

# Analytics for Health System Planning in Ontario

## Challenges and Opportunities

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Data and Decision Sciences Team

*Support and advise CCO programs in deriving insight from the wide range of available data using statistical, mathematical and simulation modelling tools*

## Background:

- Research at Universite Laval
- M.A.Sc and PhD in Operations Research
- B.Sc. in Industrial Engineering



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## *Learning Objectives:*

- *To provide an overview of CCO's data and analytics*
- *To review analytics capabilities that inform and drive decision making*
- *To illustrate examples in Data & Decision Sciences*
- *To discuss ideas on expanding the adoption of analytics by decision makers*

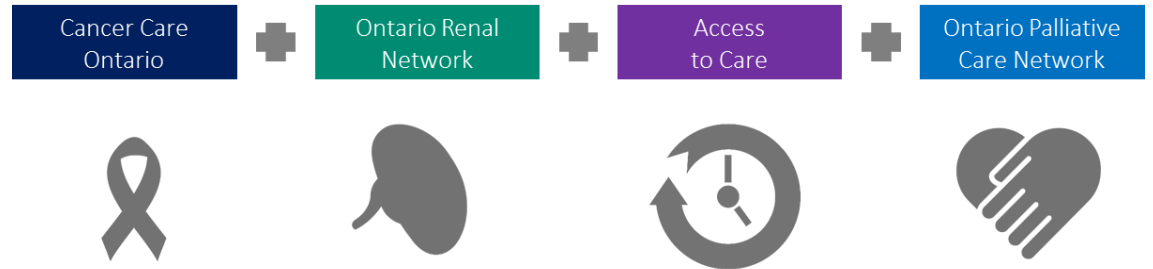
# 1.

## Overview of Data & Analytics at CCO



# Overview of CCO

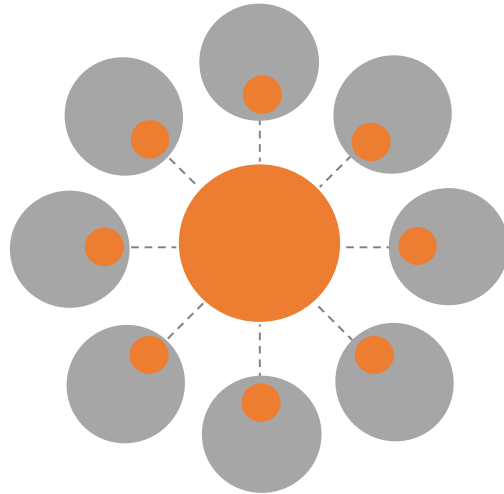
- Est. in 1943 as the Ontario Cancer Treatment & Research Foundation, known today as Cancer Care Ontario – the provincial government’s primary advisor
- Drives improvement in the cancer and chronic kidney disease health systems, as well as in access to care and palliative care
- Encourages and supports broader improvements of Ontario’s health systems



# Analytics & Informatics

- Lead the development of CCO's data acquisition, collection, analysis and reporting capability
- Provide disciplined expertise in the translation of large data sets to provide insight & knowledge on health system performance that will allow for directed improvement initiatives
- Build cooperative partnerships with external partner agencies, healthcare providers, & academia in order to support knowledge creation & translation for health system improvement

# A Federated Model of Analytics



## ***Enterprise Functions (Hub)***

The virtual 'Hub' brings together the centralized capabilities that define and drive the D&A strategy, and provides critical shared services & assets to enable the CCO Data and Analytics community.

## ***Portfolio Functions (Spokes)***

The 'Spokes' deliver on all portfolio-specific analytic services & assets in adherence with Enterprise D&A strategies, methodologies, and practices.

# 2.

## Data and Decision Sciences Practice





# Key Enterprise Analytics Services



## Data & Decision Sciences

D+DS uses advanced data and analytics techniques to maximize the potential of CCO's data assets in delivering insight and foresight to make effective health system management decisions.



## Information Design

Establishes & offers services aligned to standards and best practice for information dissemination, storytelling and visualization to create effective & consistent products tailored to targeted end users.



## Business Intelligence

Designs, builds and implements self-service and automation solutions, including reports, dashboards, scorecards and other interactive interfaces.



