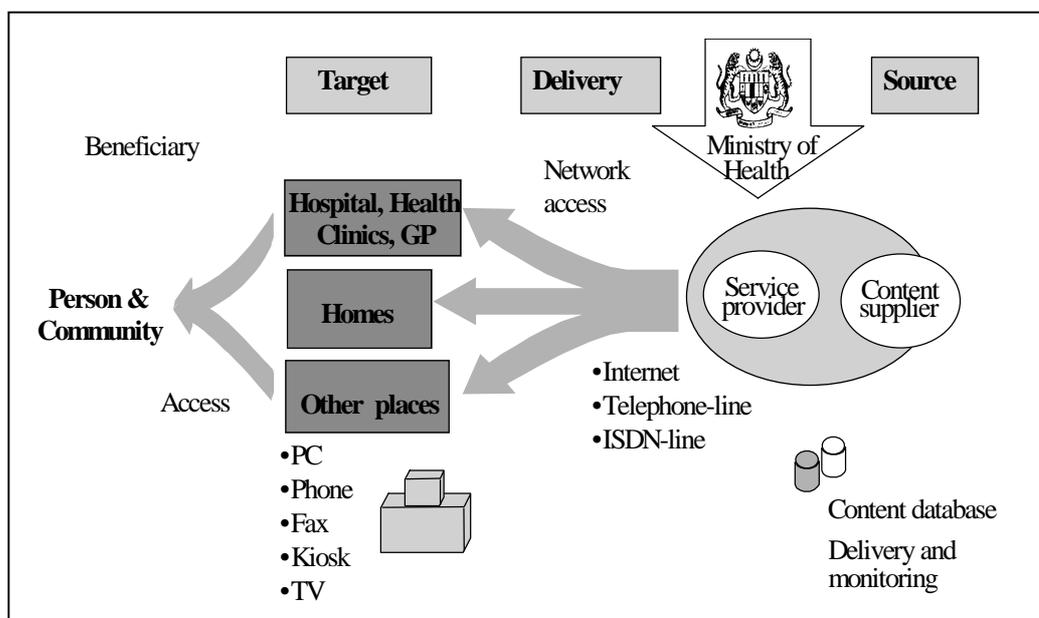


Figure 11 : The functions of Mass Customised/Personalised Health Information and Education include health information content, creation, packaging, delivery and usage monitoring.

Continuing Medical Education (CME)

The Continuing Medical Education pilot project concerns the provision of Continuing Medical Education (CME) through distance learning methods for healthcare professionals in Malaysia using appropriate multimedia information technology.

Objectives :

- To enhance **modular distant learning programmes** for healthcare professionals.
- To improve **formal distant education programmes** to acquire postgraduate and post-basic qualifications.

- To provide access to **virtual resources** to healthcare professionals to support their work.

Where,

- modular distant learning programmes refer to structured study programmes or learning modules to update and upgrade the knowledge of healthcare professionals
- formal distant education programmes refer to a sort of virtual higher education to extend outreach and possibly shorten the time of institution-and-university based education courses
- virtual resources refer to knowledge databases, virtual libraries for publications and practice guidelines, and computer-aided learning tools.

The scope of the pilot project :

- **Content development** : To develop content or identify appropriate information suppliers for modular distant learning programmes, formal distant education programmes, and virtual resources.
- **Maintenance and updating of content** : To maintain and update content to accommodate changing demand and new research findings.
- **Provision of CME through multiple delivery channels** : To deliver CME programmes through multiple delivery channels, linking government hospitals and clinics, private hospitals, general practitioners (GPs) & individuals at home.
- **Market the CME programmes to healthcare professionals** : To market the CME programmes to healthcare professionals both in public and private sector.

Time-frame :

The duration of the pilot project is approximately 5 years. The first wave of CME programmes will be started in the year of 1998, after setting up all the necessary systems, content and infrastructure. The CME services will be expanded over the pilot project to provide wider options for healthcare professionals.

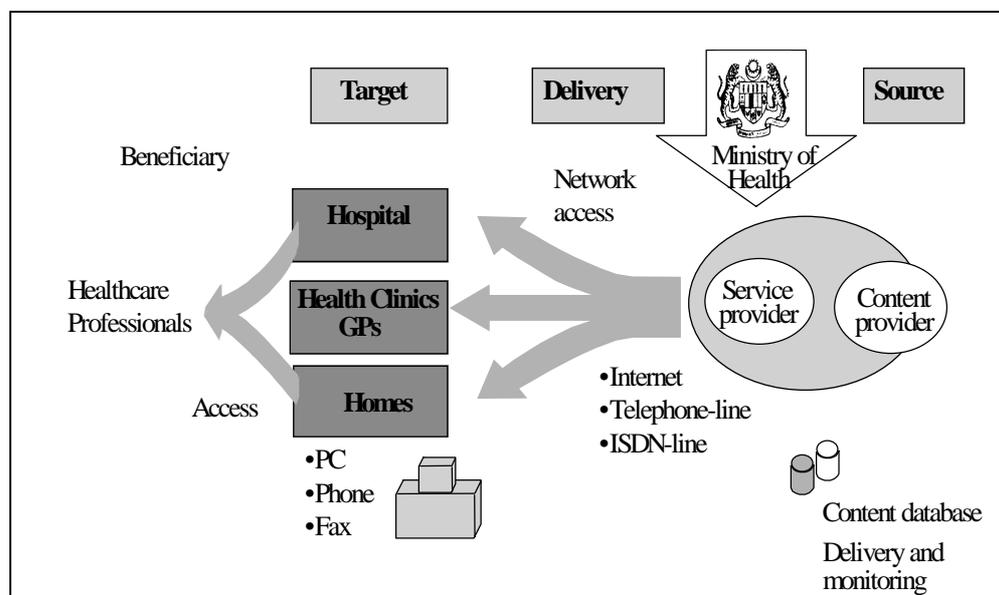


Figure 12 : The functions of Continuing Medical Education include content creation, packaging, delivery and usage coordination.

Teleconsultation

A Teleconsultation system provides health care consultation services from a distance using appropriate multimedia information technology solutions. The pilot project application is essentially an interactive discussion which involves medical specialists from a tertiary hospital providing remote consultation for patients and providers in health centres or clinics. Teleconsultation defined like this is broader than just consultation through videoconferencing as it incorporates digitisation and transmission of patients' relevant medical records, including text, diagnostic images and medical charts between the referring and consulting practitioners.

