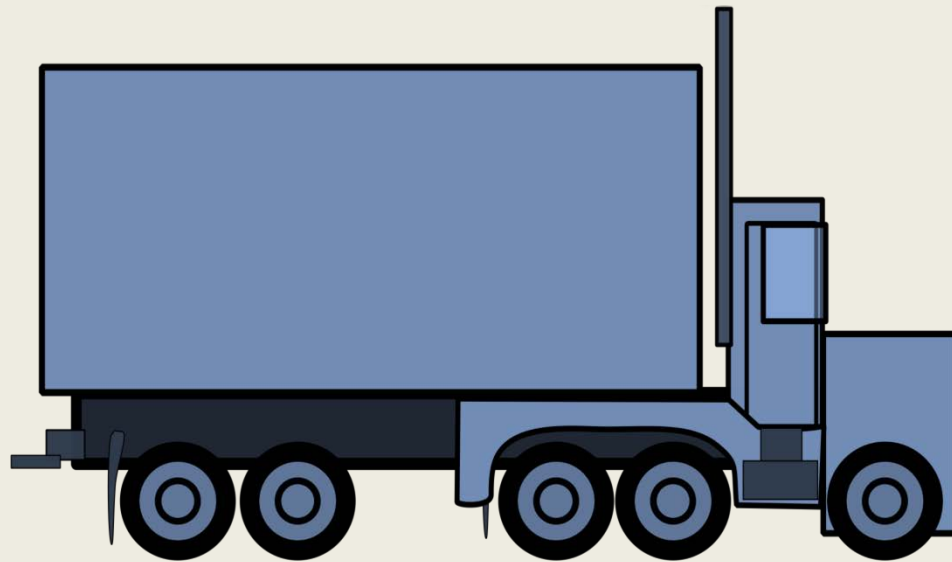


Large Truck Collision Causation Study

1



Erin Dessau
Road Safety Research Office
Ontario Ministry of Transportation

CARSP Conference 2017

Large Truck Collisions in Ontario

2

- **Large truck drivers are generally safe.**
 - In 2014, 66% of large truck drivers involved in collisions were coded as “driving properly”.
- **Large trucks are more massive than other vehicles.**
 - In 2014, 20% of fatalities on Ontario’s roads were due to collisions involving a large truck.
- **Prevention of large truck collisions relies on understanding their causes.**

Previous Large Truck Collision Causation Studies

3

➤ Studies have been conducted globally over the past 15 years.

	United States (2006) ¹	Europe (2007) ²	Australia (2010) ³	Canada (2011) ⁴
Period	2001 – 2003	2004-2006	2008 - 2011	2003-2007
Study Population	2,284 vehicles in 1,070 collisions	624 collisions	530 drivers in collisions & 517 drivers not in collisions.	663,259 large trucks in collisions.
Purpose & Methods	<ul style="list-style-type: none">• Attend collisions• Descriptive statistics• Database for future research	<ul style="list-style-type: none">• Attend collisions in sample areas• Analyzed by sequential model	<ul style="list-style-type: none">• Comparing large truck drivers who crash to those that do not	<ul style="list-style-type: none">• Used Natinoal Collision Database• Identify collision contributors

Why do we need to do this in Ontario

4

- Further enhancing road safety in Ontario requires understanding ***Ontario-specific causes*** of collisions.
- Ontario differs from other jurisdictions in many ways, including:
 - Legal and regulatory framework
 - Environmental conditions
 - Infrastructure
- Ontario's Large Truck Collision Causation study will attempt to reveal **root causes** of collisions by relying on a “basic science” approach

