


Singapore's National EHR Roadmap

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MOH HOLDINGS



Healthcare: The world's most information-intensive industry and the last frontier in information technology

Why bother?

“Preventable medical errors kill the equivalent of more than a jumbo jet full of people everyday in the US...” Leape

“Physicians deliver recommended care only about half of the time, and care for patients with chronic illnesses absorbs more than 75% of the nation’s health care dollars” McGlynn



The Canadian Adverse Events Study: the incidence of adverse events among hospital patients in Canada (Baker, Norton et al. CMAJ May 2004)

The overall incidence rate of AEs of 7.5% in our study suggests that, of the almost 2.5 million annual hospital admissions in Canada similar to the type studied, about 185 000 are associated with an AE and close to 70 000 of these are potentially preventable.

And the literature suggests that IT can

- Transcription - average savings of 73.5%
- Chart pulls – 63.4% reduction on medical records personnel
- Laboratory tests – reduced duplicate testing results in 22.4% savings
- Drug utilization – improved prescribing practices reduce outpatient drug expenditures by 15%
- Radiology – savings of 14%

And the literature suggests that IT can

- Reduction of nurses unproductive time – reduced demand of 11.4%
- Laboratory tests – 11.8% savings in lab costs
- Drug utilization – improved prescribing practices reduce inpatient drug expenditures by 15.2%
- Medication Errors – 55% reduction

And the literature suggests that IT can

- Preventable Adverse Drug Events – 17% reduction
- Reduction in length of stay – decrease LOS by 15.2% with reduction in delays
- Medical records – up to 50% reduction in costs

And the literature suggests that IT can

- Save lives and improve care by providing physicians with the information needed to make better medical decisions
- Satisfy growing physician desire for data at point-of-care
- Foster performance and productivity improvement through secure access to clinical information at the point-of-service
- Help guide clinicians towards evidence based 'best practice' through advanced clinical decision support

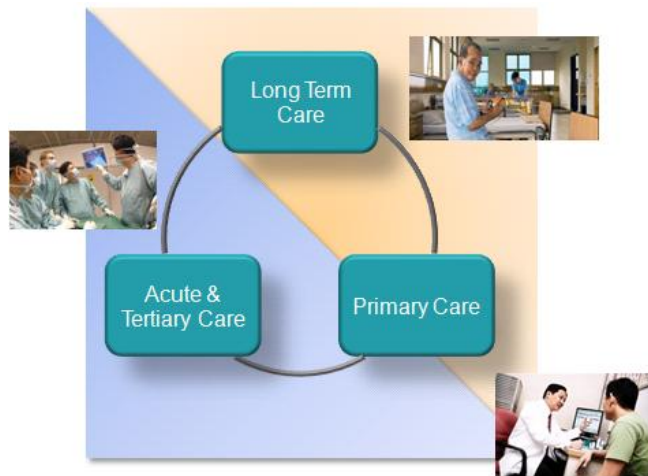
And the literature suggests that IT can

- Improve health outcomes through recommended disease management and prevention interventions (quantitative – decreased sick days and workdays lost, life-years gained)
- Advance medical knowledge and research breakthroughs through the mining of biomedical and outcome data

Getting ready for the “Silver Tsunami”

Pressures on Singapore healthcare system set to increase

- 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.