Objectives

The main objective of the pilot project is to provide a multimedia platform for interactive consultations to achieve :

- Improved quality of care and universal health care management.
- The improvement of delivery time of health care services, thereby providing equitable and rapid access to appropriate care irrespective of geographic locations.
- The broadening of access to health care by enabling the optimal use of scarce and costly resources and thereby ensuring the continuity of care throughout life.
- The enabling of individuals to make informed health choices.
- Specifically reducing referral from primary health centres to tertiary centres.

Scope

The scope of work for the responding organisation shall include :

- Design and development of the teleconsultation system.
- Operation and maintenance of the system.
- Overall project management, necessary process reengineering, necessary change management programmes and training for the system-users.

Timeframe

- The first stage covers design and development of the teleconsultation system in the selected sites.
Completion : October 1998
- Evaluation and fine tuning will take place between October 1998 - March 1999.
- Fast roll-out for other tertiary centres as appropriate.

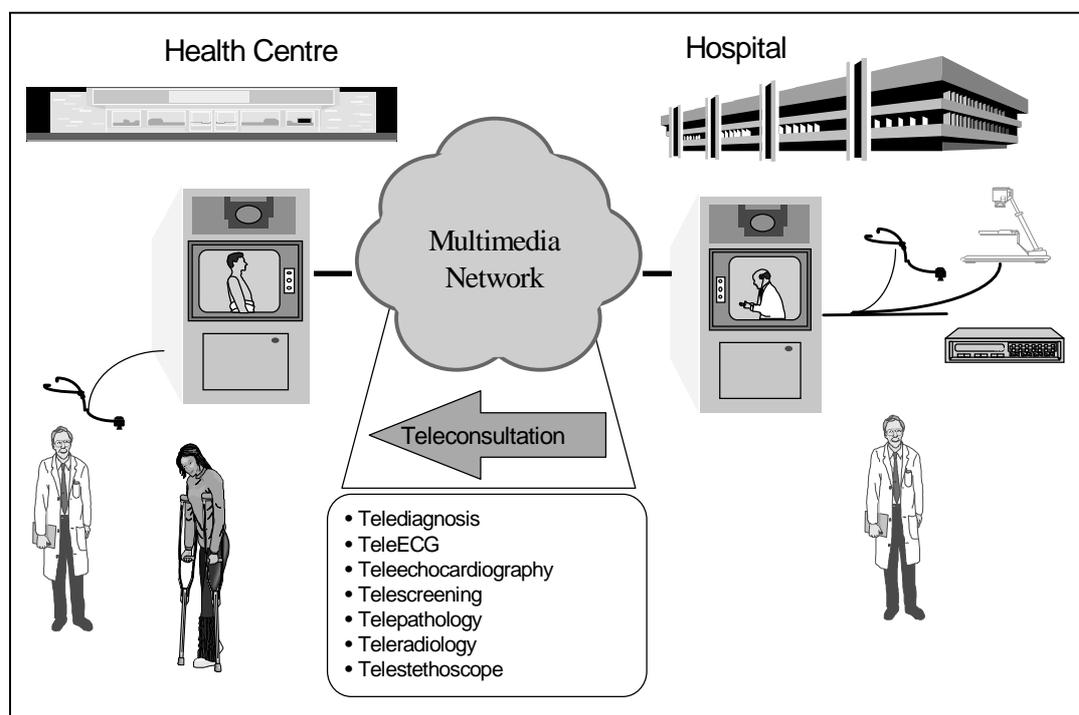


Figure 13: The Teleconsultation application links clinics to hospitals through the provision of appropriate end-user equipment.

Lifetime Health Plan

The ultimate objective of the Lifetime Health Plan (LHP) is to design, develop and implement a personalised, proactive and prospective lifetime health plan to achieve a continuum of care in order to keep the individual in the highest possible state of health. This is to be done via the delivery of LHPs directly to individuals or healthcare providers. Specifically the LHP shall ensure the provision of the following :

- a lifelong plan in wellness and illness so as to empower the individual to make well-informed health choices and thus taking greater responsibility for his own state of well-being;
- a continuous and seamless medical care, informing individuals and care providers with timely and relevant patient information leading to better health management for the individual;
- access to an integrated set of medical records independent of time and location so that advice, diagnosis and treatment provided by care providers to the individual are based on the most complete level of information.
- collection and generation of all data necessary to formulate Personalised Lifetime Health Plans (PLHPs);
- provision of data and services that will serve to enhance health planning and policy making at the national level;

The Lifetime Health Plan (LHP) application consists of three subapplications namely (i). Clinical Support System (CSS) (ii). Healthcare Information Management and Support Services (HIMSS) (iii). Personalised Lifetime Health Plan (PLHP):

- i) Clinical Support System**
The Clinical Support System (CSS) is a set of application systems that will support the work of practitioners, both clinically and administratively. Such systems include: Hospital Information System (HIS), Clinical Information System (CIS), Laboratory Information System (LIS), Radiology Information System (RIS), Picture Archiving & Communication System (PACS), Pharmacy Information System (PhIS), Critical Care System (CSS) and a Decision Support System (DSS). A major requirement for all these systems is that they must collectively contribute to building Electronic Medical Records (EMR) of patients. This will later help to create one's personalised lifetime health record (PLHR).
- ii) Healthcare Information Management and Support Services (HIMSS)**
HIMSS is made up of repositories for Lifetime Health Records (LHR) and Lifetime Health Plans (LHPs), the two being managed by an Information Management System (IMS) to handle retrieval, security, coherence and the like. Given that the system contains a potentially large amount of data in terms of LHRs and LHPs, the data can be mined to provide various general and strategic services, such as health statistics, medical forecasting, etc. This part of the system is referred to as the Group Data Services.
- (iii) Personalised Lifetime Health Plan (PLHP)**
The personalised Lifetime Health Plan (PLHP) is an application that generates the lifetime health plans for individuals covering both wellness and illness plans. PLHPs are summarised and personalised health-plans for individuals, which should at least integrate all episodic plans from womb to tomb such as immunisation plans, rehabilitation plans, etc. The plans may be generated on demand directly by individuals or via healthcare providers. Triggering mechanisms and monitoring systems will be generated to support individuals to live a healthy life following their plans.

Scope of work

The scope of work will be to deliver varying functionalities of the CSS to different healthcare facilities.

In addition to that, the responding organisation shall deliver the HIMSS and the PLHP system.

Timeframe

The overall timeline for the LHP pilot project is 5 years starting in 1998.

Jan 98-March 1998	Req. Study and design of CSS, PLHP, HIMSS
April 98-September 1998	Development of the sub-applications.
October 1998	Launching of the LHP applications
October 1998-September 1999	Evaluations, modifications and integration of sub-applications and devices.
October 1999	Local rollout of CSS and complete interfacing to existing legacy system.

