Singapore’s National Electronic Health Record (NEHR)  
The Journey to 2012 and Beyond  
Sarah Muttitt, CIO  
Sari McKinnon, Director, Solutions & Architecture  
Stephen Rainey, Director, NEHR Implementation Services  

DISCLAIMER: The views and opinions expressed in this presentation are those of the author and do not necessarily represent official policy or position of HIMSS.
Conflict of Interest Disclosure

Sarah Muttitt, MD, FRCPC, MBA
Sari McKinnon
Stephen Rainey

Have no real or apparent conflicts of interest to report.
Learning Objectives

• Describe Singapore’s efforts in three areas that are critical to NEHR success:
  – Leadership and governance
  – Architecture and standards
  – Deployment and uptake

• Detail best practices and lessons learned along a NEHR implementation journey

• Discuss how to leverage foundational investments for the future
• Lies almost on the equator

• Population – 5.2 mil (Abt 74% Chinese, 13% Malay, 9% Indian and 4% Eurasians and other ethnic groups)

• Four official languages

• 74% of resident population between 15-64 years old

• 9% aged 65 years and above; projected to grow to 20% by 2030

• National healthcare expenditure of only 4% of GDP

• In 2010, WHO ranked Singapore in the world as:
  - 2nd for infant mortality rate (2.1 per 1000 live birth)
  - 9th for life expectancy (81.4 years at birth)
Current Distribution of Healthcare Services

Primary and ILTC (intermediate and long-term care) are not well integrated or developed, resulting in frequent readmissions and disproportionate pressures on the acute and tertiary care sector.
Healthcare Financing in Singapore

**KEY GOVERNANCE PRINCIPLES**
- Individual responsibility for health; patient co-payment to minimize moral hazard and wastage
- Government subsidies to keep basic healthcare affordable
Preparing for the “Silver Tsunami”

By 2030
- 1 in 5 Singaporeans will be over 65

By 2050
- Singapore will be among the world’s demographically oldest countries with median age of 54

“A Different Pattern of Healthcare”
- Integrated healthcare delivery system
- Appropriate care from the right site
- Better allocation of resources
- More cost-effective treatment and care in the healthcare continuum
New directions

We need to do more than building more acute hospitals.

- Community hospitals, nursing homes, primary care
- Train and/or recruit healthcare providers (and IT professionals!)
- Support informal care givers
- Address incentives, disincentives
- New responsibilities, accountabilities
Vision of Future Healthcare Landscape

- **enabled by the Regional Health Systems (RHS)**

Organisation of the RHS, where Home is the central location for care, with primary care delivering person-centric care integrated with the rest of the care spectrum for both physical and mental healthcare.
Strategic vision of patients moving seamlessly across the healthcare system, receiving coordinated patient-centric care at the most appropriate settings.

Enabled by National Electronic Health Record (NEHR)
National Electronic Health Record (NEHR)

Vision of “One Patient, One Record”

The EHR is an integrated healthcare record centered on each person. It extracts and consolidates in one record, all clinically relevant information from their encounters across the healthcare system throughout his/her life.

Secure “real-time” access to patients’ EHR by authorised clinicians and healthcare providers:

> enable greater coordination and informed decision-making,
> resulting in more accurate diagnosis, better treatment and patient-centric integrated care.
Multiple EMR Systems & Radiology Systems

- Public healthcare clusters
  NHG and SingHealth hospitals, polyclinics and specialist clinics
- Ministry of Defence (MINDEF)

Minimal EMR Systems

- Private GPs (over 400 out of more than 2,000 have a CMS)
- Community Hospitals and other ILTC providers
MOH Holdings Pte Ltd - Who we are?

• Sole holding company of Singapore’s public healthcare assets (ie. Singapore Health Services, National Healthcare Group, Alexandra Health, Jurong Health Services, National University Health System and Eastern Health Alliance)

• Other wholly owned corporate entities includes Integrated Health Information System, Singapore Clinical Research Institute, Agency for Integrated Care and Health & Medical Practice Insurance
What do we do?