## Enterprise Analytic Asset Management

Stewards analytics assets including people, tools, methodologies and analytics outputs to enable efficiencies in analytics production, develop our people, establish trust in our outputs, & better position CCO for future accountabilities and exploration.

# Analytics in Health System Management



Data

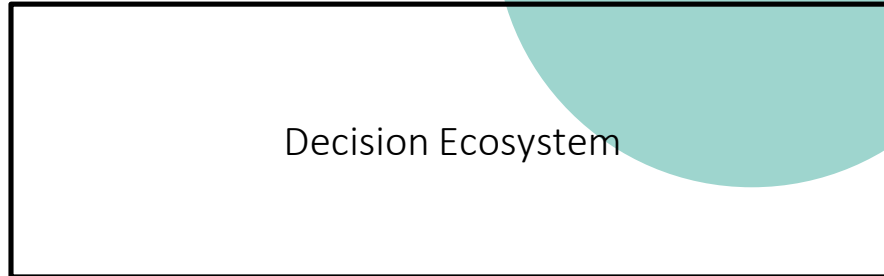
There is a gap between our data and our decision ecosystem. As a result analytics solutions don't match the true needs of their users, are not timely or overall absent.



Decision Ecosystem

This causes frustration in decision-makers who are innovative, and pushes others to ignore analytics all together. There is a sense of missing out or being lost.

# Analytics in Health System Management

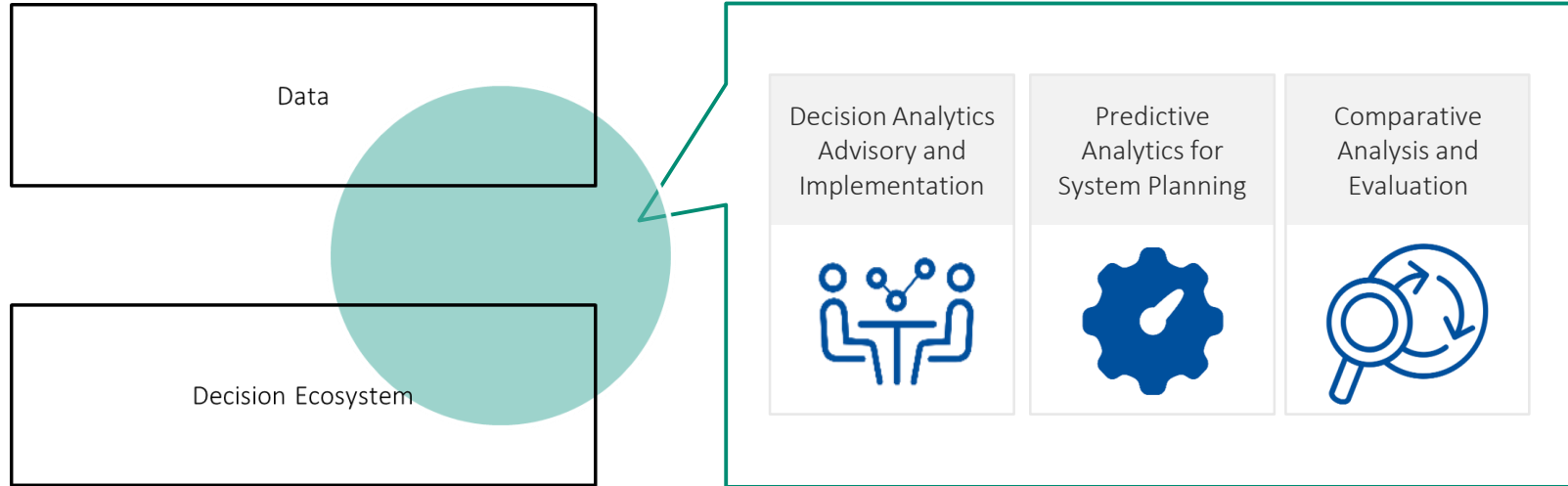


*Analytics-driven solutions to **strategic problems***

*Analytics implemented as a **strategic asset***

D+DS bridges this gap for health system management by developing products that enable CCO to design and **deploy** robust health system initiatives, **predict** their intended and unintended outcomes, and **assess** their effectiveness

