Ontario Forecasting Update

How Scarsin can help Ontario, NOW!

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www.scarsin-covid.com

November 16, 2020

Scarsin Supports Keeping Ontario Safe

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- **Why should I read this report?**
  - Ontario is at a critical point in battling Covid-19 spread in wave II
  - Decision making today will impact the spread of covid, potentially thousands of potential deaths and billions of dollars of spending and impact to the economy
  - **There is a significant opportunity to improve the BEST-AVAILABLE forecasting to inform Ontario**
  - Ontario must improve the quality of its decision making to ensure the best outcomes for Ontarians

Principles for Keeping Ontario Safe and Open

Responsible: Protecting the **health and safety of the people of Ontario**, especially those who are most vulnerable. Keeping child care centres and schools open are priorities.

Proactive, graduated, and responsive: Proactive measures, including enforcement, will work to prevent transmission, thereby protecting our health care system and helping businesses stay open. **Graduated measures should be targeted and informed by regional circumstances.**

Evidence-informed: Best-available scientific knowledge, public health data, defined criteria and consistent measures will inform public health advice and government decisions.

Clear: Plans and responsibilities for individuals, businesses and organizations (employers) will **be clear and outline what happens at each level**.

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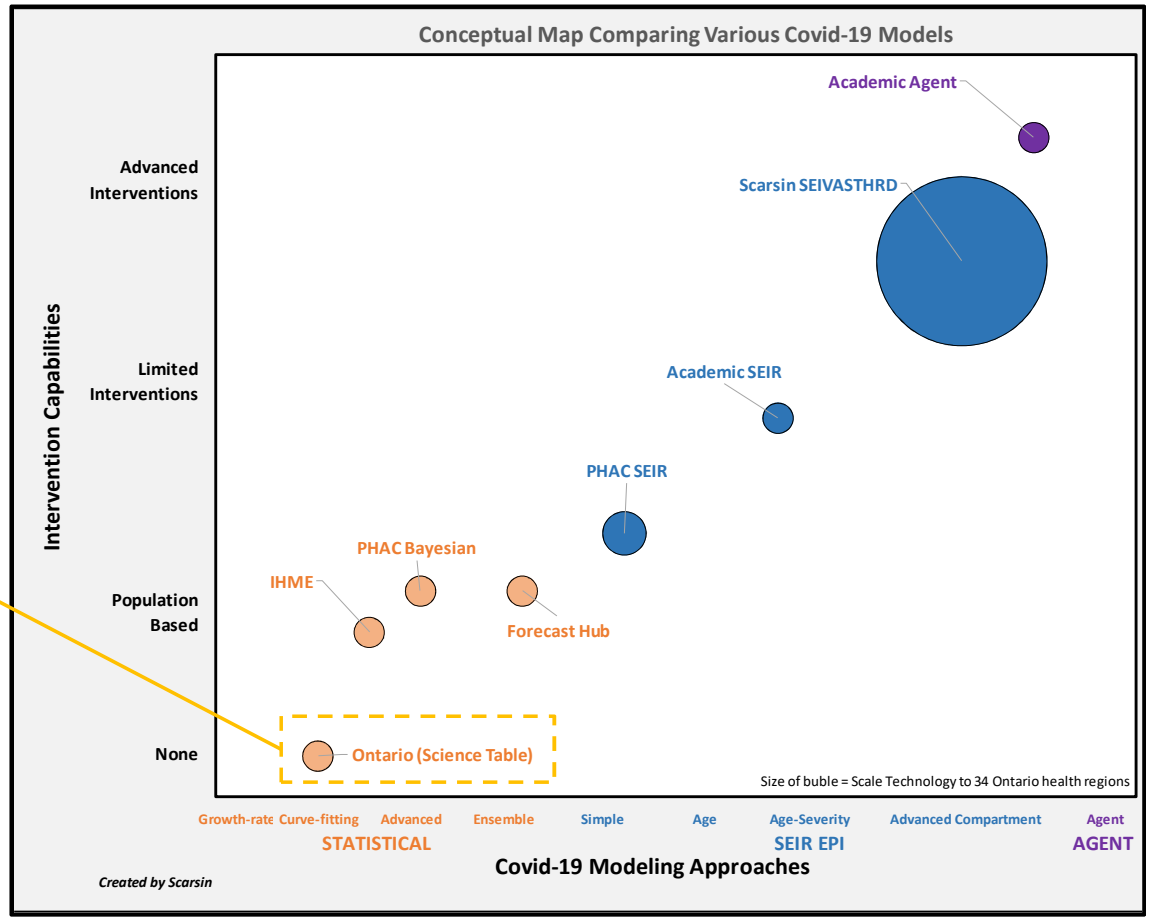
https://files.ontario.ca/moh-covid-19-response-framework-keeping-ontario-safe-and-open-en-2020-11-03-v2b.pdf

Modeling Approaches

- **Is it important what kind of "modeling" is helping Ontario set policy and make decisions?**
  - **Yes it is extremely important!**
  - It determines how much information decision makers have in setting policy and measuring results
  - It also influences how far they can plan ahead which is the difference between reactive and proactive decisions

- **What model approach is Ontario using when it communicates public forecasts?**
  - The Science Table (ST) * utilizes a growth rate assumption to create a reported cases curve
  - The ST evaluate other benchmarks (countries…) to pick the growth rate (3% or 5%...)
  - This analysis is presented at the Ontario level
  - It doesn't incorporate dynamic interventions (like the Ontario Framework on a health region basis)



* https://covid19-sciencetable.ca/wp-content/uploads/2020/11/Update-on-COVID-19-Projections.pdf