• Address systems-level gaps in our public healthcare system
• Provides systems-level strategizing and coordination
• Facilitates collaboration across clusters / healthcare institutions

Why?

• Enhances overall public healthcare system performance, while ensuring closer alignment to MOH’s vision, mission and priorities
• Seeks to leverage on synergies and economies of scale across the entire public healthcare
MOHH Leadership & Governance

Information Systems Division (ISD)

Provides leadership in setting strategic direction for Singapore’s national health informatics strategy

HIT master planning supports the national agenda for an Electronic Health Record by 2011 by facilitating strategic alignment at various Levels of the Healthcare System.
The journey towards One Health Record

2008
Formation of the National Health Informatics Strategy
Formation of the clinical advisory groups and taskforces

2009
Creation of the goal state architecture for an electronic health record solution
Beginning of Vendor Selection

2010
Award of contract for NEHR solution
Build and Development over 10 months
Collaborative focus group discussions on NEHR design with key clinicians and industry thought leaders

2011
Implementation of the production system
Integration with the legacy systems providing demographic and clinical data to the NEHR
Beginning of deployment to Singapore public healthcare
Award of contract for the delivery of a primary care solution to integrate with the NEHR
Clinician-defined Clinical Informatics Roadmap

Diverse membership of CAG and taskforces ensured national strategy was representative of broader clinical community interests
What our clinicians wanted

- Longitudinal summary health care profiles
- Consolidated view of patient’s current problems
- Consolidated view of patient’s current medications
- Ability to share critical patient information across all providers involved in patient’s clinical care journey
- Patient information accessible at the point of care— to support clinical decision making
Evaluating the benefits of EHR investment

If implemented as assumed, the EHR program will generate an NPV of ~$581 M and break even after 7-8 years.

Answering the questions:
- Are we doing the right things?
- Are we doing them the right way?
- Are we getting them done well?
- Are we getting the benefits?
Quantifying potential benefits
10 year investment strategy identified areas with the most positive gain

EHR analysis shows that ~65% of ongoing benefits are a result of better Medication Mgmt. and Quality and Performance mgmt.
NEHR – Towards A Fully Integrated Care Record: Providers are “on the same page”
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NEHR – Towards A Fully Integrated Care Record: Providers are “on the same page”
NEHR – Towards A Fully Integrated Care Record: Providers are “on the same page”

Identity Management
NHIS

NEHR Foundations

Standards
SNOMED CT
SDD
LOINC
NEHR Phase 2: Strategy and Approach - (FY2012-FY2015)

**Pillar 1**
One Patient, One Record, One Health
- Expanding outreach and access of quality records
- Facilitating seamless transitions of care
- Linking with Personal Health Record

**Pillar 2**
Better Quality Care through Smart Tools
- Supporting reconciliation of clinical standards, treatment care & goals at key clinical checkpoints
- Enhancing clinical decision support & clinical collaboration

**Pillar 3**
Building Intelligence and Knowledge
- Providing analytic capabilities for insights into:
  - clinical quality
  - care effectiveness & outcomes
  - alignment to clinical needs, initiatives & governance

**Desired Outcomes**
Better Health, Care, Value & Future for All

**Clinical Change Management**
**Architecture and Standards**
**Governance and Accountability**
The Next Wave: Transforming Healthcare Through Innovative Use of Technology

Reaching and touching the patient via Multi-access Channel, Multi-modal Means

Personal Health Management
- Self management
- Patient empowerment, education/literacy
- Shared repository of patient-entered data
- Web and mobile applications for CDM, wellness
- Open platform

National Call Centre
- Triaging
- Case management for CDM
- Healthcare services (e.g. PCPS)

Telehealth
- Remote monitoring and consult (telehealth)
- Telemedicine: provider to provider, mobility, specialist care delivery (e.g. Teleoptometry)
- Call for collaboration

Devices and Network
The Next Wave: Transforming Healthcare Through Innovative Use of Technology

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Supported by NEHR
A Patient Centric Longitudinal Record

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- Call for collaboration

Web, Mobile

Devices and Network

Supported by NEHR
A Patient Centric Longitudinal Record
## The Vision is Universal