Approach to Achieving Understanding

5

1.0 Hypothesis Generation

- Focus Group
- Literature Review

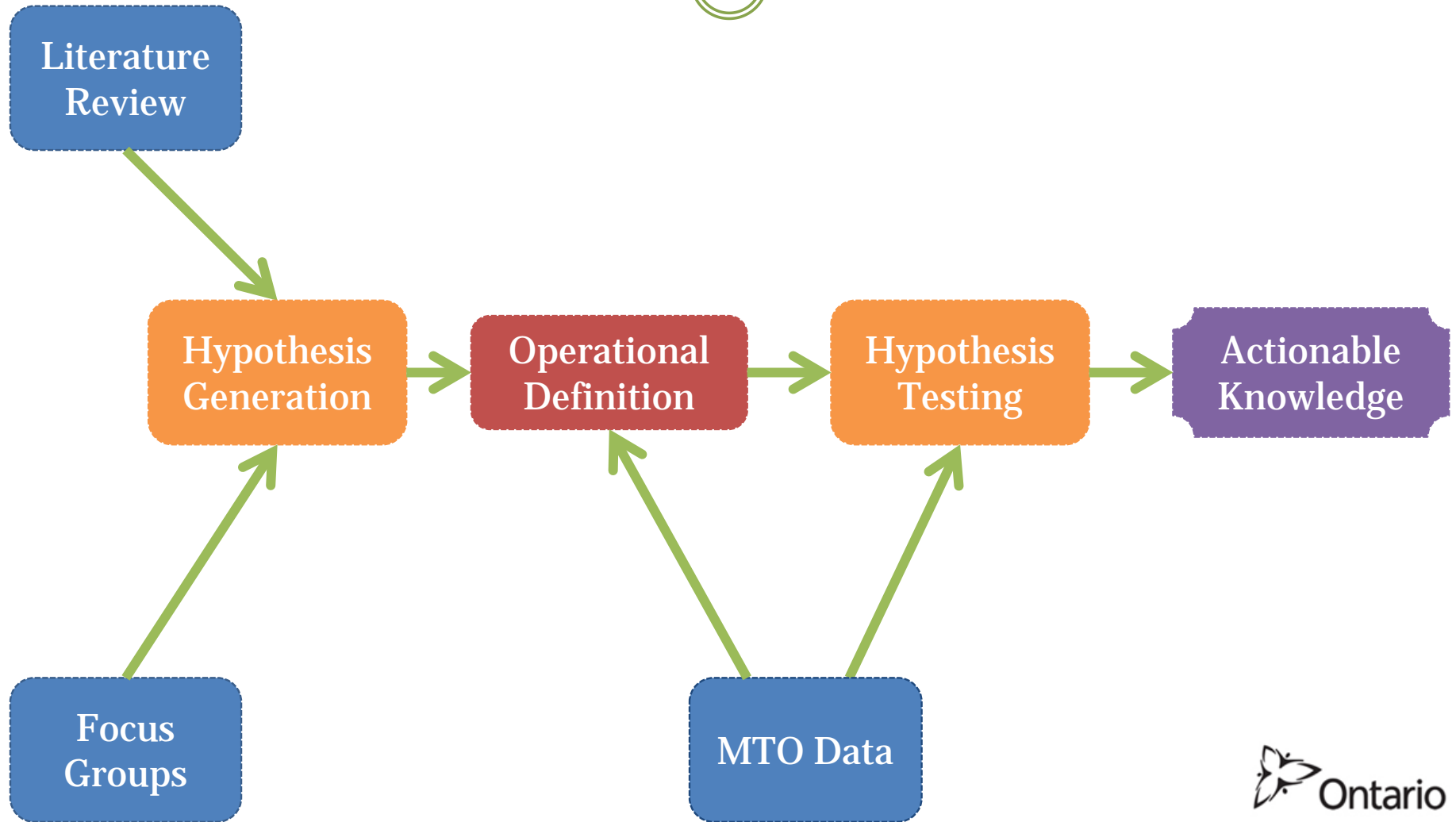
2.0 Prediction/Operationalization

3.0 Hypothesis Testing

- MTO Databases

Approach to Achieving Understanding

6



Literature Review

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1. Search strategy:

- Search terms identified.
- Places to search included google scholar, academic databases (i.e. JSTOR, ProQuest) TRID, etc.
- Inclusion criteria identified.

2. Search conducted.

- Initial title review
- Secondary abstract review
- Full-text review

➤ Results

- 4 collision causation studies identified.
- 46 other research items identified for final inclusion.

