



# **Defining Skills and Quantifying Skill Shortages: A Critical Assessment**

# Media outlets express concern over shortages in Canadian Economy

- Historically low national unemployment rates and labour/skills shortages major concern
- Businesses report difficulty finding workers<sup>1</sup>
- Concern over shortage situation paints depressing picture:

Staff Shortages Create Emergency Situation  
for Canadian Retailers

July 18, 2019

Labour shortages are holding back the construction  
sector: Here's what governments and businesses can do

ECONOMICS | News Wire | Company News

Oct 25, 2018

**Skilled labour shortages at record high for  
Canadian small businesses**

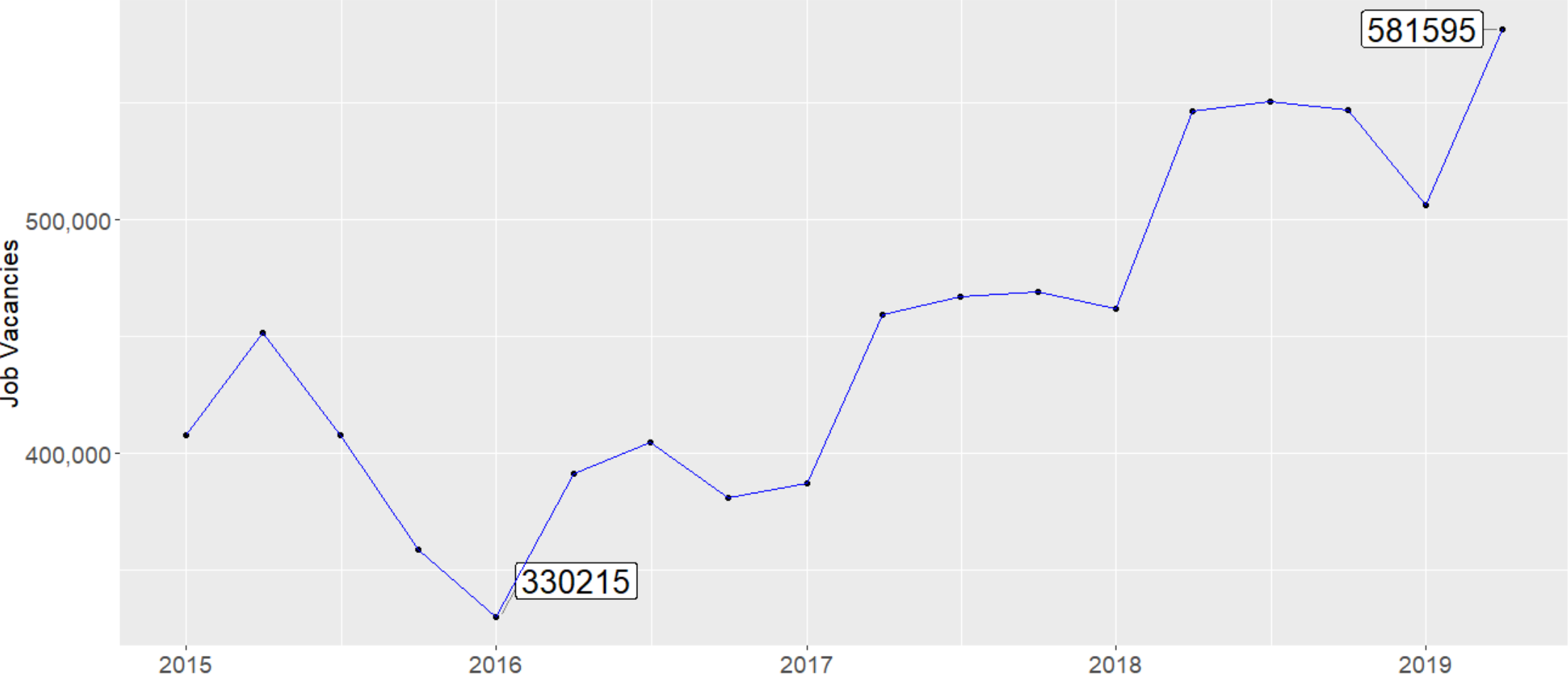
In Canada, labour shortage is 'the new  
normal': study

David Paddon The Canadian Press

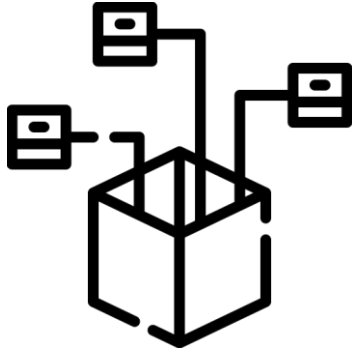
Published Wednesday, September 5, 2018 7:56AM EDT