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1</td>
<td>Enable the sharing of critical patient information across providers</td>
</tr>
<tr>
<td>2</td>
<td>Enable transformations in way care is delivered</td>
</tr>
<tr>
<td>3</td>
<td>Improve the health care journey for patients</td>
</tr>
<tr>
<td>4</td>
<td>Make our clinician lives easier with access to patient information from anywhere</td>
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## The Singapore Advantages

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<tbody>
<tr>
<td>1</td>
<td>A city state</td>
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<tr>
<td>2</td>
<td>Rich technology foundations</td>
</tr>
<tr>
<td>3</td>
<td>Support of the government</td>
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<tr>
<td>4</td>
<td>Will of the people</td>
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<tr>
<td>5</td>
<td>Less legal constraints</td>
</tr>
<tr>
<td>6</td>
<td>‘It will be done’</td>
</tr>
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</table>
Adaptive Architecture

(1) Top Down Strategy
iN2015 Healthcare and Biomedical Sciences Report

Focus on Governance & Control + Develop Artefact Library

Focus on Delivery + Future Planning & Innovation
Enterprise Architecture – Value Approach

- Work Collaboratively
- Become part of natural process
- Add value early on
- It’s always about Delivery
- Pragmatic approach
- Be supportive
- Value breeds demand.
Passionate Vs. Passive Architecture

Passionate Architecture

<table>
<thead>
<tr>
<th>Passion</th>
<th>Meaningful &amp; Credible</th>
<th>Explore</th>
<th>Involvement</th>
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</thead>
<tbody>
<tr>
<td>Business Analysts, Solution Architects, Enterprise Architect</td>
<td>Architecture Analytic</td>
<td>“The Art of Possible”</td>
<td>Excite &amp; Encourage</td>
</tr>
</tbody>
</table>

You may make a mistake, but don’t make the same mistake twice

Passive Architecture

- Build the EA Organization
- Build the Principles and Blue Prints
- Develop Governance Blue Prints
- Mandate Uptake
- Committees and boards

Balancing Goals & Objectives

Linking People, Potential and Progress

You may make a mistake, but don’t make the same mistake twice
### Principles

<table>
<thead>
<tr>
<th>Principle</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Buy not Build</td>
<td>To buy where ever possible</td>
</tr>
<tr>
<td>Portal based</td>
<td>Provide access from anywhere – with additional toolsets as appropriate</td>
</tr>
<tr>
<td>Real Time</td>
<td>As real time as possible to support clinical care processes</td>
</tr>
<tr>
<td>Role based</td>
<td>Enable clinical / user access requirements in a secure and authorized way</td>
</tr>
<tr>
<td>Loosely coupled</td>
<td>Support flexibility and extensibility over time</td>
</tr>
<tr>
<td>‘Hybrid’</td>
<td>Central repository summary health care information, access to detailed reports / images via record locator service</td>
</tr>
<tr>
<td>Service orientated approach</td>
<td>Services based approach to support plug and play and extensibility over time</td>
</tr>
<tr>
<td>Leverage</td>
<td>Leverage existing systems and investments where possible</td>
</tr>
<tr>
<td>Iterative</td>
<td>Iterative and phased implementation – targeting key clinical capabilities</td>
</tr>
<tr>
<td>Data Integrity</td>
<td>Data integrity through transmission – ensuring data is sent and received as intended</td>
</tr>
<tr>
<td>Adaptable</td>
<td>Adaptable to new business processes and technologies</td>
</tr>
<tr>
<td>Extensible &amp; Scalable</td>
<td>Extensible to include future EHR participants and higher usage.</td>
</tr>
</tbody>
</table>
What do we really, really need?
EHR Information Exchange

EHR Services
Summary Care Record
- Demographics
- Allergies
- Diagnoses
- Events
- Investigation & Procedure Rpts

Detailed Documents
- Event Summaries
- Referral Docs

Shared Services
- Medications Reconciliation
- Problem List Reconciliation
- Shared CDS
- Shared Care Plan