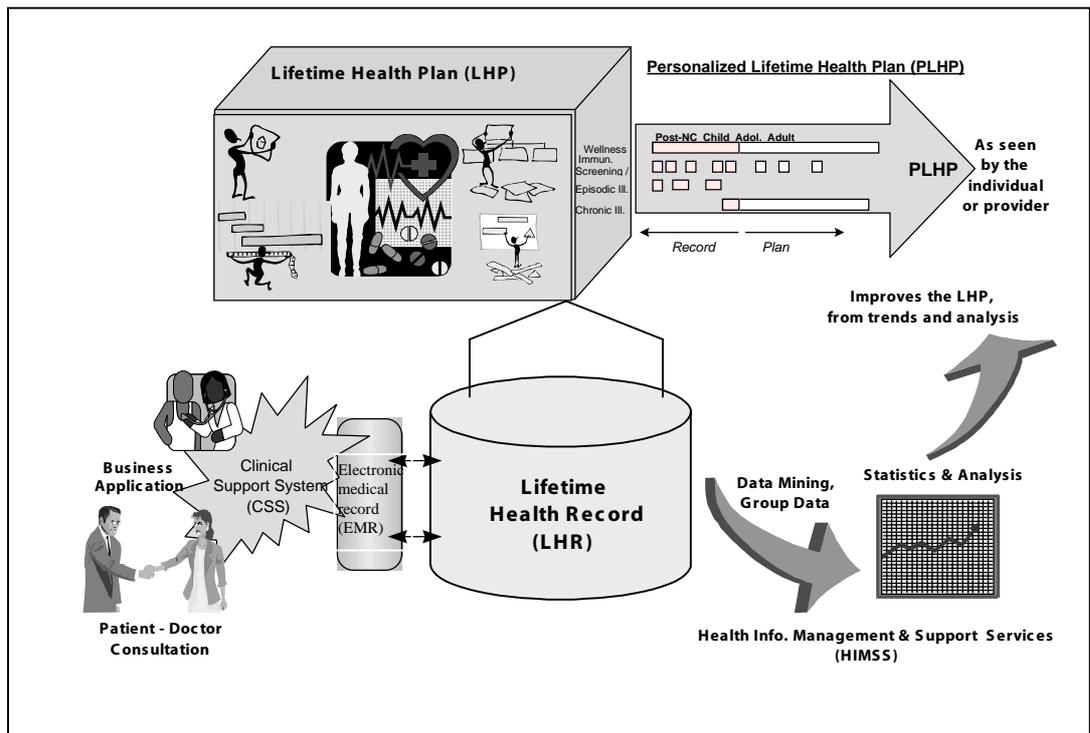


Figure 14: Overview of Lifetime Health Plan (LHP)

3.4.4 Pilot Applications Inter-relationship

Considered individually, each of the pilot applications has been selected on the basis of its significant potential to have a positive impact on the health status and well being of Malaysians.

Taken as a whole, however, the four pilots are integrally inter-related in a way that offers outstanding potential benefits. The end result of this relationship is an absolute focus on the sustained wellness of the individual through the personalised LHP and its ability to access, record, influence or plan delivery of all services to be provided by the other applications.

Any one application can stand on its own merits, but the four applications together support and enhance the benefits to be gained from each other, the ultimate expression of which is a person-centred system of healthcare enabled by telemedicine.

The inter-relationships are shown in the figure below.

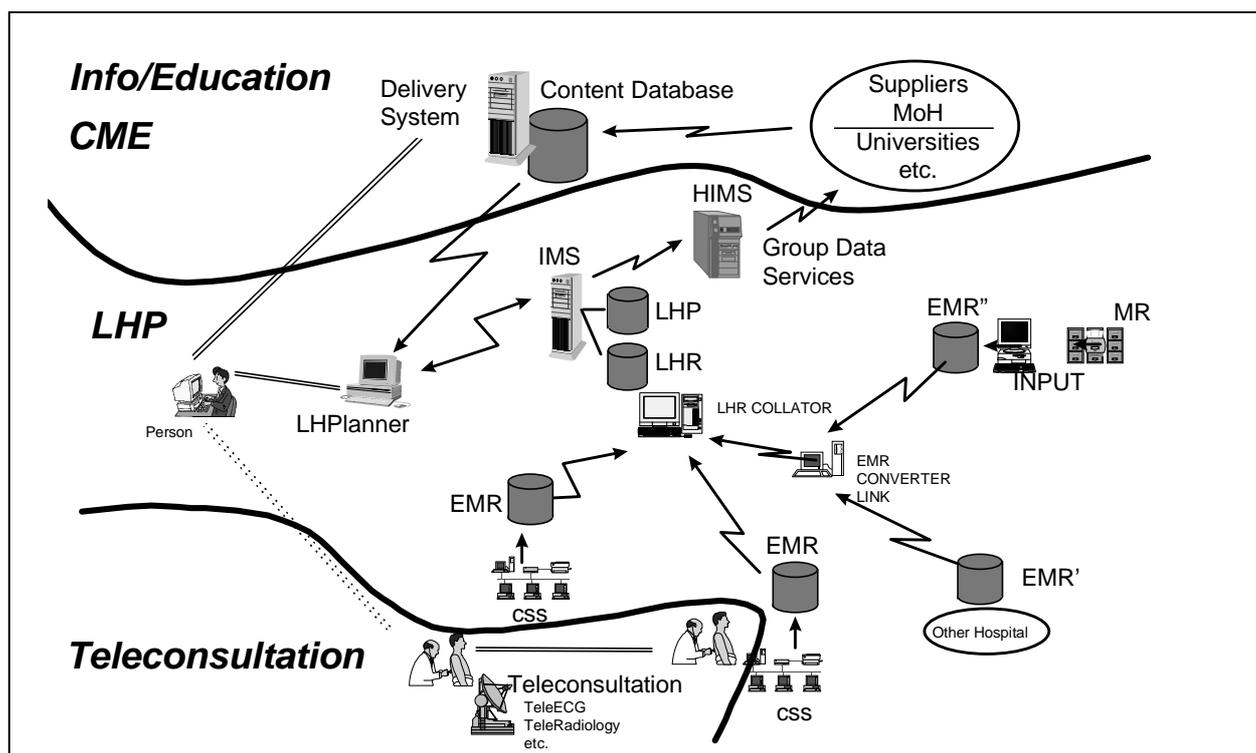


Figure 15 : Entire Scope of Telemedicine Pilot Projects

3.5 Physical Implementation Pathway

Implementing the suite of initial telemedicine applications described above is the tangible, outward expression of Malaysia's journey towards Information Age healthcare. The implementation path described below has been mapped out in line with the fundamental direction and guided by the considerations discussed.