Focus Groups

8



Drivers of
Large Trucks



Police Collision
Reconstructionists

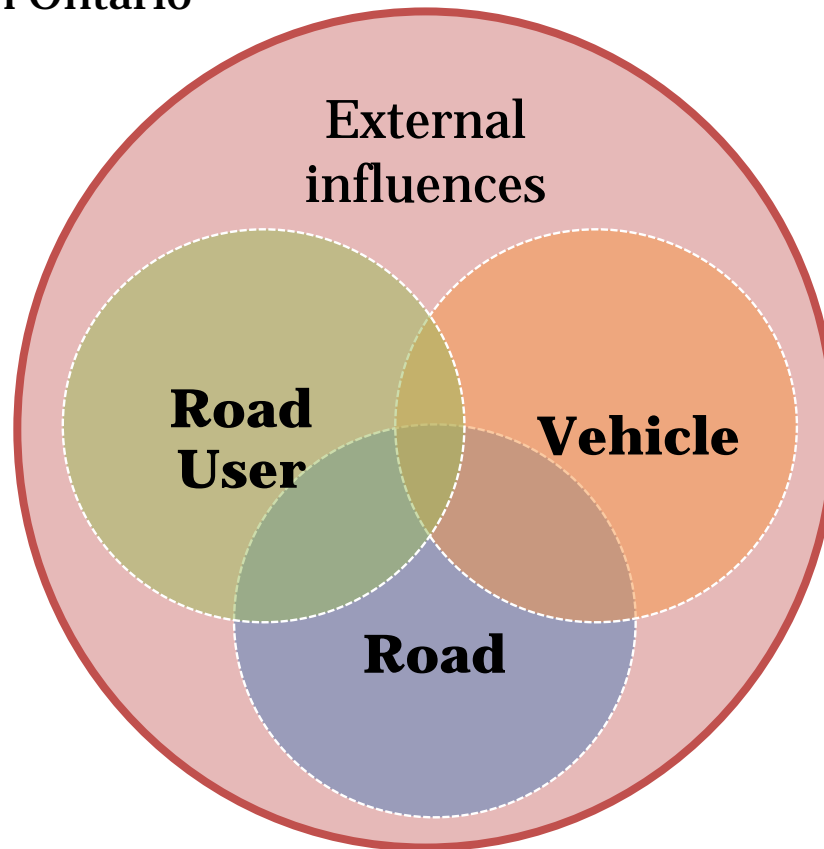


Ministry
Enforcement
Officers



Safety Risk
Managers

- Identify contributing factors for large truck collisions in Ontario



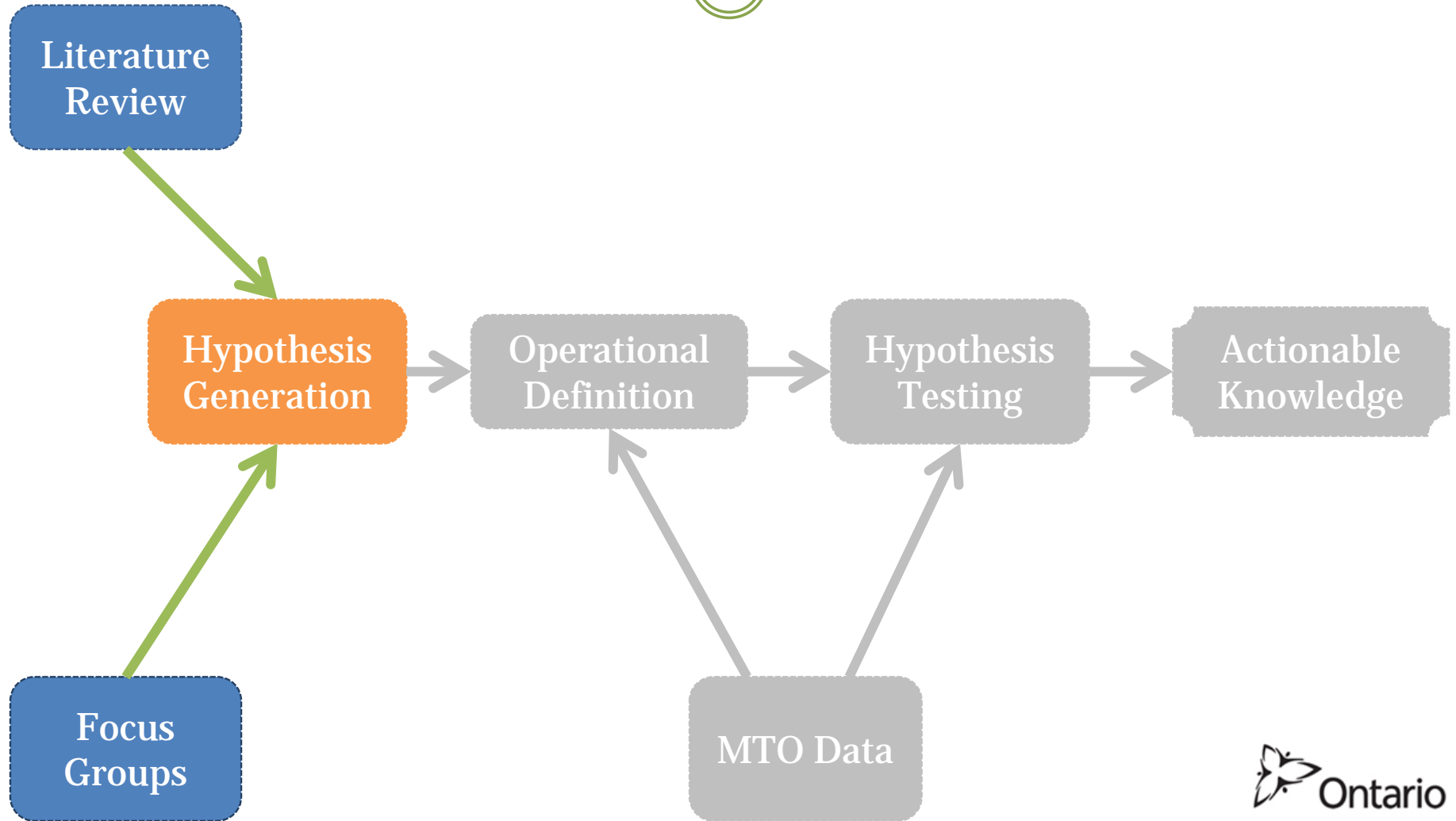
Hypothesis Generating to Attainable Knowledge

9

LARGE TRUCK BLIND SPOTS AS AN EXAMPLE

Large Truck Blind Spots as an Example

10



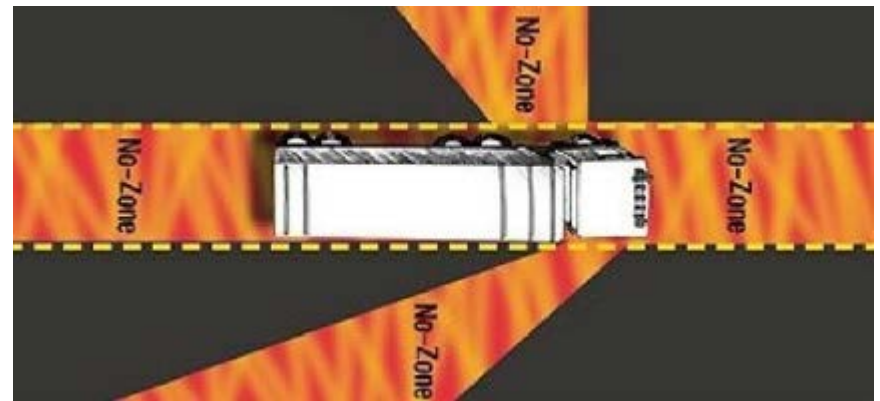
Large Truck Blind Spots as an Example

11

- Our focus groups suggested that other drivers might not be sufficiently aware of large truck dynamics and constraints (e.g. blind spots).



