



Developing AI Technology Platform in Hospital Authority

Artificial Intelligence and Digital Healthcare Workshop

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22nd November 2018



Our AI Vision

HA's Clinical Management System (CMS): A Functional-driven System

100%

made in HK &
designed by clinicians

55,000+

clinical users in 42
public hospitals

280TB

of HK citizens'
clinical data

25+ Years

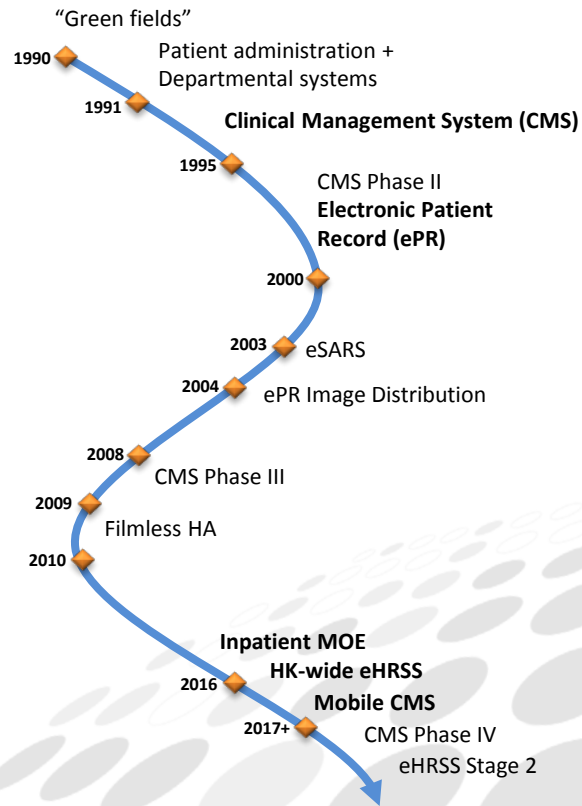
evolution to a world-
leading clinical IT system

800 Modules

covering all aspects of
hospital healthcare

10M+

daily data
transactions



What is a Data-driven Enterprise ?

- In 21st century, every company will become a data company
- Paradigm shift to data driven IT service



- Data is the new fuel of business transformation
- Technology and data enable new service model

What does it mean to HA ?

1. Train people to manage data
2. Get insight for everyone
3. Data trigger actions



What does it mean to IT ?