Khoo Teck Puat Hospital
550-bedded regional hospital

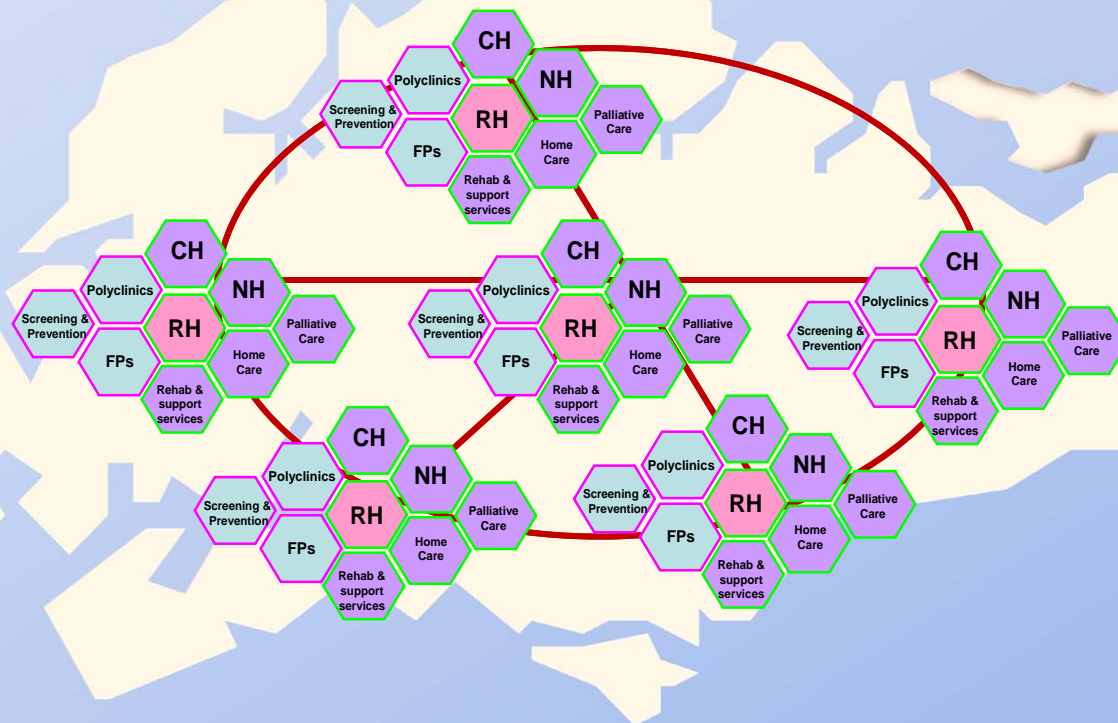


Jurong General Hospital (2014)
700-bedded regional hospital

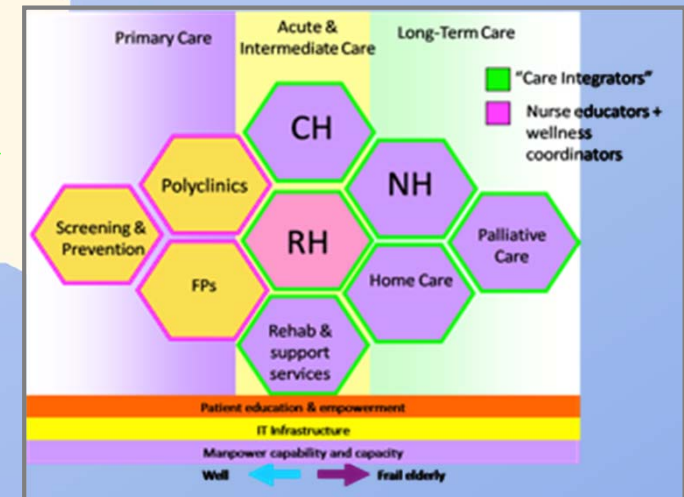
- Community hospitals, nursing homes, primary care
- Train and/or recruit healthcare providers (and IT professionals!)
- Support informal care givers
- Address incentives, disincentives
- New responsibilities, accountabilities

New healthcare landscape

Strategic vision of patients moving seamlessly across the healthcare system, receiving coordinated patient-centric care at the most appropriate settings.



Enabled by the National Electronic Health Record (NEHR)



Vision of “One Singaporean, One Health 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



The difference between EMR and EHR

EMR

**Specific to a facility
(institution, private office)**

- Equivalent of its paper predecessor
- Includes everything recorded by the organization about a given patient
- Has “depth” but lacks “breadth”