BI Enablement
- Audit Scorecards
- Prog Eval Scorecards

Data Sources
Clinical & Supporting Systems
- EMR
- Laboratory
- Radiology
- Pharmacy
- OT
- Patient Admin

National Systems
- EMRX
- CMIS
- NIR

EHR Information Exchange

Provider Gateway
- Extraction
- Doc Retrieval

Integration Services
- Data Collection & Validation
- Data Retrieval & Document Retrieval

Transformation Services
- Structure Mapping
- Terminology
- Data Quality
- Error Workflow

Registries
- Patient
- Clinician
- Facility
- Record Locators

2nd Data Use Support
- Extraction
- Pseudo-anonymisation
- Notification
- Subscription & Notification

Technology Infrastructure

Interaction & Integration
- Portal
- Doc Mgmt & Workflow
- Messaging & ETL
- App Server & Batch
- Security
- Authentication
- Encryption & Signature
- Audit Logging

Operations
- Provider On-boarding
- Registry Updates
- System Monitoring & Management
- Provider Support
- Data Error Resolution
- User Rights Admin

Development
- Standards & Processes
- SDLC Methods & Tools
- Environments

Platform & Availability
- Replication, Archival
- Backup & DR
- Clustering, Load Balancing
- Server
- Network
- Storage
NEHR Product Suite

User Interface
- ORION HEALTH
- Initiate
- ArcSight

Clinical Application
- ORION HEALTH
- Oracle HTB
- Secondary Use Services

Core Services
- Security Services
  - Authentication
  - Authorization
- Audit
- Cryptographic Services
- Oracle HTB & SOA Suite
- Oracle IAM Suite
- Registry Services
  - Patient
  - Clinical
  - Document
- Terminology Services
  - Terminology Retrieval
  - Terminology Validation

Data
- Oracle HTB
- Directory Services
- Oracle DB
- ArcSight

Technical Infrastructure and Operations

Provider Source Systems
Oracle SOA Suite
External Systems
NEHR Phase 1 (2009-2011)

Sources
- Administrative systems from SHS, NHG, NUHS & JHS
- SHS Electronic Medical Records system
- Clinical Data Repository from NHG, NUHS & JHS
- Ministry of Defence (MINDEF)

Data
- Demographics
- Events
- Lab / Rad
- Meds Order
- Meds Dispense
- eHIDS
- Procedures

Capabilities
- Patient Demographics
- Care Team
- Allergy/ADR
- Medical Alerts
- Diagnoses / Problems
- Medications
- Laboratory
- Radiology
- Procedures

Deployment
- Restructured Hospitals
- Specialty Centres
- Selected Community Hospitals
- Polyclinics
- Selected GP Clinics
- Ministry of Defence (MINDEF)
- Selected ILTC Institutions
- Others: AIC, MOH, HPB, HSA

Summary Care Record
- Discharge & Event Summaries

Links to panels: Community Hospital/ ILTC institution (P1/P2), GP Clinics (P1/P2)
Solving Wicked Problems: Source Data & Operations

1. Data Differences within and across Clusters
2. Master Code Sets Governance
3. Data Quality at Source
4. Data Filtered at Source or Cluster Integration
5. Data Model Differences between NEHR and Source
To Enable Transformation and Innovation

- Services catalog
- Inter-operability & Integration
- National Service Bus Architecture
- Data & Data repository Architecture
- National Health Identity Service
- Capabilities Catalog
Moving Forward

• Phase 1
  – **One-way** sharing with **limited** integration partners
  – Information **viewed** via NEHR Portal

• Phase 2
  – Increased Integration, Bi-directional information flows
  – More information and data sources
  – Reconciliation services
  – Increased Portal Access
Integrated Care Capability Maturity Model (ICCMM)

Three dimensional

1. Capability Areas for Integrated Health
2. Consumer Segmentation
3. Care Continuum
First Dimension

1. Capability Areas for Integrated Health

A set of similar processes and functions to cover the key enterprise capabilities required for a seamless patient-centric journey in an integrated healthcare ecosystem.
Second Dimension

1. Capability Areas for Integrated Health
   A set of similar processes and functions to cover the key enterprise capabilities required for a seamless patient-centric journey in an integrated healthcare ecosystem.

