



# Data and Analytics at Niagara Region Public Health: a new beginning?

A New Way Forward: Navigating a Path for Local Epidemiology  
**APHEO – November 2017**

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# Disclosures

- The presenter does not have potential conflicts of interest to declare
- The presenter has not received financial support or in-kind support from a commercial sponsor.

# What we will cover

- **Learning objectives:** At the end of this presentation, attendees will have obtained an insight into the actions and partnerships that may be necessary to invoke change in analytics within local PHUs.

# What is the difference between health informatics versus health analytics? (AHIMA)

## Health Informatics Professionals

- information systems,
- databases,
- information technology
- design effective technology systems that
  - gather,
  - store,
  - manage the data that is generated in the provision of healthcare to clients

## Health Analysts

- capture and use the data that is acquired by health information technology systems either
  - within the health system
  - from external sources,
- Display in meaningful ways to improve decision-making.

## Niagara Region Public Health Data/Informatics Roles

### Organizational & Foundational Standards Division



Departmental Business Support Analyst



Departmental Medical Informatics Analyst

Departmental Statistician (Harm Reduction)

Divisional Epidemiologists  
 1) CDIP  
 2) Clinical Services  
 3) Family Health

Geospatial Health Specialist

Data Governance Health Advisor

Program Evaluator

**Family Health Division**  
 Child Health  
 Dental Health  
 Infant/Child Development  
 Healthy Babies/Healthy Children  
 Reproductive Health  
 School Health