EHR

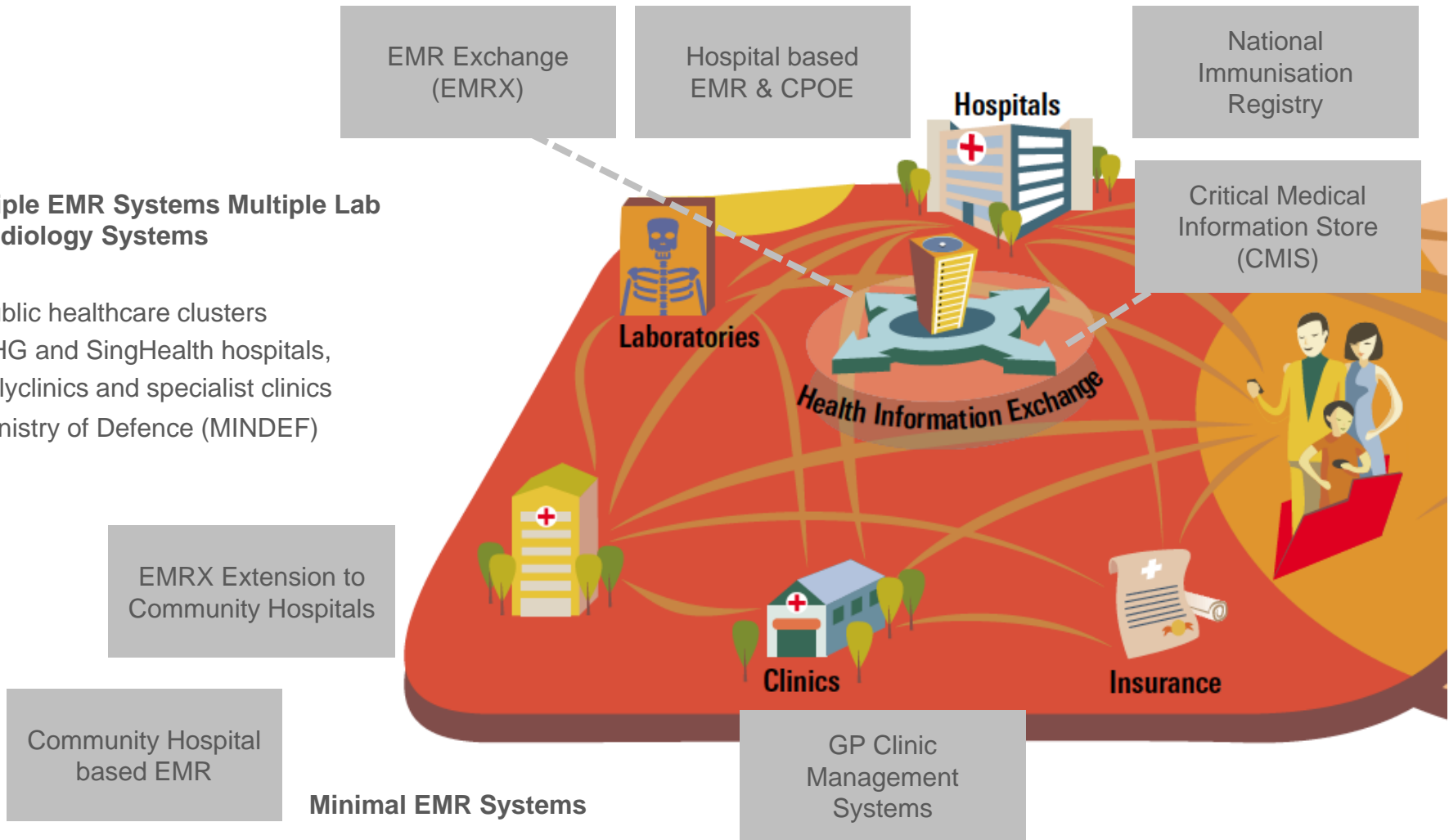
Specific to an individual

- Captures a key subset of health information from multiple point-of-service systems
- Available electronically to authorized healthcare providers anytime, anywhere
- Designed to facilitate the sharing of data across the continuum of care, across healthcare delivery organizations and across geographies

Existing eHealth systems in Singapore

Multiple EMR Systems Multiple Lab & 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

What our clinicians need

- 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

Guided by architectural principles

- **Portal based** – with additional toolsets to support targeted clinical capabilities
- **Iterative and phased implementation** – targeting key clinical capabilities
- **Role based** – to support clinical access requirements in a secure and authorized way
- **Loosely coupled** – to support flexibility and extensibility over time
- **'Hybrid'** – central repository summary health care information, access to detailed reports / images via record locator service
- **Service-oriented based approach** – integration layer to support interoperability and provision of registry and identification services
- **Leverage existing systems and investments where possible**

Establishing a suite of standards that are:

- Clinically-driven
- Easy to use
- Internationally recognised

To ensure clinical data included in the EHR can be:

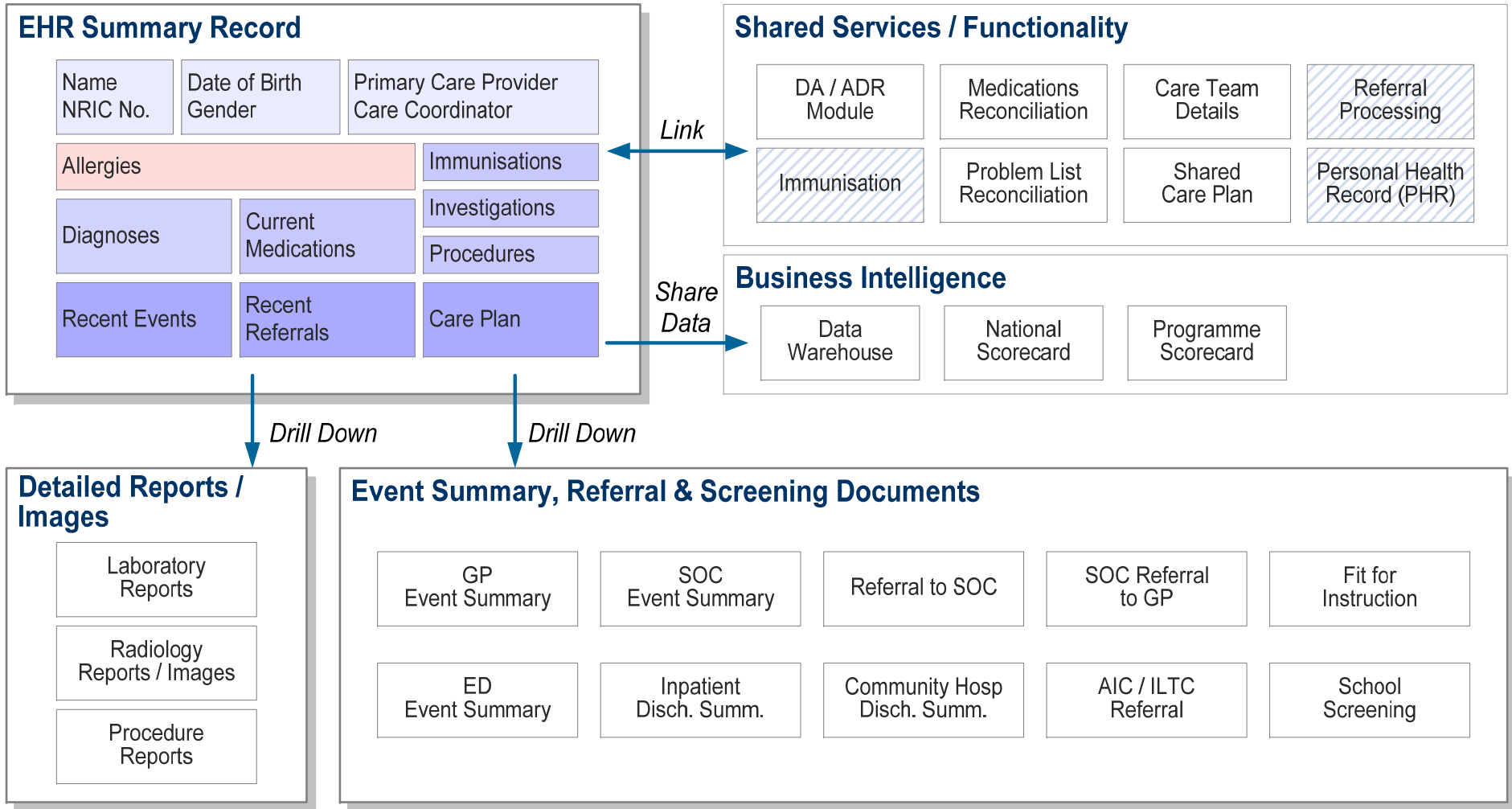
- Shared and exchanged safely and reliably for the monitoring and care of patients
- Used meaningfully for secondary purposes including production of clinical knowledge