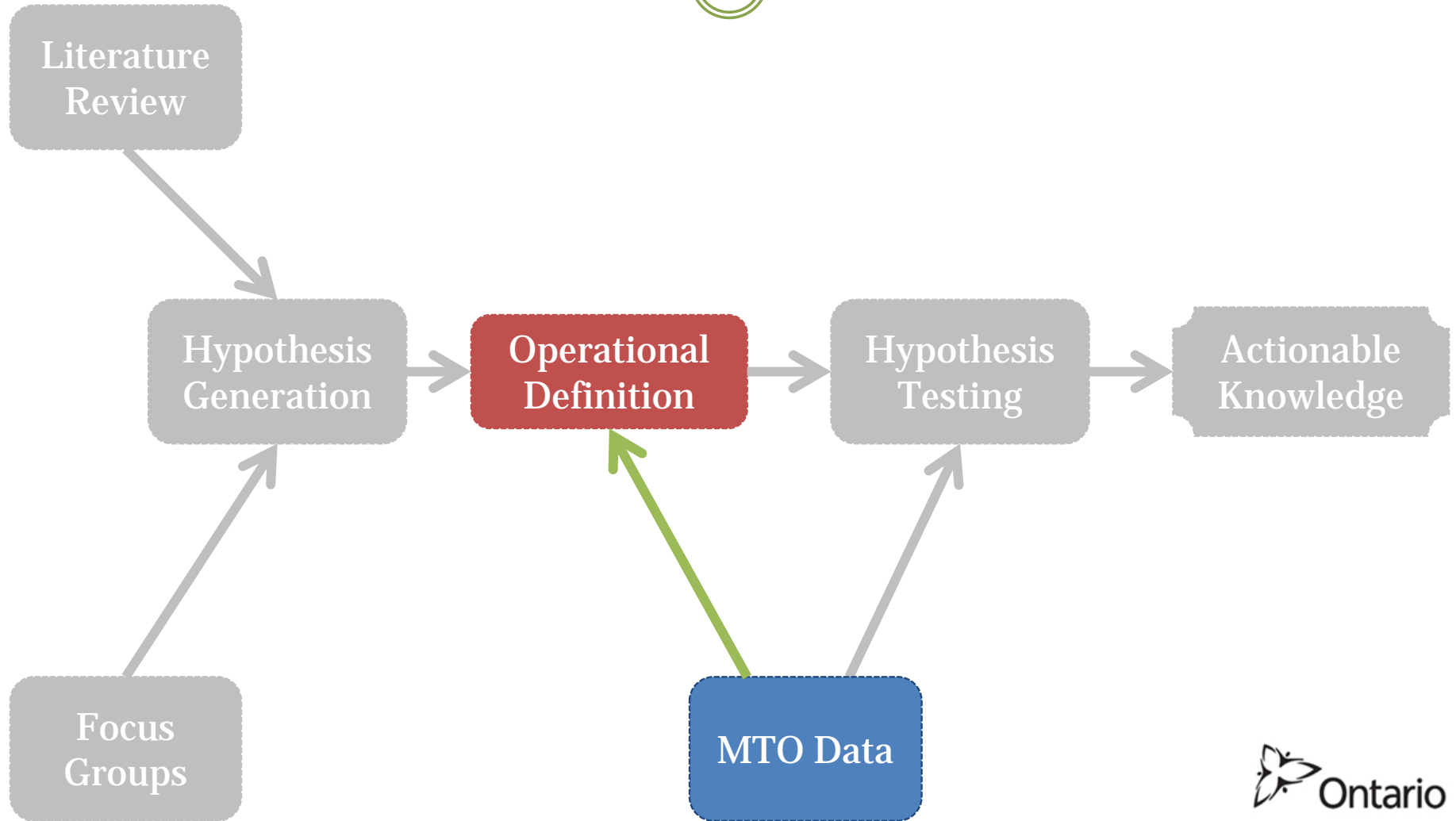
FMCSA (2017)⁵



NHTSA (2015)⁶

Large Truck Blind Spots as an Example

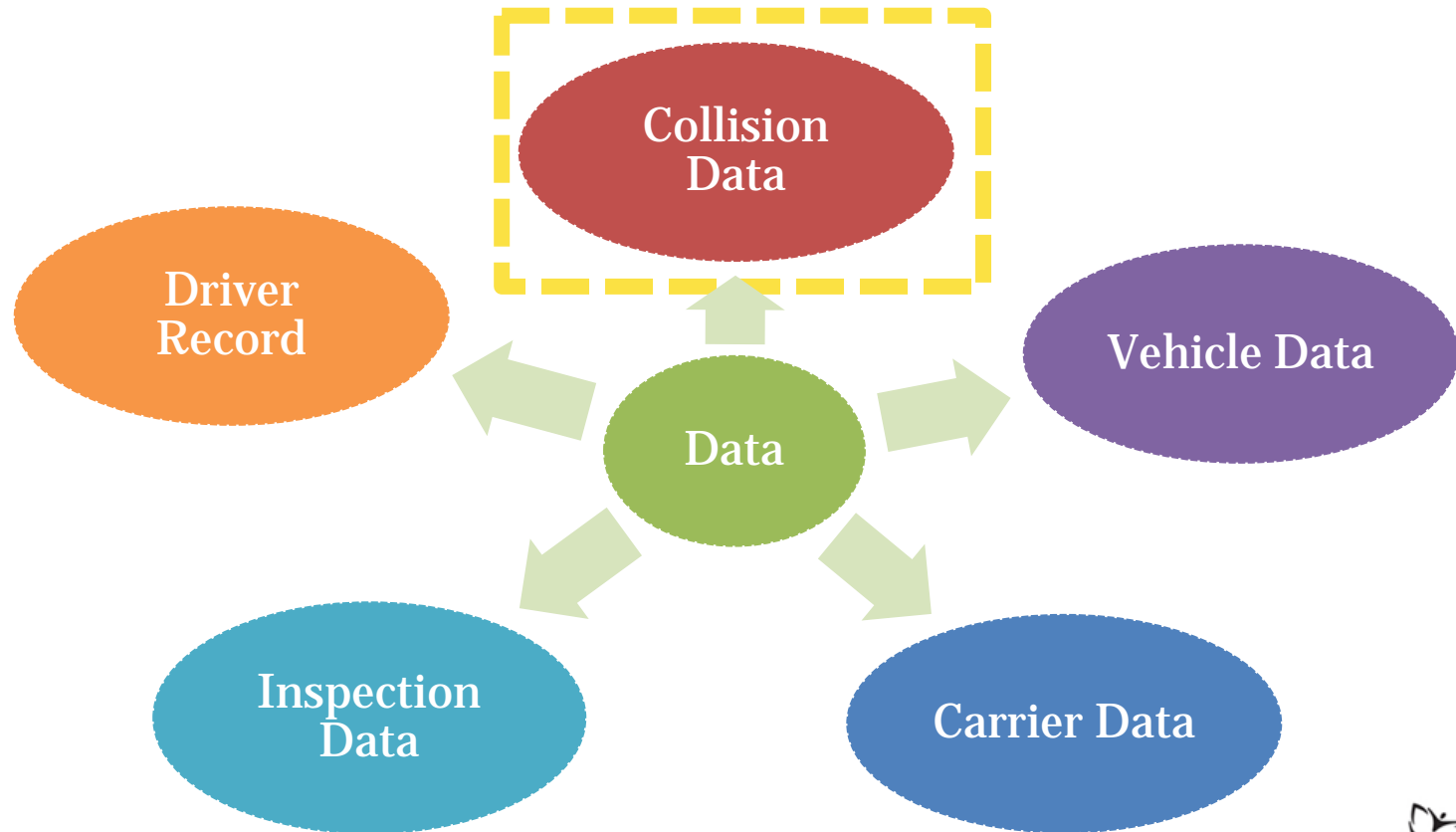
12



Large Truck Blind Spots as an Example

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- How can we operationalize and test this hypothesis?