Family Health Data Analyst

Healthy Babies/Healthy Children Data Analyst

**Clinical Services Division**  
 Infectious Disease  
 Mental Health  
 Sexual Health  
 Vaccine Preventable Disease



Clinical Services Data Analyst

### Environmental Health Division

Environmental Health Data Analyst

### Chronic Disease and Injury Prevention (CDIP) Division

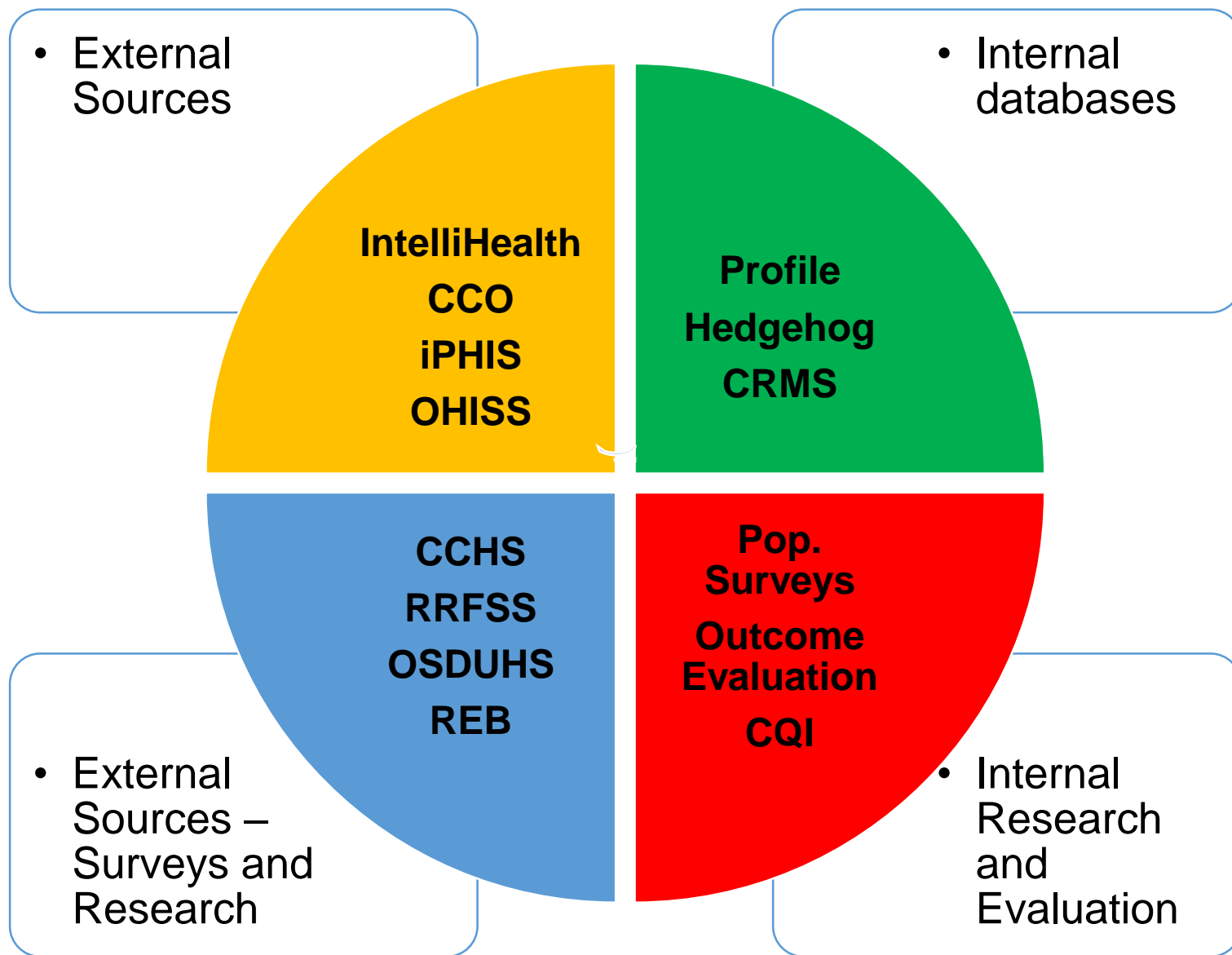
#### **LEGEND**

Colour = Reporting Structure

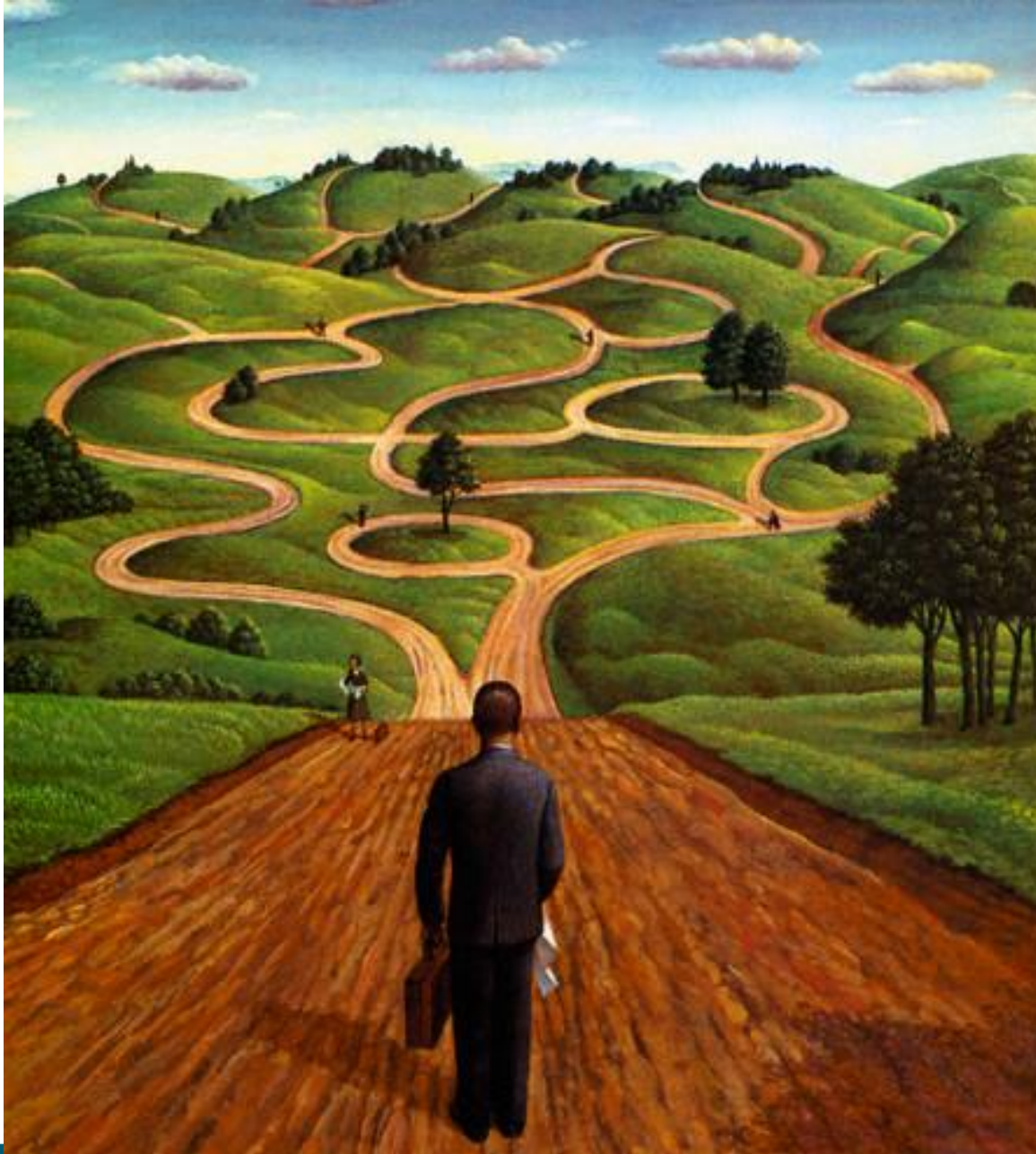
Vertical Swimlane = Physical Location of Staff member