Ontario Science Table Forecast

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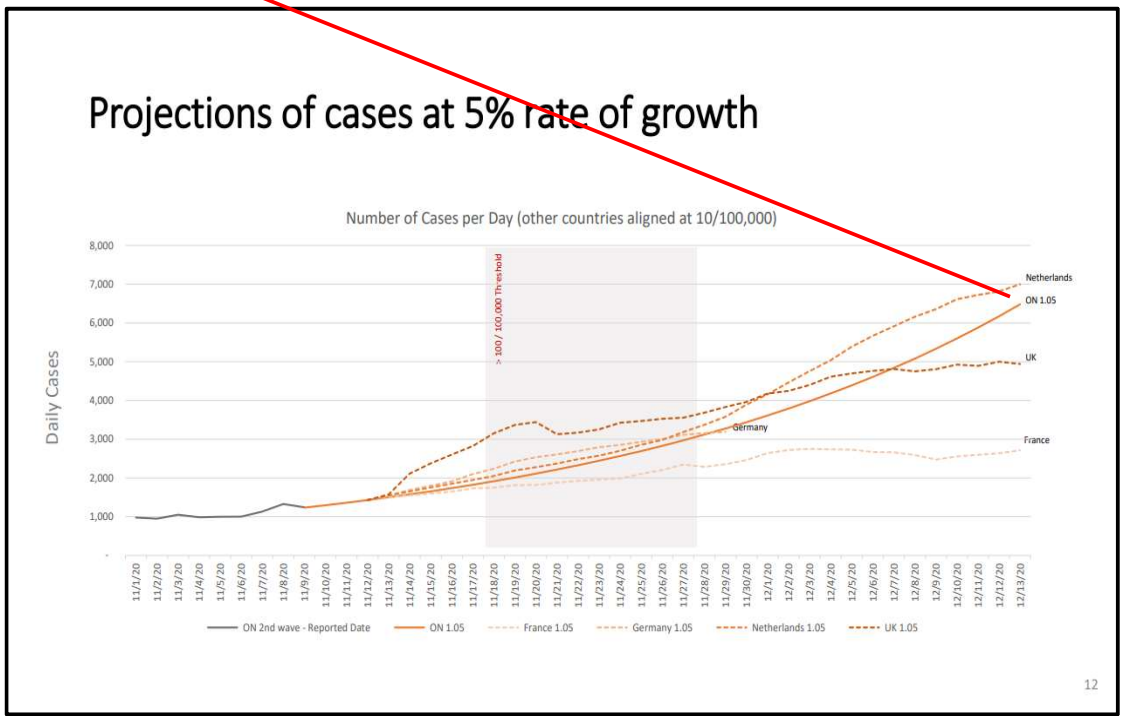
- **How does Ontario potentially get to 6,500 cases a day for mid Dec in the Nov 12 update?**
  - 1,500 cases per day and grow it at 5% compound rate for 30 days
  - 6,482 = 1,500 x (1 + 0.05) ^ 30

- **How can this inform decision making?**
  - Statistical approaches like this can provide a secondary benchmarking on potential ranges of outcomes
  - It does not provide enough scientific rigor or flexibility to fully inform policy or framework decisions

- **Can Ontario improve this to "best-available"?**
  - **GREAT NEWS!** Yes adopting a more advanced epidemiology model would improve Ontario decision making
  - SEIR styled models can be particularly helpful
  - These can provide direct evidence of how policy scenarios can slow the spread of Covid-19

SCIENCE TABLE
COVID-19 ADVISORY FOR ONTARIO



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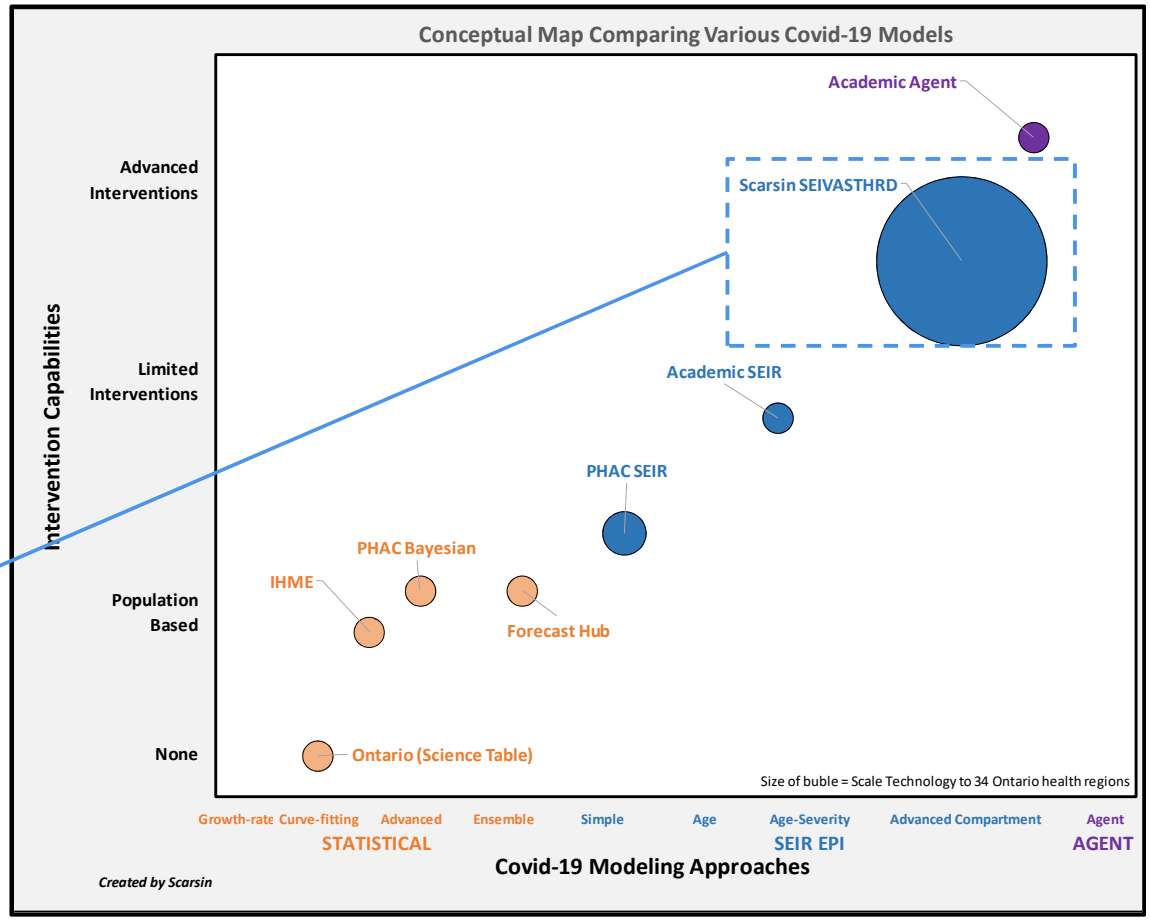
Scarsin SEIVASTHRD Approach