Large Truck Blind Spots as an Example

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Collision:

1. Involves a light duty vehicle (LDV) and a large truck (LT).

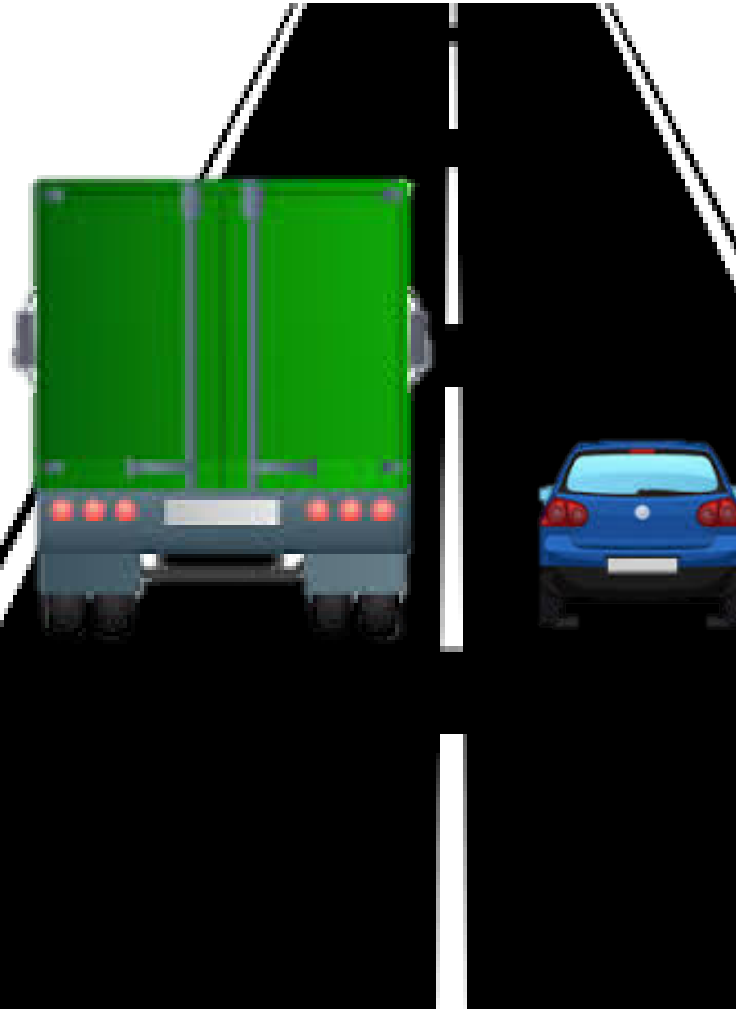


Large Truck Blind Spots as an Example

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Collision:

1. Involves a light duty vehicle (LDV) and a large truck (LT).
2. LDV is driving properly.



Large Truck Blind Spots as an Example

16

Collision:

1. Involves a light duty vehicle (LDV) and a large truck (LT).
2. LDV is driving properly.
3. The initial impact for the collision is coded as “side swipe”.

