



Health Analytics in the Real World:

Insights from 15 years of pan Canadian Health Information Data Warehousing and Digital Health perspectives



Why are we here?



Objective:

**Share Clinical
Data Warehousing
long-term lessons
learned and
Health Analytics
insights**

Share real-world experiences:

Mark Fuller – CIHI

- Director Health Information Applications

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Alex J Mair – Canada Health Infoway

- Director, Architecture
- Health Analytics, Emerging Technology Group

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Agenda



Topic	Lead	Time
Clinical Data Warehousing Lessons learned	Mark	10 min
Health Analytics – Architecture and Canadian Deployment Framework	Alex	10 min
Conclusions	Both	5 min
Q&A	All	5 min

Setting the stage...



“Hub and Spoke Architecture” (Inmon)

- *“Subject-oriented, integrated, time-variant and non-volatile collection of data”*

“Data Mart Bus Architecture with Linked Dimensions” (Kimball)

- *“A copy of transaction data specifically structured for query and analysis”*

Setting the stage...



Data Warehousing in Healthcare:

- *A trusted source of truth of comprehensive healthcare data structured for query and analysis purposes.*

Clinical Data Warehouse(CDW)

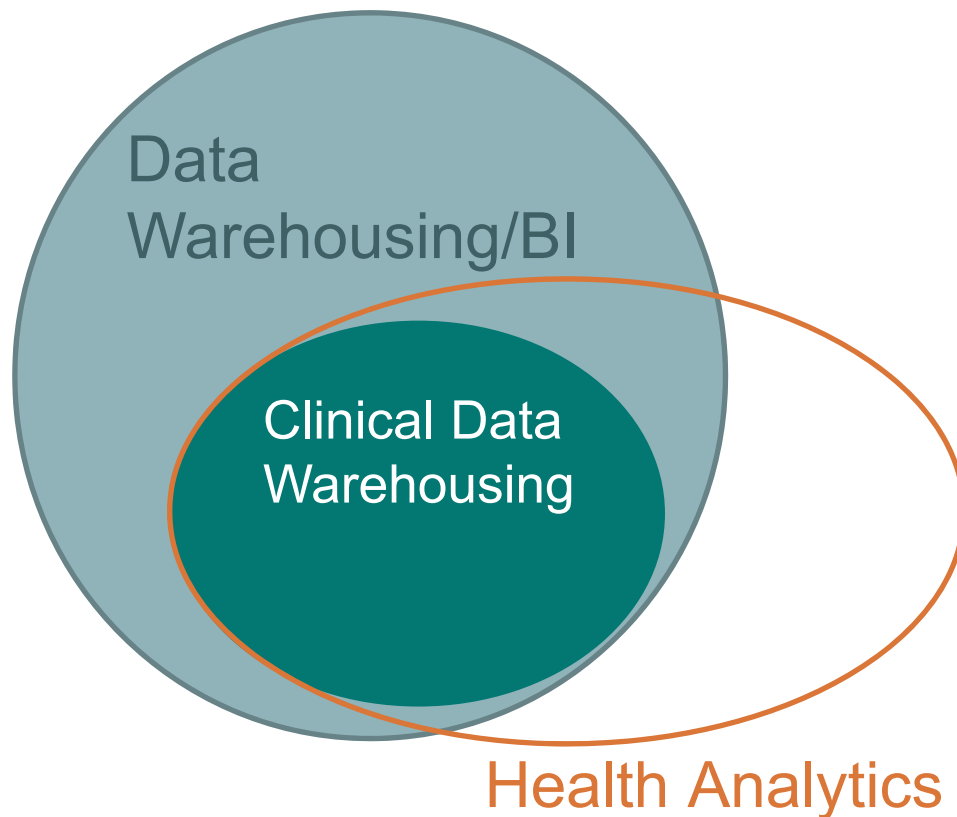
- *A grouping of data accessible by a single data management system, possibly of diverse sources, pertaining to a health system or sub-system and enabling secondary data analysis for questions relevant to understanding the functioning of that health system, and hence supporting proper maintenance and improvement of that health system - ISO/TS 29585*

Setting the stage...



**Data Warehousing =
Business Intelligence**

Setting the stage...