★ Critical Role for EMR Support

# Data Sources: Current







# Results from the Consultation with Information Builders (Jan 2018)



- Extensive time wasted in extracting, reorganizing and consolidating information within Excel
- No comprehensive understanding of how the entire IT infrastructure works and how it integrates with data needed for a holistic view of the service and its impact on the community.
- Lack of coordination within the NRPH's divisions to deliver a unified patient life-cycle view of service to the public.



# Analytical Challenges for Public Health

- *Multitude of data sources*
- *Volume of data – structured and unstructured*
- *Systems not connected provincially and/or locally*
- *Lack of data standards*
- *PHIPA, privacy and unique client identifiers*
- *Data Governance issues with new and traditional data sources*
- *Growth of health related digital data*
- *Still need to retain the core epidemiological skills of Surveillance, Health Assessment, Research and Evaluation but.....*
- *Integrate with new analytical tools and techniques*

Sanders, Burton and Protti (2016) The Healthcare Analytics Adoption Model: A Framework and Roadmap



# Healthcare Analytic Adoption Model

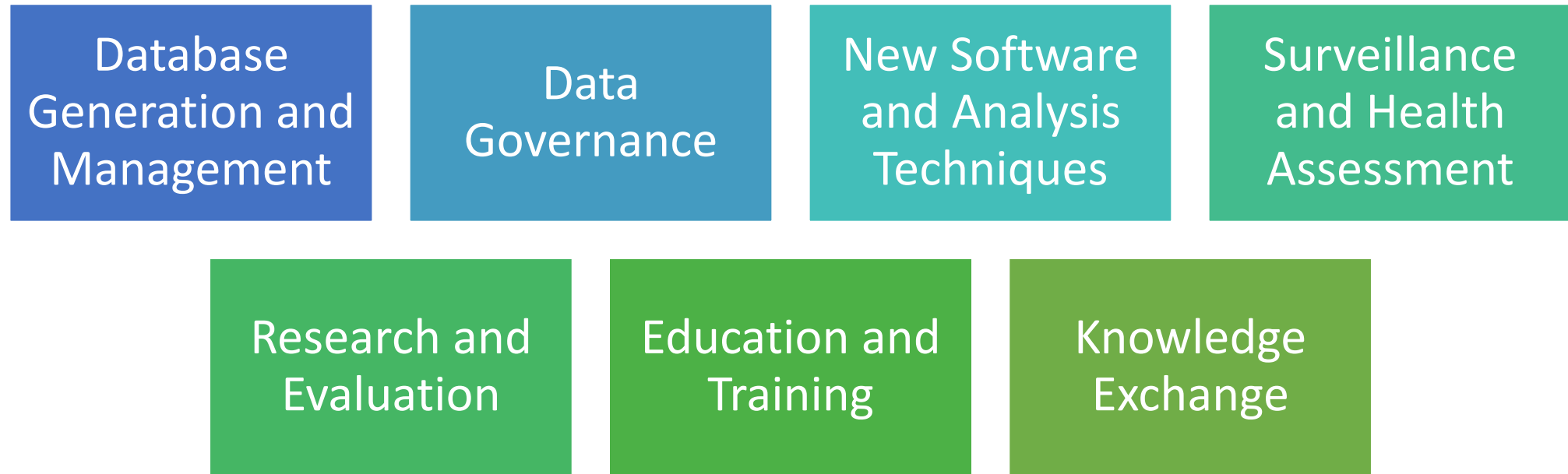
Data binding grows in complexity with each Level