The approach is regarded as the most effective response to a calculus of relevant factors, which include Vision 2020 objectives; national health goals; developments within the MSC; technological, social, legal and cultural considerations; feasibility, achievability, and practicality; access to infrastructure; and the availability of resources.

3.5.1 Overview

From a high-level perspective, the pathway for implementing applications is marked by the following:

- Implementation of the Telemedicine Flagship will be ongoing. Aligned with the MSC strategy and Vision 2020, it will be complete at the latest by 2020, preferably sooner.
- Telemedicine applications are to be site-tested in two environments, one within the MSC and the other outside of it.
- MSC site-testing will include all functionalities of, and utilise all the enabling technologies germane to, the application.

- Site-testing outside the MSC will be to the (agreed) extent possible given the location(s) and the availability of enabling technologies and infrastructure.
- Basic functionality of applications provided in pilot settings will be enhanced and expanded as part of the rollout strategy.
- Outreach of telemedicine applications to rural communities at the earliest practicable time is a priority goal.

3.5.2 Pilot Sites

To the maximum practical extent, applications will be piloted both within the MSC and in a non-MSM environment. The MSC will permit testing of a full range of solutions and technologies, because its infrastructure facilities are Malaysia’s most comprehensive.

Outside the MSC, the needs and benefits of telemedicine services will be greater. However, lack of supporting information infrastructure constrain the scope of a particular telemedicine service; overcoming these challenges will provide solutions applicable in other localities. The Government proposes to overcome these constraints in the near future through a national information technology strategy that includes a national data communications network serving all areas of Malaysia.

Details of potential pilot sites for the four initial applications are contained in their respective CRFPs. The figure shown below indicates the rationale for and scope of piloting within and outside the MSC.

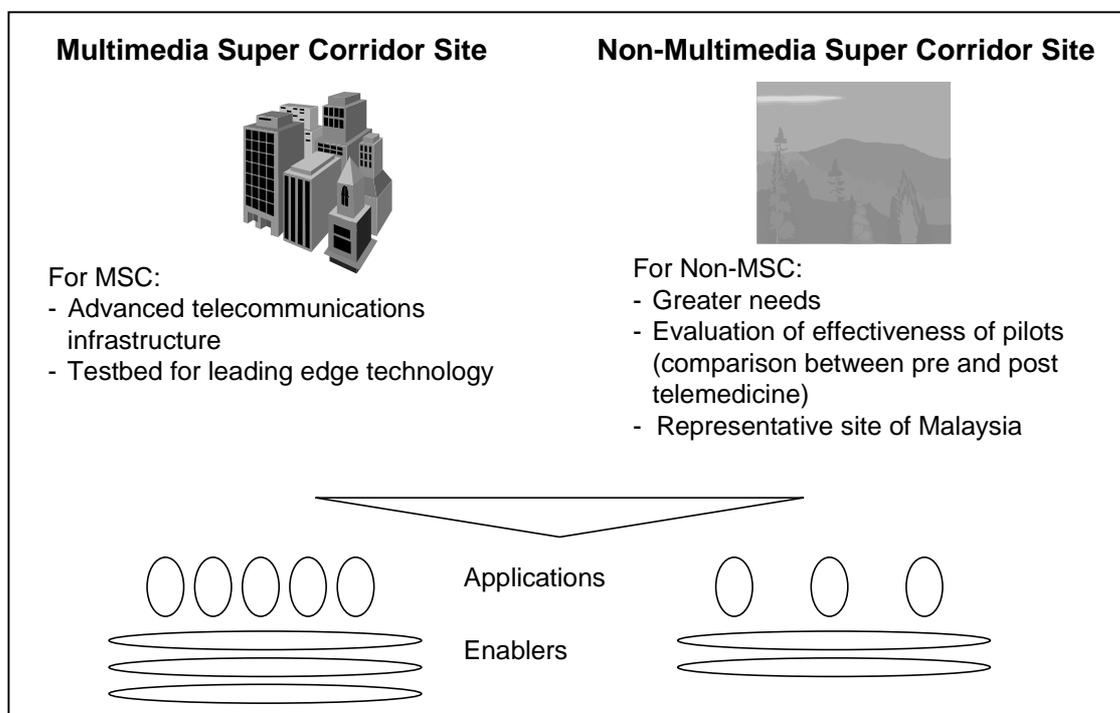


Figure 16 :. Overview of Pilot Site Selection

3.5.3 Application Expansion and Rollout

A major signpost on the implementation pathway is the directional indicator for expanding and rolling out the pilot applications.

In general, (and subject to the availability of supporting technology and infrastructure), the selected portfolio of telemedicine applications will be progressively implemented along three dimensions, once the initial projects have been established. The dimensions are

- Functionality and features of applications
- Number of programs or health disciplines involved
- Reach of program in terms of geography and user base.

The same approach will be adopted for all subsequent pilot applications. In terms of priorities, expansion will be predicated on need. Priority for rollout will be given to geographical outreach to overcome the tyranny of distance. It is essential that remote and rural communities benefit from telemedicine as close to home as possible and regardless of their physical location.

A schematic of the three dimensions for rollout is provided in the following figure.