1. Real time, single truth
2. Combine Transactions with Data Warehouse
3. Rule or AI based, able to trigger events

HA's AI Vision: Data-driven Enterprise



Analyze clinical data on the spot to support clinical decision

Clinical Advisor & Decision Support



Use patient and risk profiles to provide personalized healthcare advice

Personalized Health Management



Provide massive data to support population health analytics

Data Support for Population Health



Hospital

Home & Community

Population Health



Make healthcare available anywhere and anytime

From Hospital to Home & Community Care

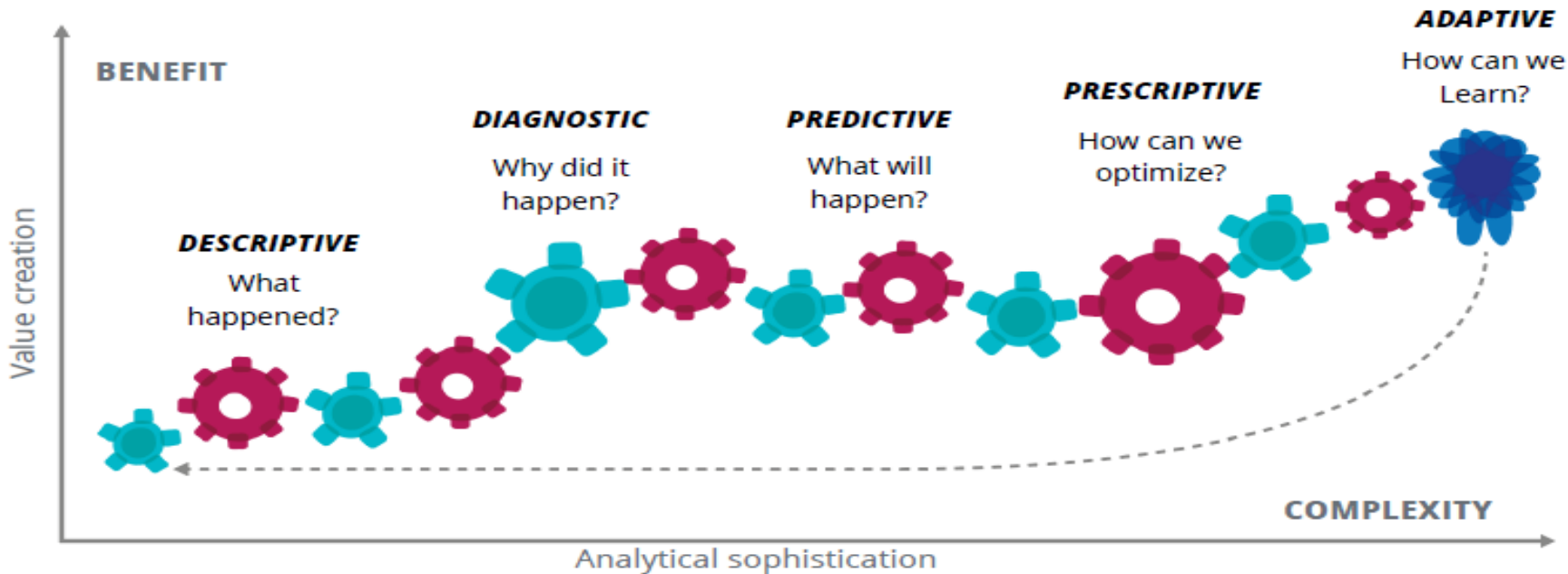


Use data to enhance resource allocation & utilization

Data-driven Resource Optimization

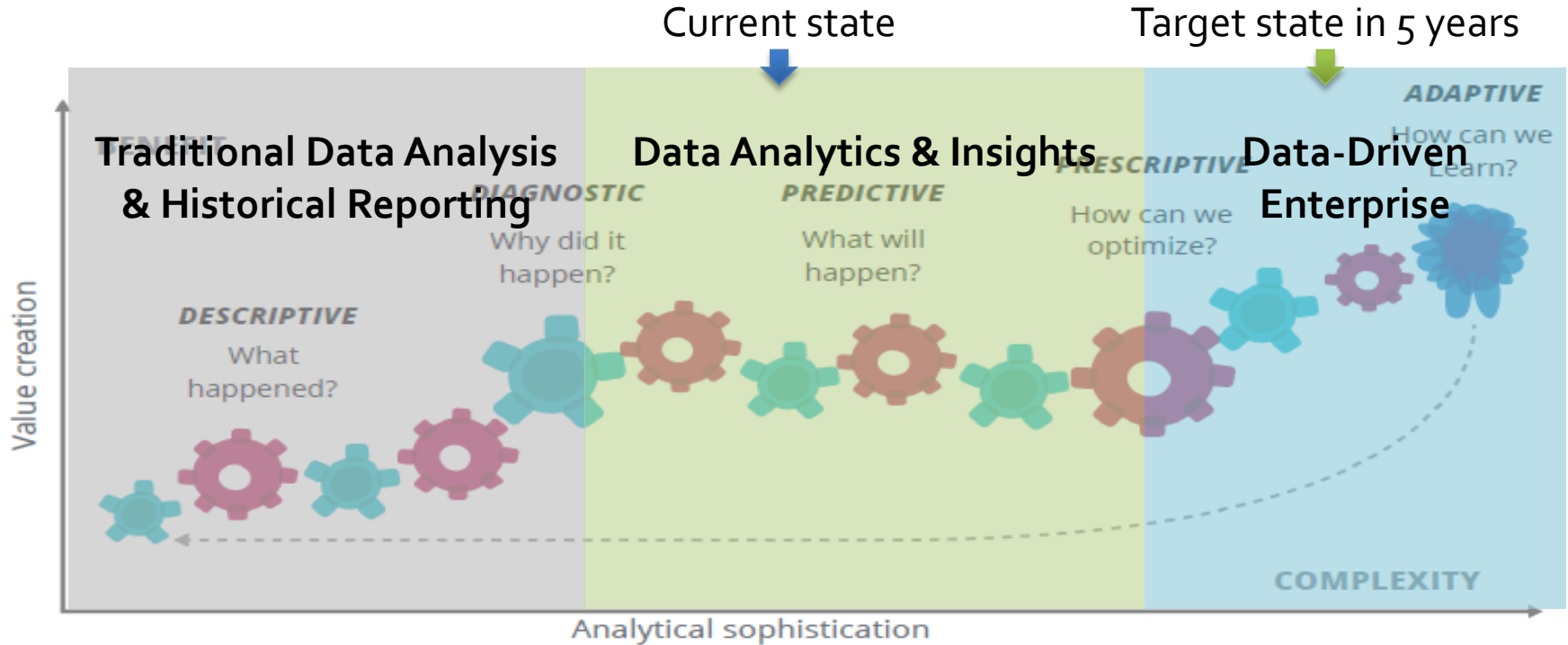


Roadmap Towards Data-Driven Enterprise





Roadmap Towards Data-Driven Enterprise





HA's AI Strategy





Our AI Challenges

Expertise

Lack of in-house expertise while expensive & difficult to get from market

Tools

Lack of low cost data analytics tools

Innovation

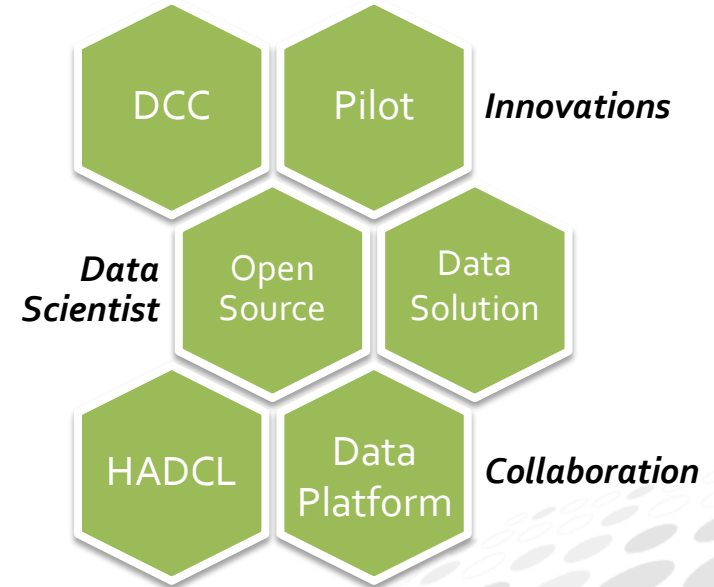
Need a variety and reliable environment for data sharing and exploration

Business Support

Lack of business sponsorship for data projects



Our AI Strategy



Deliver Data Driven Solutions in 5 IT Strategic Portfolios

3 Demand Strategies: Transforming HA Service Provision

1 Next Generation Clinical Management

- › HA's care model transformation
- › Efficiency improvement