Global Standards Engagements

- HL7 (Health Level Seven)
- IHTSDO (International Health Terminology Standards Development Organization)
- ISO TC215 on Health Informatics
- IHE (Integrating the Health Enterprise)

Standards also provide a platform for long term semantic interoperability and research informatics

EHR – Conceptual view



 Applications that are not a part of the EHR solution, but will be integrated with the EHR

Access



EMRs

EHR Portal

Patient Health Record

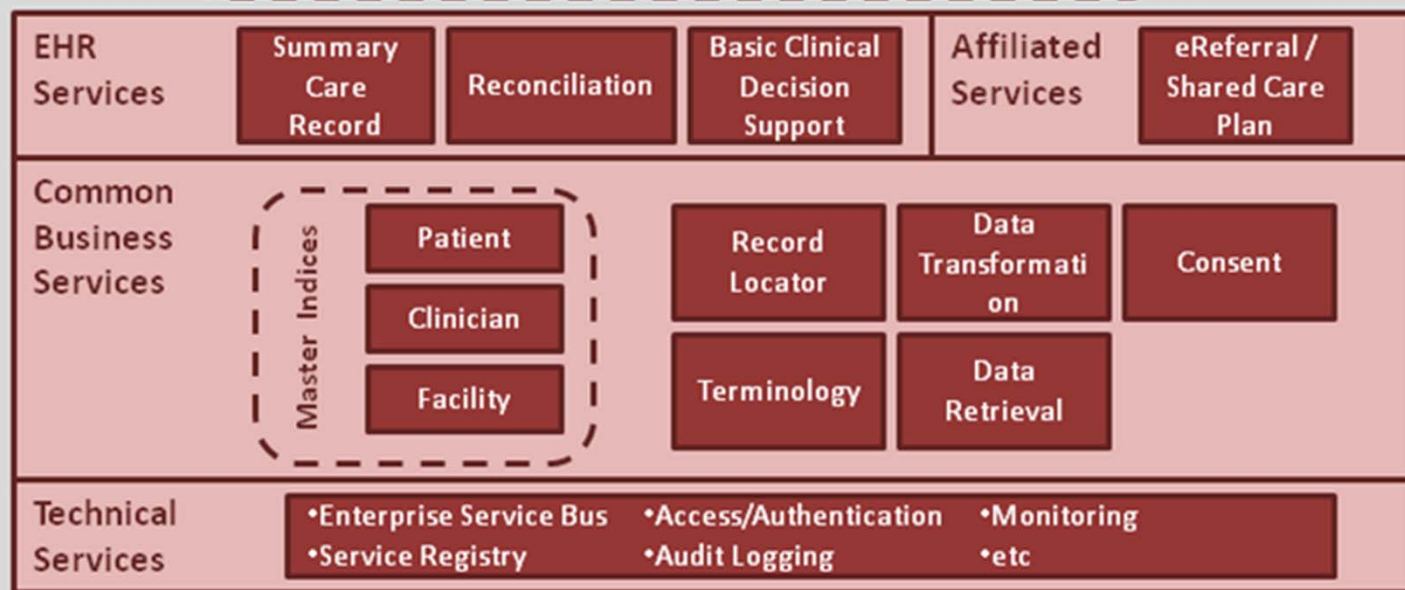
Analytics / Audit

Data Access Interface

New end-user screens/functionalities

- Summary Care Record
- Reconciliation
- Shared Care Plan
- Detailed Documents
- Referral
- Basic CDS
- etc