Level 8	Cost per Unit of Health Reimbursement & Prescriptive Analytics	Contracting for & managing health
Level 7	Cost per Capita Reimbursement & Predictive Analytics	Taking more financial risk & managing it proactively
Level 6	Cost per Case Reimbursement & Data Driven Culture	Taking financial risk and preparing your culture for the next levels of analytics
Level 5	Clinical Effectiveness & Population Management	Measuring & managing evidence based care
Level 4	Automated External Reporting	Efficient, consistent production & agility
Level 3	Automated Internal Reporting	Efficient, consistent production
Level 2	Standardized Vocabulary & Patient Registries	Relating and organizing the core data
Level 1	Data Integration – Enterprise Data Warehouse	Foundation of data and technology
Level 0	Fragmented Point Solutions	Inefficient, inconsistent versions of the truth

**SHARE Mission:** To deliver actionable evidence to have an impact on the health of Niagara Residents

**Vision:** Local evidence, knowledge and action for a healthier Niagara.

**Objective:** Produce timely actionable intelligence to drive evidence informed decision making underpinned by these 7 areas:



# Why is this important?

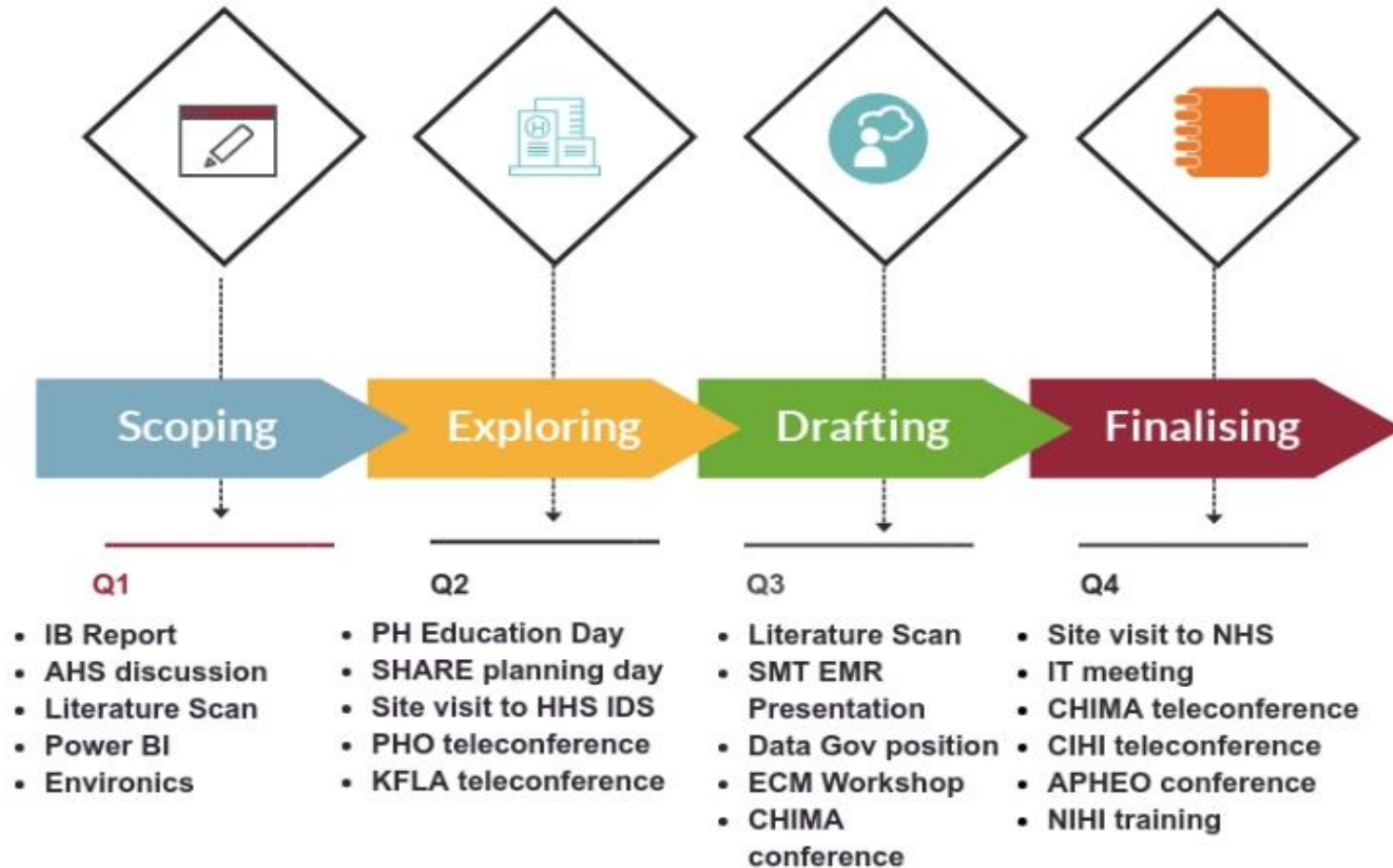
*To adapt the traditional public health functions of*