Last Updated Wednesday, September 5, 2018 6:47PM EDT

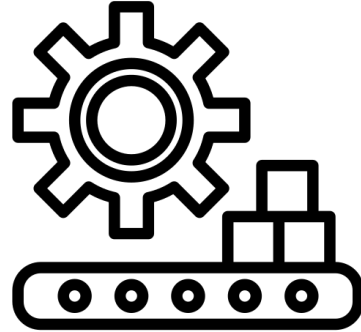
# Job vacancies at highest level in 2<sup>nd</sup> quarter of 2019



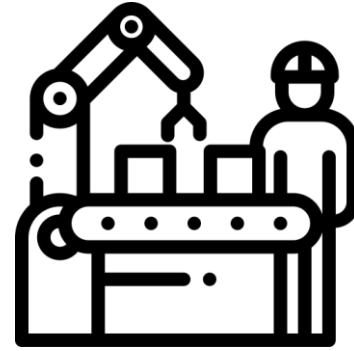
# Why be concerned with shortages in the first place?



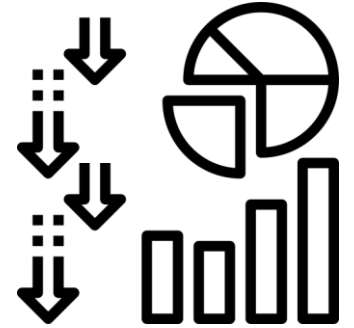
Inefficient  
resource  
allocation



Reduced  
aggregate  
production



Unappealing  
working conditions  
(e.g., increased  
forced overtime,  
unattractive job  
assignments)



Decreased output  
and reduced  
profits

# Are shortages REALLY hindering Canada's economic prosperity?

## Is Canada's skills shortage real, or are businesses to blame?

September 13, 2017 7:05pm EDT

COMMENTARY

OPINION

## How the myth of a Canadian skill shortage was shattered: Goar

BUSINESS 10/31/2018 17:16 EDT | Updated 11/01/2018 12:30 EDT

## Canada Has A Historically Large Labour Shortage, But Job-Seekers Are Still Struggling

It takes nearly as long today to find a job as it did during the Great Recession.

McDaniel's SSHRC study reveals no evidence of labour shortage



Like 0










Tweet

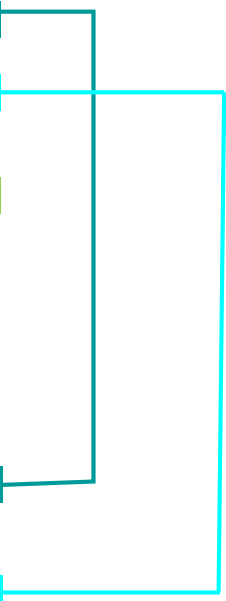


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# Inconsistent terminology: no single definition for what shortages are

| TERM            | DEFINITION  |   |
|-----------------|---|---|
| LABOUR SHORTAGE | "A shortfall in the total number of individuals in the labour force. <sup>2</sup> "   |    |
| LABOUR SHORTAGE | "An insufficient number of workers in a particular occupation. <sup>3</sup> "   |    |
| LABOUR SHORTAGE | "A situation in which the number of workers in an occupation is fewer than what is ideal. <sup>4</sup> "                                      |    |
| LABOUR SHORTAGE | "When the number of workers available increases less rapidly than the number demanded at the salaries paid in the recent past. <sup>5</sup> " |   |
| SKILLS SHORTAGE | "A lack of workers arising from general shortfalls in the total number of individuals in the labour force. <sup>6</sup> "                     |    |
| SKILLS SHORTAGE | "A shortage of individuals in a particular occupation. <sup>7</sup> "   |    |
| SKILLS GAP      | "Widespread shortfall in the basic skills of future employees, usually attributed to the failure of the education system. <sup>8</sup> "      |  |
| SKILLS GAP      | "When firms' existing staff do not have the skills they need to do their job effectively. <sup>9</sup> "                                      |  |





# Are we solving the right problem?

**If I were given one hour to save the planet,  
I would spend 59 minutes defining the  
problem and one minute resolving it.**

*- Albert Einstein*



Example 6-step process for  
problem solving:

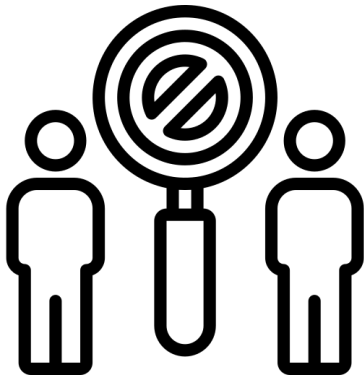
- 1. Identify the problem**
2. Structure the problem
3. Develop solutions
4. Select a solution
5. Implement a solution
6. Monitor for success

# Getting to the root of the issue (1Y)

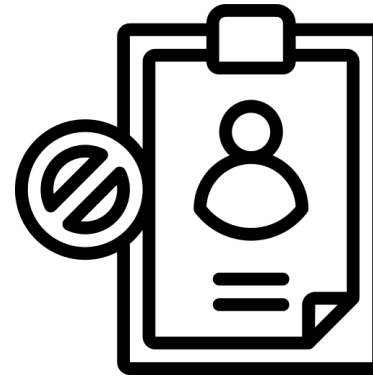


**Problem:** Employers are unable to fill vacancies in the Canadian labour market

**Why:**



There are  
no job  
applicants



Job applicants  
are lack the  
appropriate  
skills



# Defining the issues LMIC style



# The identification issue: measuring shortages

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- In empirical work, shortages have always been interpreted, or even defined **directly**, in terms of difficulties filling vacancies.<sup>10</sup>



## Limitations to using vacancies as a measure for shortages

- Employer reactions obscure measurement:
  - Increased OT
  - Later retirement
  - Internal recruiting
- Different data reporting agencies yield different results
- Incentives to overstate hiring challenges
- Hiring difficulties may signal problems with the firm

# (Limitations)<sup>2</sup>: no local, granular data

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## **Primary data source:**

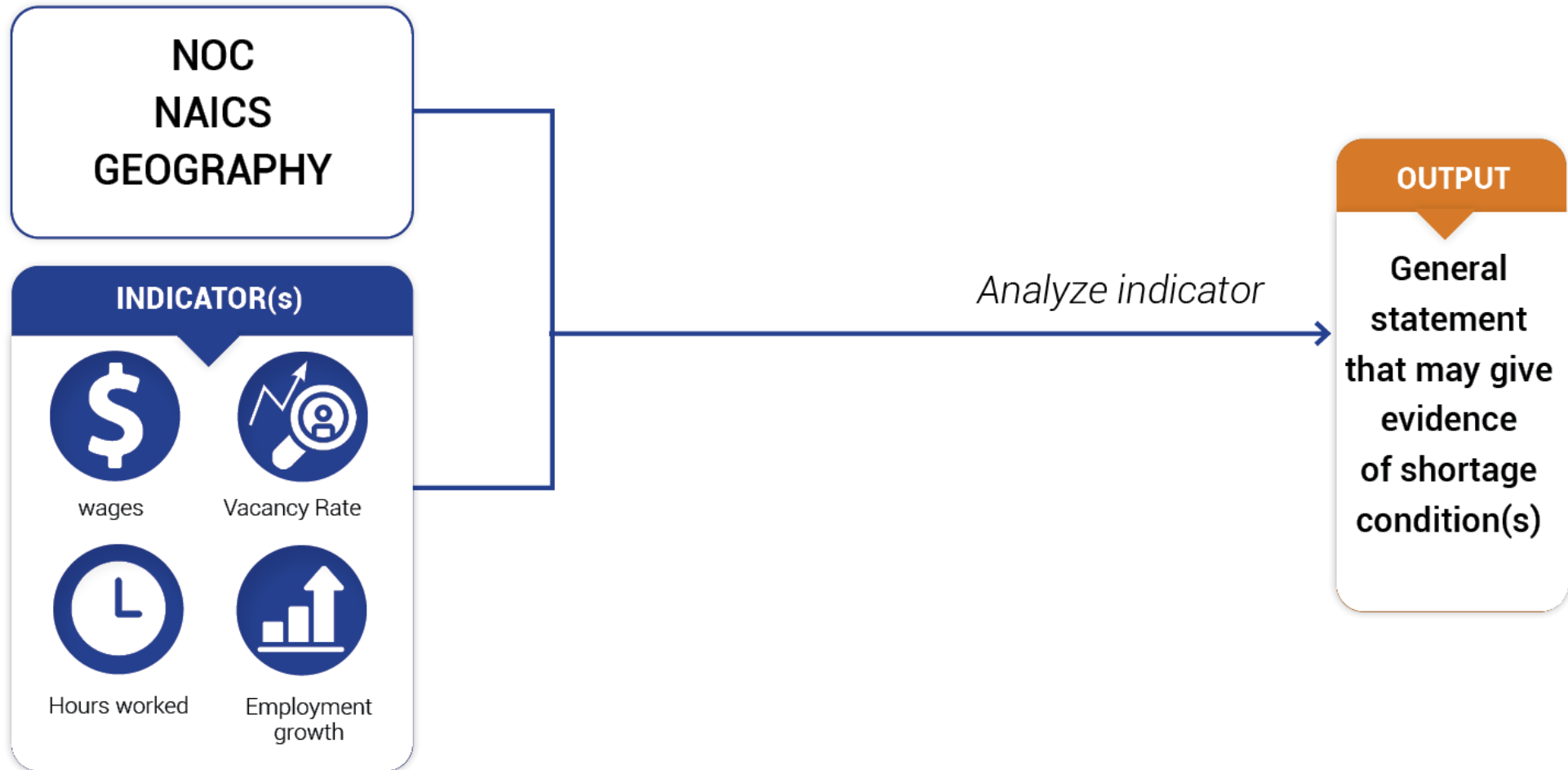
- Job Vacancy and Wage Survey
  - Introduced in February 2015
  - Surveys 100,000 locations every quarter
  - Provides job vacancy levels by industry, NOC, and economic region
- 