EHR Info Exchange



Data Provision Interface

Provider Gateway

Data



EMRs



Repositories (CMIS, NIR, etc)



Virtual EHR Database (RLS)



Summary Care Record



Master Indices



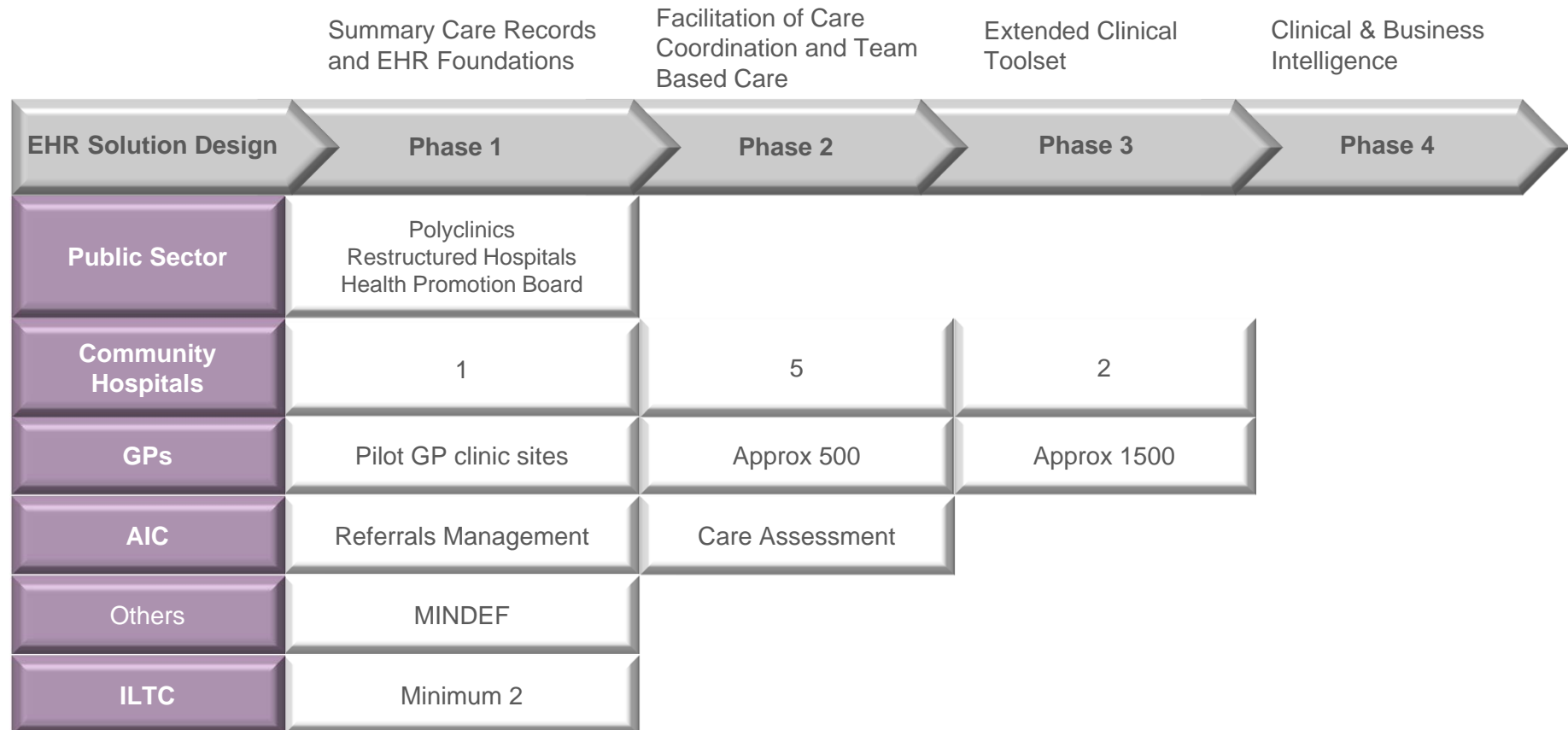
Reconciliations (Med, Diagnosis, etc)



Documents (Event Summaries, Referral, etc)