- ***notifiable disease reporting,***
- ***outbreak detection,***
- ***emergency response, and***
- ***program evaluation,***

*public health departments will need to update existing approaches to data collection and management and develop new analytical techniques to take advantage of evolving public health data sources while protecting patient confidentiality'*

<https://www.cdc.gov/mmwr/preview/mmwrhtml/su6103a8.htm>

# Timelines and activities underpinning data and analytics strategy development (2018)



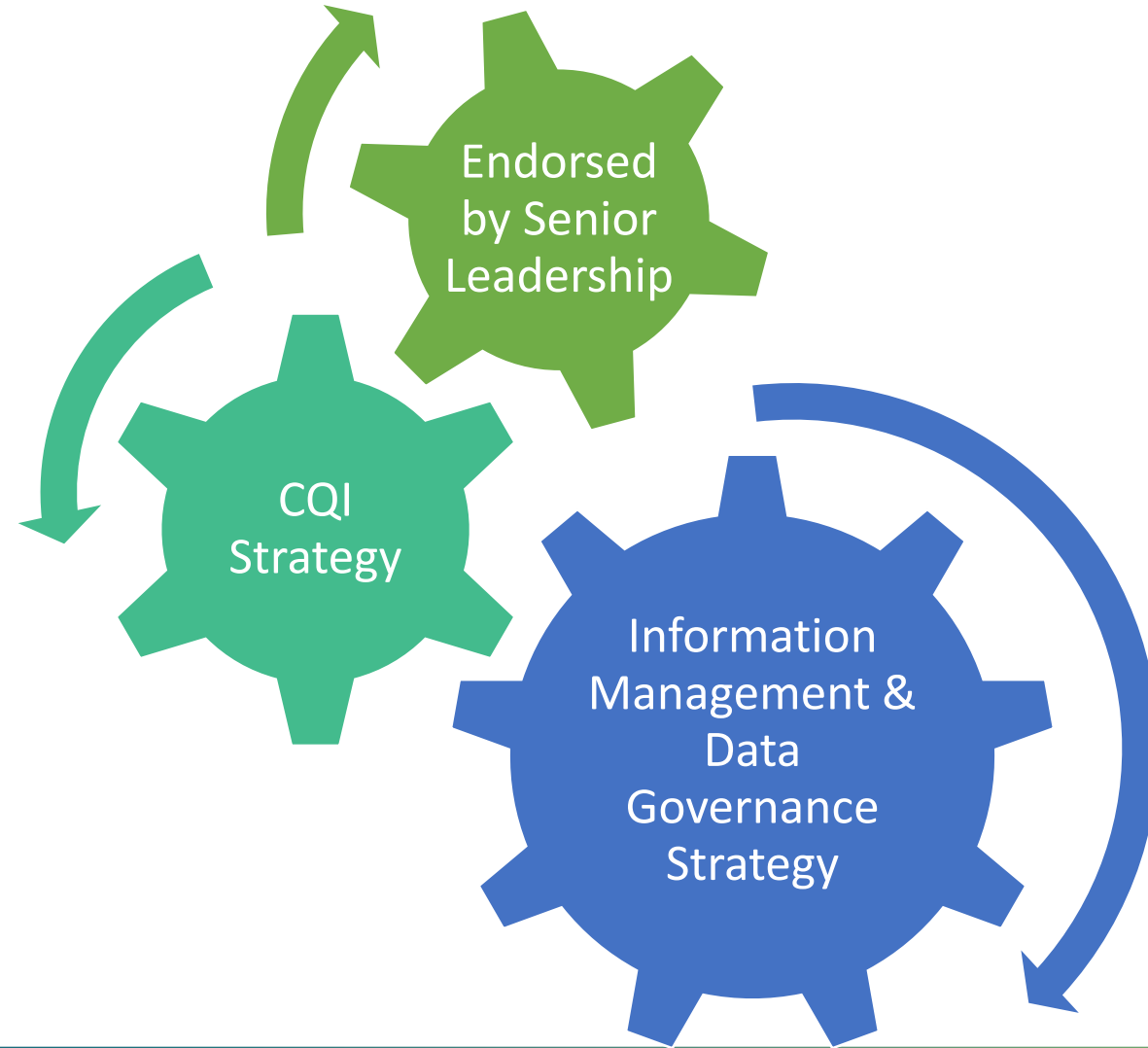
# Feedback from experts in the field (AHS, HHS and KFLA)

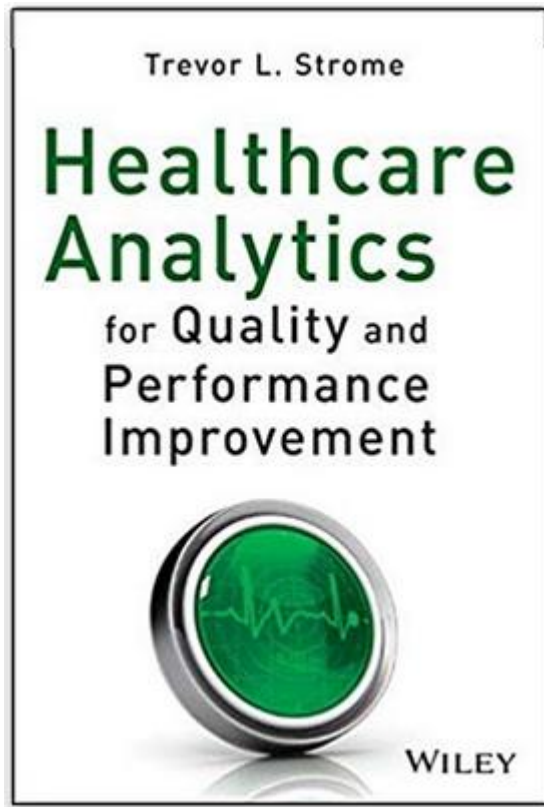
- *Need to have the data liberation battle*
- *SSOT*
- *Get a data staging area and move the largely untransformed data to this and allow data to be accessible.*
- *You need an Analytic Executive Committee (CFO, Finance, CQI, Operations etc)*
- *Decision makers need to be more data literate*
- *Set up policies and procedures (related to data use/analyses etc) and need data stewards*
- *Who is going to manage the data environment – IT v Analytics team?*
- *Create an Analytics Roadmap/Strategy*
- *Secondary use data policy*
- *Need to think Provincially*
- *Concerns about getting back end access to Provincial Sources*
- *Think about cloud computing*
- *Use R*