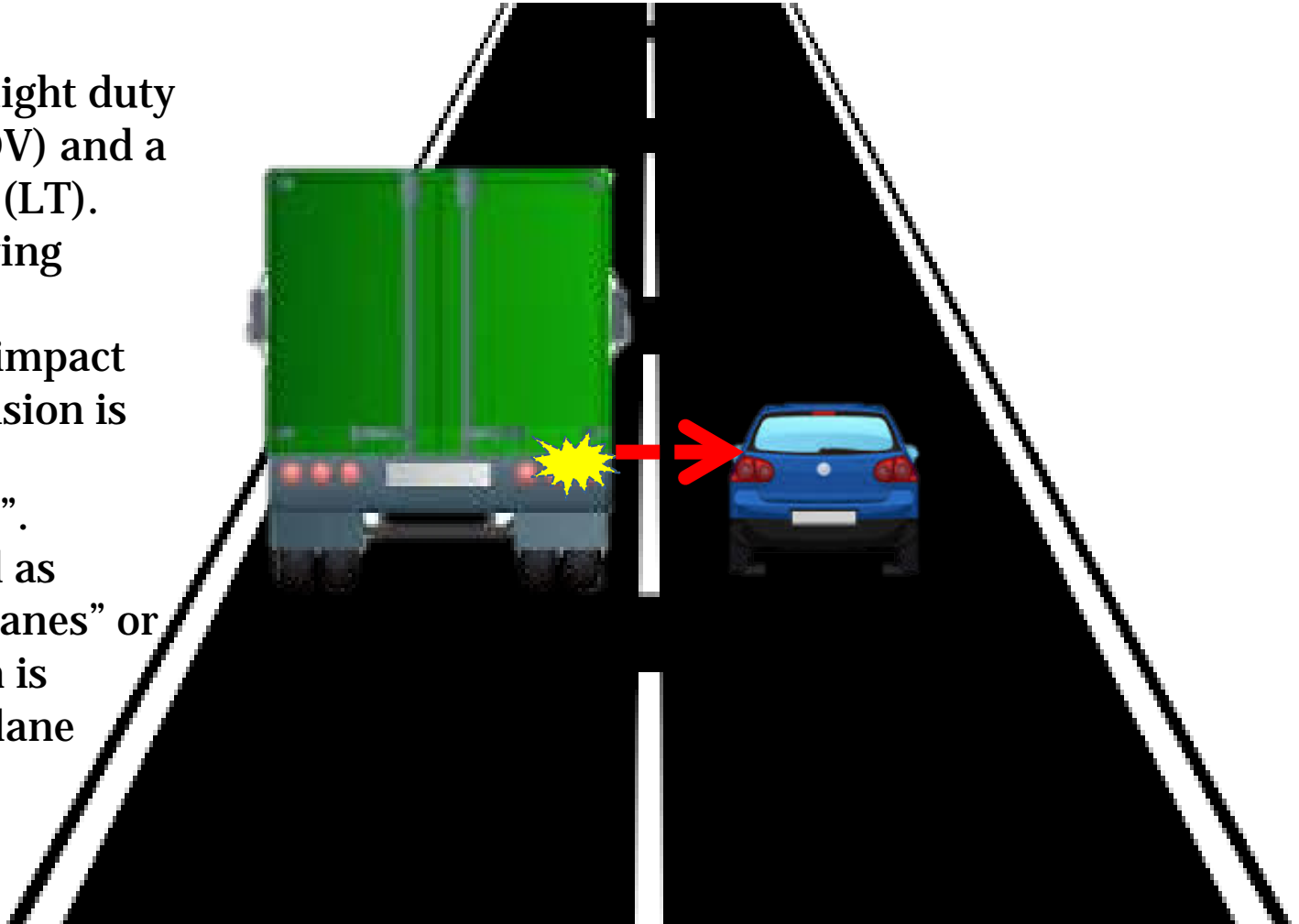


Large Truck Blind Spots as an Example

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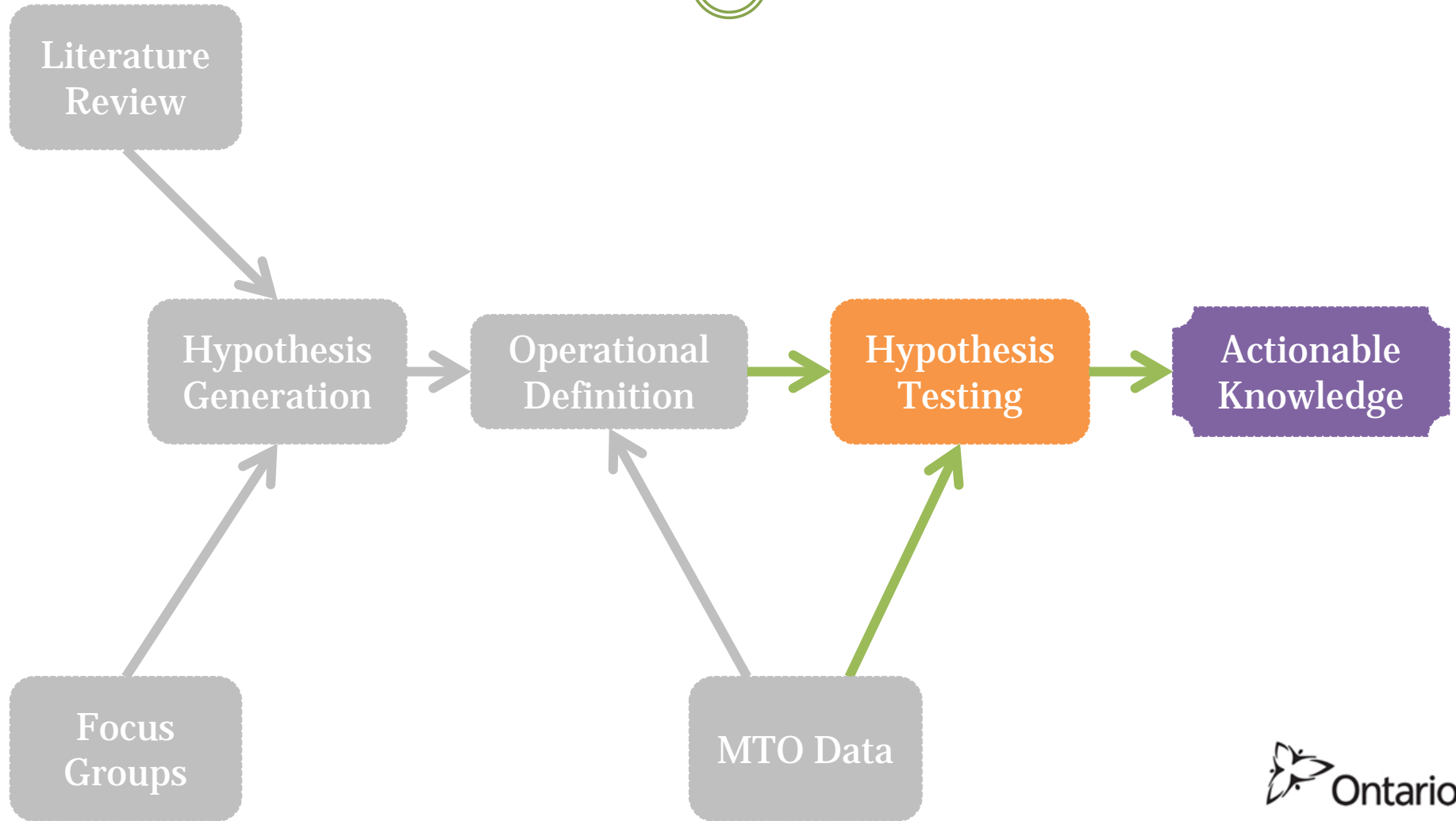
Collision:

1. Involves a light duty vehicle (LDV) and a large truck (LT).
2. LDV is driving properly.
3. The initial impact for the collision is coded as “side swipe”.
4. LT is coded as “changing lanes” or their action is “improper lane change”.