2. Consumer Segmentation
   Hierarchy that classifies the consumer groupings in the provision of healthcare service.
Integrated Care Capability Maturity Model

Third Dimension

1. Capability Areas for Integrated Health
A set of similar processes and functions to cover the key enterprise capabilities required for a seamless patient-centric journey in an integrated healthcare ecosystem.

2. Consumer Segmentation
Hierarchy that classifies the consumer groupings in the provision of healthcare service.

3. Care Continuum
An comprehensive system of care that provides health care for individual, family, community and population health, through an array of health services spanning all levels of intensity of care.
Integrated Care Capability Maturity Model

Three dimensions:

1. **Capability Areas for Integrated Health**
   A set of similar processes and functions to cover the key enterprise capabilities required for a seamless patient-centric journey in an integrated healthcare ecosystem.

2. **Consumer Segmentation**
   Hierarchy that classifies the consumer groupings in the provision of healthcare service.

3. **Care Continuum**
   An comprehensive system of care that provides health care for individual, family, community and population health, through an array of health services spanning all levels of intensity of care.
<table>
<thead>
<tr>
<th>Clinical Functions</th>
<th>Patient Administration</th>
<th>Corporate Functions</th>
<th>Ancillary Functions</th>
<th>Consumer / Partner Services</th>
<th>Reporting / Analytics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Care Plans</td>
<td>Appointment Scheduling</td>
<td>Human Resource Management</td>
<td>Bloodbank &amp; Donor Management</td>
<td>Multi Channel Contact Center</td>
<td>Clinical Quality</td>
</tr>
<tr>
<td>Clinical Pathways</td>
<td>Health Financing Management</td>
<td>Supply Chain Management</td>
<td>Pharmacy (Rx)</td>
<td>Social Media / Consumer Collaboration</td>
<td>Population Health Analytics</td>
</tr>
<tr>
<td>Referral Management</td>
<td>Ward / Bed Management</td>
<td>Financial Management</td>
<td>Laboratory</td>
<td>Care Coordination</td>
<td>Health Information Research</td>
</tr>
<tr>
<td>Virtual Care (Telehealth)</td>
<td>Patient Registration</td>
<td>IT Management</td>
<td>Radiology &amp; Medical Imaging</td>
<td>Consumer Health Services</td>
<td>Services Quality</td>
</tr>
<tr>
<td>Clinical Care Documentation</td>
<td></td>
<td>Quality Management</td>
<td></td>
<td></td>
<td>Operations Monitoring</td>
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<tr>
<td>Medication Management</td>
<td></td>
<td>Project Portfolio Management</td>
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<td>Financial Analytics</td>
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<tr>
<td>Order Management</td>
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<td>Partner Relationship Management</td>
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<tr>
<td>Results Management</td>
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<td>Marketing &amp; Communications</td>
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<tr>
<td>Monitoring</td>
<td></td>
<td>Health Information Management</td>
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</table>
Implementation

The NEHR and the challenges ahead
Implementation Goals

1. **Predictable** quality and risk

2. **Repeatable** delivery and quality

3. **Reliable** operation and quality
Implementation Goals

- **Predictable** quality and risk
  - Understanding the path ahead, the interdependencies and the influence of the client and the stakeholders.
  - Establishing strict quality methods and acceptance criteria required by each of the main deliverables.
  - Identifying risk, both qualitative and quantitative. This baseline becomes the measure of what you can see – but only at that point in time, and is already out of date....
  - Document your assumptions, and assign every qualified risk to a milestone, or if possible, a deliverable.
Implementation Goals

• **Repeatable** delivery and quality
  – Dyed in the wool processes – proven to work, and measurable against industry norms
  – Plagiarism is the greatest form of flattery. Remember what worked well for you before, so why re-invent the wheel?
  – Embed quality measurement as a safety assurance check. If it does not pass quality review, it does not pass.
  – Closing the loop on defect identification, their correction, and pushing impact of correction through the documentation cycle. Remembering that most deliverables spawn or are spawned by many others, so updates to one means multiple risk to others.
Implementation Goals