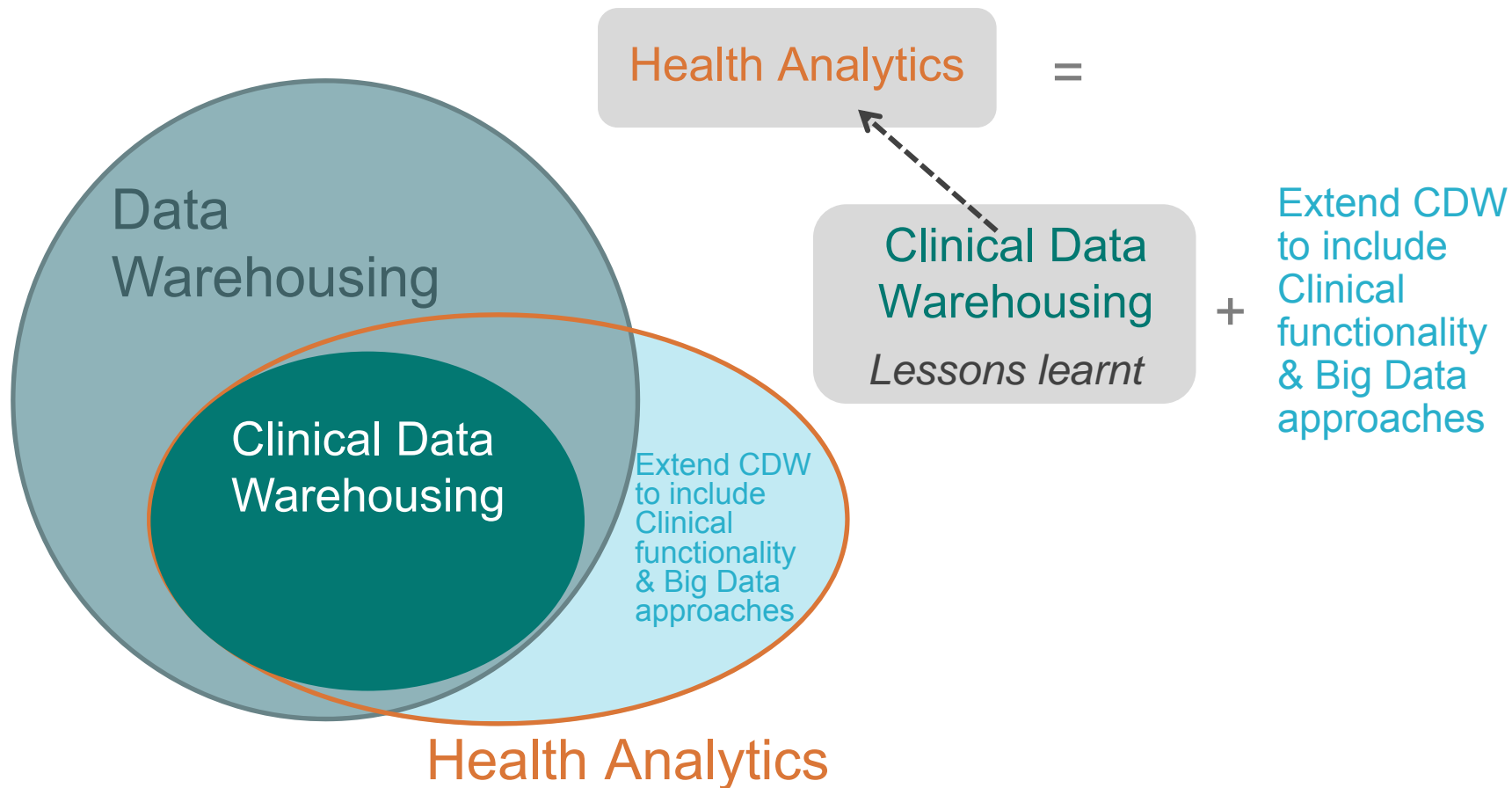


Health Analytics

The systematic use of data, information technology and methods to create insights in context that inform clinical and business decision making around the planning, delivery, management and measurement of health care.

Source: HIMSS Clinical and Business Intelligence Community of Interest , 2013

Setting the stage...



Clinical Data Warehousing Lessons learned (aka Health Information Data Warehousing)

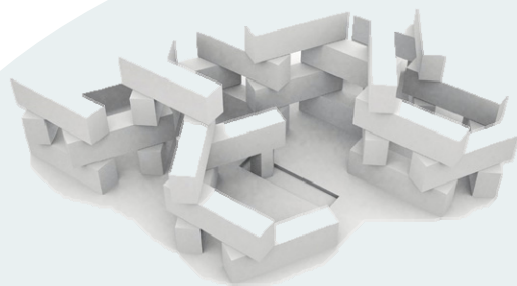


Mark Fuller, Director, Health Information Applications,
Canadian Institute for Health Information

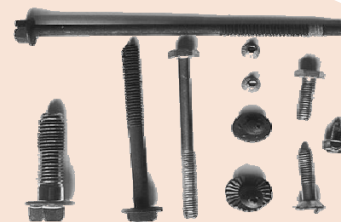
What makes Healthcare data unique...



Compared to other industries, Healthcare in Canada is:



Complex



Often involves Non-Standard Processes

Highly Privacy Sensitive



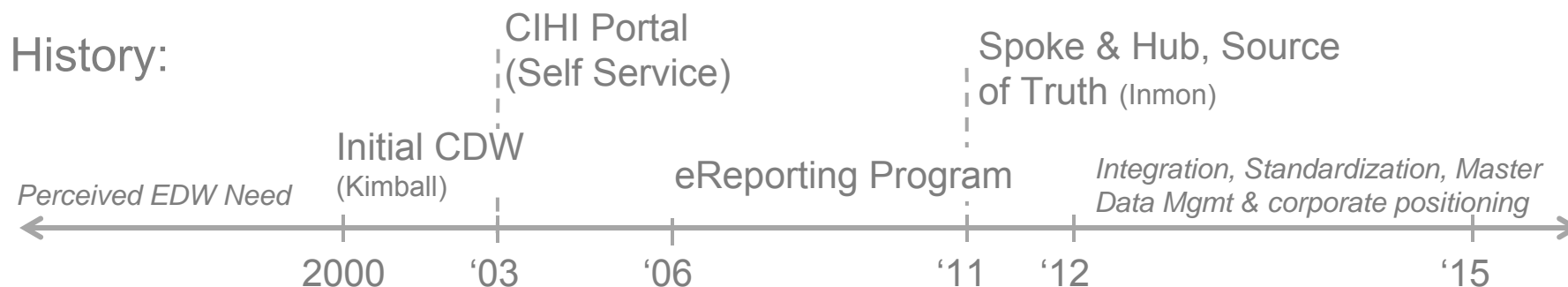
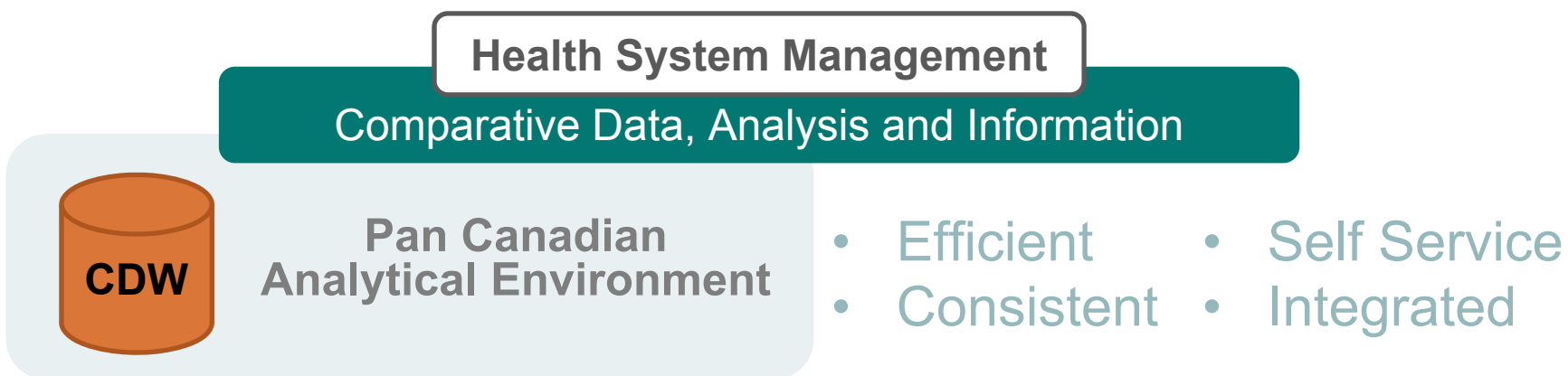
Federated



CIHI's Data Warehousing & BI



Canadian Institute For Health Information (CIHI)



CDW Lessons learned:



- Establish strong executive support
- Define data and information governance
- Implement data quality strategy where data precision matches data purpose
- Quantify business value and ROI

CDW Lessons learned:



- Establish enterprise-wide information & data requirements based on corporate goals
 - Master Data Management
 - Global business questions: who asks, when and why
- Remember that building a CDW is an enterprise program (not a project)
- Engage users and recognize usage patterns
 - Build it and they will come... or not!
 - Develop mechanism to foster trust in data sources and tools
- Use Self Serve BI to address capacity bottlenecks

Evolution of CDW



- Evolve CDW maturity to anticipate Big Data
- Big Data considerations:
 - Semi/Unstructured Data
 - Exploratory Analytics
 - Complex Data Integration
 - New Technologies
 - Real Time Data
 - Predictive Analytics
- Guide shift with architectural framework:
 - Define Data Warehouse Architecture, Data Model Approach, Binding Time (when to bind data to standards),
 - Architecture needs to support a full range of data depth, integration and functionality from ad-hoc, exploratory to dashboards etc,
 - 80/20 mix?: Traditional Analytics Infrastructure (80) plus New Approaches (e.g.: semi structured) (20)

Health Analytics Architecture and Deployment Framework for Canada



Alex J Mair, Director, Architecture, Health Analytics, Emerging Technology Group
Canada Health Infoway

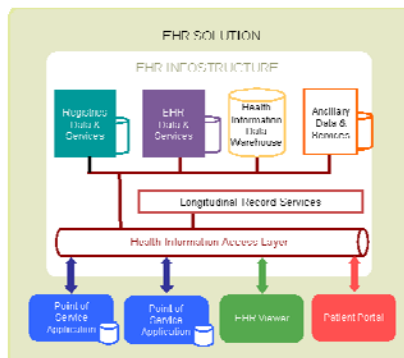
Who and what is Infoway?



With our partners, *Infoway* helps accelerate the development, adoption and effective use of digital health solutions across Canada



Infoway Emerging Technology Group



“Nexus of Forces” Represents the Arrival of Digital Health



Mobile Computing



Cloud Computing

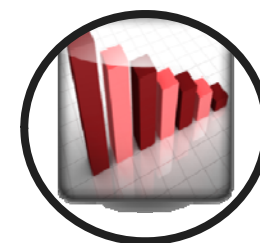


Internet of Things

These enablers are intertwined, creating a new computing ecosystem which is user-driven. One that is beginning to accelerate in health. One that will transform health delivery.