- › Clinical quality and risk management

2 Enhanced Patient Experience and Outcome

- › Data-driven insights for better outcome
- › Patient engagement
- › Community collaboration

3 Digital Workplace and Collaboration

- › Mobile tools
- › Staff collaboration
- › Enhanced resource management
- › Value-adding process

4 Advanced Process and Infrastructure

- › Smarter IT services
- › Advanced infrastructure
- › More reliable and secure platform

5 Resource Centralization and Specialization

- › Talent specialisation
- › Learning culture
- › IT for IT
- › Better business alignment

2 Supply Strategies: Uplifting IT Capability



Our AI Impact to the Digital Transformation

Next Generation Clinical Management

1. Enable **real-time clinical data & event alerts** for data-driven care

Enhanced Patient Experience & Outcome

2. Utilize **citizen-provided data** for engagement & personal health management

Digital Workplace and Collaboration


3. Provide **on-demand data analytics & visualization** for actionable strategic insight

Advanced Process and Infrastructure

4. Establish **architecture, infrastructure & governance** for advanced data capability

Resource Centralization and Specialization

5. Uplift **data competency** and foster **collaboration** for innovation





HA Data Competence Center (DCC)



Establish Data Competence Center (DCC)



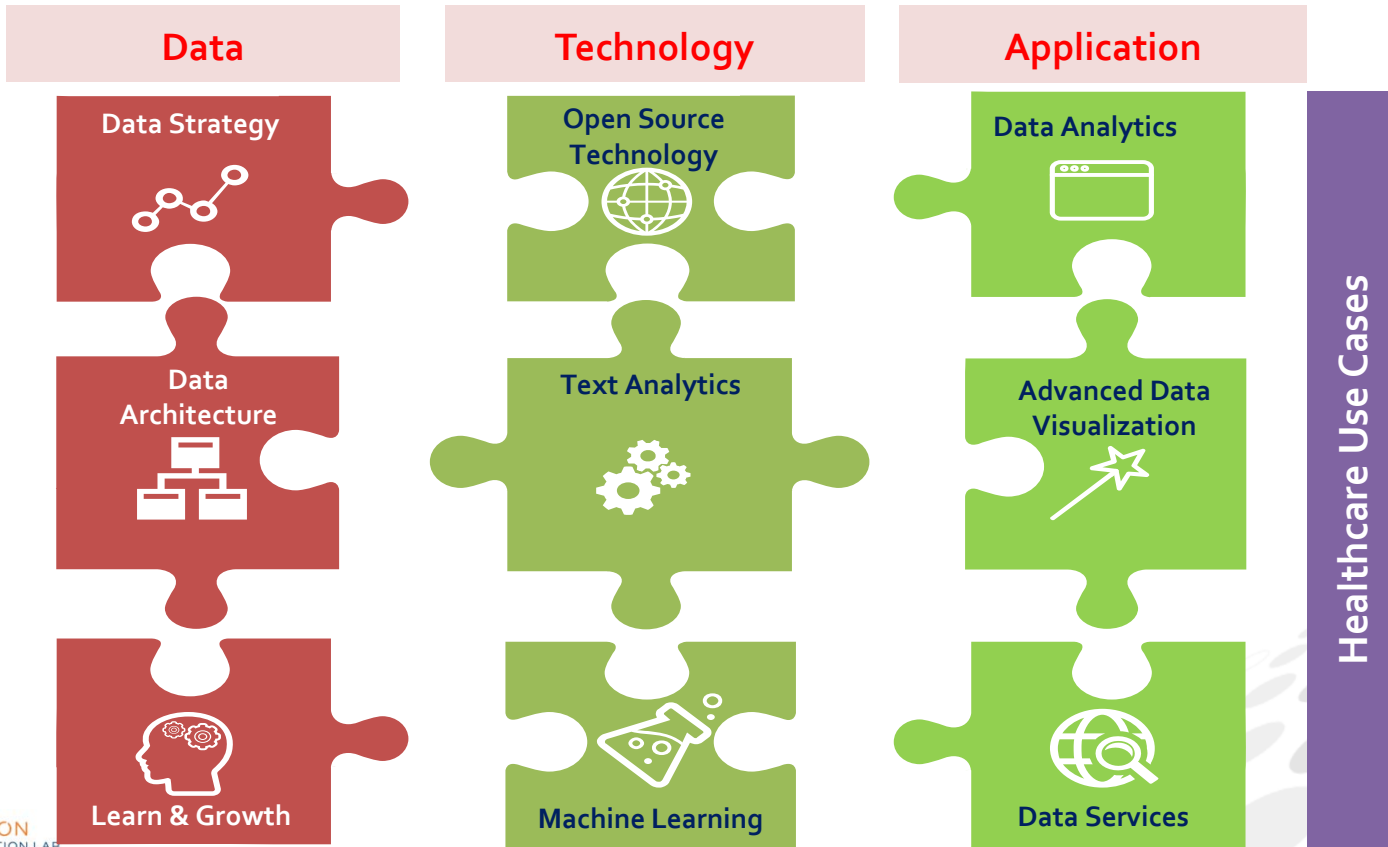
Formed in June 2015
from 8 to 80 members
in 2017