- **What is unique about the Scarsin SEIVASTHRD?**
  - It has over 70 different intervention parameters to evaluate how policy will change the spread at the health region level
  - It then consolidates those to the province for more accurate forecasts
  - The provincial data loaded everyday is calibrating the unique forecasts for each health region

- **What is the benefit to Ontario decision making?**
  - Robust scenarios can be run for each of the 34 health regions to assess provincial framework or any local interventions (as Peel recently implemented)
  - Anticipate if the interventions will be successful from both a timing and impact perspective, if not then implement other interventions



Change in Framework Criteria

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- **What was the impact of the provinces change in criteria for the colour framework?**
  - Significant changes were made to move health regions through the colour framework earlier
  - Entering Restrict and Control earlier will reduce the covid spread earlier
- **Why was is it changed?**
  - The original framework was too lax and allowed for unwarranted spread
- **How could best-available modeling have helped avoid this?**
  - Proactive modeling of various scenarios would have illustrated the material difference in spread based on the timing of the Control intervention framework
  - Less changes in communication
  - Reduced spread in Peel and Toronto today

Nov 3

Indicators: Adjusting and Tightening Public Health Measures

PREVENT (Standard Measures)	PROTECT (Strengthened Measures)	RESTRICT (Intermediate Measures)	CONTROL (Stringent Measures)	LOCKDOWN (Maximum Measures)
Epidemiology • Weekly incidence rate is < 10 per 100,000 • % positivity is < 1 • Ro < 1 • Outbreak trends/ observations • Level of community transmission/non-epi linked cases stable **Health System Capacity** • Hospital and ICU capacity adequate **PH System Capacity** • Case and contact follow up within 24 hours adequate	**Epidemiology** • Weekly incidence rate is 10 to 39.9 per 100,000 • % positivity is 1-2.5% • Ro is approximately 1 • Repeated outbreaks in multiple sectors/settings OR increasing/# of large outbreaks • Level of community transmission/non-epi linked cases stable or increasing **Health System Capacity** • Hospital and ICU capacity adequate **PH System Capacity** • Case and contact follow up within 24 hours adequate	**Epidemiology** • Weekly incidence rate is 40 to 99.9 per 100,000 • % positivity is 2.5-9.9% • Ro is approximately 1 to 1.2 • Repeated outbreaks in multiple sectors/settings, increasing/# of large outbreaks • Level of community transmission/non-epi linked cases stable or increasing **Health System Capacity** • Hospital and ICU capacity adequate or occupancy increasing **PH System Capacity** • Case and contact follow up within 24 hours adequate or at risk of becoming overwhelmed	**Epidemiology** • Weekly incidence rate ≥ 100 per 100,000 • % positivity ≥ 10% • Ro ≥ 1.2 • Repeated outbreaks in multiple sectors/settings, increasing/# of large outbreaks • Level of community transmission/non-epi linked cases increasing **Health System Capacity** • Hospital and ICU capacity at risk of being overwhelmed **PH System Capacity** • Public health unit capacity for case and contact management at risk or overwhelmed	Trends continue to worsen after measures from Control level are implemented.

NOTES:
- **Indicators will generally be assessed based on the previous two weeks of information. However, movement to apply measures will be considered sooner than two weeks if there is a rapidly worsening trend.**
- **Local context and conditions will inform movement, including potential regional application of measures.**
- **Thresholds within a region may not all be met at the same time; decisions about moving to new measures will require overall risk assessment by government.**

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Nov 13

Indicators and Thresholds: Adjusting and Tightening Public Health Measures

PREVENT (Standard Measures)	PROTECT (Strengthened Measures)	RESTRICT (Intermediate Measures)	CONTROL (Stringent Measures)	LOCKDOWN (Maximum Measures)
Epidemiology • Weekly incidence rate is < 10 per 100,000 • % positivity is < 0.5 • Rt < 1 • Outbreak trends/ observations • Level of community transmission/non-epi linked cases stable **Health System Capacity** • Hospital and ICU capacity adequate **PH System Capacity** • Case and contact follow up within 24 hours adequate	**Epidemiology** • Weekly incidence rate is 10 to 24.9 per 100,000 • % positivity is 0.5-1.2% • Rt is approximately 1 • Repeated outbreaks in multiple sectors/settings OR increasing/# of large outbreaks • Level of community transmission/non-epi linked cases stable or increasing **Health System Capacity** • Hospital and ICU capacity adequate **PH System Capacity** • Case and contact follow up within 24 hours adequate	**Epidemiology** • Weekly incidence rate is 25 to 39.9 per 100,000 • % positivity is 1.3-2.4% • Rt is approximately 1 to 1.1 • Repeated outbreaks in multiple sectors/settings, increasing/# of large outbreaks • Level of community transmission/non-epi linked cases stable or increasing **Health System Capacity** • Hospital and ICU capacity adequate or occupancy increasing **PH System Capacity** • Case and contact follow up within 24 hours adequate or at risk of becoming overwhelmed	**Epidemiology** • Weekly incidence rate ≥ 40 per 100,000 • % positivity ≥ 2.5% • Rt is ≥ 1.2 • Repeated outbreaks in multiple sectors/settings, increasing/# of large outbreaks • Level of community transmission/non-epi linked cases increasing **Health System Capacity** • Hospital and ICU capacity at risk of being overwhelmed **PH System Capacity** • Public health unit capacity for case and contact management at risk or overwhelmed	Trends continue to worsen after measures from Control level are implemented.