# Feedback from NRPH staff (Education day Apr 2018)

- *Need one common data system for data collection*
- *Unique identifier*
- *Implementing one system use*
- *Break down data silos*
- *Drop downs to eliminate spelling errors (in EMRs)*
- *Audit Staff*
- *Info sharing between health units*
- *Identifying Priority populations*
- *Need more training in how to use data we have in a useful way*
- *Different charting systems to speak to one another*

# Data and Analytics Strategy/Roadmap (3 – 5 y) Considerations





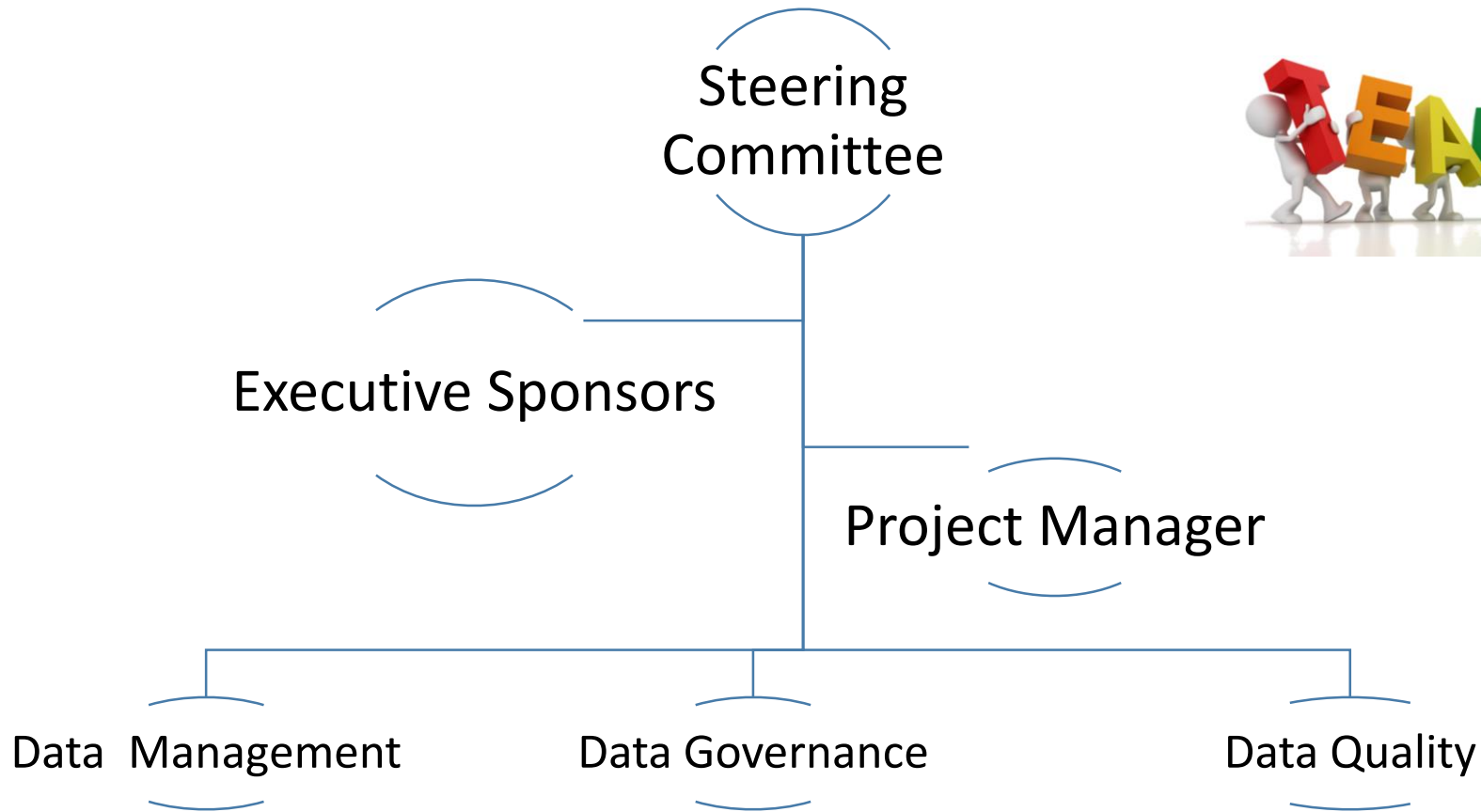
**Strome 2013  
pp 33**

## Components of Analytics Strategy



STRATEGY AREAS	Examples of content
Business and Quality Context	<ul style="list-style-type: none"> <li>• NRPH Strategic Objectives</li> <li>• QI Plan &amp; ECM</li> <li>• EIPH</li> </ul>
Stakeholders and Users	<ul style="list-style-type: none"> <li>• Internal clients (Front line staff, Decision makers)</li> <li>• Academic Institutions and Professional Bodies</li> <li>• Region, LHIN and other Stakeholders</li> </ul>
Processes and Data	<ul style="list-style-type: none"> <li>• Data Generation (EMRs, Research and Evaluation)</li> <li>• Data Acquisition (RRFSS, CCHS, OSDUHS, Environics etc)</li> <li>• Data Governance (Lifecycle, Privacy, Audit, Security)</li> </ul>
Tools and Techniques	<ul style="list-style-type: none"> <li>• Analyses packages</li> <li>• Software</li> <li>• Data vizualization</li> </ul>
Team and Training	<ul style="list-style-type: none"> <li>• Scope &amp; Role (including JDs)</li> <li>• Conferences</li> <li>• Training and Education Opportunities (e.g. Secondments)</li> </ul>
Technology and Infrastructure	<ul style="list-style-type: none"> <li>• EDW</li> <li>• ETL &amp; Data Marts</li> <li>• Hardware &amp; Application Support</li> </ul>

# Eg. Data Governance Structure



# IT & Public Health

*‘Although information technology specialists and public health programmatic or scientific staff might be comfortable within their respective domains of expertise, the new challenges will require increased attention in the analytic data management gap that exists between these two domains’*

Rolka et al. Analytical Challenges for Emerging Public Health Surveillance MMWR **July 27, 2012 / 61(03);35-39**