R&D
Open source
data technology
Data infrastructure

HA use cases, develop
prototypes

Learn and share, develop
50+
data engineers

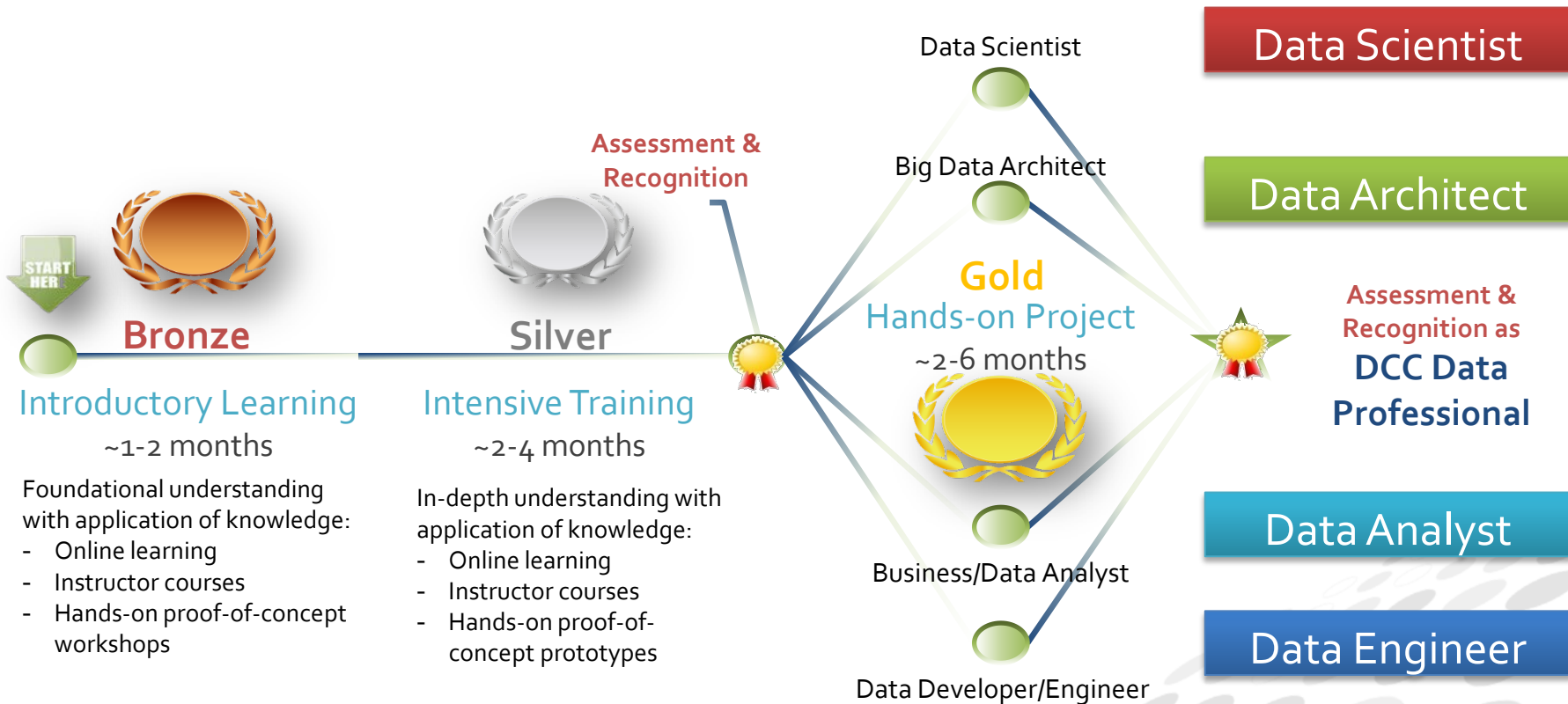
Focus on 9 areas of DCC Development (2015)