Large Truck Blind Spots as an Example

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Large Truck Blind Spots as an Example

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$N^{LT \rightarrow LDV}$ = number of large trucks side swiping LDVs

$N^{LDV \rightarrow LT}$ = number of LDVs side swiping large trucks

$N^{LDV \rightarrow LDV}$ = number of LDVs side swiping LDVs

N_{naf}^{LT} = number of large trucks “not at-fault” in collisions (exposure)

N_{naf}^{LDV} = number of LDVs “not at-fault” in collisions (exposure)

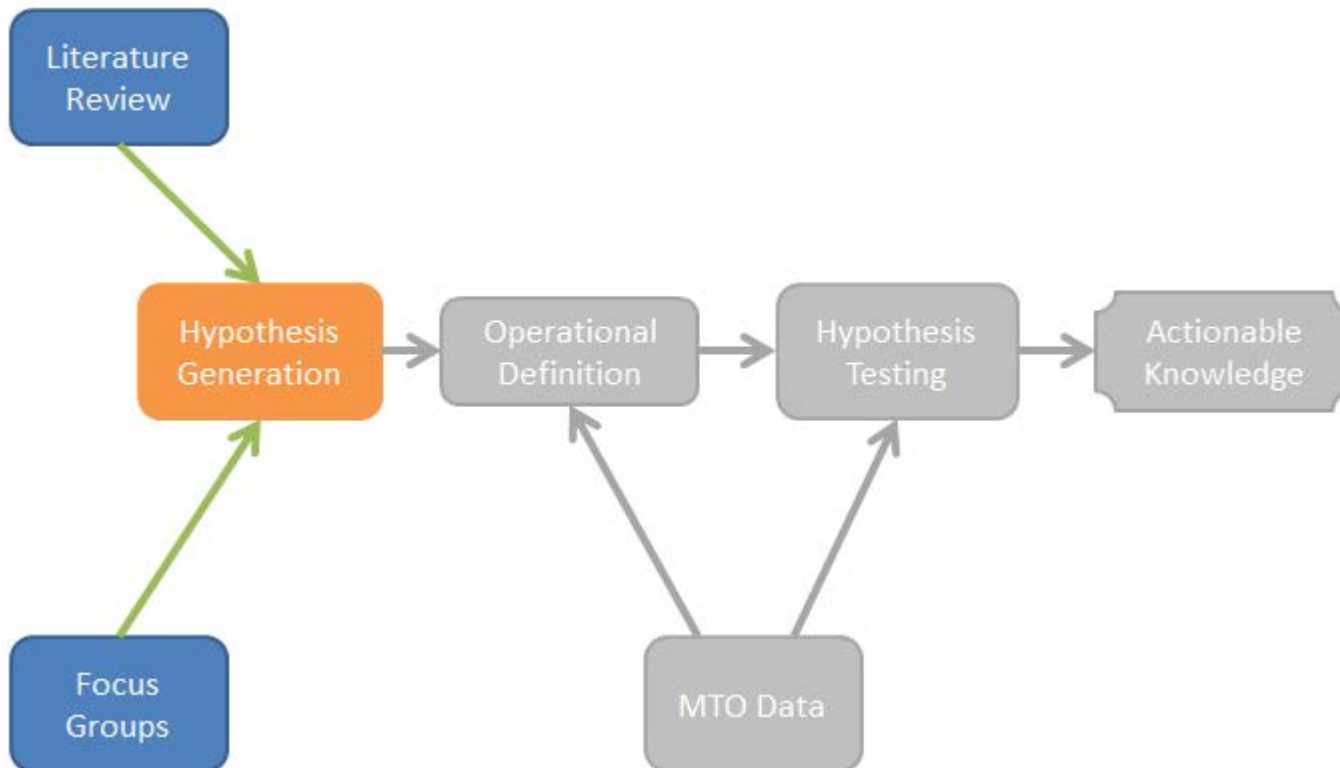
Outcome 1: $\frac{N^{LT \rightarrow LDV}}{N^{LDV \rightarrow LT}}$;

Outcome 2: $\frac{N^{LT \rightarrow LDV}}{N_{naf}^{LT}} \div \frac{N^{LDV \rightarrow LDV}}{N_{naf}^{LDV}}$