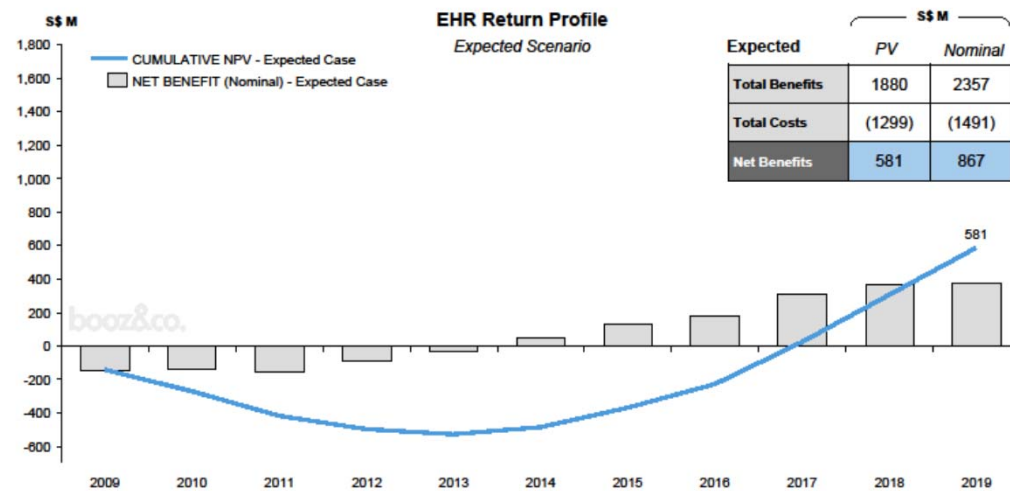
NEHR rollout roadmap

- Iterative rollout with refinement and enhancement from each deployment cycle
- System will mature and evolve with shifts towards shared information and care, lowered institutional barriers and mindset change



Evaluating the benefits of EHR investment

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



1) Expected scenario assumes 100% of expected benefits are realized; includes cost contingencies of 20%; adoption at expected levels; and health finance reform occurs in 2014
Note: Does not include terminal value

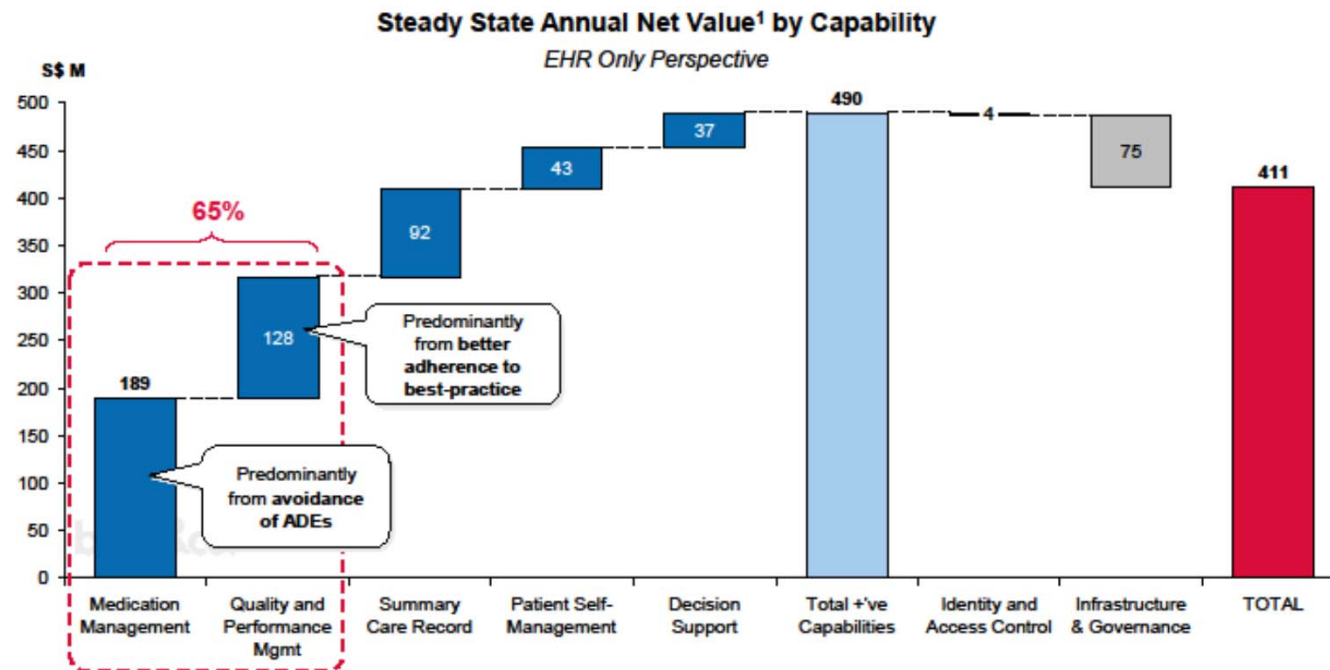
Answering the questions:

- 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.