Leverage Open Source



Design our DCC Training Roadmap



Selected Prototype Projects by DCC

Early Detection of Potential Super Bug Outbreaks via Real-time Visualization



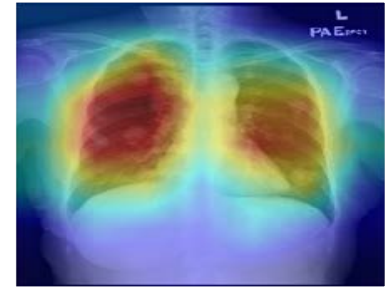
- Flag cases and identify clustering based on real-time lab & in-patient data
- **3D data visualization** to help identify origin

Predictive Colorectal Cancer (CRC) Detection via Machine Learning



- Pilot trial with one year of CRC result from HA's LIS
- Achieved promising result (AUC = 0.814, results comparable to other similar published studies)

Auto Identification of Lung Diseases via Image Analytics



- Making use of both public (NIH) and HA data
- Able to automatically identify 14 lung diseases (with AUC=0.75 – 0.95)



HA Data Collaboration Lab (HADCL)



Big Data Collaboration as a Strategic Initiative



HKSAR CE's 2017 Policy Address

HA to
establish
a Big Data
Analytics Platform

Facilitate
biotechnological
research

Support
formulation of
healthcare
policies

Improve
clinical and
healthcare services

Promote
innovation in
healthcare services



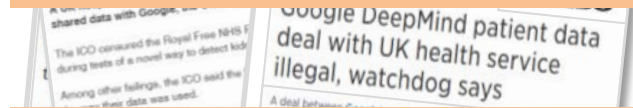
The NHS Story: Patient Data Security is a Prime Concern

- The Royal Free NHS Foundation Trust gave **1.6 million patient records** to Google DeepMind for a trial
- Including **sensitive patient data** (e.g. HIV status, mental health history, abortions)
- NHS & Google **did not properly inform patients** the use of their data
- Ruled **illegal** and a **failure to comply** with UK's data protection rules



"The price of innovation does not need to be the erosion of fundamental privacy rights,"

Elizabeth Denham, UK Information Commissioner



"We underestimated the complexity of the NHS and of the rules around patient data, as well as the potential fears about a well-known tech company working in health"

