(Draft)

An APEC-Wide Foresight Project

Converging Technologies to Combat Emerging Infectious Diseases

Phase 1

Report of the Scenario Workshop

Khaolak Merlin Resort, Phang-Nga, Thailand

5-7 February 2007

http://www.apecforesight.org

1 Background

Emerging and re-emerging infectious diseases is high on the agenda of APEC, as stated in the 2005 Leaders Declaration regarding Influenza Pandemic preparedness. For APEC to have sufficient preparedness, all control options - pharmaceutical or non-pharmaceutical, must be considered and fully explored. In most cases these options require new technological developments and/or convergence between existing technologies.

This project aims to enhance the region's capacity in using converging technologies, i.e. two or more disparate technologies or disciplines that come together, to contribute to the prevention and management of emerging infectious diseases that could become widespread in the APEC region. In the first stage (self-funded, to be conducted in 2006) the project had identified a group of converging technologies by using "preforesight study and an online questionnaire" and scenario planning. Then in the second stage (to request additional funding from APEC), through workshops in Japan and Chinese Taipei in 2007, it will invite experts in various technological areas throughout APEC to jointly build roadmaps of these technologies. Since technologies usually take time to develop, this participatory process will stimulate immediate action needed to be taken today, and guide future collaboration in the region towards the next decade, in the perpetual combat against diseases.

The final output, the technology roadmaps, will provide specific recommendations for governments of member economies, the academia, and the industry to cooperate and respond to the region's urgent need in not only short term but medium to longer term. Particular attention will be given to providing of clear guidance (with performance measures and targets) for technological and human capacity building in developing members of APEC, where infectious diseases are prevalent and resource is scarce. The expected outcome is for APEC to maintain long term security through practical solutions in managing infectious diseases and bioterrorism. The APEC Health Task Force is already informed of this project and close exchange is established.

2. Conduct of the Study

This study is the first stage of the APEC wide project on Roadmapping Converging Technologies to Combat Emerging Infectious Diseases, which includes the preforesight study and online questionnaire and Scenario planning. The former part will be discussed in the session 3. The Scenario planning was conducted as workshop, where the workshop was held at Phang Nga in Thailand from 5-7 February, 2007.

33 participants from 7 economies heard presentations of the invited speakers on the current situation of EID and potential emerging technologies to combat the EID. Participants then expressed their views in a Roundtable discussion. Following this, the scenario planning technique was used to create four scenarios for Emerging Infectious Diseases in 2017. The opportunities of technology applications in combating EID were then discussed which provide the linking of the outcomes of the scenario planning to Phase 2 of the project involving technology roadmapping. The full details of scenario planning workshop will be reported in session 4.

3. Pre foresight study and Online Questionnaire

Two months before the Scenario Workshop at Phang Nga a "technology applications to combat EID" online questionnaire was mounted on the APEC CTF website to encourage potential participants to express their views. The questionnaire was derived from three

sources. They were bibliometric analysis study ran by NISTEP Japan, bibliometric analysis study ran by NECTEC and the Center and finally the literature reviews on UK Foresight on Infectious Diseases: preparing for the future. The objectives of this study were to share the result of bibliometric analysis to experts in APEC economies, to confirm the results of bibliometric analysis and to learn more about on going research projects related to EID from APEC economies. Based on the three studies, three research domains related to combating EID were identified as:

1. Bioterrorism&Surveillance System
2. Earth and Climate Observation
3. Detection, Diagnosis, and Identification

There are a few technology applications corresponding to each domain. In order to develop the technology applications, potential technologies are needed. This online questionnaire asked respondents to vote for level of impact of each technology application follows with level of technology readiness and technology relevant for each potential technology. Finally, respondents were encouraged to identify additional potential technologies, additional technology applications or comment on the overall process.

In total, there were 21 respondents from 6 economies. The following is the brief survey result for each research domain. Each list contains technology applications sorted by the potential impact of the applications on APEC member economies in preventing or managing emerging infectious diseases. [The full result can be found in http://www.apecforesight.org/apec_wide/EID/eid_scenario_workshop.cfm]

1) Bioterrorism&Surveillance System

1.1) To have a global outbreak alert and response network
1.2) To monitor prediagnostic health-related data for early detection of outbreaks. (Public health surveillance technology)
1.3) To Support public health analysis in interpreting surveillance data and identifying disease outbreaks
1.4) To estimate impact of attack
1.5) To control airborne pathogens.