## **Limitations:**

- Timeliness: JVWS estimates are published approximately three months after reference period
- No information below economic region
- Publicly available data very sparse

# From direct to indirect measures of shortages: general shortages



# Analyzing the indicators

| Signal   | Explanation   |
|--|---|
| <b>Hourly wage growth</b><br>       | Wage growth functions as a signal for employers to attract candidates when those candidates are not easily found in the labour market (i.e., when there is a shortage).   |
| <b>Employment growth</b><br>        | Employment levels represent the volumes/quantities of workers. An increase in the quantity of employed workers in a given occupation can be interpreted as an indication that demand is rising for that occupation.   |
| <b>Growth in hours worked</b><br> | When facing shortages, employers may respond by incentivizing overt-time or by increasing the hours worked by existing workforce. Thus, an increase in the total number of hours worked by individuals in a certain occupation may be interpreted as a signal of stronger demand for that occupation. |

# Hourly Wage Growth

## Primary Data Source(s):

- SEPH, Census, LFS, CIS, T1FF, JVWS (prior to 2017)

## Theoretical limitations:

- Wage growth may accelerate independently from a shortage.
- Wage growth may be modest despite a shortage, if, for example, employers are slow to adjust to the imbalance or wages are not free to adjust.

## Empirical limitations

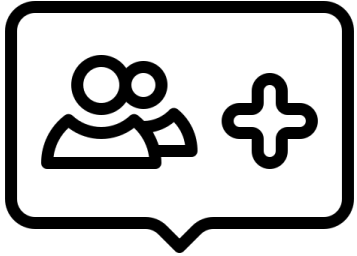
- NOC2
- NAICS4
- By province

### Output

Average hourly wages in PEI's construction industry are increasing.

Average hourly wages for Technical occupations in health in Ontario are increasing.

# Employment Growth



## Data Source(s):

- LFS, SEPH, LEAP

## Theoretical limitations:

- Measure of demand only
- Serves as a only as a precondition under which a shortage is likely to occur.

## Empirical limitations

- NOC2 + CMA
- NAICS2 at ER

### Output

Employment in sales support occupations in Montréal, Quebec has increased.  
Total employed in Kingston-Pembroke manufacturing has increased.