# MODERN DATA SCIENTIST

Data Scientist, the sexiest job of 21st century requires a mixture of multidisciplinary skills ranging from an intersection of mathematics, statistics, computer science, communication and business. Finding a data scientist is hard. Finding people who understand who a data scientist is, is equally hard. So here is a little cheat sheet on who the modern data scientist really is.

## MATH & STATISTICS

- ☆ Machine learning
- ☆ Statistical modeling
- ☆ Experiment design
- ☆ Bayesian inference
- ☆ Supervised learning: decision trees, random forests, logistic regression
- ☆ Unsupervised learning: clustering, dimensionality reduction
- ☆ Optimization: gradient descent and variants



## PROGRAMMING & DATABASE

- ☆ Computer science fundamentals
- ☆ Scripting language e.g. Python
- ☆ Statistical computing packages, e.g. R
- ☆ Databases: SQL and NoSQL
- ☆ Relational algebra
- ☆ Parallel databases and parallel query processing
- ☆ MapReduce concepts
- ☆ Hadoop and Hive/Pig
- ☆ Custom reducers
- ☆ Experience with xaaS like AWS

# Next steps

- Complete the scoping work by Nov 2018
- Finalise a working draft of the strategy/road map for review by
  - All SHARE Unit
  - OFS Director and MoH
  - **APHEO members??**
- Revise and finalise strategy late Dec 2018
- Present to SMT for discussion in early 2019 for endorsement – discussion around staffing & priorities
- Implementation
  - Theme lead and a small work team for each of the 6 areas of strategy
  - Identify activities & timelines for each of the 6 areas (3 – 5 y)
  - Identify appropriate sequencing of activities across all 6 areas
  - Regular updates at team meetings
  - Require Project Sponser and Project Management expertise
  - Contained within 2019 POs

- To reflect on the journey of discovery that NRPH has undertaken in terms of data governance, analytics and data visualization to support the creation of a data and analytics strategy
- **Learning objectives:** At the end of this presentation, participants will have obtained an insight into the actions and partnerships that may be necessary to invoke change in analytics within local PHUs.

Thank you!

# Questions?