1. Indonesian profile
2. ICT Environment
3. Regulation
4. Pilot project Telemedicine
5. Future plan and development
Area: South East Asia
2 million km² (736 000 sq. mi.)
17,508 islands
1,128 tribes
33 Provinces, 497 district/municipalities (199 district behind dev.)
92 small Islands at the borderlines with neighboring countries
Ring of fire
Indonesian Profile

- 234.2 million with an annual growth rate of 1.18%
- Dependency ratio 50.3%
- 28.07 million poor
- Proportion of budget spent on health as to GDP is 2.7% (2011)
- Demographic bonus

Source: BPS-Statistics Indonesia, 2011

http://www.who.int/countries/idn/en/
Health Disparity

- Maldistribution of specialist doctors especially at rural area
- Lack of hospital beds around 90 thousands beds (from ideal 1:1000 population)
- In 18 Province (55%), has over 94,1% households located more than 5 km to health facility
- Geographic obstacle
- Health expenditure proportion to GDP is less 5%
- Quality of services
- 40% uninsured
Blackbone Fiber optic access

<table>
<thead>
<tr>
<th>No</th>
<th>Region/Islands</th>
<th>Number of Province</th>
<th>Number of District/Municipality</th>
<th>Covered</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sumatera</td>
<td>10</td>
<td>151</td>
<td>105</td>
<td>70%</td>
</tr>
<tr>
<td>2</td>
<td>Java</td>
<td>6</td>
<td>118</td>
<td>116</td>
<td>98%</td>
</tr>
<tr>
<td>3</td>
<td>Borneo</td>
<td>4</td>
<td>55</td>
<td>33</td>
<td>60%</td>
</tr>
<tr>
<td>4</td>
<td>Celebes-North Maluku</td>
<td>7</td>
<td>82</td>
<td>48</td>
<td>59%</td>
</tr>
<tr>
<td>5</td>
<td>Bali-Nusa Tenggara</td>
<td>3</td>
<td>40</td>
<td>26</td>
<td>65%</td>
</tr>
<tr>
<td>6</td>
<td>Maluku- Papua</td>
<td>3</td>
<td>51</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>33</td>
<td>497</td>
<td>328</td>
<td>66%</td>
</tr>
</tbody>
</table>

(Ministry of Communication & Information, 2012)
## Infrastructure and services

<table>
<thead>
<tr>
<th>Broadband Penetration</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household</td>
<td>11%</td>
<td>15%</td>
<td>20%</td>
<td>35%</td>
<td>50%</td>
<td>75%</td>
</tr>
<tr>
<td>Building office</td>
<td>30%</td>
<td>30%</td>
<td>40%</td>
<td>70%</td>
<td>85%</td>
<td>100%</td>
</tr>
<tr>
<td>Fixed <em>(fixed to pops)</em></td>
<td>3%</td>
<td>5%</td>
<td>10%</td>
<td>15%</td>
<td>20%</td>
<td>25%</td>
</tr>
<tr>
<td>Mobile</td>
<td>10%</td>
<td>12%</td>
<td>15%</td>
<td>20%</td>
<td>45%</td>
<td>75%</td>
</tr>
<tr>
<td>School</td>
<td>11%</td>
<td>20%</td>
<td>40%</td>
<td>60%</td>
<td>85%</td>
<td>100%</td>
</tr>
<tr>
<td>Hotel</td>
<td>N/A</td>
<td>40%</td>
<td>75%</td>
<td>65%</td>
<td>80%</td>
<td>100%</td>
</tr>
<tr>
<td>Hospital</td>
<td>N/A</td>
<td>50%</td>
<td>50%</td>
<td>80%</td>
<td>95%</td>
<td>100%</td>
</tr>
<tr>
<td>Primary Health care</td>
<td>N/A</td>
<td>20%</td>
<td>30%</td>
<td>65%</td>
<td>80%</td>
<td>100%</td>
</tr>
<tr>
<td>Local District Office</td>
<td>N/A</td>
<td>50%</td>
<td>75%</td>
<td>85%</td>
<td>90%</td>
<td>100%</td>
</tr>
<tr>
<td>Police Station</td>
<td>N/A</td>
<td>40%</td>
<td>75%</td>
<td>65%</td>
<td>80%</td>
<td>100%</td>
</tr>
<tr>
<td>Public facility :seperti Airport, Shopping Centre, public park etc</td>
<td>N/A</td>
<td>35%</td>
<td>50%</td>
<td>75%</td>
<td>85%</td>
<td>100%</td>
</tr>
</tbody>
</table>
PROVIDER 3G COVERAGE

http://www.cellmapper.net/map
Global fixed broadband access

Indonesia coverage around 1% (not seeing in the chart.)