2) Earth and Climate Observation

2.1) To improve understanding and accuracy of planning, prevention and prediction of outbreaks
2.2) To have an early warning system based on seasonal forecasting models
2.3) To improve tagging of animals in order to assist with monitoring and management of animal movements
2.4) To improve geographical data

3) Detection, Diagnosis, and Identification

3.1) To have a rapid and sensitive real-time diagnosis for infectious diseases
3.2) To share large databases for disease I.D.
3.3) To have rapid, cheap and precise method to identify pathogens or chemical agents
3.4) Portable detection system
3.5) Mobile system for non-invasive unobtrusive and fast screening

3.6) To identify diseases caused by previously unknown pathogens and thus may be of use in rapidly choosing the most effective therapy
3.7) To interpret genome data using GIS
3.8) To detect and to classify microorganisms according to the volatile gases given off during metabolism (Electronic nose)

Scenario-Based Futures

Scenario planning is a way of envisaging what the future might hold for a particular economy, industry sector or organization for a period of 10-20 years ahead. Rather than using projections from past trends as a forecast, scenario planning attempts to develop internally consistent stories about possible futures. It recognizes that the future is complex, uncertain and ambiguous. The essence of scenarios is that they: represent possible alternative futures; allow for qualitative perspectives; allow for discontinuities; allow us to develop new insights; enable us to express multiple views on complex events through stories; and enable us to develop strategies to deal with change.

The technique follows a systematic series of steps. The full scenario program is given at the Appendix A. On the first day, after participants attended presentation sessions in the morning and early afternoon, participants were divided into four groups and worked in these throughout the process. Each group had approximately ten members of 6-7 experts from different background including two facilitators and one note taker.

Every group were asked to identified the key drivers and trends that relate to emerging infectious diseases using a classification called STEEP-social, technological, economic, environmental and political. The groups also classified uncertainties, which can be obtained either from wildcard event or trends that the participants were not certain in its likelihood (i.e. lack of basis to predict their occurrence) and/or impact.

The first day of the workshop ended with lists of drivers, trends and uncertainties. The facilitators and note takers. Uncertainties and the lists of drivers were subsequently used as inputs (scenario logics) for the four groups to create their scenarios. The groups spent the second day to develop scenario, including presenting their scenario to other groups. The scenarios took various forms as seen below.

Based on the scenarios derived in each group, participants identified potential technology applications that will prevent or reduce impact of crisis in each scenario.

Key Drivers for Emerging Infectious Diseases

Social

- Health concern for everyone
- Increasing population
- Urbanization
- Gap of Knowledge Sharing

Technology

- Complexity of transportation
- Nanotechnology
- Genetic modification
- Event Tracking

Economics

- Free Trade Agreement
- Sufficient economy
- Rich poor gap

Environment

- Climate change
- Vector patterns changes
- Land use change

- Wild life – Changes of wild life consumption But pet trades will increase

Politics

- Terrorism
- Patent in developed countries, incubate for developing countries
- Wrong policy

Uncertainties

- Massive Natural disasters such as massive volcanoes, earthquakes, etc.
- Global securities (man-made diasters, alien species/ breakthrough tech.)
- Local/Global panic
- Urbanization: increase, Economic crisis
- Gap of Knowledge sharing
- Unpredicted/unplanned technologies

Scenario from Group 1 "Malaria in Miami 2017"

A family arrives in Miami from tropical Latin America. A family member, a little girl, was infected with an unknown strain of Malaria. She was bitten by competent mosquitoes. There is no experience or history of treating this disease in Miami so disease spreads. Some deaths occur; no treatment available social unrest begins.

As the global carbon economy continues unchecked, global warming accelerates. Rising sea level creates "environment refugees" into Florida. Rainfall patterns change with Florida's climate becoming tropical. Inundation (flooding) of low lying land causes insect vectors to increase more severe storms occur and the hurricane season is extended resulting in a category 5 hurricane hitting Miami on the New Year' s Eve.

A human smuggling develops to bring people from endemic drug-resistant malarial areas in Latin America through the Everglade swamps to Miami. Endemic malaria develops in swamps around Miami. A bad hurricane season leads to an increase in malaria – carrying mosquitoes. Sea levels rising push populations into swampy areas. Finally, a major category 5 hurricane destroys transportation and public services in Florida, loss of infrastructure – no mosquito control over many months. Drug-resistant malaria erupts in Miami. Food and water scarcity along with public violence disrupts access to care. Refugees are leaving infected region and carrying disease beyond Florida.