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Scarsin Ontario Forecast to Dec 15

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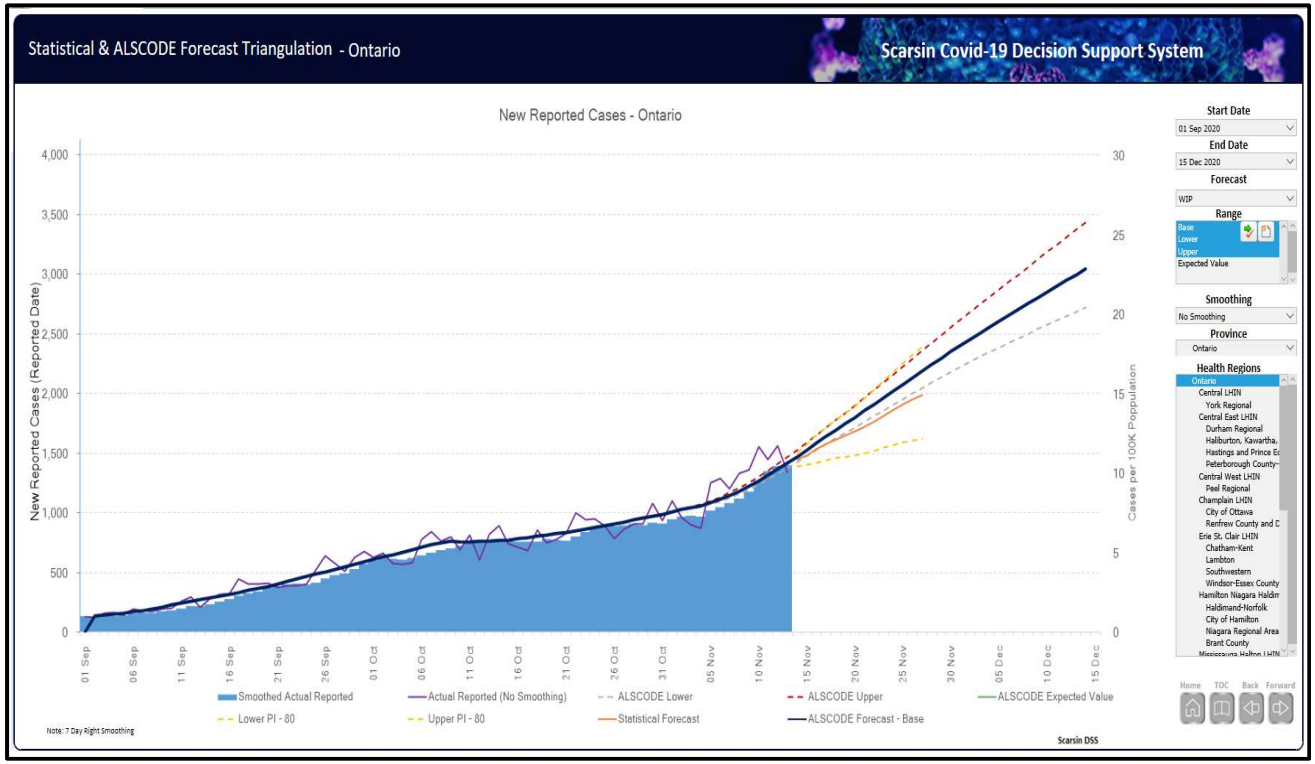
- **How is the Ontario Forecast in the Scarsin DSS created?**
  - Create a forecast for each of the 34 health regions
  - Apply the new Ontario framework (Nov 13) in alignment to estimated dates health regions change colour status
  - Did Not implement any Stage I shutdowns in the next 30 days

- **What is the forecast?**
  - Continued growth to 3,091 cases per day with an upper and lower bound of 3,499 and 2,756 respectively for Dec 15



Screen captures from the **LIVE** Scarsin Covid-19 decision support system for **CANADA** based on Saturday November 14 data