Consumer Enablement



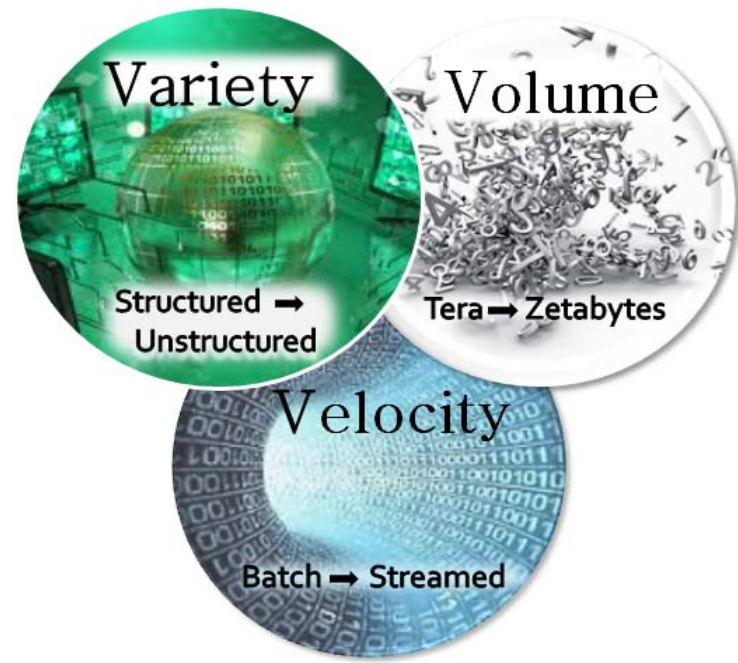
Data & Analytics

Arrival of Big Data Analytics

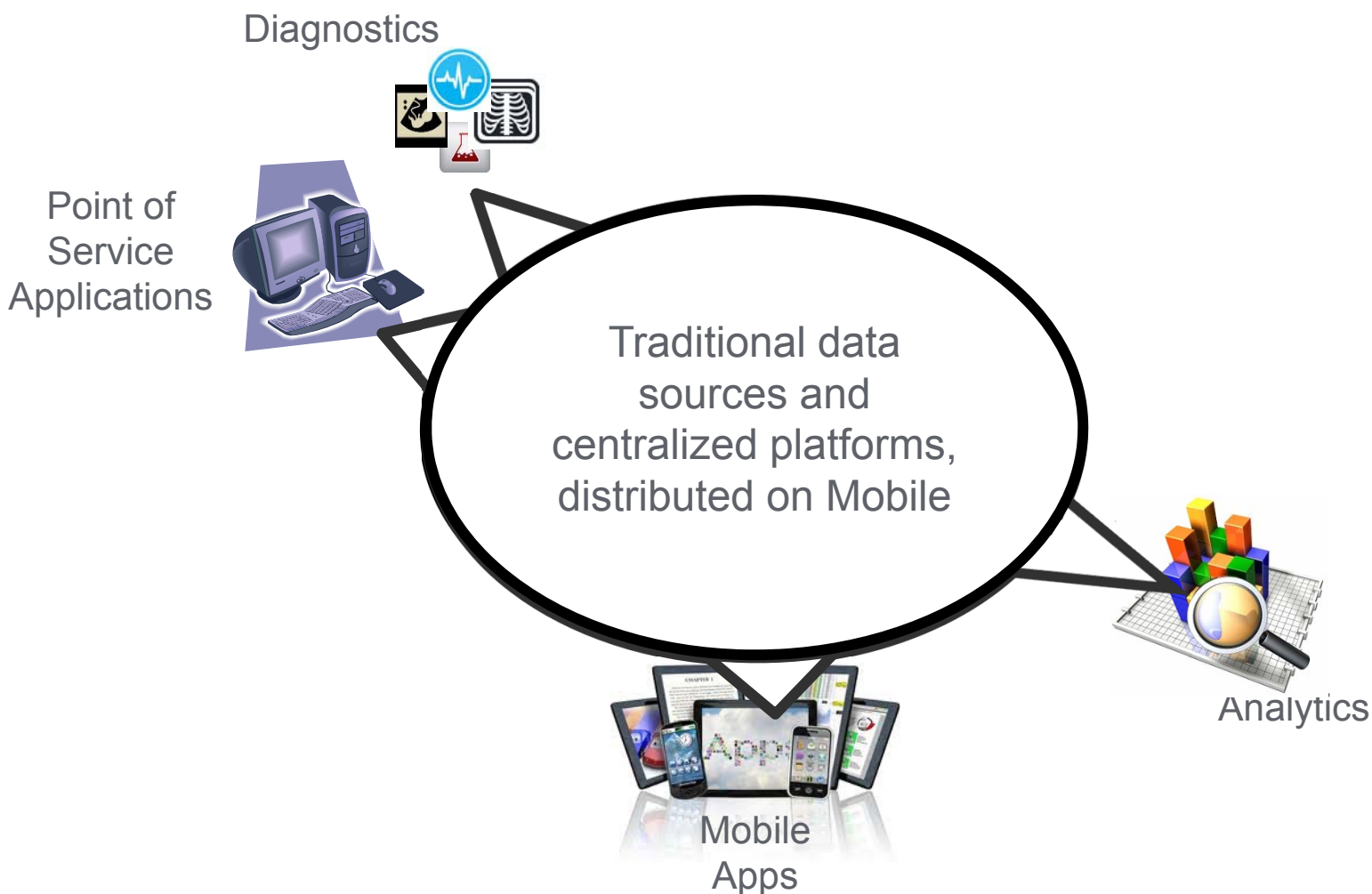


Volume, velocity and variety of types of data