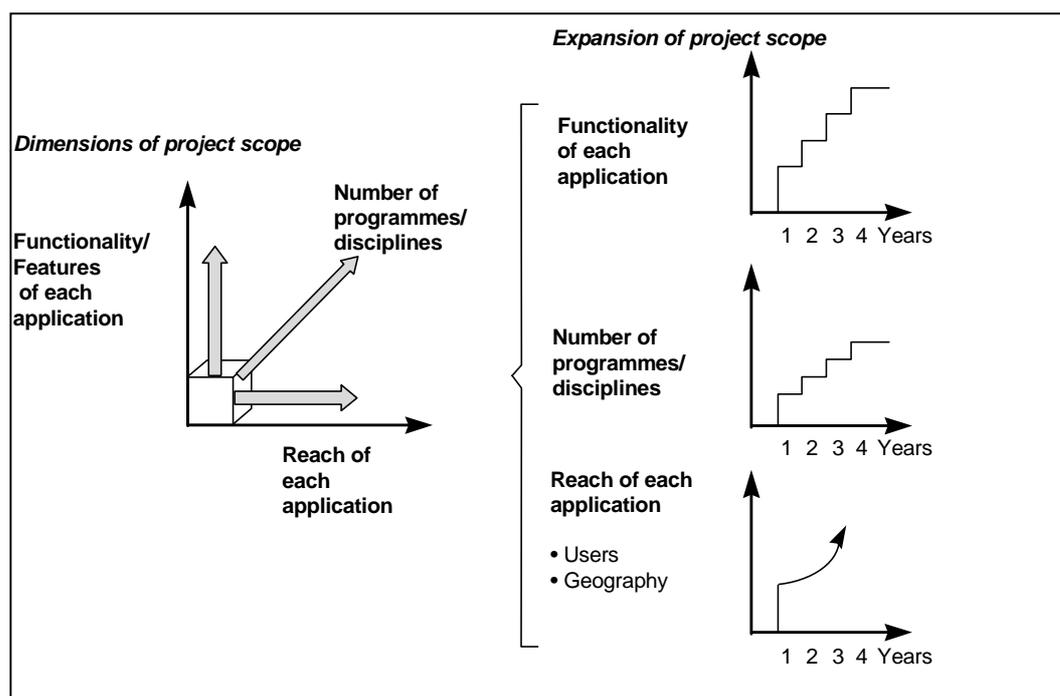


Figure 17: Implementation Approach - Dimensions of Expansion

3.5.4 Program Emphasis for Pilot Projects

The number of health programs that can be simultaneously addressed by a given pilot application will need to be limited initially. However, future expansion of the pilots, as discussed in the preceding section, will include enhancements based on additional program coverage, and this will form an important component of the rollout strategy.

Since the pilot applications have been selected and crafted to respond to the most pressing healthcare needs, an initial program emphasis has been established according to national mortality statistics. The Telemedicine pilot programmes and the rationale for their selection is shown in the table below.

Table 4 : Selected Telemedicine Programs

Principal causes of deaths (government hospitals) (1995)	Percent	Pilot Programmes
Cardio- and cerebro-vascular causes	26.18	Cardiovascular Health
Accidents	10.14	Injury Prevention and Management
Perinatal conditions	10.08	Antenatal and Perinatal Management
Neoplasms (cancer)	9.23	Cancer Prevention and Management

3.5.5 Technical Standards

A crucial signpost along the telemedicine implementation pathway provides directions for the adoption and common use of technical standards.

The Telemedicine Flagship Application uses the standards set by the Information Technology and Standards document of the Electronic Government Flagship Application.

In addition, there are a number of specific standards pertinent to the implementation of telemedicine; these have been defined in the *Telemedicine Standards* document. The main requirements are for the recognition and consistent use of standards concerning:

- Health Data Structure and Communication
- Medical Image Storage and Communication

The standards defined for telemedicine are internationally acknowledged and represent the current status of relevant de jure and de facto industry standards.

In a dynamic field like information technology, standards are constantly being developed or refined; consequently, progress in these areas must be monitored closely. Should prevailing standards be no longer relevant or preferred, new directions for the use of standards in implementing telemedicine will be furnished. Any alteration will seek to ensure that seamless integration, connectivity and interoperability are maintained.

The figure below shows the hierarchy of telemedicine standards in the context of electronic government policies and standards.

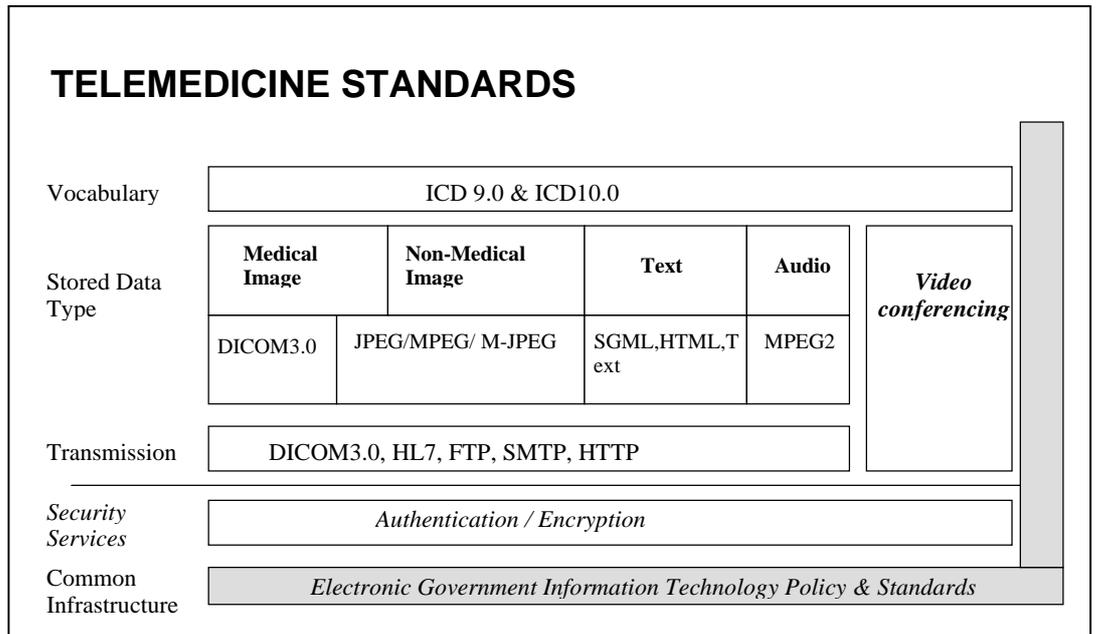


Figure 18 : Telemedicine Standards

CHAPTER 4: HEALTHCARE SYSTEM TRANSFORMATION ISSUES RELATED TO TELEMEDICINE

4.1 The Challenge of Transformation

Telemedicine has the potential to transform the healthcare system, making it more integrated, distributed and virtual. Telemedicine will profoundly effect how services are designed and delivered, how consumers interact with the system, how health professionals operate and the role, size and distribution of healthcare facilities. The challenges of repositioning the healthcare industry for the Information Age are formidable. The development of one of the most advanced healthcare systems in the world, where maximum leverage is obtained from new and emerging information and multimedia technologies, demands commitment and change-management skills of a high order.

At a planning and management level, the transformation process involves integrating and sequencing changes across a broad front. There are a significant number of challenges to be addressed, which include the following:

- ***Degree of change.*** A significant degree of change will be required to shift an industry traditionally focused on providers, facilities and illnesses to one that is focused on consumer empowerment and wellness, with a wide range of services distributed directly into people's homes.
- ***Speed of change.*** The most significant reshaping of the healthcare system in more than a century will occur over a relatively short period of time, as telemedicine is implemented, rolled out across the nation and linked internationally.
- ***Complexity of change.*** The health industry is an exceedingly complex and compartmentalised industry with wide variations in practices, organisational cultures and service integration.
- ***Number and type of stakeholders.*** The health system involves a large number of stakeholders who will be affected by the virtual delivery of health services, including all members of the health professions and every member of the population.
- ***Computer readiness.*** Attitudes towards information technologies and skill levels vary enormously among health industry personnel and the general community. To take full advantage of telemedicine, people will need to be able to interact with computers as naturally as they use a telephone.