# CCO's Advanced Analytics Competency for Health System Management

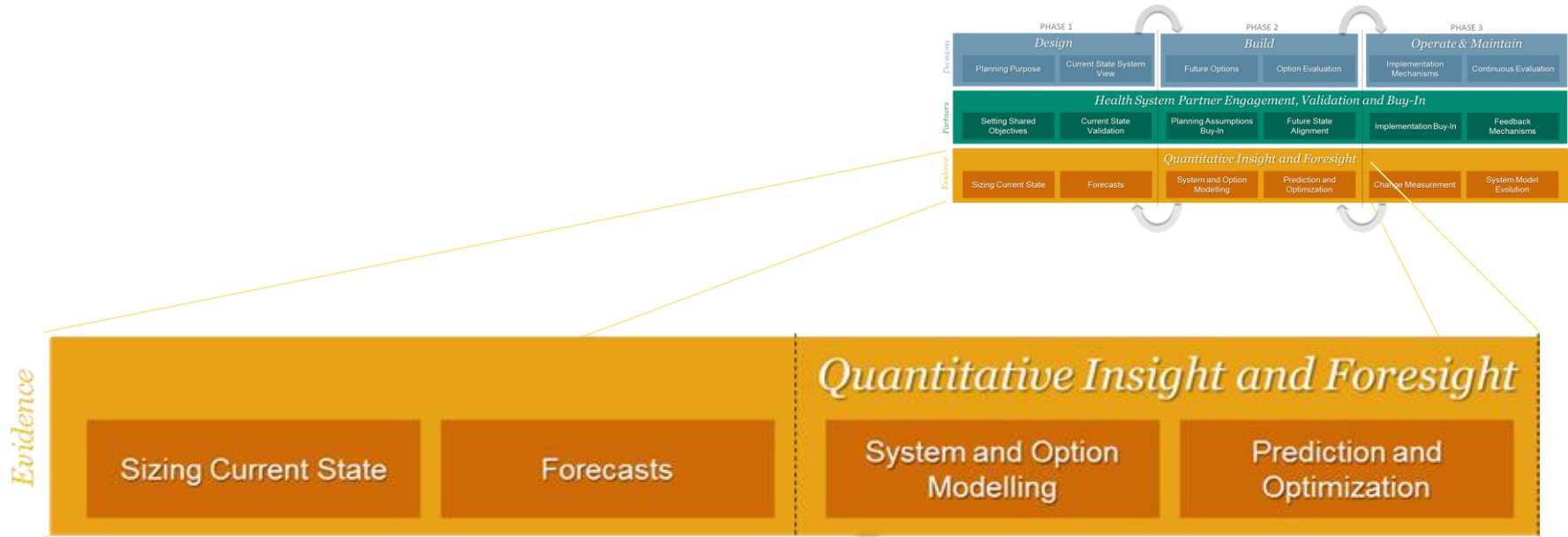


# Advanced analytics is delivered through an interdisciplinary swat team

Background in engineering,  
finance, forestry, management,  
biostatistics & mathematics