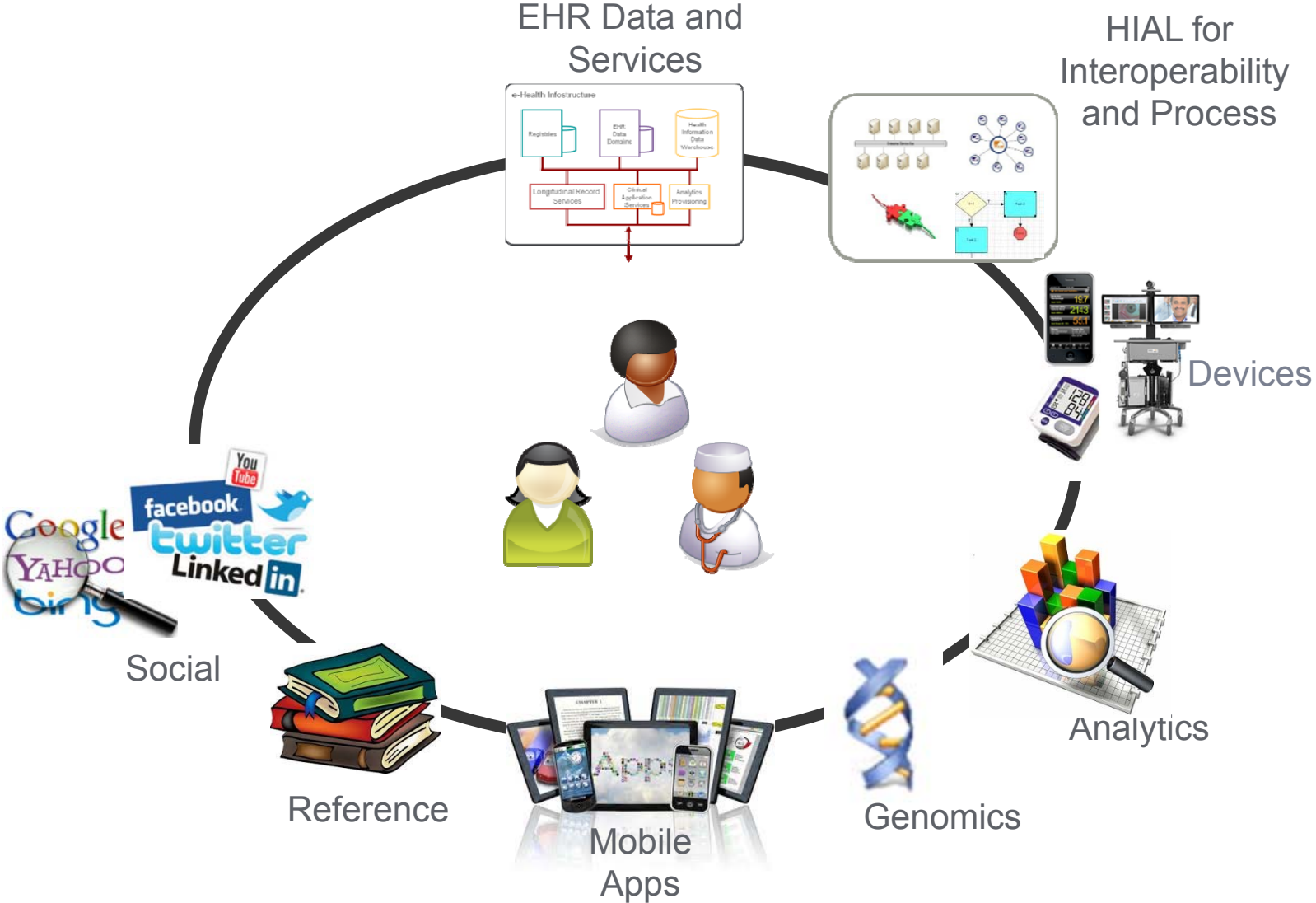
Systemic processes that examine large amounts of data to deliver new insights that can enable decisions in real or near real time