- **Reliable** operation and quality
  - With predictable quality, repeatable processes, the operational reliability of the solution is therefore known.
  - However, as a solution, other factors come into play such as integration, load, stress, behaviors, and a catalogue of non-functional requirements.
  - The drive for reliable operation by providing predictable quality in its components, means the baseline for quality is elevated and focus returns to the key elements of the solution which provide the greatest risk.
### Controlling the delivery

<table>
<thead>
<tr>
<th>Stage</th>
<th>Product Name</th>
<th>Product Description</th>
<th>Owner</th>
<th>Producer</th>
<th>Approver</th>
<th>Reviewer</th>
<th>Consult</th>
<th>Informed</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>TA230 Technical Architecture Specification - Desktop &amp; Infrastructure</td>
<td>The Client Computing Design document may include: - Client Platform - Operating System flavour and version - Internet browser flavour and version - Javascript options - Other scripting options This document should contain the following: - sizing calculation of the infrastructure (hardware) - capacity plan of the infrastructure (hardware) - table of servers - table of networking equipments - table of security appliances - table of other infrastructure components</td>
<td>Lead INFRA (A&amp;S)</td>
<td>Vendor</td>
<td>A&amp;S INFRA / TECH / OPS Lead</td>
<td>Lead INFRA (A&amp;S), A&amp;S Principal</td>
<td>PD</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Gate Closure Report</td>
<td>The contents may be: - gate objective - success criteria - assessment results - recommendation</td>
<td>PM</td>
<td>Vendor</td>
<td>PD</td>
<td>PM</td>
<td>PMO Project Officer (NEHR), Senior Leadership</td>
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</tbody>
</table>
Audit trail of Accountability

• **Gate** (usually at end of a Stage/Phase)
  – **Milestone** 1 (number of milestones within a Stage)
    • **Deliverable** 1 (pre-defined – artifacts, documents, code)
      – PARCI (including Product Description, Acceptance Criteria etc)
      – Draft issued for review (Main deliverables are presented)
      – Formal review comments
      – Issue for contractual approval (Formal point of delivery)
      – Acknowledgement Notice through contract Mailbox
      – Evaluation Notice (decision – Positive/Negative)
    • **Acceptance** Certificate (Full/Conditional/Fail)
      – **Milestone** Acceptance Certificate
  • **Gate Closure** Report – Full/Conditional/Fail
What this actually means....

• A predicted deliverable which has a defined criteria, linking it to other predicted deliverables, has met the prescribed acceptance criteria that was agreed for the deliverable, artifact or product.

• It has contributed to a Milestone, which (assuming all deliverable states are the same) has been met contractually.

• The Gate recognizes the Milestone achievement, but also assesses the capability of the project to meet the next Milestone.

• This forward projection of risk, protects the business, before hitting an issue.

• It also encourages a mind-set to look forward on what is to come, rather than look backward at what has happened.
Placing skills

<table>
<thead>
<tr>
<th>Functions</th>
<th>Plan</th>
<th>Analyze</th>
<th>Design</th>
<th>Build</th>
<th>Int &amp; Test</th>
<th>Operate</th>
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</thead>
<tbody>
<tr>
<td>Identity Mgmt</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>Security &amp; Policy</td>
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<td>National Standards</td>
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<td>Tech Requirements</td>
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Setting the Governance

MOH (HS) Appointed Governance
- Implementation Oversight Committee
- Clinical Oversight Committee
- Technical Oversight Committee
- Implementation Extended Team

MOHH Project Governance
- MOHH Senior Mgmt
- Steering Committee (MOHH)
- Project Board (MOHH)

MOHH/Vendor Contracted Governance
- Executive Committee
- Program Board (MOHH/Vendor)
- Project Board (MOHH/Vendor)
- Working Group #1
- Working Group #2