Google DeepMind



Other Challenges for Further Opening Up Data



Data

- Operational rather than research
- Highly sensitive in nature



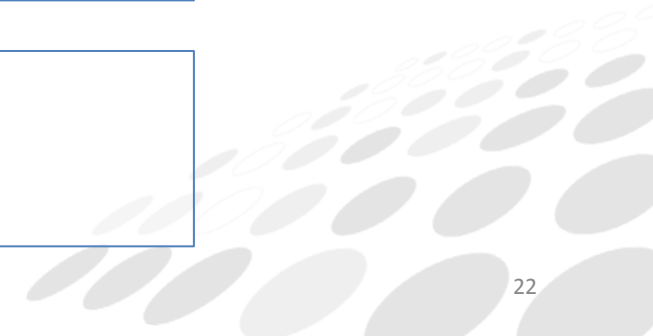
Legal

- Global commercial collaboration
- IP Rights issue

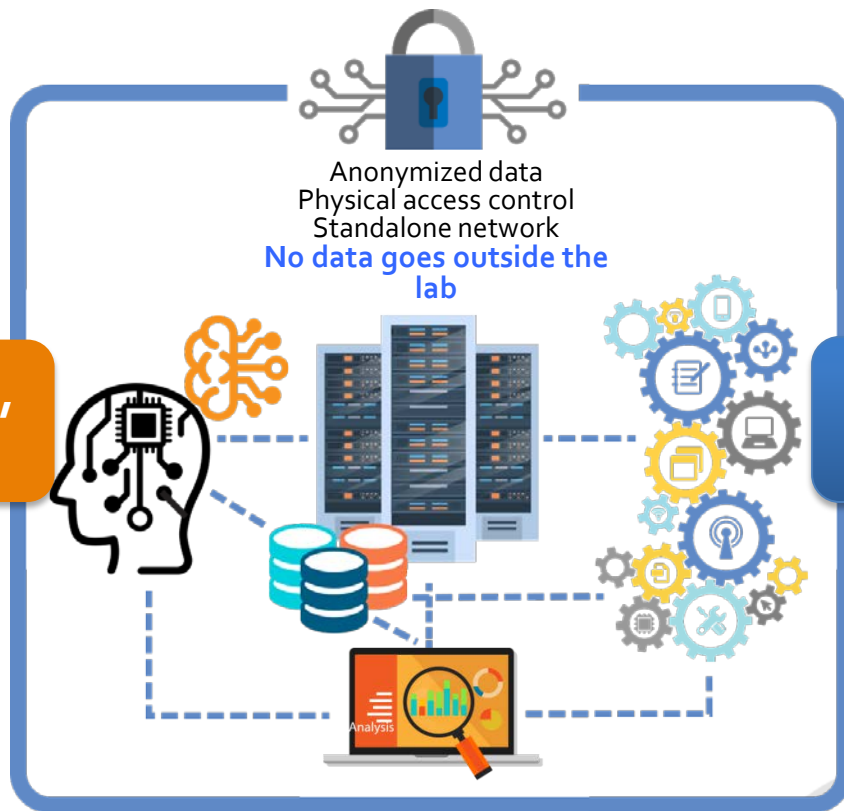


Public Perception

- Public and media opinions



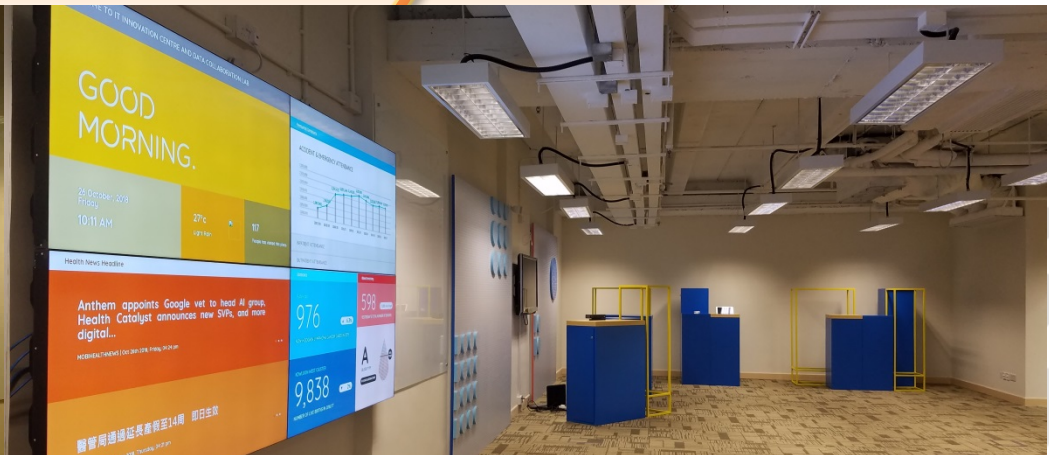
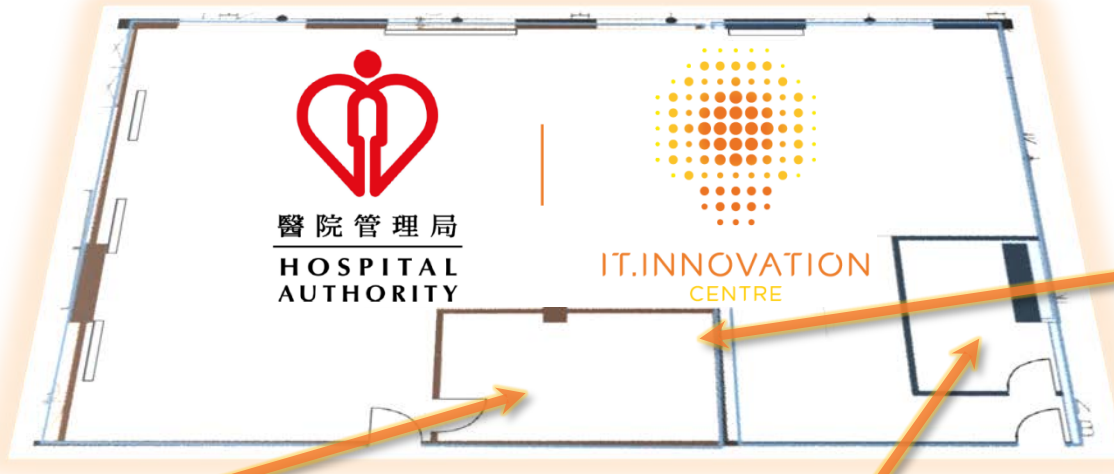
What is HA Data Collaboration Lab?