These and other challenges require a comprehensive change-management approach to prepare the population and the healthcare industry to interact in a more consumer empowered, more integrated and more virtual healthcare system.

4.2 Approach to Transformation

The implementation and roll-out of telemedicine in Malaysia must be supported by a number of enabling strategies and activities that together will help bring about a quantum improvement in health service delivery and a boost to health outcomes. Accessibility, quality, resource efficiency and integration of services should all show measurable improvements.

A comprehensive change-management approach that integrates a number of enabling strategies and activities will be required at system, enterprise and project levels to ensure the effective implementation of telemedicine . This should address the following:

- ***Vision alignment.*** The healthcare system, including telemedicine, will need to align with and support national health vision and goals. Telemedicine must be seen in the context of the vision and the value it adds in achieving national health goals.
- ***Health system organisation.*** The organisation of health services will need to be re-examined and redesigned to promote wellness and ensure that services are effectively integrated, focused on the person and provided at home or as close to home as possible.
- ***Service model design and process reengineering.*** Service delivery models will need to be redesigned and processes re-engineered to maximise the benefits of investments in multimedia technologies. Telemedicine projects should utilise service models designed for achieving world-best practice performance in terms of access, quality and cost.
- ***People issues: change management, communication, training and development.*** Addressing the attitudes, habits and cultures/ behaviours focused on present healthcare delivery practices and preparing the general population and healthcare professionals for the major changes linked to telemedicine will require comprehensive communication and education/training strategies, particularly for people and healthcare professionals, who will need to operate in the new environment. Furthermore, this will entail training and developing personnel to operate effectively in a team-based, information-rich and multimedia-enabled working environment. As knowledge workers, health professionals will increasingly interact with each other and their clients/patients through multimedia networks. This alone will require a significant investment in training and technology.
- ***Healthcare financing.*** At a macro level the health financing system will need to promote efficiency and provide appropriate incentives to help achieve overall healthcare goals. At a project level, telemedicine projects should be cost effective either internally or achieve measurable savings elsewhere in the healthcare system.
- ***Enabling Framework.*** An enabling framework of appropriate laws, policies, regulations and standards will be required to underpin the transformation process and ensure the effective operation of virtual healthcare delivery.

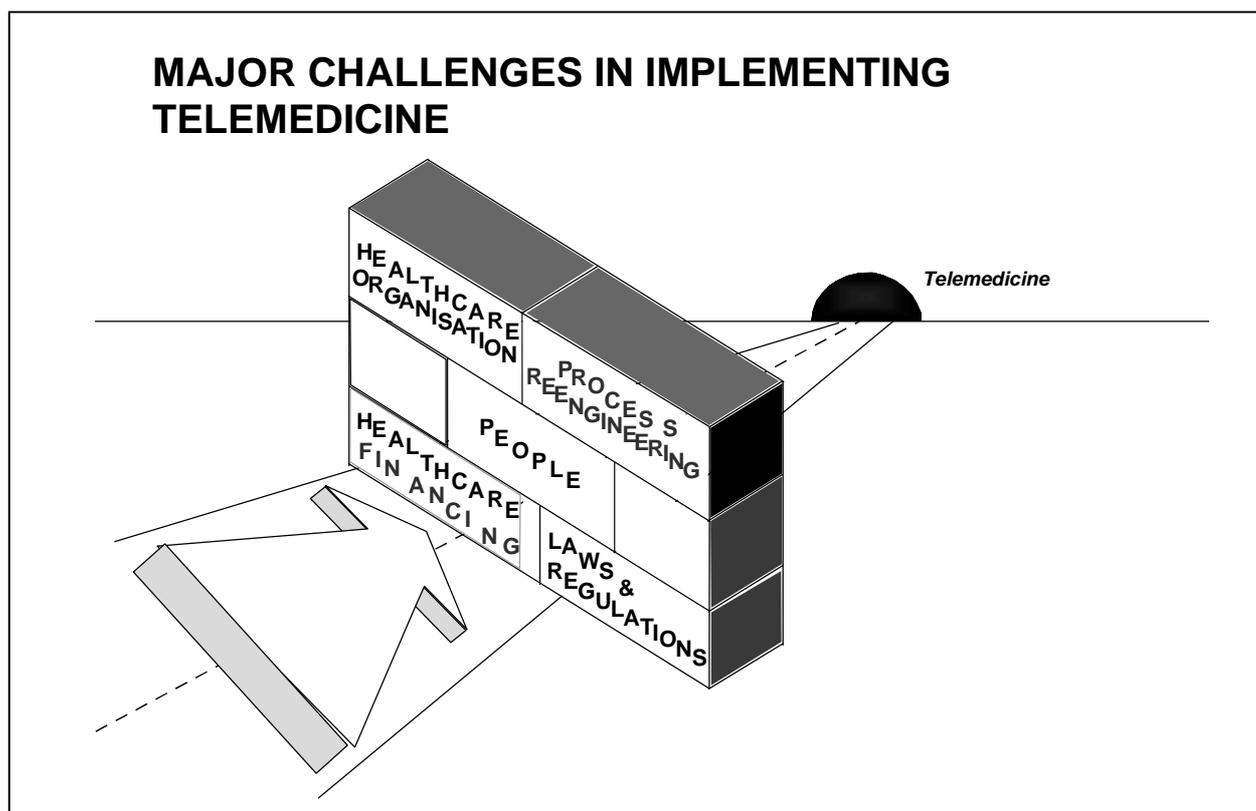


Figure 19 : To address the major challenges in transforming the healthcare system, a comprehensive change-management approach will need to be supported by an enabling framework of policies, laws, regulations and standards.

4.3 Healthcare Organisation

Malaysia's Telemedicine Flagship Application heralds an historic shift from physical to virtual, and facility-based to home- and community-based healthcare delivery. It also proposes an overriding emphasis on wellness and both personal and national risk management. New information and telecommunications technologies will allow healthcare providers to adopt a more virtual, more integrated and more distributed approach to the delivery of health services.