Top 10 HR Forecast on Dec 15

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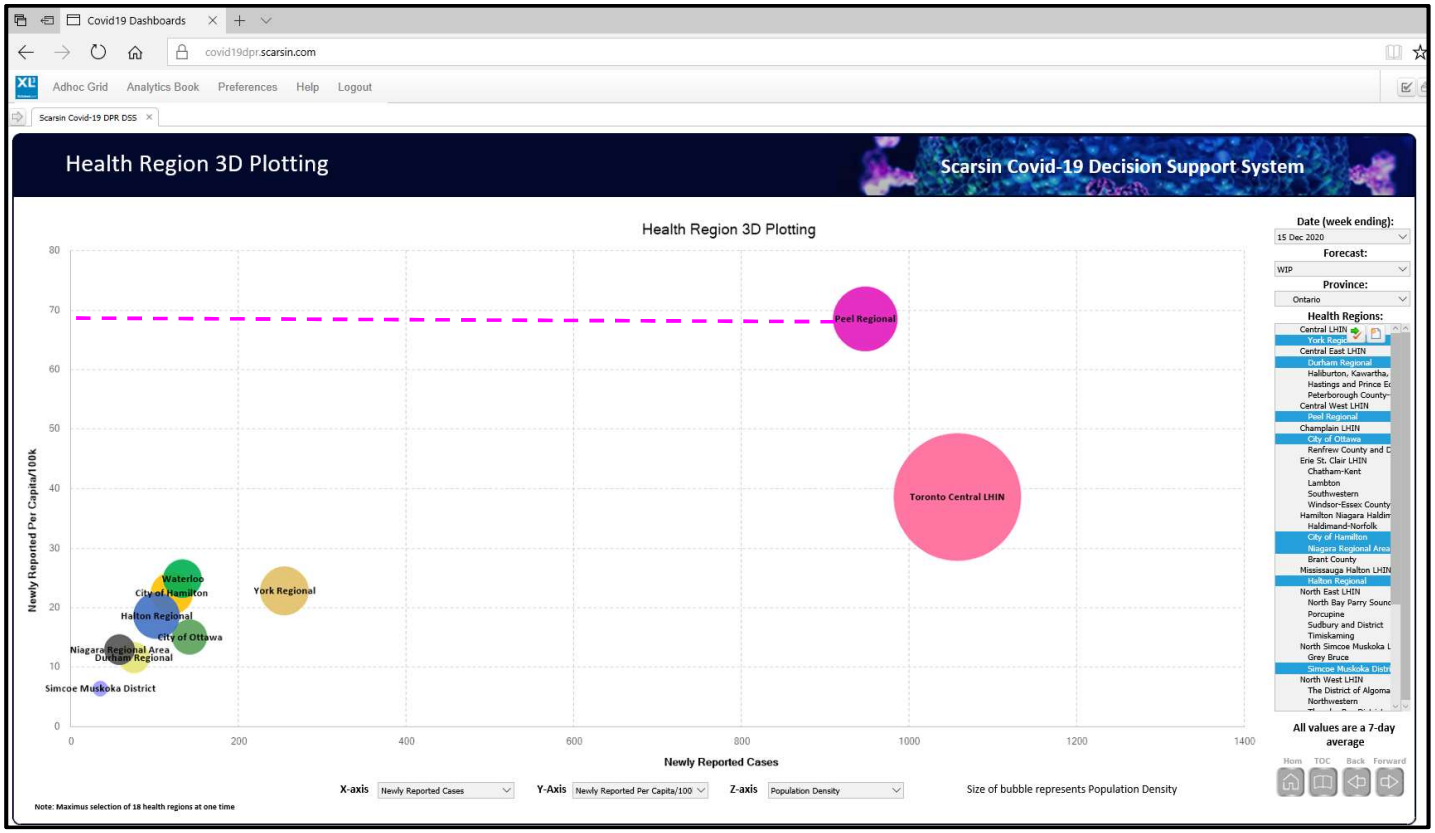
- **What forecast insights can be gained about the top 10 health regions?**
  - The vast majority of the reported patient case volumes will be in Toronto and Peel
  - Peel will approach critical levels of spread concentration (~70 daily cases /100K)* [US level!]
  - The spread concentration in Peel and Toronto are expected to reach levels that will require a Stage I shutdown to regain control



Screen captures from the **LIVE** Scarsin Covid-19 decision support system for **CANADA** based on Saturday November 14 data

* Scarsin reports in Daily cases per 100K in alignment to international standards, not weekly

Peel Interventions >> Forecast

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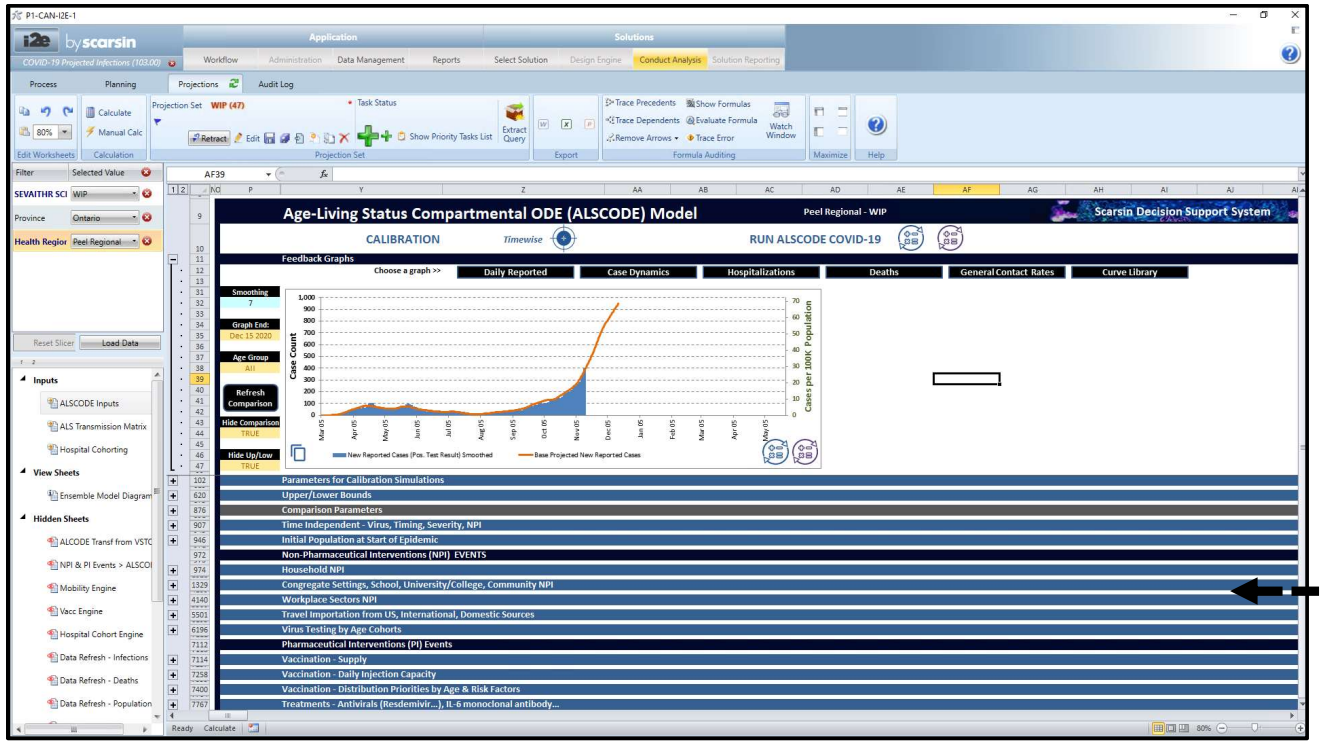
- **How does the Scarsin system incorporate healthcare policies in Peel as an example health region?**
  - The blended interventions between the Ontario Control framework and additional measures by Peel region are mapped to different potential infection locations (home, community, workplace…)
  - Changes are made to the reduction in daily contacts in the forecast model, the SEIVASTHRD algorithm calculates the Covid-19 spread