Specialist Contribution

Dispute Resolution
## Project Dashboard

<table>
<thead>
<tr>
<th>Status</th>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Phase</td>
<td>05 May 2011</td>
<td>All components are designed</td>
</tr>
<tr>
<td>Release 1.2 Data</td>
<td>10 Oct 2011</td>
<td>Release 1.2 Data is tested</td>
</tr>
<tr>
<td>Release 1.2 Production</td>
<td>10 Oct 2011</td>
<td>Release 1.2 Production is tested</td>
</tr>
<tr>
<td>Release 1.2 DR</td>
<td>10 Oct 2011</td>
<td>Release 1.2 DR is tested</td>
</tr>
<tr>
<td>Integration Test</td>
<td>10 Oct 2011</td>
<td>Integration Test is completed</td>
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### GANTT Chart

1. **High Level Schedule**
   - Main Accomplishments for Last Week
   - Main Targets for Next Week
2. **Project Work Plan**
3. **Review Board Recommendations**
   - Architecture Workgroup
   - Clinical Workgroup
   - Data Governance Workgroup
4. **Key Work Off Plan Tracking**
5. **Overall Status**
   - Main Accomplishments for Last Week
   - Main Targets for Next Week
6. **Deliverables Status**
   - Overall Status
7. **Dependencies**
   - Overdue Items
8. **Key Issues**
9. **Key Risks**
10. **Change Control**
## Governance and information

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Project/Initiative</th>
<th>Project Sponsor</th>
<th>Delivery Director</th>
<th>Project Manager 1; Project Manager 2</th>
<th>Project Status Report</th>
<th>Evaluation Parameters</th>
<th>Overall</th>
<th>Remarks</th>
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<td>Project Manager 8; Project Manager 9; Project Manager 10</td>
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<td>Schedule; Scope; Resources; Cost; Quality</td>
<td>Overall</td>
<td>Remarks</td>
</tr>
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</table>

**Program Dashboard**

**Reporting Date:** 11 October 2011

- **NIS Status**
  - **Schedule:** Red
  - **Scope:** Yellow
  - **Resources:** Green
  - **Cost:** Red
  - **Quality:** Yellow

- **Remarks for Project A:**
  - The project has hit a major decision point for both credibility in Vendor_A being able to fulfill contractual obligation, and a technical solution viability point.
  - Strategy for 14 Oct 2011 meeting with MD/Directors to be agreed. Strategy for Project_A to be confirmed. (Please see attached supporting material)

- **Remarks for Project B:**
  - Thread_A: Evaluations underway with 4 remaining vendors who submitted proposals.
  - Thread_B: RFP issued and awaiting proposals.
  - Thread_C: Progress in Co-Dev work.
  - Thread_D: Review with Institute_A and Program this week on scope and cost Institute_B.

- **Remarks for Project C:**
  - DEV Project now in closure.
  - New OPERATIONS project underway. This will also manage all of the changes to requirements that are a result of Live usage.

- **Remarks for Project D:**
  - Deployment activity to begin this month. Number of institutions already visited with preliminary briefings (Institute_C, Institute_D, Institute_E, Institute_F).
Challenge #1: Synergy in IT enablement

- With 6 Clusters and over 30 institutions and organizations, and with such a fast-paced changing IT landscape within Singapore healthcare, it is imperative that controls exist to;
  - Understand the state of investments within each area
  - Understand the objectives of our Stakeholders regarding IT enablement in health
  - Understand the Work plans for the future
Challenge #2: Data, Data, Data

• The main aim is to take, process, display accurately, meaningful data

• Essential we have a national strategy for the creation, implementation and management of standards in health information exchange

• Data also includes information which is non-clinical, such as information used to identify people, organizations, locations, departments etc
Challenge #3: Predictability, Repeatability, Reliability

• The journey and the results of any delivery are predictable. Understand what challenges we face ahead of, not when, they arrive.

• Important that when a project is delivered, when a deployment to a hospital is planned, that the results are repeatable, through re-use of product, process, and people, supported by tried and trusted methods.

• Since the overall challenge is about getting benefit to patients and clinicians, the reliability of what we do in Singapore cannot be understated.
Thank You!

And see you in Singapore
HIMSS Asia Pac
17-19 September, 2012

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