Yet the current healthcare system is structured and organised around physical, facility-based illness services whereby people go to hospitals or clinics when they are ill and receive direct physical services. The major portion of healthcare resources are consumed by the hospital sector in expensive interventions to treat illnesses, many of which are preventable. In addition, new treatment methods and technologies mean that many services provided in hospitals, including tertiary services, can now be appropriately and more cheaply provided to people in their homes or other care settings close to home.

The reorientation of provider organisations from treating illness episodes to supporting lifelong wellness and illness management raises significant issues and challenges. Provider organisations need to reorganise themselves to support the new healthcare paradigm and the realities of operating in the Information Age.

Providers will require structures in which

- **Services are designed and organised to promote wellness.** The current preponderance of illness services will change as wellness, prevention and early intervention programmes

and services expand and new services are created. The design of illness services will also have to change to be more person and wellness focused. Organisations and personnel with a wellness management function are expected to play an important role in the future healthcare system.

- ***Services are designed and organised to promote continuity.*** Providers must focus on long-term relationships with individuals, families and communities and ensure that their services are effectively integrated with other health and community services to promote seamless continuity of care and support throughout life. The role of health co-ordinators in helping to co-ordinate wellness and illness services for individuals and families requires consideration and could be undertaken by general medical practitioners, nurses or a new classification of healthcare professionals.
- ***Services are designed and organised to include the individual and family in decision-making roles.*** Consumers will be more empowered, more knowledgeable and have at their disposal powerful tools to help manage their own health. Their interests, inputs and role must be accommodated at an organisational and operational level.
- ***Services are provided by multidisciplinary teams.*** A range of professional skill sets are required to deliver healthcare and must be tailored and integrated to meet individual needs. From the consumer's perspective the correct mix of professional expertise should be provided when required. This requires personnel structures that are team based rather than professional (e.g., medical, nursing) based and that span hospital and community-care sectors.
- ***Services are designed around homes and communities.*** New technologies and treatment methods require a major reappraisal of care settings. Planning should involve redistributing to homes and community settings any health service that can more appropriately, effectively and efficiently be delivered to the home or community.
- ***Changing role for hospitals is defined.*** The design and deployment of healthcare facilities will change. Expertise and services that are currently only available in hospitals will increasingly be distributed to new care settings, and services suitable for being delivered virtually will be available directly in people's homes. As home and community services and virtual services expand, hospitals will become smaller, more technological and more integrated with the rest of the healthcare system. Distributed facilities such as polyclinics and medihotels/community care centres will play an increasing role in the healthcare system. Hospitals will continue as an essential component of the healthcare system; however, only patients who need the resources of a hospital will be admitted and the length of stay will continue to fall. Improvements in health status resulting from the wellness approach will also reduce the need for acute hospital services, while aged care services will expand. The internal operations of hospitals must be restructured and redesigned to be more patient focused, wellness orientated and integrated with the rest of the healthcare system if they are to promote continuity of care.
- ***Healthcare personnel are efficiently organised, utilised and developed.*** The future healthcare system will require a re-examination of the organisation, role and deployment of healthcare personnel. Personnel will be working in an information technology-rich environment across a range of healthcare settings in integrated teams. Greater expert support, skill development and education will be available for front-line staff with the potential to broaden and raise their skill level. The virtual delivery of healthcare will enable many health professionals to work from home and the distribution of physical services to homes and community settings will result in jobs growth in the community sector. Healthcare organisations must be structured to accommodate the dynamic reshaping of the workforce that is occurring in all professional service industries.

To meet these organisational challenges, many provider organisations will have to reinvent themselves and align their structure and systems to survive and prosper in the Information Age. Visionary organisations and firms that commit the necessary organisational infrastructure to achieve the overall vision will provide leadership to the healthcare system as a whole. New entrants will also assist in seeding innovation and creating new business approaches.

The implementation and rollout of telemedicine requires a strong organisational infrastructure to ensure its success overall, as well as on a project-by-project basis. However, telemedicine must be seen in the context of the organisation of healthcare as a whole. Telemedicine is an integral part of Malaysia's future healthcare system and will not be separately structured and organised. Malaysia's vision to be at the forefront of healthcare delivery by 2020 will require all provider organisations to examine their structures and processes and reorganise to provide outstanding healthcare.

4.4 Health Model Design and Process Reengineering

Malaysia's Vision 2020 requires the design and building of a healthcare delivery system which is recognised as one of the world's best. This will require considerable up front design effort to ensure that future healthcare services and products meet or exceed international best practice benchmarks. Design effort should ideally precede the application of information technology solutions in order to maximise the benefits of technology investments. It also serves to focus providers on services and people rather than technology.

Global trends, competitive forces, regulatory and accreditation requirements will require healthcare providers to compare and benchmark their activities and performance against other providers in Malaysia and internationally. In meeting the expectations of an increasingly well informed and empowered population, healthcare providers will need to examine existing models of healthcare delivery, scan for world leading examples of new models and the design or redesign accordingly. New models of healthcare delivery should incorporate the world's best but be tailor-made and developed locally to reflect local needs and circumstances.

4.4.1 Design Principles

Healthcare models should be designed to achieve maximum benefit and adopt innovative and efficient approaches to improving service delivery. Key principles in health model design include

- ***Consumer at the centre of activities.*** The design process should place the consumer at the centre of all activities and processes.
- ***Services closer to consumer.*** Services should be brought as close to the person as possible.
- ***Redesigning/re-engineering processes.*** Processes should be redesigned/reengineered to simplify and improve the quality and efficiency of service delivery.
- ***Providing immediate information.*** Person-specific and back-up information should be available whenever services are required.
- ***Designing from a consumer's perspective.*** Services, access tools and delivery points should be designed from a consumer's perspective.

4.4.2 Process Reengineering

In the design of new service delivery models, process re-engineering will be essential for achieving best-practice outcomes, and it will be the basis for applying information technology solutions. Processes must be designed to be as effective and efficient as possible in order to maximise benefits from investments in new technologies.

In relation to telemedicine, process re-engineering should address:

- Identifying core processes essential to the efficient and effective delivery of the service.
- Examining processes from the point of view of effectiveness (i.e., does the process achieve what it is meant to achieve), quality (i.e., at what level of quality) and efficiency (i.e., in use of time and resources).
- Streamlining, restructuring or reinventing processes to maximise effectiveness, quality and efficiency by methods that may include reducing the number of steps involved, improving scheduling and reducing the number of personnel involved.
- Identifying technologies, systems and other enablers, including information technologies, that help simplify, automate and deliver the re-engineered processes.
- Integrating and implementing, where appropriate, a range of re-engineered processes to achieve best-practice delivery of services.