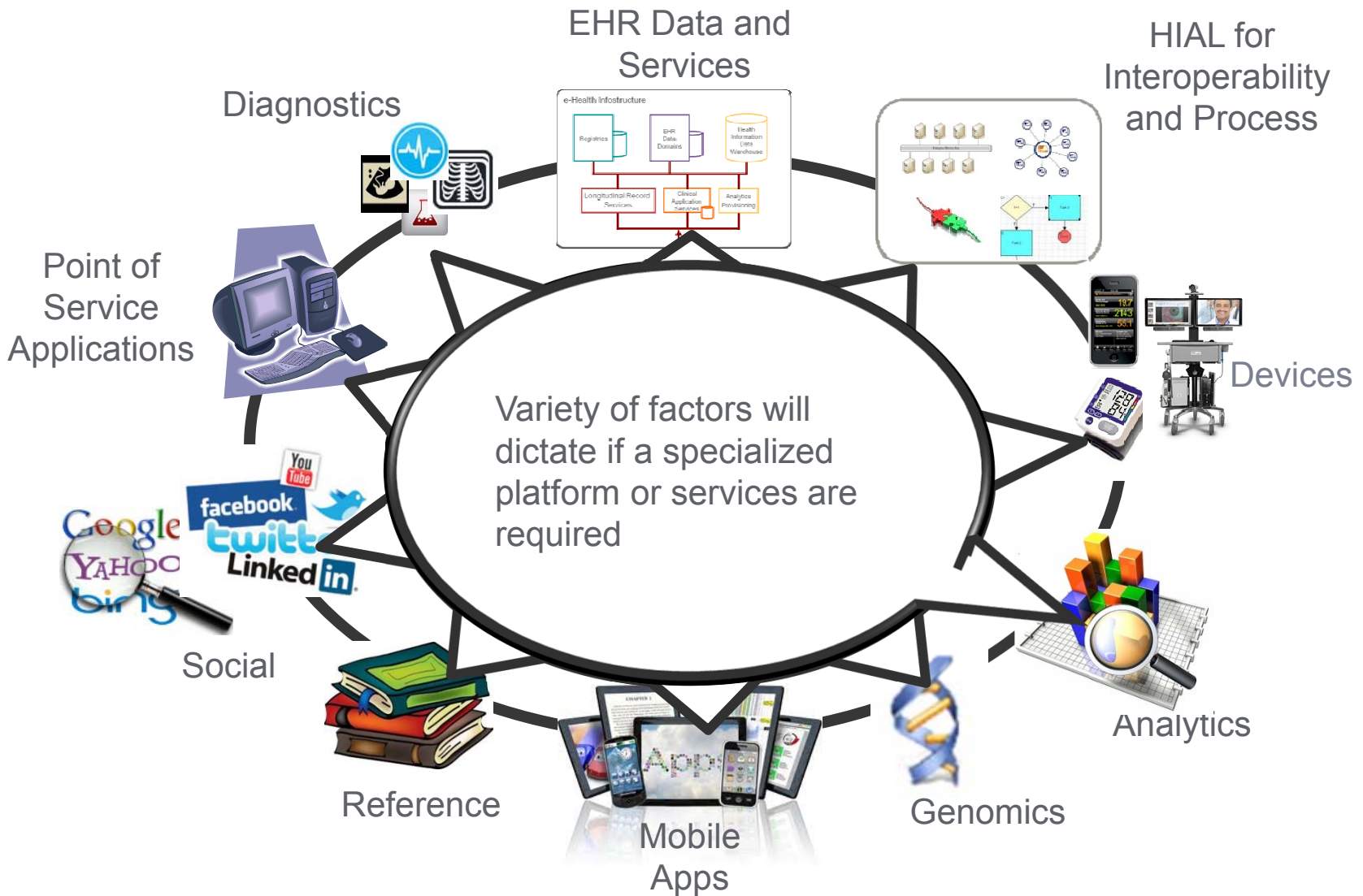
Clinical Data Warehouse (CDW)