1) Steady state refers to the value generated once the program has ramped up (i.e., in 2019). Annual net value considers ongoing benefits in 2019 less ongoing costs
 Note: Connected Care and Advanced Capabilities do not accrue any quantitatively sized steady state benefits / costs - hence are excluded from this figure

Quantifying potential benefits

Aim to support clinical transformation in GP healthcare sector:

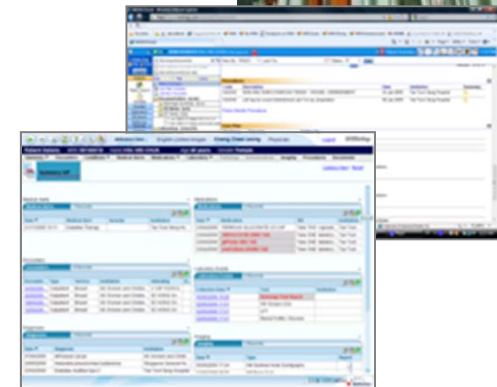
- Pillar 1: Support clinical transformation within clinic practice
- Pillar 2: Strengthen care partnership and linkages
- Pillar 3: Encourage professional collaboration through trusted relationships and networks within the primary care sector

5-year Strategy

- Developed in consultation with 80+ GPs over past year, including international experts and professional bodies (CFPS, SMC, SMA)

Phase 1 in progress

- Implementing CMS-EMR solution for 50 GPs



Community Hospital Integrated Care (CHIC)

Initial aim to implement a common platform to support 6 Community Hospitals' operational and clinical needs

- Improve patient care
- Enhance operational efficiency
- Contribute national initiatives

Obtained buy-in and alignment across all 6 CHs

- Setup of a MOH-MOHH-CHs committee to jointly make decisions and agree on harmonised requirements (CFPS, SMC, SMA)

Community Hospital Integrated Care (CHIC)

Revised approach in progress

- Alignment with regional health services (RHS) model
- Balancing vertical and horizontal integration for efficiency and economies of scale
- Aligning with National EHR Enterprise Architecture
- Affordability, sustainability, meeting future needs