As the malaria pandemic progress, children are more vulnerable to infection. Government is requested to take urgent interventions.

Preventions

- Try to get people not to live in swampy areas
- Attempt to discover non-toxic mosquito control methods
- Establish an emergency mosquitoes (or insect) controlled program
- Prevent global warming – start global carbon trading – forest plants
- Develop genetic modification for controlling insects/ pathogens
- Pursue more new clean/green alternatives energies

Monitoring

- Develop a better method to identify malaria in mosquitoes' populations – eg. Using breaking technology – put fire fly gene into parasite so mosquitoes would get luminescent once they carry malaria diseases
- Develop a robust disease surveillance infrastructure
- Develop smart and portable devices for malaria detections/ diagnosis
- Monitor drug resistance for many disease
- Use GIS to analyze the correlation between rainfall and mosquitoes population.

Tracking

- Track people who caught the diseases (where, what they have done)
- Track climate changes
- Tack the vectors
- Track geographic areas that has been treating

Containment

- Isolate infected people and provide a proper treatment
- Provide public education
- Establish an efficient disease management (train/distribute (assign) right people to do right places) Manage people, who are doing the work, keep track of what they are doing
- Globally distribute sufficient information
- Implement emergency response plans

Scenario from Group 2 "20,000 People Now Confirmed Dead from Mystery Disease"

Over the last 2 weeks, 20,000 people in Bangkok have been reported dead from a mystery disease and more than 50000 sick. The resulting chaos has been the worst in the history of Thailand. Hospitals are overwhelmed with people claiming to be sick and doctors are overstressed dealing with patients at home. The economic consequences are severe with businesses unable to operate due to lack of staff while transport system are erratic and fuel supplies are limited. Tourism has plummeted and retailers are facing bankruptcy. Everyone is beginning to stockpile food, water and medicine.

Large numbers of birds have also been found dead throughout the city of Bangkok. Experts speculate that there could a link to the dead ducks found in an intensive production facility located 50 Km away from Bangkok. Last month, at this facility about 1000 ducks died. Disease investigation determined that the ducks were infected with duck plaque. However, sample collected from dead birds in Bangkok were submitted to the National Institute of Animal Health and scientists have confirmed that these birds were infected with a novel flavivirus (transmitted by mosquitoes). Subsequently, testing of stored samples from the dead ducks confirmed that these were also infected with the same flavivirus.

Scientists have speculated that this flavivirus might have emerged in the large intensive duck production facility where genetically modified ducks had been specifically bred to be resistant to H5N1 virus. This breed of ducks might be particularly susceptible to flavivirus infection. At the time that breeding avian flu virus resistant ducks was first proposed, there was significant debate in the scientific and general community. Commercial pressure coupled with an overwhelming desire to avoid continuing H5N1 outbreaks finally convinced the government to approve the production of the genetically modified ducks.

Over the last 5 years, the city's population has been growing very rapidly. The water supply system has been stretched in recent years with the recent population growth. Last month, when the major water supply system failed, people started to store water for their households using a wide range of collection methods. The public health department had warned people to keep their water in covered storage to prevent the reproduction of mosquitoes. However, a large number of people ignored such warnings, and it has been speculated that those new to the city kept water in jars even after the public water supply was restored.

The Royal Thai Government has declared a state of emergency and the armed forces are controlling population movement as people flee the city in panic. Education of schoolchildren is being continued by TV and a mosquito control program is underway. A spokeman said "we are confident that the situation is under control."

Back-casting	*Intervention*
2007	
- Urbanization	- UNDP held international **workshop to address urbanization issue**. As result of this workshop, Thailand resolved to **increase education services** and **rural community to the same standard as the city by 2010** and **increase economic development funding** to the top-ten most populous provinces. - Thailand recognized that migration to the city might slow but would still continue and consequently, instituted an education program for those newly settled in the city. This included **training related to health risk associated with urban living.**
2008	
- Changing production systems to larger facility and relatively closer to the city	
2009	
- Continuing **outbreak of H5N1**	- **Expert review of production system** of poultry and duck and decision to develop genetically modified duck.
	- mandate **monitoring system** `(need data collection & management)
- **GM duck program launched**	- deploy technology for **rapid detection** devices
2012	
- Outbreak of **H5N1 still continues**	- Establish the **National Management Plan for EID** * surveillance plan * containment plan * prevention plan
2013	
- Major drought stimulates movement to city	- **Investment in water supply** infrastructure
2017	
- Failure of city water supply	

Scenario from group 3.