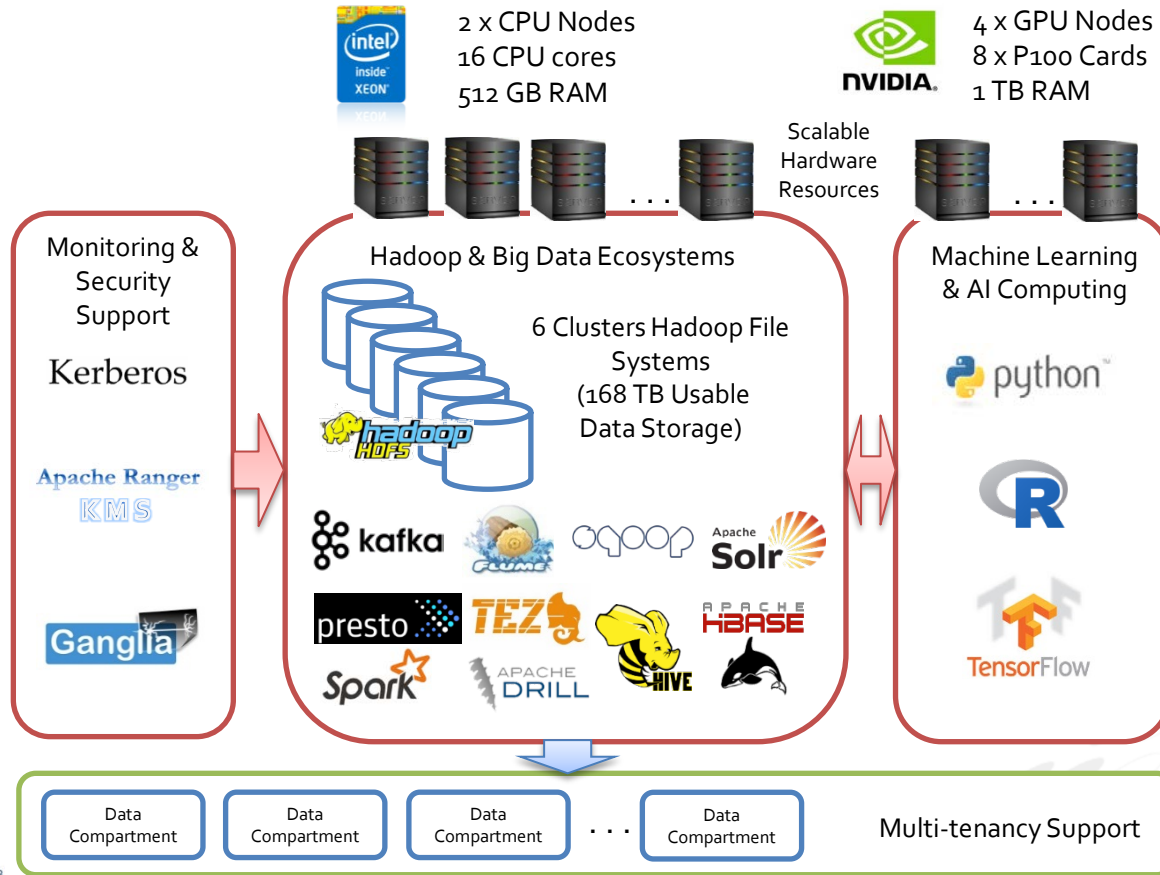
Artificial Intelligence,
Machine Learning

Data Technology
Platform for Innovation

HADCL Collaborative Space



HADCL Technical Infrastructure



HADCL Data Catalogue (for pilot phase)



More information at <https://www.ha.org.hk/data>



HADCL Development Roadmap

2018 2H

2019 onwards

- Set up HADCL
- Launch **12-month pilot** for at least **4** pilot projects
- Provide Data Exploration Workshops
- Review and enhance process and capability
- Scale up HADCL service capacity
- Further expanding HADCL service profile