Assessment eHealth with COIA tools, 2013

eHealth Building Block

- Services (Applications)
- Infrastructure
- Standards
- Protection
- Governance

(1) Not present, needs to be developed;
(2) Needs a lot of strengthening;
(3) Needs some strengthening;
(4) Already present, no action needed
Self Assessment (Positioning)

- Emerging enabling environment for eHealth
- Early adoption
- Experimentation
- Developing and building up
- Scale up
- Mainstreaming

National eHealth Strategy Toolkit, WHO
People began to recognize and learn to use telematics

1980s

People began to recognize and learn to use telematics

1990s

growth of telematics network in Indonesia (internet)

2000s

The Gov commitment to deal telematics (policy or regulation)

2001

Telekardiology, phone base

2004 - 2012


2012

Implementation pilot project on teleradiologi & tele-ECG, online NHIS

2012

Develop teleradiology policy, Pilot project tele-radiotherapy, develop National health info. Integration system

2013
Telemedicine

- MoH
  - The concept was planned in 1997
  - 2001: tele-ECG (phone base)
  - 2012: Hospital manajemen under sister hospital development (Mother & Child Harkit Hosp. & NTT province hospital)
  - 2012: Pilot project on teleradiology & tele-ECG
  - 2013: Pilot project on radiotherapy → planning therapy

- Private sector
  - Already implement telemedicine using common mobile technology to send image or cases (personal relation)
  - locally in the hospital and/to its doctors
  - Eka hospital and Mayo Clinic 2010 etc
Gov. Regulation No. 10 year 1966 regarding obligation of medical data confidentiality

Law No. 29 year 2004 regarding Medical Practice

Law No. 11 regarding Information and Electronic Transactions year 2008

MoH Decree No. 269 year 2008 regarding Medical Record

Gov. Regulation No. 82 Year 2012 regarding Implementation of System and Electronic Transactions

Director General Decree for pilot project Telemedicine 2012........
A. Implementation refer to MoU or contract agreement between sites and centre
B. Forming functional implementation team
C. Standard operating procedure
D. Specialist should have recommendation from their profession association serving pilot project
E. Registry form
F. 2 year period
Pilot project Telemedicine 2012

- 2 (two) areas
  - Teleradiology: expertise services
  - Telecardiology (ECG): patient management services
- Serving for health facilities that did not have expert/specialist
- Point to point service, simple system
- Centre of telemedicine services: Cipto Hosp. and Cardiac Centre Harapan Kita Hosp.
Criteria Selection

**Health facility at site**
- Type C/D hospital
- Field hospital
- Primary health care
- Ambulance (ECG)

**Centre of telemedicine service**
- Cipto Hosp: teleradiology
- Cardiac Centre Harapan Kita: tele-ECG

- Lack of specialist (radiologist, internist/cardiologist)
- Remote and isolated area
- Special location → easy to evaluate
- Proposals to MoH

- Provide 24 hour specialist support
- Teaching hospital (type A hospital)
- ICT infrastructure
- Commitment
Teleradiology

Background:

- Currently there are less than 50% hospitals owned by radiologists, and mostly centralized in Java island.
- Especially aims to address isolated and rural health facilities for diagnostic radiology services.
- Association Radiologist Indonesia has developed the concept and its referral network.
- Teleradiology product and technology most visible in Indonesia.