# DDS Competency: Decision Analytics Advisory and Implementation



**Dementia Repository + Regional Profiles**

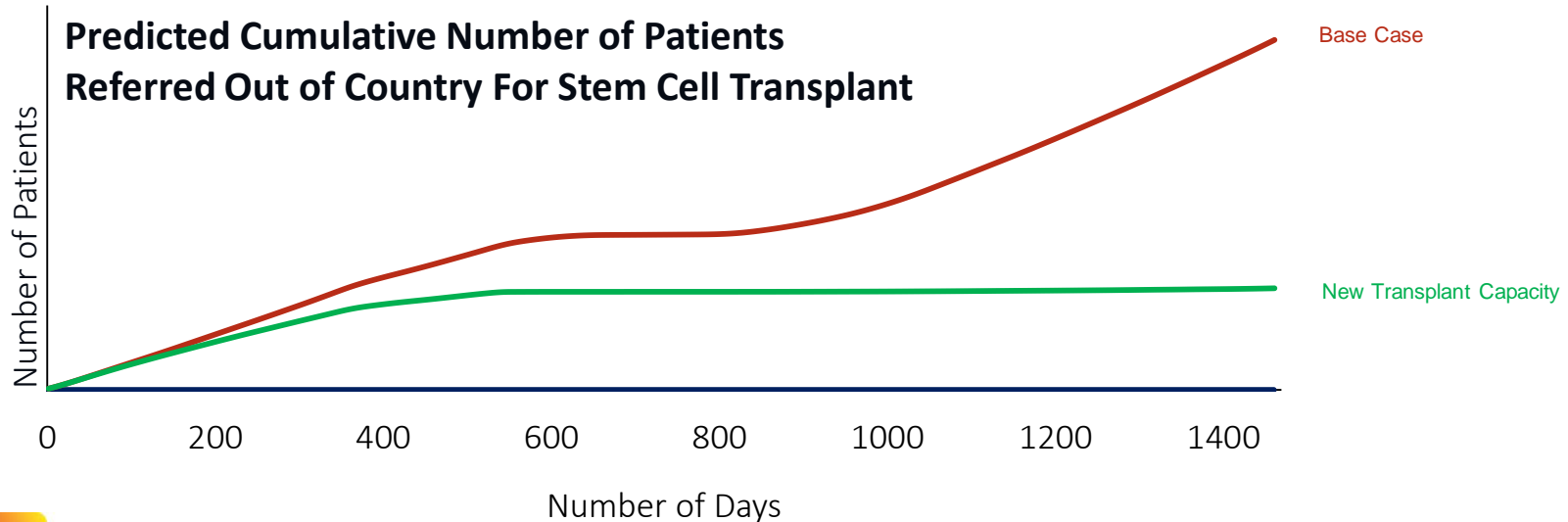
**Spatio-temporal projection of dementia incidence in the community**

**Agent-based simulation model of dementia prevalence and care state transitions based on effective interventions identified in the scoping review**

# DDS Competency: Predictive Analytics for Health Services (Re)Design

Supporting new program, model of care or intervention launches through predictive/prescriptive analytics encompassing clinical and operations modelling.

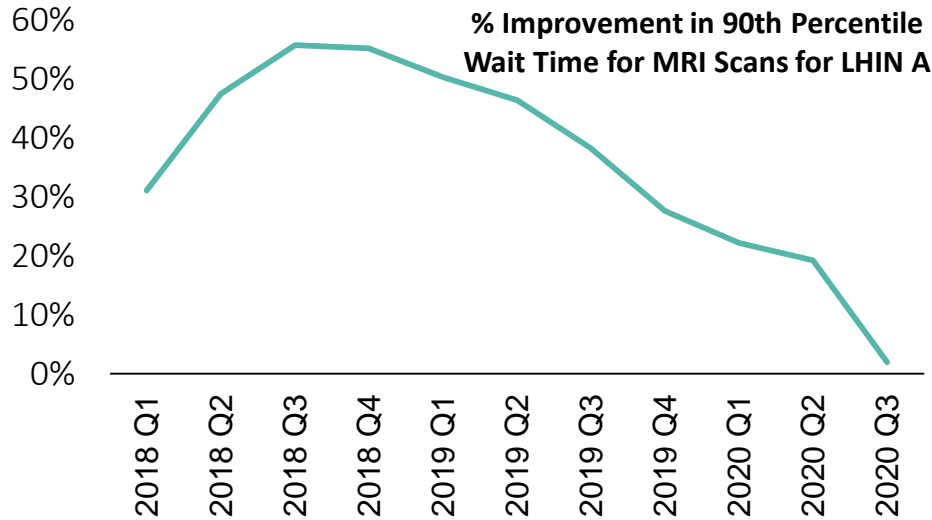
## Example: Stem Cell Transplant Services Redesign



# DDS Competency: Prescriptive Analytics for Healthcare Operations Management

Primarily focusing on capacity and funding operations, this offering provides tools for optimal management of existing care services

Example: Optimizing MRI Capacity to Reduce Waits



The screenshot shows a software interface for optimizing MRI capacity. It includes a title bar, a 'Run' button, and a 'Main Menu' button. Below the title bar, there is a section for 'LHIN Level Input Parameters' with a table for the years 2017/18, 2018/19, 2019/20, and 2020/21. The table shows 'Available LHIN MRI Hours (Hours/year)' and 'Maximum Allowable Difference Among Facilities (Days)'. Below this is a section for 'Facility Level Input Parameters' with a table for 'Fiscal Year' (2018/17, 2018/19, 2019/20, 2020/21) and 'Facility' (Facility 1, Facility 2, Facility 3). The table shows 'Efficiency (Patient Operating Hr)' and 'Proportion of P1 and P2 Scans (Combined)'. Below this is a section for 'Proportion of P3 Scans' and 'Quarterly Demand Adjuster'.