4.5 People Issues: Change Management, Communication, Training and Development

The major focus of change management is people. The transformation of healthcare using multimedia will dramatically reshape the work environment and the way professionals and consumers interact in the delivery of services. The key issues and challenges include

- ***Creating a more empowered environment for both consumers and professionals.*** As people become more informed and empowered, their relationships with professionals will change, becoming partners in the healthcare process. Professionals will operate in self-directed teams and hierarchical organisational structures for the delivery of healthcare will diminish.
- ***Involving people in the change process.*** At a community and health-organisation level, people will need to be engaged in the transformation process. This involves ensuring people are aware of the overall vision and the key role that telemedicine will play in the future delivery of healthcare. People should be involved in planning and re-engineering processes associated with telemedicine and structures must be established to ensure both consumer and professional input.
- ***Communicating change.*** Appropriate communication structures and processes will be required to ensure the general community and health professionals are fully informed of the overall direction and progress of telemedicine and the transformation of healthcare. A well-conceived and well-planned communication strategy to support the change programs should be

- *Designed to help achieve national and project goals.* Tailored to address national and project-level issues and perceptions, the plan should aim to “sell the vision” of telemedicine and garner individual, community and national support.
- *Sensitive to cultural context.* Cognisant of the transformational change expected of the healthcare community, the plan should include special recognition for the cultural a situational context and ensure the benefits to individuals and communities are appreciated and championed.
- *Appropriately structured to consider communication networks.* Where possible, communication should utilise appropriate network structures to disseminate information on a timely basis.
- *Training Programmes.* Major investment in training programmes for health professionals will be required to ensure personnel can effectively operate in a knowledge-rich, multimedia-enabled working environment. As well as multimedia computer training, personnel may need to be trained for new roles, to undertake new processes and to operate within new team-based structures. For members of the community, the gradual shift towards healthcare accessible and delivered to the home, will require knowledge of and training in the use of Lifetime Health Plans, health knowledge databases and accessing services, as well as the general use of computers.

4.6 Health Financing Issues

4.6.1 Macro Financing

The widespread reshaping of the healthcare system and rollout of telemedicine must take into account the potential impact on the cost of services delivered. Malaysia is determined to extract the maximum value out of current and planned healthcare expenditures, including investments in telemedicine.

The new wellness-oriented healthcare system will be ideally supported by a risk-management approach to healthcare financing. This should incorporate funding structures and incentives that promote effective health and illness management and appropriate utilisation of services.

As well as providing substantial benefits, telemedicine will place new demands on the healthcare system, as services become more readily available. The focus of cost management will be on ensuring that access to and delivery of services is appropriate, i.e., the right services are provided the right way at the right time. At a macro level the changes to the healthcare system will be considered in a national cost-benefit context, taking into account the overall health benefits and costs associated with a national lifetime risk-management approach to healthcare.

Some of the cost issues include

- The cost-benefit of enhanced health promotion, disease prevention and early intervention provided by telemedicine.
- The cost-benefit of increased availability and utilisation of healthcare services in the community.
- The effect of telemedicine on the cost, type, size and distribution of healthcare facilities.

- Resource allocation/reallocation required to achieve widespread implementation of telemedicine.
- Cost of initial increased demand for services or catch-up in underserved groups.
- Finance or insurance products linked to improved health management provided by telemedicine.

4.6.2 Business Models

Business models need to support the overall vision and goals of Malaysia's healthcare system, improving health outcomes while enhancing access, quality, efficiency and integration of health services. They should support a lifetime wellness risk-management approach that aims to boost health outcomes while containing overall healthcare costs. Innovative solutions that are seen as adding value and affordable are encouraged, especially where they accelerate the achievement of the vision.

Business models must also respond to healthcare needs especially in underserved groups and communities. They must also ensure that service provision remains appropriate to need and not result in over utilisation of existing or new services.

4.7 Laws and Regulations

Appropriate laws and regulations have been developed to support telemedicine (e.g., Telemedicine Act, Digital Signature/Contract Act, Computer Crime Act, Multimedia Intellectual Property Act, Electronic Government Act) while protecting the rights of individuals.

They may need modification from time to time to ensure relevancy to developments in this area.

Conclusion

Malaysia aims to become a world leader in Information Age healthcare. The Government will build on its visionary approach to delivering high-quality healthcare services and continuously enhance the country's ability to develop innovative, cutting-edge multimedia solutions, by creating and maintaining a virtual Centre of Excellence in Telemedicine under the auspices of the Ministry of Health.

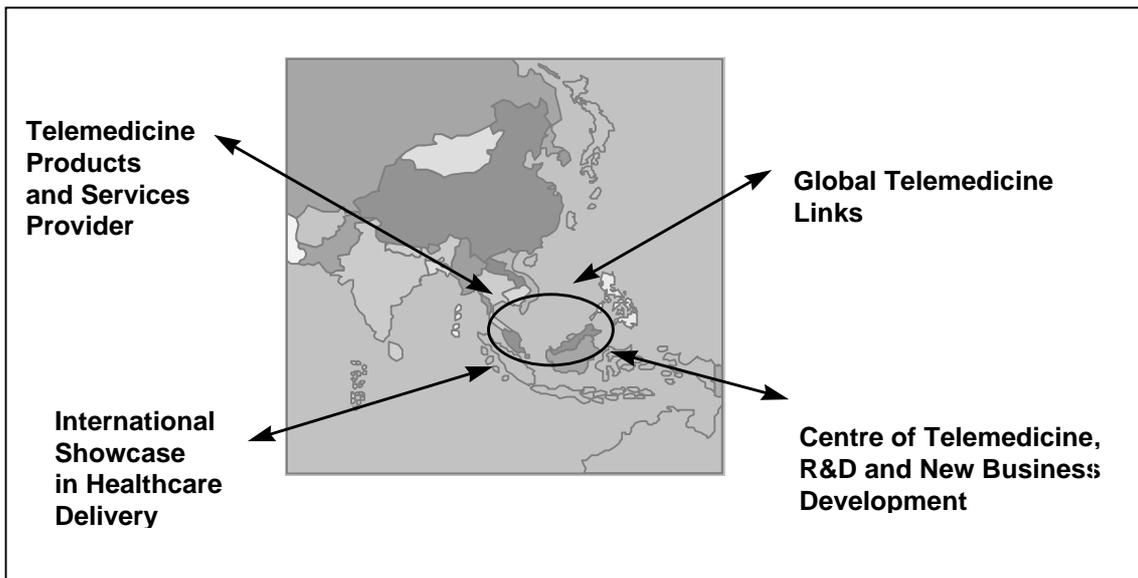


Figure 20: Malaysia as a Centre of Excellence