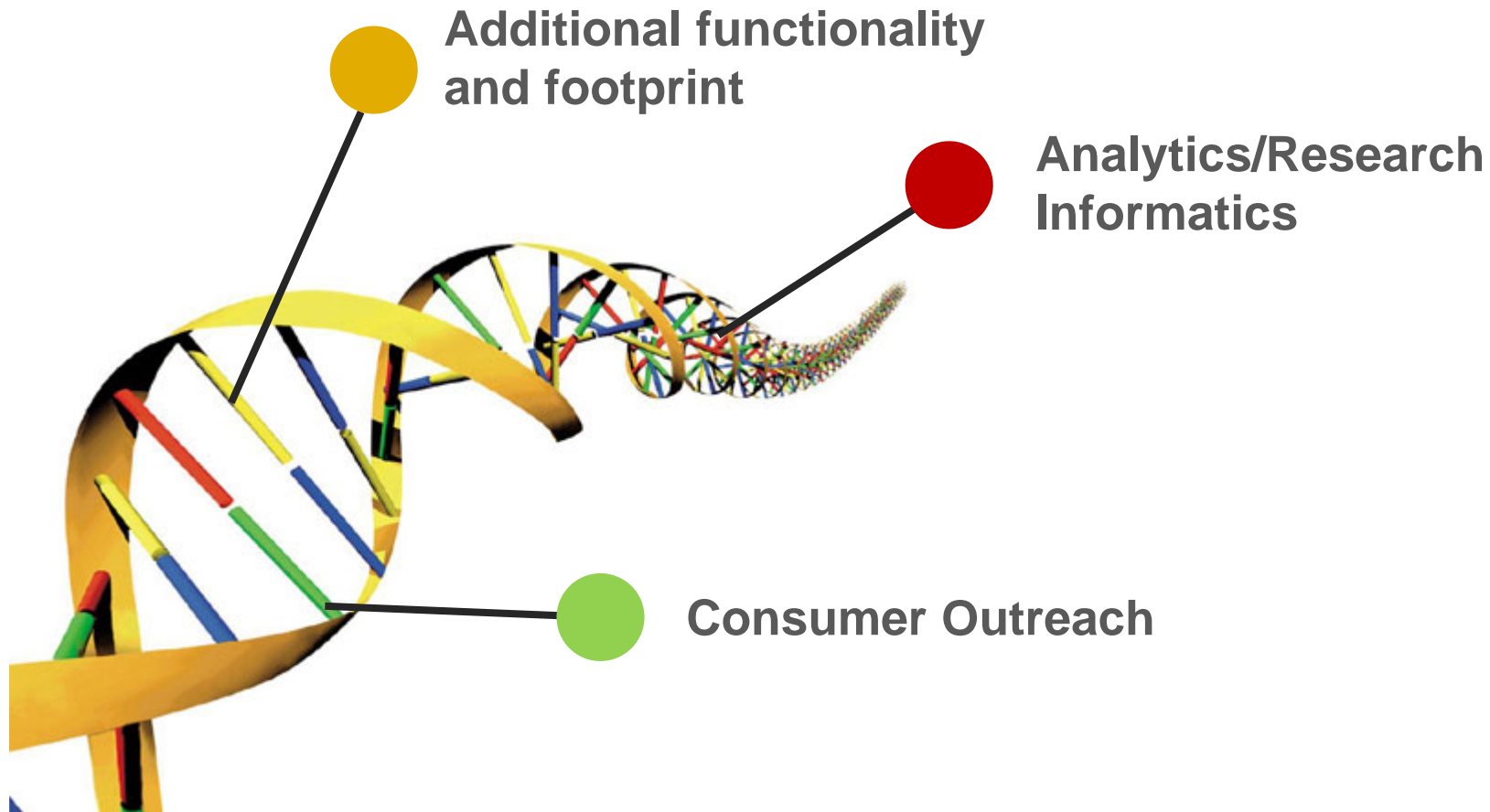


Other key initiatives in ILTC sector

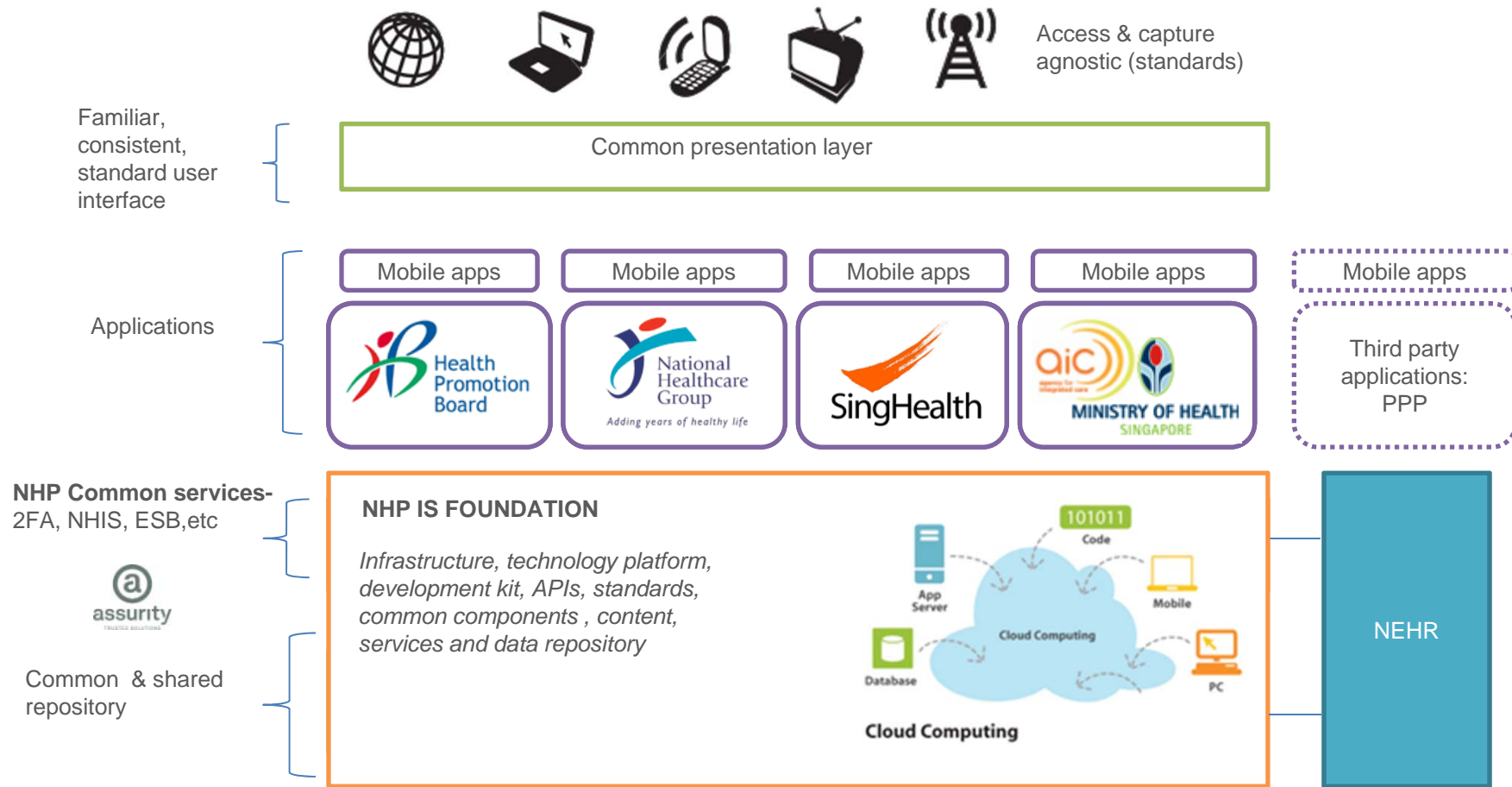
- ILTC Innovation Programme
 - IT capability adoption model for Nursing Homes & Inpatient Hospice
- NH Implementation Plan (N-Help)
 - IT enable 70% of NHs with basic administration, billing, and case mgmt systems
- Telehealth



What's next for the EHR? Journey to iN2015



Eg. Extension of national architecture: PHM platform



Riding on national infocomm initiatives



Enhanced Island-wide Wireless Access



National Broadband Network Rollout



National Two-factor Authentication



G-Cloud

The NEHR journey

- Breaking new ground
- Assessing best practices worldwide
- Adapting and adopting approaches in IT and health informatics in the context of healthcare ecosystem
- Focus on meeting real-time clinical needs
- Engagement of key stakeholders
- Building talent and capabilities
- Measure, measure, measure!



Thank You



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