| LHIN Level Input Parameters                          |  | 2017/18 | 2018/19 | 2019/20 | 2020/21 |
|--|--|---------|---------|---------|---------|
| Available LHIN MRI Hours (Hours/year)                |  | 21,091  | 21,091  | 21,091  | 21,091  |
| Maximum Allowable Difference Among Facilities (Days) |  | 30      | 30      | 30      | 30      |

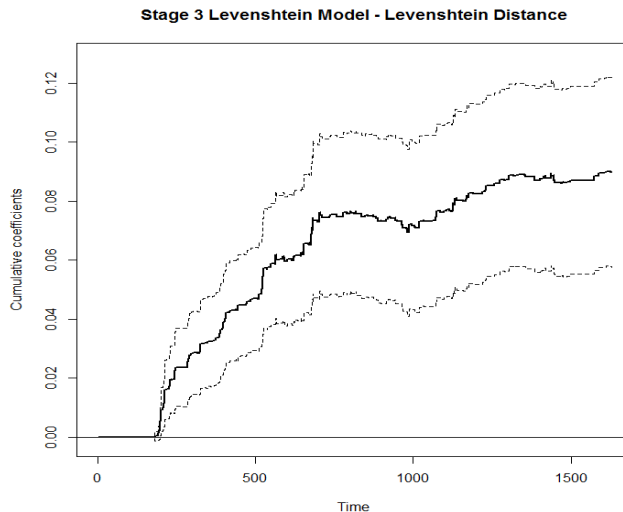
| Facility Level Input Parameters  |         | Fiscal Year | Facility 1 | Facility 2 | Facility 3 |
|--|---------|-------------|------------|------------|------------|
| Efficiency (Patient Operating Hr)<br>Specify efficiency of each facility   | 2018/17 | 1.85        | 1.91       | 1.99       |            |
|  | 2018/19 | 1.853       | 1.914      | 1.996      |            |
|  | 2019/20 | 1.853       | 1.914      | 1.996      |            |
|  | 2020/21 | 1.853       | 1.914      | 1.996      |            |
| Proportion of P1 and P2 Scans (Combined)<br>Specify total proportion of P1 & P2 scans  | 2018/17 | 6.27%       | 6.46%      | 6.12%      |            |
|  | 2018/19 | 6.27%       | 6.46%      | 6.12%      |            |
|  | 2019/20 | 6.27%       | 6.46%      | 6.12%      |            |
|  | 2020/21 | 6.27%       | 6.46%      | 6.12%      |            |
| Proportion of P3 Scans<br>Specify proportion of P3 scans   | 2018/17 | 14.3%       | 4.41%      | 4.67%      |            |
|  | 2018/19 | 14.3%       | 4.41%      | 4.67%      |            |
|  | 2019/20 | 14.3%       | 4.41%      | 4.67%      |            |
|  | 2020/21 | 14.3%       | 4.41%      | 4.67%      |            |
| Quarterly Demand Adjuster<br>Specify adjuster value to increase or decrease forecasts. E.g. Enter 5% (-5%) to increase (decrease) demand forecasts by 5% | 2018/19 | 0.0%        | 0.0%       | 0.0%       |            |
|  | 2019/20 | 0.0%        | 0.0%       | 0.0%       |            |
|  | 2020/21 | 0.0%        | 0.0%       | 0.0%       |            |



# DDS Competency: Comparative Analytics for Evaluation

Combination of clinical, operations and financial analytics to prospectively or retrospectively evaluate interventions and programs