	Ontario Stringent + Peel Additional
Home	Residents of Peel must restrict their contact to members of their household and essential supports only. Those that live alone may join one designated household.
	Residents of Peel should not visit any other household or allow visitors to their homes or yards, except for emergency reasons, including medical and repairs, renovations or construction, deliveries and one-on-one tutoring. Proper precautions must always be used in these situations, including mask wearing, distancing, hand hygiene, and isolating if sick.
Community	Social gatherings celebrating holidays and life events in business establishments are not allowed, starting at 12:01 a.m. Nov. 13, 2020.
	Wedding receptions and associated gatherings are not allowed, starting at 12:01 a.m. Nov. 13 until at least Jan. 7, 2021.
	Religious services, rites or ceremonies should be virtual. When not possible, in-person religious events, including weddings and funerals, must:
	Seat households and essential supports together, at least 2 metres from other groups.
	Reduce indoor capacity to 30% capacity to a maximum 50 people per facility.
	Bars, restaurants and other food establishments must restrict seating to people from the same household, or their essential supports. No mixed seating is permitted.
	Gyms and fitness centres must make sure all fitness class participants pre-register and provide accurate contact information to help with contact tracing if there is an exposure. No walk-in participation is allowed.
	Meeting and event spaces, including banquet halls, must close.
Workplace	Workplaces must prohibit all non-essential visitors and make work-from-home options available, as much as possible.

Peel Forecast

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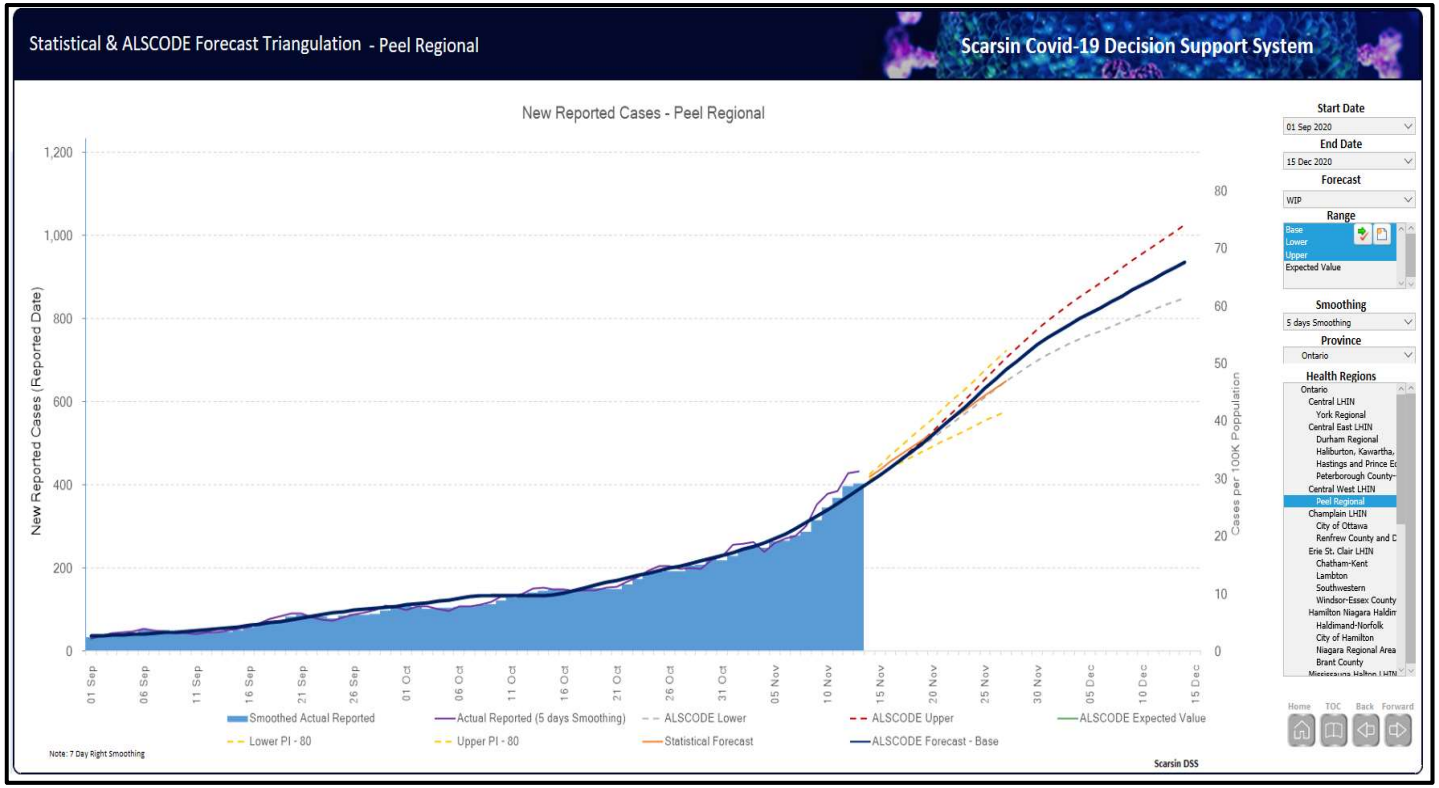
- **What key insights does the Peel forecast reveal?**
  - Peel is at a very high level of covid-19 spread (30 daily cases per day / 100k) with no signs of slowing
  - The Scarsin forecast takes into consideration the current interventions
  - There is nothing stopping Peel from reaching 60-70 daily cases per day / 100k (420-350 cases per week / 100k) within the next month
  - Peel should be in Stage I lockdown now