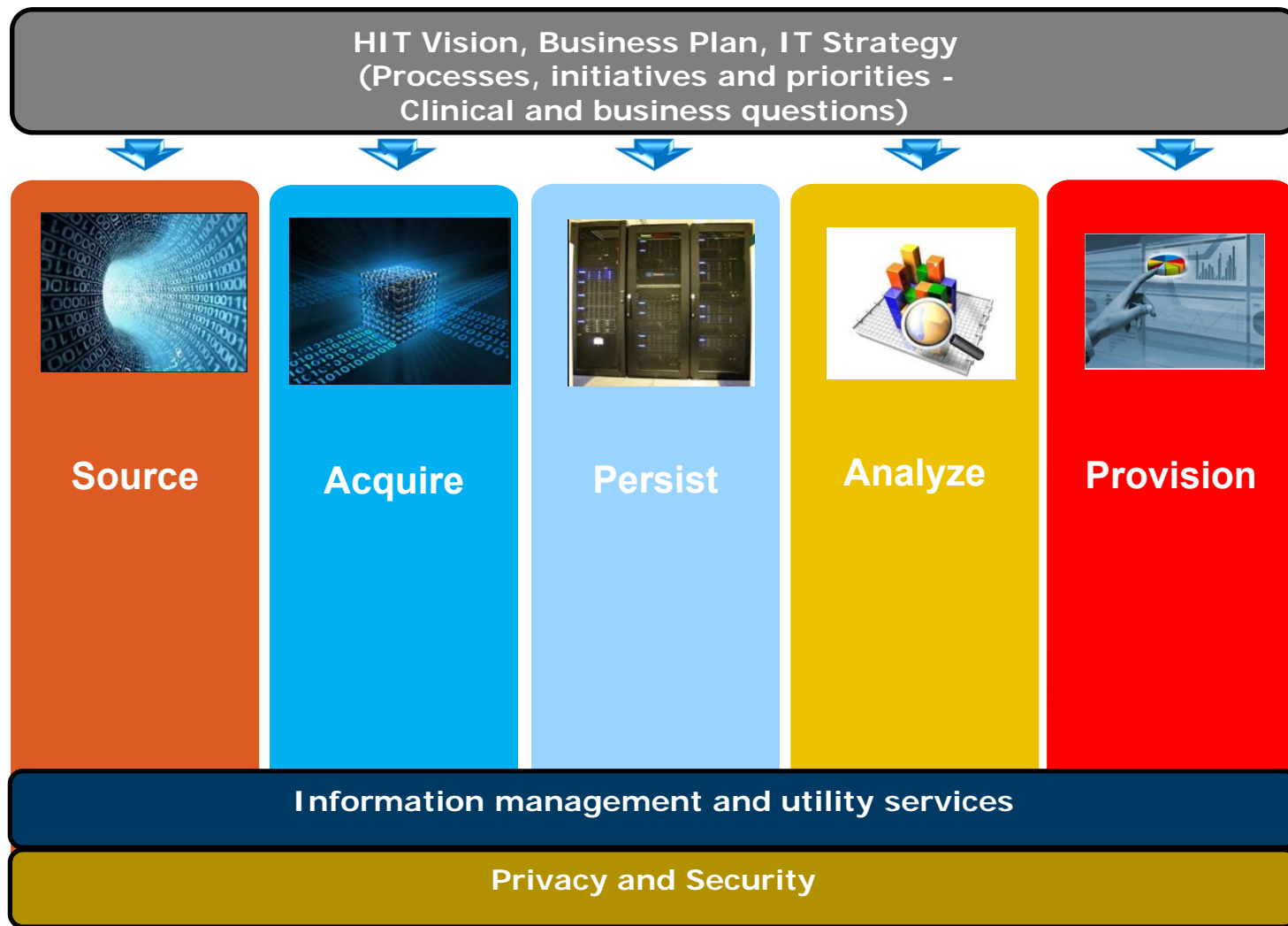
Digital Health



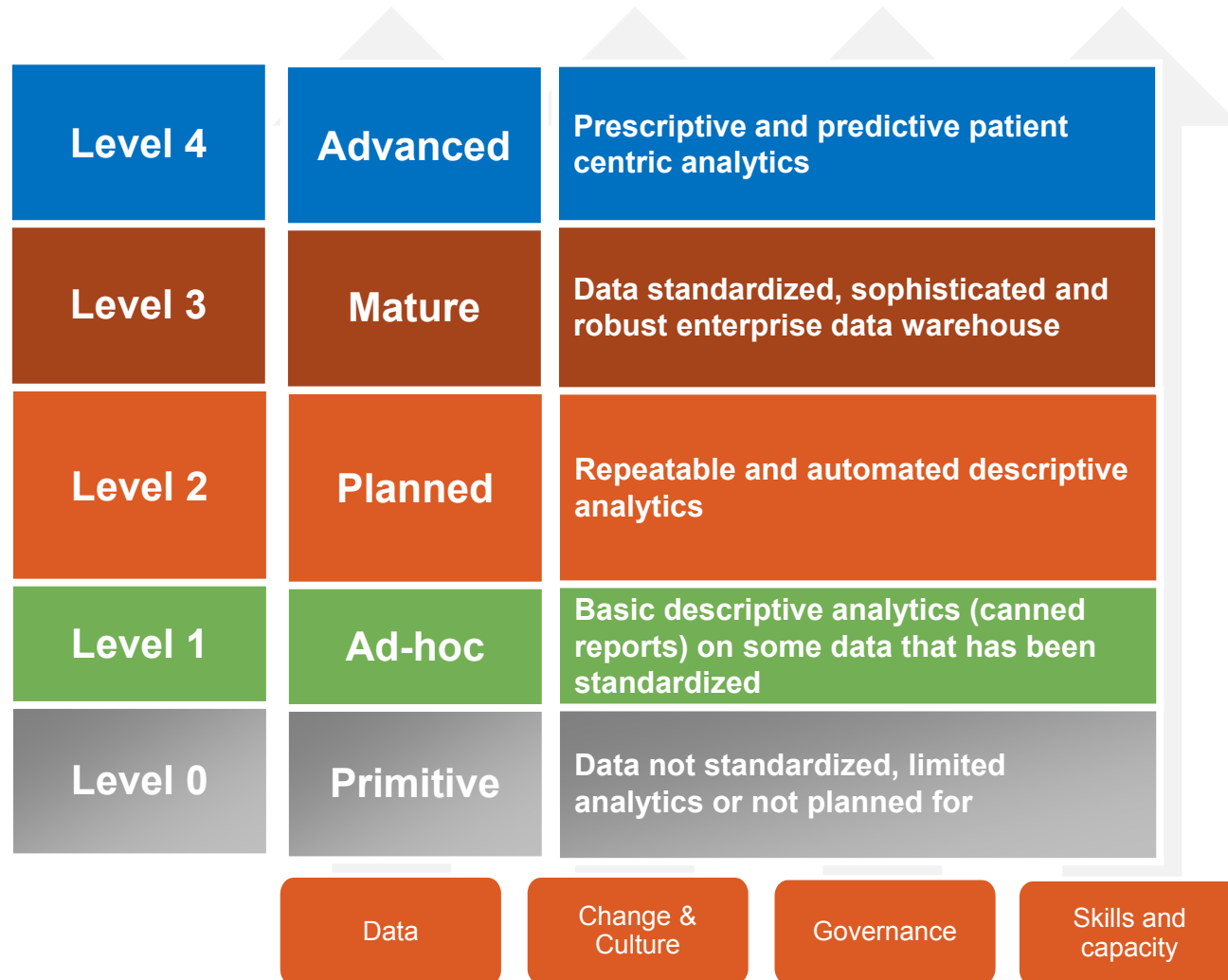
Digital Health Analytics



Considerations for Health Analytics



Draft Health Analytics Maturity Model



Source: 1) Dale Saunders and Dennis Protti, <https://www.healthcatalyst.com/white-paper/healthcare-analytics-adoption-model>
 2) HIMMS Analytics - DELTA Powered™ Analytics Maturity Suite , 3) TDWI Analytics Maturity Model
 2015 Canada Health Infoway

Architecture and Deployment Conclusions for Health Analytics



- Start with your existing data
- Plan for acquisition and linkage of new data
- Start with descriptive analytics
- Think “in context” for big data
- Re-use building blocks
- Address gaps with new technologies and toolkits
- Experiment with new types of analytics
- Assess your maturity, plan to increase capabilities, monitor

Overarching Conclusions



Clinical Data Warehouse/ Health Analytics:

- Is critical to managing a healthcare system or an organization's healthcare delivery
- Plan CDW/Health Analytics as part of a broader Digital Health strategy
- Is a Disruptive 'Technology'
- Realizes full value of data via data linkage & integration
- Self Service – Allows appropriate Data, Information and Insights access to the greatest numbers of people – Supports Open Data concept



Questions?