At the third week of October 2017, "Mysterious death" was the headline news on television in almost every country around the world. In a Larry King show, an APEC advisor was interviewed, where he explained that there are roughly 5,000 people being infected by the virus. Within this group there are 20% mortality, 60% are critically ill, 10-20% recovery. The death rate is low because it is thermosensitive and only become virulent under hot climate. The real time International Press Conference via Holographic teleconference supported by IBM was held on 22 November 2017. Four scientists from France, Thailand, Canada and Taiwan were on the lines and provided us about the technical part that they are working on to combat the disease.

The truth was revealed that the virus is called "Archaea virus". Origin of the virus is from animal in Jurassic period. Due to the global warming, the Greenland ice is melting. The Archaea virus is soon brought back to life. Some animals carry the virus and infected local native and create local epidemic. 2-3 Natives in Greenland infected by melted Jurassic Virus. The "Jurassic Virus" has been circulated in the native population through rodents which act as the reservoir and vector and infected people

When the expeditions study the soil and archaeology in Greenland, they released the Jurassic virus from Greenland. The scientists who travel to Greenland get infected, with no symptom at the beginning. The virus mutated to human-human transmission. In a big International conference on Biotechnology in Paris, the infected scientists spread to his colleagues at the conference over dinner. The scientist visit then infected from human-human transmission. Scientists go home to the big city and spread the disease. Pandemic soon happens.

All kind of science technology has been put to use to stop the virus. One year later at the late Larry King show, Scientists were interviewed. They revealed that the situation of the disease now under control and vaccine is available.

Scenario Group 4 “Emerging Rainforest Syndrome (RFS)”

- RFS Contained

In 2009, epidemiology with 600 died and a mortality rate of 30% occurred in 10 countries without knowing solid reasons. After tracing back to 2007, we found that there was a scientific meeting in a rainforest country. At that time, there were 20 cases found of an unknown illness showing cold-like symptoms followed by flu-like symptoms such as chills and arches, but then severe gastrointestinal distress, leading to death in 20% of the afflicted patients within 2 weeks. People who survived transmitted the disease, which was named Rainforest Syndrome in 2009. Scientists successfully isolated pathogens in 2010 with the establishment of international committee to combat rainforest syndrome (ICCRES) in 2009. The ICCRFS started to educate people and give recommendations as well as warnings. These included the recommendations for avoiding development that disturbed the rainforest ecological system and brought people in contact with the yet-unidentified vectors. Vectors and reservoir involved in spreading to human (bats to intermediate rodents, then airborne) were also successfully isolated. In 2013, ICCRFS finds vaccine and antiviral and then establishes vaccination policy in 2015. In 2017, there is a report showing zero cases in past 6 months investigation with a mortality rate of 3%.

- RFS #1 Public Health Problem

Lack of information sharing leads to epidemiology delayed until 2011, with result that more than 10000 people died. While international meetings were held, no international committee was established and the recommendations of the meetings, which were voluntary to follow, were not heeded, so that the disease continued unabated. Technical measures were unsuccessful as well. The virus mutated so rapidly that even though one genotype was isolated, others increased in virulence. There was no diagnostic, no antiviral, no vaccine, and no measures to prevent people from contact with the vectors. The result was that in 2017, Rainforest Syndrome became the # 1 global public health problems.

Lists of technology applications from each group that will reduce impact of crisis

Group 1

Drivers	Technology	Evolution	Strategy	Outcome
Insect control	Bio control-DNA Chemical – ID chemical Modified insect – DNA technology Physical-trapping			-Microarray control -Nontoxic chemical -sterile insect -new traps
Detection Diagnostics	Micro/nano array Molecular tech portable Networked			Rapid diagnosis -people -wildlife -insects
Treatment	Drug design+delivery Vaccine DNA/proteomics		Delivery	Effective treatment
Monitoring/ Surveillance	Field tests networked Data collection+ management real time info	Tracking -spatial – GIS -climate -vegetation		Vectors, People Insect control
Info/Comm Infrastructure	Data collection Storage, management, Sharing, communication	→ portable		Awareness, alerts Decisions and control
Tracking people	Mobile phone tracking?			Id potential infected people