Next Steps

20

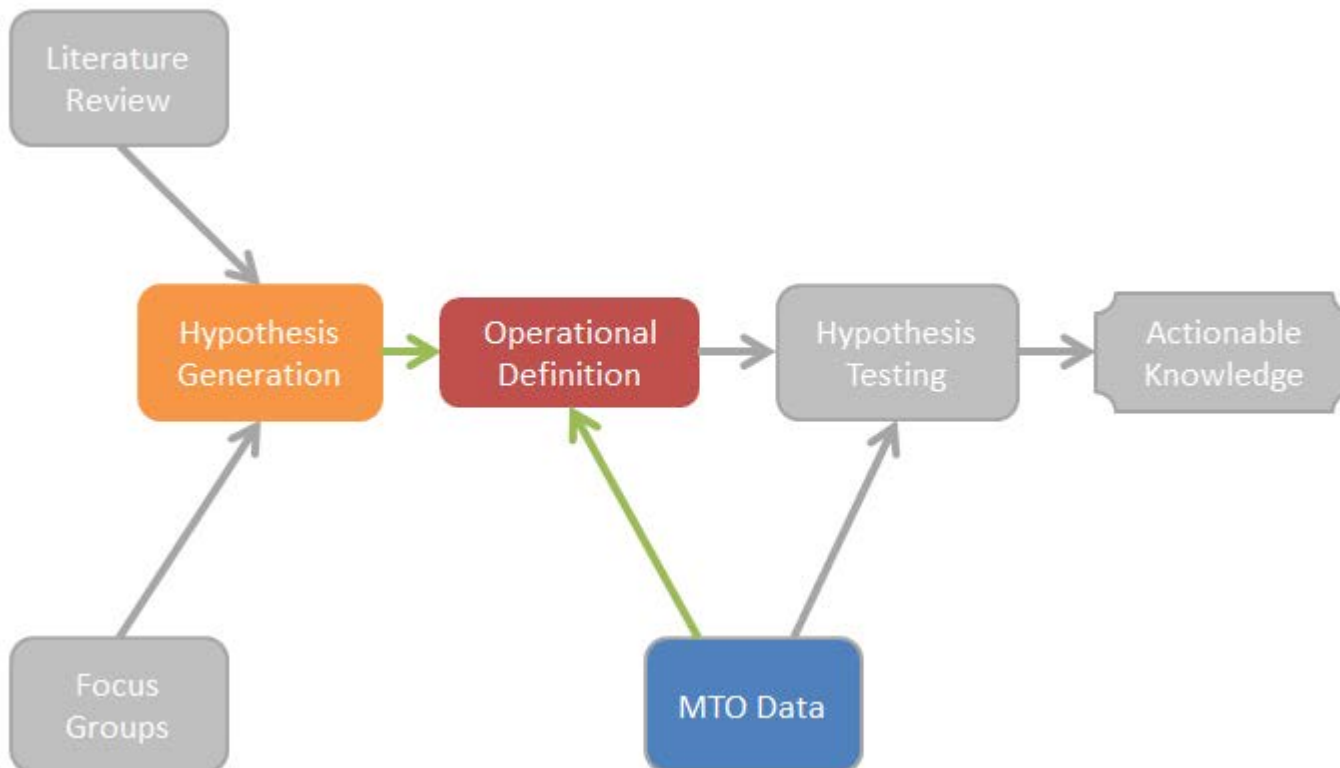
1. Draw out and prioritize hypotheses from literature and focus groups.



Next Steps

21

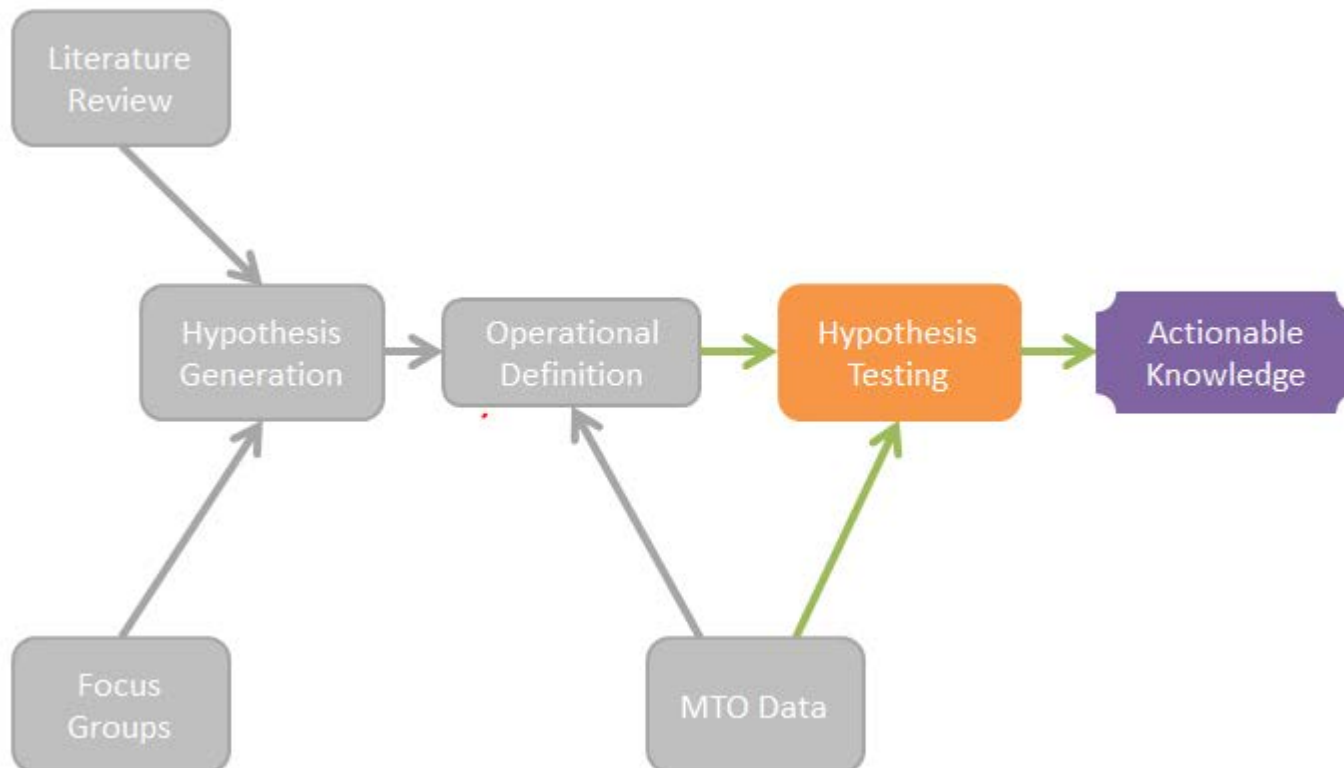
2. Develop operational definitions based on available data.



Next Steps

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3. Execute hypothesis testing by conducting statistical analysis.



Feedback

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Questions & Comments

Erin Dessau

T: 416-235-3631 E: erin.dessau@ontario.ca

Patrick Byrne

T: 416-235-6592 E: patrick.byrne@ontario.ca

Tracey Ma

T: 416-235-4025 E: tracey.ma@ontario.ca

Francine Rubin

T: 416-235-3619 E: francine.rubin@ontario.ca

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