Thank you



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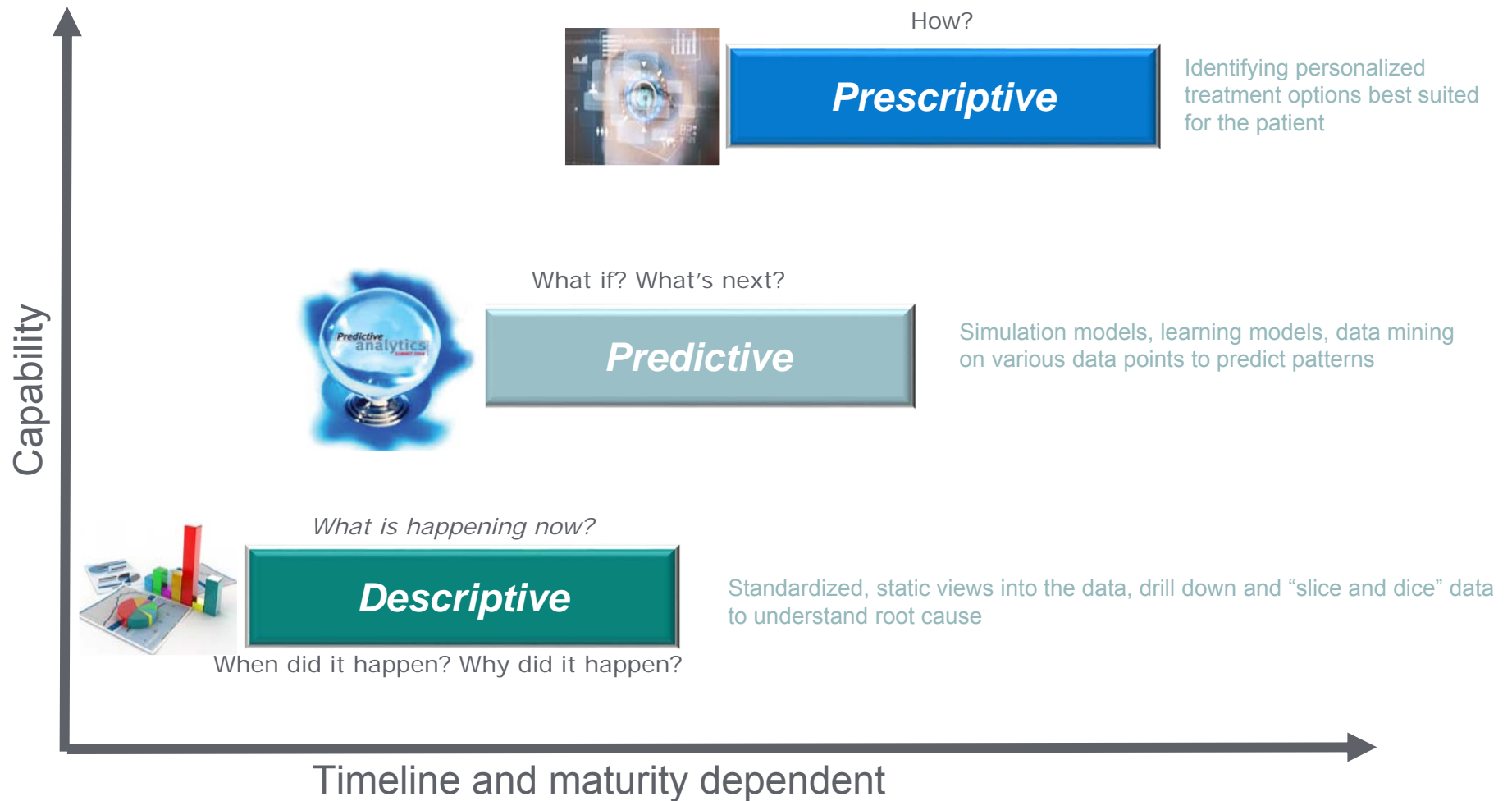
Blog: <http://infowayconnects.infoway-inforoute.ca/>



Appendix



Types of Health Analytics



Type of Health Analytics Examples



Prescriptive

- Algorithms that continuously simulate, assess and learn from past treatments and outcomes and recommends treatment options that are best suited for the individual patient



Predictive

- A risk model that uses various data points (e.g., demographics, social supports, lifestyle, other medical conditions, test results, etc.) to predict if a patient's disease condition may worsen.
- Real-time alerts to detect influenza and potential viral outbreaks



Descriptive

- Reports that profile patients with a chronic disease condition requiring intervention (e.g., diabetics that have not had a visit in past year)