Group 2

Event/Timeline	Tech	Tech evolution	Strategy	Expected results
2009 Continuing outbreak of H5N1	- Micro array	Commercial product	Systematic detection and characterization	Rapid and reliable detection
	- Data sharing	Commercial product	More rapid response	Reduction of losses and elimination of virus
2009 Introduction of GM duck	- Molecular biology	Research → application (3 years)	Change duck genotype	H5N1 resistant ducks
2009 Independent monitoring of production system	- Micro arrays - Implantable diagnostics - Data collection	Commercial product	Monitor for early warning of problems	Early response to changes
2012 National Management Plan for EID • surveillance • containment • prevention	- diagnostics - Modeling - Data banks - Bioinformatics - Spatial data - Vaccine development	Developing tech	Early warning	Rapid response + small losses (in term of the national plan)
2013 Water supply investment	Nanofilter	Commercial product	Better water supply	Elimination of mosquitoes and transmission

Group 3

Event /Time line	Tech	Tech evolution	Strategy	Expected results
	Conventional Drug Discovery	Systems *in silico* simulation	-inexpensive (cheap) genotyping of human genome -Biobank database -Bypass or shorten clinical trial -International Clinical committee (Buffer)	-Vaccine -drug synthesis based on protein 3D structure modeling *in silico* -toxicity -immunogenicity
	Simple thermographical scanner	Quarantine/containment technology		- total vital sign analysis - personalysed, wearable or implanted device with genotypic information of full genome
	Genotyping characterization (1 week)			- Quick and cheap genotyping (2 hours) - Characterization (1/2 day)
	Microarray laboratory based			- Portable nanoarray point of care?? p.o.c. connected to database automatically
	Primitive model		Metrology, disease specific , epidemiological parameters (incubation period, mode of transmission), geographical/ population info, Hap map	- computer simulation of the disease spread pattern (epidemiology model)

Group 4

	Development	Year
1. BIO NANO array for fast id [isolate→ diagnostic] Advance in micro-fluidic device, Advance in genetic sequencing, Advance in lab on a chip experiments	S&D	2010-12 (likely)
2. networked info system countries sign up for info sharing, using 2007 technologies: evolution (based on HL7 RIM → evolution and improvement)	S&D	2008 (possible)
3. computerized modeling of spread (epidemiology in this scenario uses current methods)	PM-S&D-(Tr, PoS)	2009 (possible later in time)
4. personalized medicine advance in pharmaceutics computerised drug design advance in accuracy of model virus and evolution and regulatory approval in drug design nano delivery of drugs, evolution of 2007 to encapsulate drug (increase solubility and bioactivity) molecular medicine, Cell-based vaccine development advance in genetic engineering of virus and antiviral material	Tr	2015 (possible) (likely) (likely) (likely)
5 fabric coatings, Biocide, Nano-Ag for wound dressing new nanoscale material effective against RFS virus (Biomaterial Testing program from 2009) coating fabric uses 2007 technologies.	PoS	2013 (likely)

The previous four tables indicate potential technology applications that will potentially reduce impacts of EID for each scenario. They can be summarized and grouped into three main research domains as follows:

Research domain	Technology applications
Ubiquitous	• Field tests networked • Data collection (real time) • Data mining • Mobile phone tracking • Data sharing • Modelling • Bioinformatics • Network info system countries sign up for info sharing
Treatment	• Drug design • Delivery vaccine • Vaccine development • Personalised medicine advance in pharmaceutics • Nano delivery of drugs • Molecular medicine, Cell-based vaccine development advance in genetic engineering of virus and antiviral material • Conventional Drug Discovery
Diagnostic kits	• Micro/Nano array molecular • Implantable diagnostics • Simple thermographical scanner • Genotyping characterization • Advance in micro-fluidic device • Advance in genetic sequencing • Advance in lab on a chip

Discussions, Conclusions and Further Thoughts:

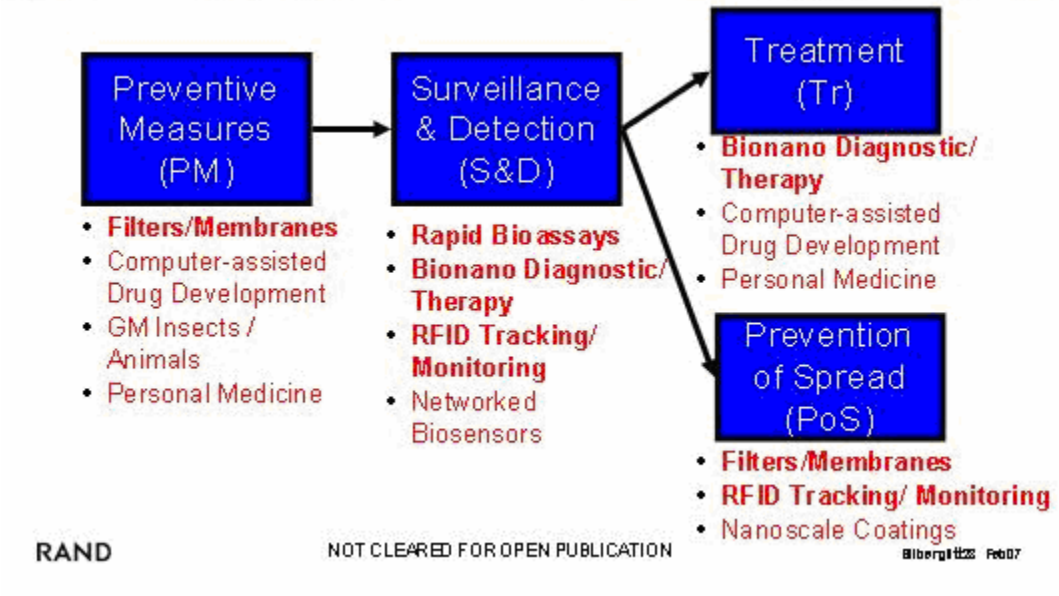
These four scenarios reflect the fact that many global trends have high impact on emerging infectious diseases. For example, climate change will have both direct and indirect impact on EID. It increases chances for having new diseases. Climate change also leads to other natural disasters, for example global warming, hurricane, floods which potentially cause emergence or re-emergence of infectious diseases. People move around a lot more than in the past due to migration, tourism, etc. This trend makes diseases to spread quicker, since people interact/contact with both people and animal more. Cities are expanding (urbanization); people will need more land, more food, which will force people to stay in inhabitant area and increase the chance for diseases to pass from animal to human. However, new technologies tend to intervene and reduce impact of the EID,

When there is an outbreak, there will be many incidents to lead to global panic and chaos, for example, water supply shortage in big city, which can lead to many more problems including infectious disease (Emerging Issues in Water and Infectious Disease, WHO). Consequently, there will be impacts on both global and local business and economic.

Even though there are many evidence to support that the global trends do exist and have high impact on EID (Emerging Infectious Diseases in South East Asia: Research Priorities), but there are opportunities we can prevent or reduce impacts of emerging infectious diseases as follows:

- There should be policy to control where people should/should not stay (zoning), to prevent people to live or involve in inhabitant area (reduce the chance of human contacted with animal).
- Global warming plays an important role in driving emerging infectious diseases. To reduce the impact of global warming includes using new clean/green alternatives energies, integrating health surveillance into ecological monitoring programs and restoration of forests and wetlands should reduce impact of global warming.
- There are three-key solutions to combat emerging infectious diseases.
  - Improvement of surveillance system, response capability and Public health services.
  - Drugs and vaccines development, including to understand drug resistance mechanism used by pathogens in order to develop new strategies to overcome microbial mutation.
  - Smart portable devices for detections/diagnosis and greater provision of Clinical care
- Many diseases spread quickly because people do not know how to treat with diseases. Hence, to provide public education, global alert system including to implement emergency response plans will reduce the impact of emerging infectious diseases (Knowledge Management and Health, WHO http://www.who.int/kms/en/).
- Big cities will be vulnerable and plausible to be chaotic when there is pandemics, therefore basic infrastructure, hospitals, etc. should be well prepared.

- Due to the globalisation, people travel more and there should be a system to track people. Mobile phone system may provide a solution, in which this may lead to new business opportunities.



The study has highlighted that the effect of emerging infectious diseases is severe and can lead to many more social and economics impacts. However, technologies can be employed to reduce the crisis. The slide above (Provided by Dr. Richard Silberglitt, RAND), which summarised the opportunity of technology applications to combat EID nicely, suggests that there are mainly three areas of technology applications to intervene the life cycle of EID. They are ubiquitous, drugs & vaccines and finally diagnostic kits. These three research areas should be in attention and have further research. Therefore they will be considered and developed technology roadmaps in the later stage of the project.