Services:

- Enable for routine examination.
- Image captured by film scanner at site, and send (store and forward) it to the centre of services (Cipto Hospital).
- Specialist at center of service interpret the images and send the expertise back to the site.
- Minimum internet connection is 1 mbps for upload, and 2 mbps for download.
Tele-ECG

Background:
- In 2011, CVD is the top cause of mortality (30%) in Indonesia (WHO)
- Acut cardiac syndrom need rapid emergency response (less 4 minute)
- The existing Integrated Emergency Service Care System (SPGDT) for cardiac cases in Jakarta, Banten dan Bandung was not supported with tele-ECG service

Service
- for emergency cases only
- 12 leads ECG data transmits to the Cardiac Center Harkit Hosp. using dedicated ECG equipment (PP05V12)
- Using 3G connection providing real-time transmission
- available alert system (alarm notification) at the centre
- Specialist at the centre, responds to any irregular ECG rhythm to the sender/operator at site, and guides for patient management
Pilot Project Telemedicine (Teleradiology)

CENTRE OF TELERADIOLOGY
Cipto Hospital, Jakarta

SITES
1. Cilandak, Primary health centre, Jakarta
2. Pulang Pisau District Hosp.
3. Lingga, Field Hosp.
5. Bener Meriah, field Hosp.
7. Atambua District Hosp.
10. MoH clinic, Jakarta
Pilot Project Telemedicine (Telecardiology)

BANTEN PROVINCE
1) Banten, Hospital
2) Pandeglang, District Hospital
3) Malingping, District Hospital

JAKARTA PROVINCE
4) Two ambulances 118
5) Prim. Health care, Pesanggrahan
6) Prim. Health care, Kalideres

BANDUNG PROVINCE
8) Ujung Berung District Hospital
8) Central Cimahi District Hospital
9) Sumedang District Hospital

JAVA ISLAND

CENTRE OF TELECARDIOLOGY
Cardiac Centre Harapan Kita Hospital, Jakarta

SITES: 3 sites in Banten Province, 4 sites in Jakarta Province, 3 sites in Bandung Province, all site teleradiology
Center for Pilot Project Telemedicine

Control room of Tele-ECG at the Emergency Care Unit in Cardiac Care Centre of Harkit Hospital

Reading room at Dept of Radiology, Cipto Hospital

Server

MoH enable to access the data report and flow of the activities among the sites
1. Adam Malik Hospital, North Sumatera
2. M. Hoesin Hospital, South Sumatera
3. Cipto Mangunkusumo Hospital, Jakarta ➔ to be 1st tertiary referral service
4. Soetomo Hospital, East Java ➔ to be 2nd tertiary referral service
5. Wahidin Sudirohusodo Hosp, South Celebes
## Referral Centre and Network Design in Teleradiology

<table>
<thead>
<tr>
<th>TERTIER (PROVINCE)</th>
<th>SECUNDERY (CITY)</th>
<th>PRIMERY (PROVINCE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jakarta</td>
<td>Region 1 Medan</td>
<td>Nangroe Aceh Darussalam, North Sumatera</td>
</tr>
<tr>
<td>Jakarta</td>
<td>Region 2 Padang</td>
<td>West Sumatera, Riau, Riau Islands</td>
</tr>
<tr>
<td>Jakarta</td>
<td>Region 3 Palembang</td>
<td>South Sumatera, Jambi, Bengkulu, Bangka Belitung</td>
</tr>
<tr>
<td>Jakarta</td>
<td>Region 4 DKI Jakarta</td>
<td>Jakarta, Bogor, Depok, Bekasi, Lampung, Banten</td>
</tr>
<tr>
<td>Jakarta</td>
<td></td>
<td>+ Jabar, West Borneo, Middle Java and DIY</td>
</tr>
<tr>
<td>Surabaya</td>
<td>Region 5 Denpasar</td>
<td>Bali, West Nusa Tenggara, East Nusa Tenggara</td>
</tr>
<tr>
<td>Surabaya</td>
<td>Region 6 Banjarmasin</td>
<td>South Borneo, Middle Borneo</td>
</tr>
<tr>
<td>Surabaya</td>
<td>Region 7 Manado</td>
<td>North Celebes, Gorontalo, Middle Celebes</td>
</tr>
<tr>
<td>Surabaya</td>
<td>Region 8 Makasar</td>
<td>South Celebes, West Celebes, South East Celebes</td>
</tr>
<tr>
<td>Surabaya</td>
<td>Region 9 Ambon</td>
<td>Maluku, North Maluku</td>
</tr>
<tr>
<td>Surabaya</td>
<td>Region 10 Jayapura</td>
<td>Papua, West Papua</td>
</tr>
<tr>
<td>Surabaya</td>
<td></td>
<td>+ East Borneo</td>
</tr>
</tbody>
</table>