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Peel Forecast Scenarios

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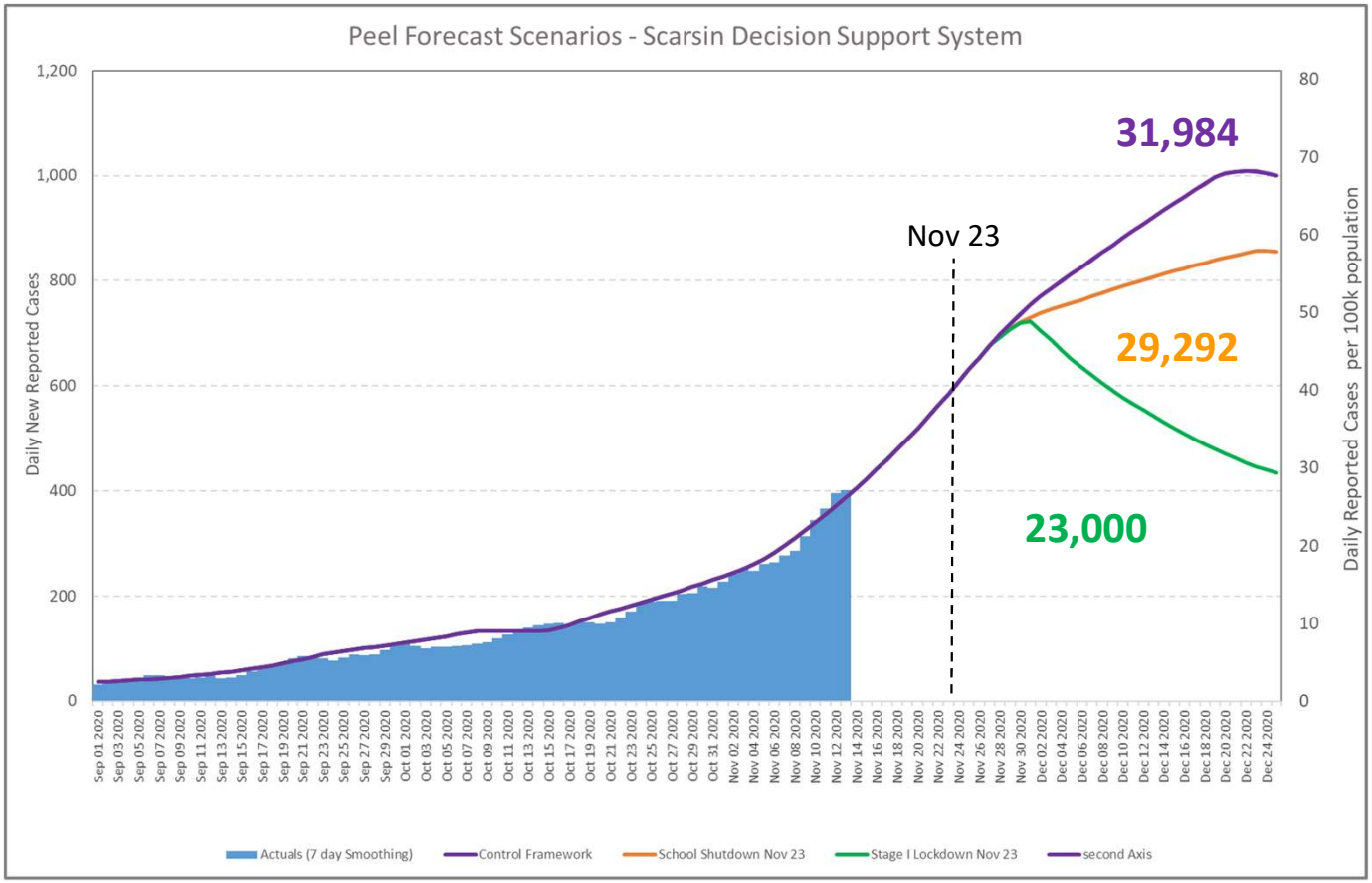
- **What is the Control framework forecast?**
  - The purple line represents the Scarsin model forecast utilizing the combined Peel and Ontario Control framework
  - It predicts 1,000 cases per day with ~32K cumulative cases Nov 15-Dec 25

- **What are relevant alternative scenarios?**
  - Closing schools is an option as positivity rates in school age has risen. The orange line represents adding school closures on Nov 23 to the Control framework with ~29K
  - The green line represents a Stage I shutdown implemented on Nov 23 with $23K