Appendix A

Converging Technologies to Combat Emerging Infectious Diseases (EID): Scenario Workshop Program
5-7 February 2007
Khao lak Merlin Resort, Phang-Nga, Thailand

Workshop materials are provided at http://www.apecforesight.org

Day 1: Monday 5th February 2007

08.45-09.15 Registration

09:15-09:20 Opening Remarks:
by Dr. Pansak Siriruchatapong, Director of National Electronics and Computer Technology Center (NECTEC)

09:20-09:45 Introduction: "Converging Technologies to Combat Emerging Infectious Diseases (EID)", the APEC-wide project and roles of workshop participants
by Dr. Nares Damrongchai

09:45-10:15 Keynote speech: The Global Challenge of EID
by Jean-Paul J. Gonzalez, M.D.

10:15-11:00 Presentation: Progress and Activities report on EID project, including Bibliometric analysis result and online survey result.
by Dr. Yuko Itoh, Dr. Alisa Kongthon, Dr. Ponpiboon Satangput

11:00-11:15 Coffee Break

11:15-12:00 Invited Talk Session 1: Chaired by Philippe Barbazan, M.D.

Dr. Jin-Town Wang	Capsular Genotyping for Detecting emerging bacterial infections diseases--------*Klebsiella pneumoniae* as an example
Dr. Stephen Prowse	An improved approach to combat EID using recent technologies

12:30-13:30 Lunch

13:30-14:45 Invited Talk Session 2: Chaired by Dr. Ronello Casio Abila

Dr. Saji Hameed	How climate related technologies and information could help in combating EID
Prof. Greg Tegart	Converging technologies-characteristics and examples
Mr. Mike Troppe	Health Information Exchanges and Pandemic Preparedness

14:45-15:00 Coffee Break

15:00-15:15 Introduction: Foresight and Scenario Planning

15:15-17:00 Scenario Building Part I (Small groups):
Identifying drivers that increase the risk of EID

19:00-21:30 Reception Dinner

END OF DAY 1

Day 2: Tuesday, 6th February 2007

08:30-08:45 Objectives of Day 2
Review: Highlights and Issues of Day 1

08:45-10:00 Invited Talk Session 3: Chaired by Dr. Noppawan Tanpipat

Mr. Jack Smith	Toward understanding science and technology convergence
Dr. Richard Silberglitt	Suggestion from a 2020 technology foresight on technological approaches to combating EID
Dr. Dan Russler	The Application of HL7 RIM-based approaches to EID

10:00-10:15 Coffee Break

10:15-12:00 Scenario Building Part II (Small groups):
- Explaining the scenario creation process
- Snapshot of the next 10 years

(Draw up separate future scenarios where technologies converge and play significant role in combating EID)

12:00-13:30 Lunch

13:30-16:00 Scenario Building Part III (Small groups):
- To continue from Part II until completion of snapshot
- Backcasting of Key decision points or intervention
- To identify choices in technological applications development
- To formulate strategies & initiatives for APEC

(Coffee break available from 14:30-)

Questions you will be asked:
- What would have had happened that got you to 2017? What is the final stage and what would you have done differently to get there, desirable or undesirable?
- What would be new business opportunities?

- What advise would you give to the policy makers today to avoid undesirable scenario?
- What advise would you give to the policy makers today to approach desirable scenario?

16:00-16:45 Group Presentations

19:00-20:30 Dinner

END OF DAY 2

Day 3: Wednesday, 7th February 2007

08:45-09:00 Reprise: Achievements of Day 2

09:00-10:00 Issues emerged from scenarios, suggestions for future action. (Plenary session)

10:00-10:15 Coffee Break

10:15-11:15 (Continue)

11:15-11:45 Post-Workshop Activities
- Linking scenarios into technology roadmap
  By Dr. Nathasit Gerdsri
- Technology roadmapping workshop in Tokyo
  By Dr. Yuko Itoh

11:45-12:00 Evaluation and Closing Remarks

12:00-13:00 Lunch

13:00-18:00 Boat excursion to a nearby island

END OF DAY 3

Appendix B

List of Participants
Total number of participants 33 from 7 APEC Economies
Genders: 25 Male and 8 Female

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