Example: Measuring outcomes related to concordance to colon cancer pathways



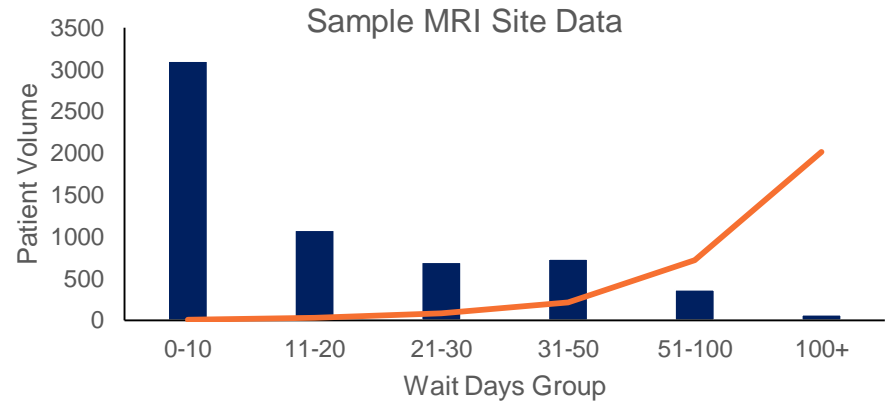
Significant improvement in survival with better concordance for stage III colon cancer patients

# 3.

## Exploring Opportunities



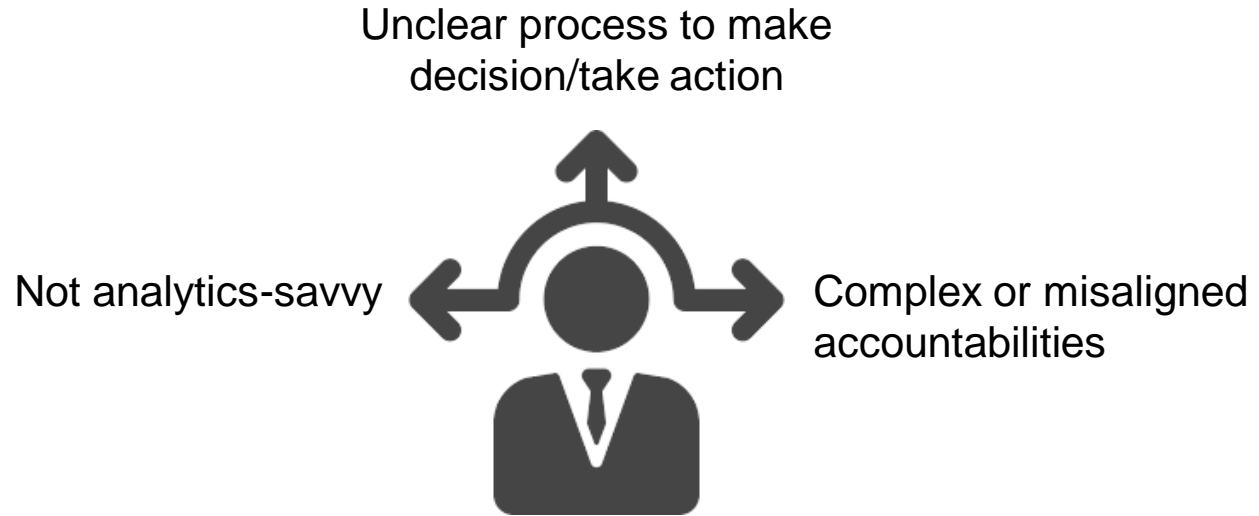
# Embrace Real vs. Ideal Data



■ P3 patients in each wait category

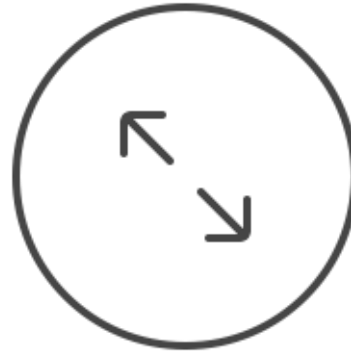
— Average number of P4 patients who arrived after and were served before P3 Patients

# Understand Readiness to Use Insights from Analytics



- Design solutions with end-user in mind:
  - Earn their trust
  - Understand the system
  - Address client's concern

## Explore Scaling the Results



- Diverse population with a single payer system
- Findings may apply beyond Ontario
- May generate revenue to put back in the system

# Strike Partnerships



- Long-standing, open-ended questions
- Large volumes of data
- Research vs. planning mandate



Thank you