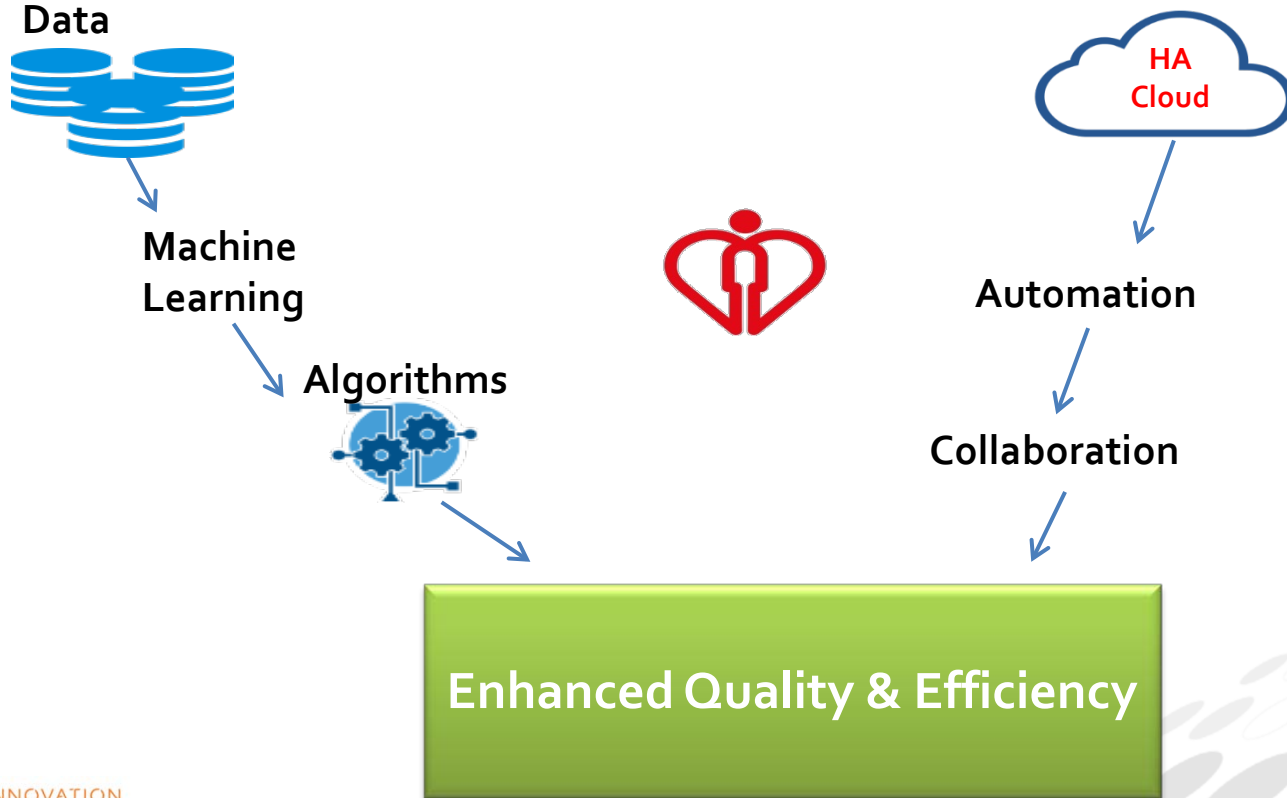




Our Transformation: Data-Driven Healthcare



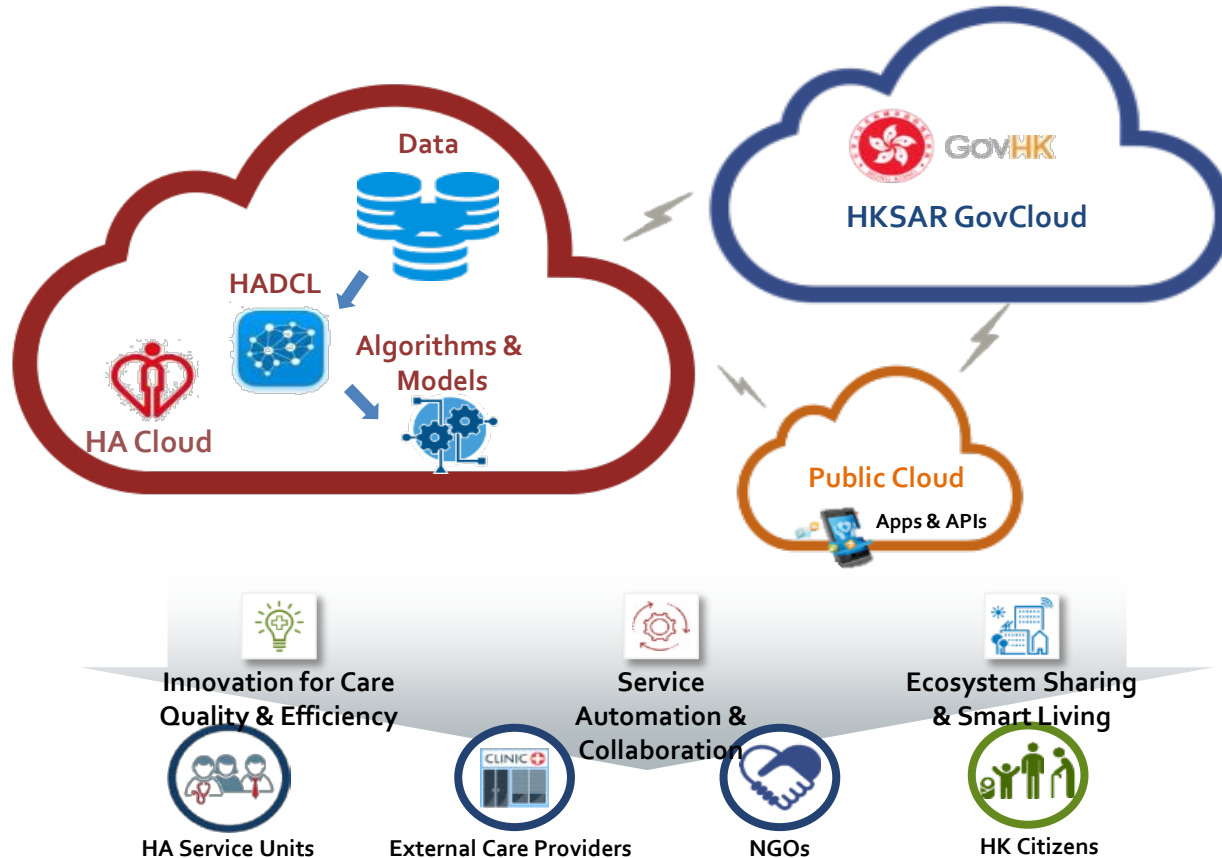
Leverage Data Analytics and Cloud for Enhanced Healthcare Quality & Efficiency



Connect Patients beyond Hospital Care



Build HK Healthcare Cloud Ecosystem





Thank You !