Surabaya & Jakarta is selected to be tertiary referral services
The Role of MoH in Pilot Project

- Providing legal aspect
- Facilitating and coordinating among the member to develop procedure, task & obligation and fee negotiation
- Involve profession/specialist association to assist and support the programme
- Supervise the service
- Financial support
The Role Professional Association

- Giving recommendation/ authentication for specialist serving telemedicine
- Setting goal standard and quality of services
- Providing training assistance for operator at site
- Recommendation on location and site service selection
- To ensure readiness of participating health facility
Telemedicine Training Session

Dr. dr. Surya Dharma, Sp.JP (K), FIHA, FICA, FESC, FAPSIC
Head of Intensive and Emergency of Cardiovascular, Cardiac Center Harapan Kita Hospital

Dr. dr. Jacub Pandelaki, Sp.Rad (K)
Department of Radiology, Cipto Mangunkusumo Hospital
Device

- **Teleradiology**
  - Film scanner, to capture image at site
  - Workstation/PC → at site, centre of service and MoH
  - Server → at the centre of services
  - Medical grade monitor → at the centre

- **Telecardiology**
  - ECG mobile machine, touchscreen, chargeable
  - 12 leads, synchronous transmission (depend on availability of 3G connection)
  - Laptop → to receive result/interpretation from centre
  - Workstation/PC → centre of service and MoH
  - Server → at the centre of services
Application Teleradiology

- Web base *Pellucid
- Viewer application (installed) and enable picture customization feature
- Enable clinical data patient input
- Enable remote configuration and customization
- Chatting feature
- Reporting
- Upload document informed consent, doctor request form, old / previous film
- Safety :
  - Doctors and other officer has different menu
  - User name and password each operator
Screen shoot teleradiology application
Utilization on March 2013

Teleradiology

- RSUD Pulang Pisau
- RSUD H. Andi Sulthan Daeng Radja Bulukumba
- RSUD BIMA
- RSUD Atambua
- RSU Lapangan Lingga
- RSU Lapangan Anambas
- RS Stroke Nasional Bukittinggi
- RS Bergerak Bener Meriah
- Puskemas Cilandak / Dinkes Prop DKI Jakarta
- Klinik Kemenkes
Technical Problems

• High operational cost for ECG machine (voucher, consumable of electrodes) and weak battery life
• Unstable 3G connection in sites (min > 35%), even 70% tele-ECG sites are 3G blank spot
Challenges of Telemedicine Implementation

Policy and regulation not yet established

Infrastructure

- Internet connection coverage at east Indonesia
- Limited 3G connection access in some sites

Human Resources

- Lack of awareness to technology

Device

- Product driven (dependency) “not base on what we need, but what we can do with the product”

Sustainability

- Integrating the telemedicine service to the national health insurance scheme (year 2014)
- Decentralization
1) Developing National Health Information System

   Ministry of health
   – Private cloud development plan
   – Providing intranet connection coverage/VPN 2013:
     • 497 (all) local health office, 128 Kbps, VoIP service
     • 33 (all) Provincial health office (33), 512 Kbps, VoIP service
     • 45 (all) MoH technical unit (health facilities), 128 Kbps
     • 559 Local hospitals, bandwidth 128 Kbps

2) IBP (Indonesian Broadband Plan)

   Expanding internet coverage program, aims to build a fiber optic network that connects all districts/cities to support broadband services → under Ministry of Communication & Infor., MoP, MoE
Telemedicine Future Plan

• Standarization: proposing ISO Standard for telehealth adoption
• Building community:
  – National centre of excellence of telemedicine
  – Join with international association on telemedicine
• To established national authority of telemedicine
• Thank you