Forecast Outlook by Health Region Dec 15

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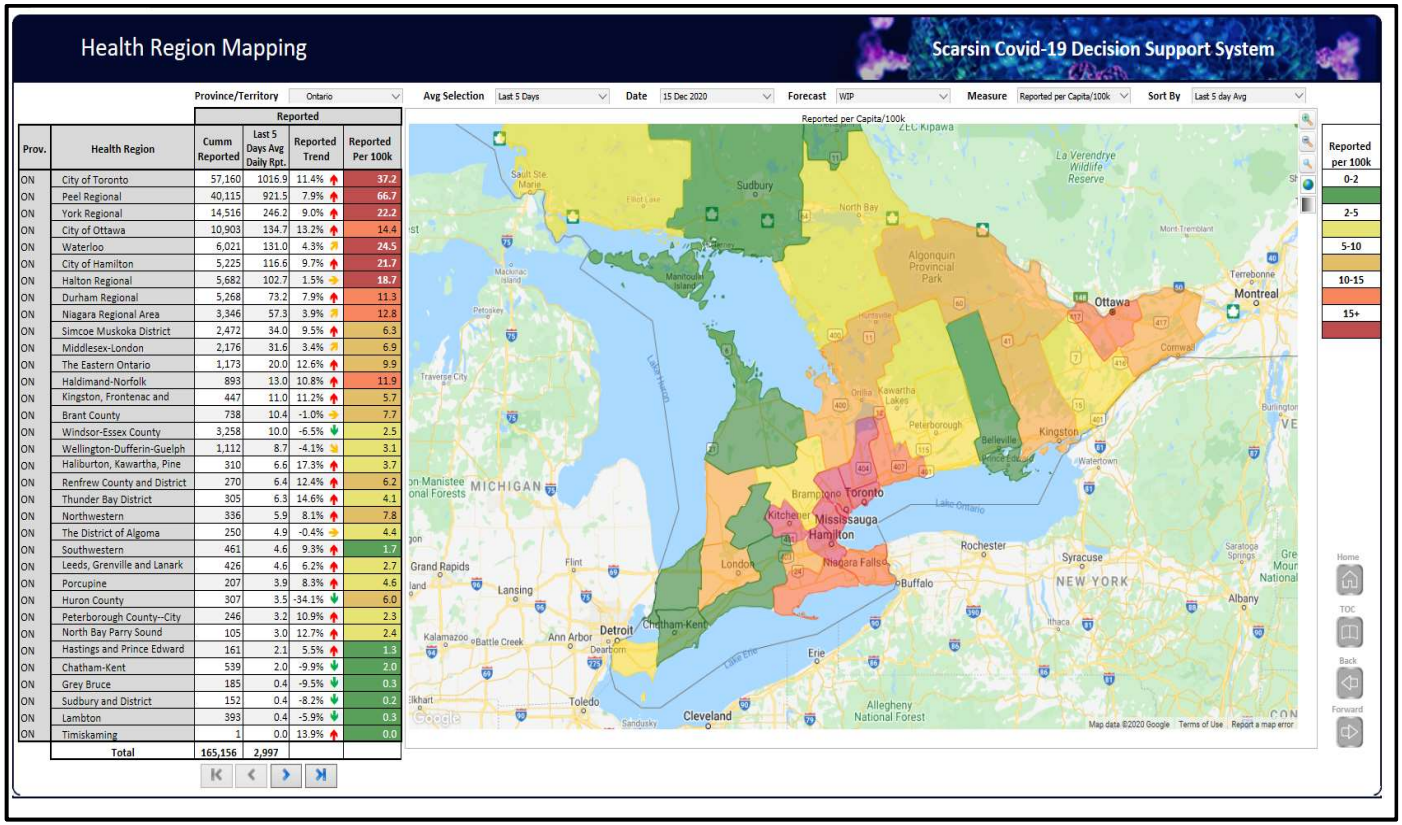
- **What is the outlook for the province as a whole?**
  - This heat map of the Ontario health regions illustrates the different levels of spread and concentration of concern primarily in the GTA
  - Scarsin runs an identical process for all 34 regions on a daily basis which ensures that any new dynamics will be picked up quickly and adjusted in the provincial forecast
  - Stay tuned for our upcoming Vaccine impact analysis for the province!



Prov.	Health Region	Reported: Cumm Reported	Reported: Last 5 Days Avg Daily Rpt.	Reported: Reported Trend	Reported: Reported Per 100k
ON	City of Toronto	57,160	1016.9	11.4%	37.2
ON	Peel Regional	40,115	921.5	7.9%	66.7
ON	York Regional	14,516	246.2	9.0%	22.2
ON	City of Ottawa	10,903	134.7	13.2%	14.4
ON	Waterloo	6,021	131.0	4.3%	24.5
ON	City of Hamilton	5,225	116.6	9.7%	21.7
ON	Halton Regional	5,682	102.7	1.5%	18.7
ON	Durham Regional	5,268	73.2	7.9%	11.3
ON	Niagara Regional Area	3,346	57.3	3.9%	12.8
ON	Simcoe Muskoka District	2,472	34.0	9.5%	6.3
ON	Middlesex-London	2,176	31.6	3.4%	6.9
ON	The Eastern Ontario	1,173	20.0	12.6%	9.9
ON	Haldimand-Norfolk	893	13.0	10.8%	11.9
ON	Kingston, Frontenac and	447	11.0	11.2%	5.7
ON	Brant County	738	10.4	-1.0%	7.7
ON	Windsor-Essex County	3,258	10.0	-6.5%	2.5
ON	Wellington-Dufferin-Guelph	1,112	8.7	-4.1%	3.1
ON	Haliburton, Kawartha, Pine	310	6.6	17.3%	3.7
ON	Renfrew County and District	270	6.4	12.4%	6.2
ON	Thunder Bay District	305	6.3	14.6%	4.1
ON	Northwestern	336	5.9	8.1%	7.8
ON	The District of Algoma	250	4.9	-0.4%	4.4
ON	Southwestern	461	4.6	9.3%	1.7
ON	Leeds, Grenville and Lanark	426	4.6	6.2%	2.7
ON	Porcupine	207	3.9	8.3%	4.6
ON	Huron County	307	3.5	-34.1%	6.0
ON	Peterborough County--City	246	3.2	10.9%	2.3
ON	North Bay Parry Sound	105	3.0	12.7%	2.4
ON	Hastings and Prince Edward	161	2.1	5.5%	1.3
ON	Chatham-Kent	539	2.0	-9.9%	2.0
ON	Grey Bruce	185	0.4	-9.5%	0.3
ON	Sudbury and District	152	0.4	-8.2%	0.2
ON	Lambton	393	0.4	-5.9%	0.3
ON	Timiskaming	1	0.0	13.9%	0.0
	Total	165,156	2,997		

Screen captures from the **LIVE** Scarsin Covid-19 decision support system for **CANADA** based on Saturday November 14 data

Scarsin Desire to Help Ontario

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- **Why didn't Scarsin help Ontario, Toronto, Peel with its system?**
  - We have reached out to Peel and Toronto directly for months offering to help and share the Scarsin DSS forecasts for their regions
  - We submitted an Ontario Together Fund business case (phase II of the process) for the Scarsin decision support system on May 25
  - We have been ready for months, please contact

- **Is Scarsin working with any Ontario health regions?**
  - Scarsin is working with York Region

- **Can Scarsin still help Ontario achieve Best-Available?**
  - **YES**. We have a turnkey solution ready to help Ontario and its health regions immediately
  - We answered Canada and Ontario's call for innovation as a global leader in disease forecasting and build a BEST-AVAILABLE system at a cost of ~$1.6M **all self funded**