# Hours Worked



## Data Source(s):

- LFS, SEPH

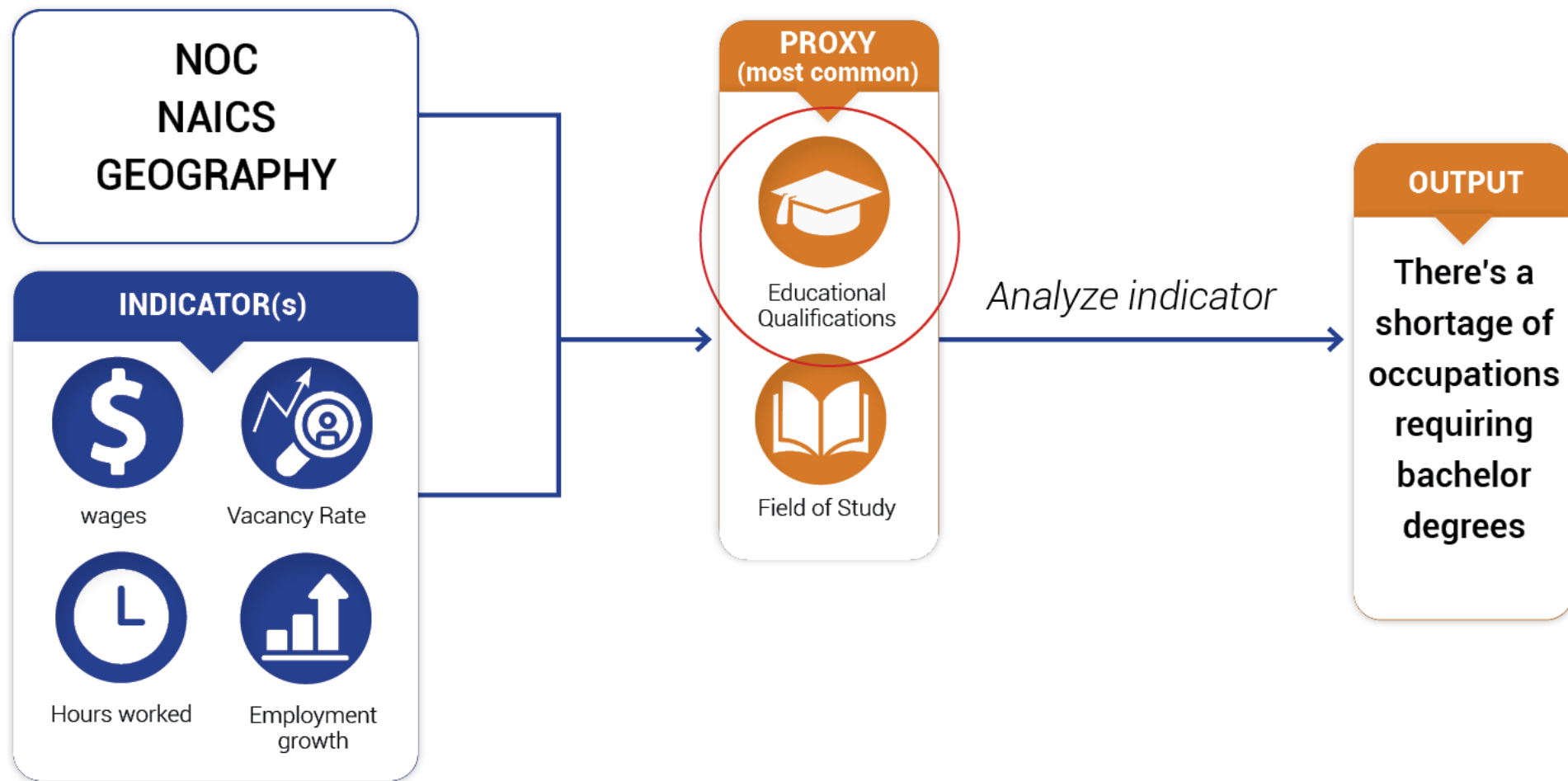
## Empirical limitations

- NOC2 + provinces
- NAICS4 + provinces


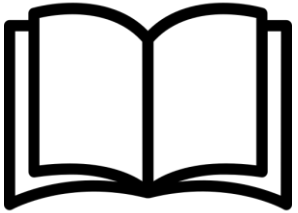
## Output

Average usual hours worked in office support occupations Manitoba has increased.  
Average usual hours worked in the utilities industry in Saskatchewan is increasing.

# From shortages to skills shortages: proxying skills



# Digging deeper into the proxies

| Type of assessment   | Description  | Example                            | Limitation  |
|--|--|------------------------------------|---|
| <b>Educational attainment</b><br> | Workers' educational attainment levels are used to proxy the skills they are expected to have acquired.            | Bachelor's degree, college diploma | <ol style="list-style-type: none"><li>1. Analysis restricted to a small number of skill categories.</li><li>2. Treats all individuals within the category to have the same skills at the same level.</li><li>3. Fails to capture skills acquired outside of formal educational programs, such as on-the-job training, professional development courses, or adult learning.</li><li>4. Does not reflect skills that are lost through disuse.</li></ol> |
| <b>Field of study (FOS)</b><br>  | The skills acquired by one degree program, such as art history, differ from the skills in another, say accounting. | Art history, accounting            | <ol style="list-style-type: none"><li>1. Social desirability bias</li><li>2. Reliability and validity questionable</li><li>3. Costly</li></ol>  |

# Where can we go from here?

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“We’re very much behind virtually every other developed country in attaching the characteristics that go along with different jobs – the skill sets....”

# Where can we go from here?

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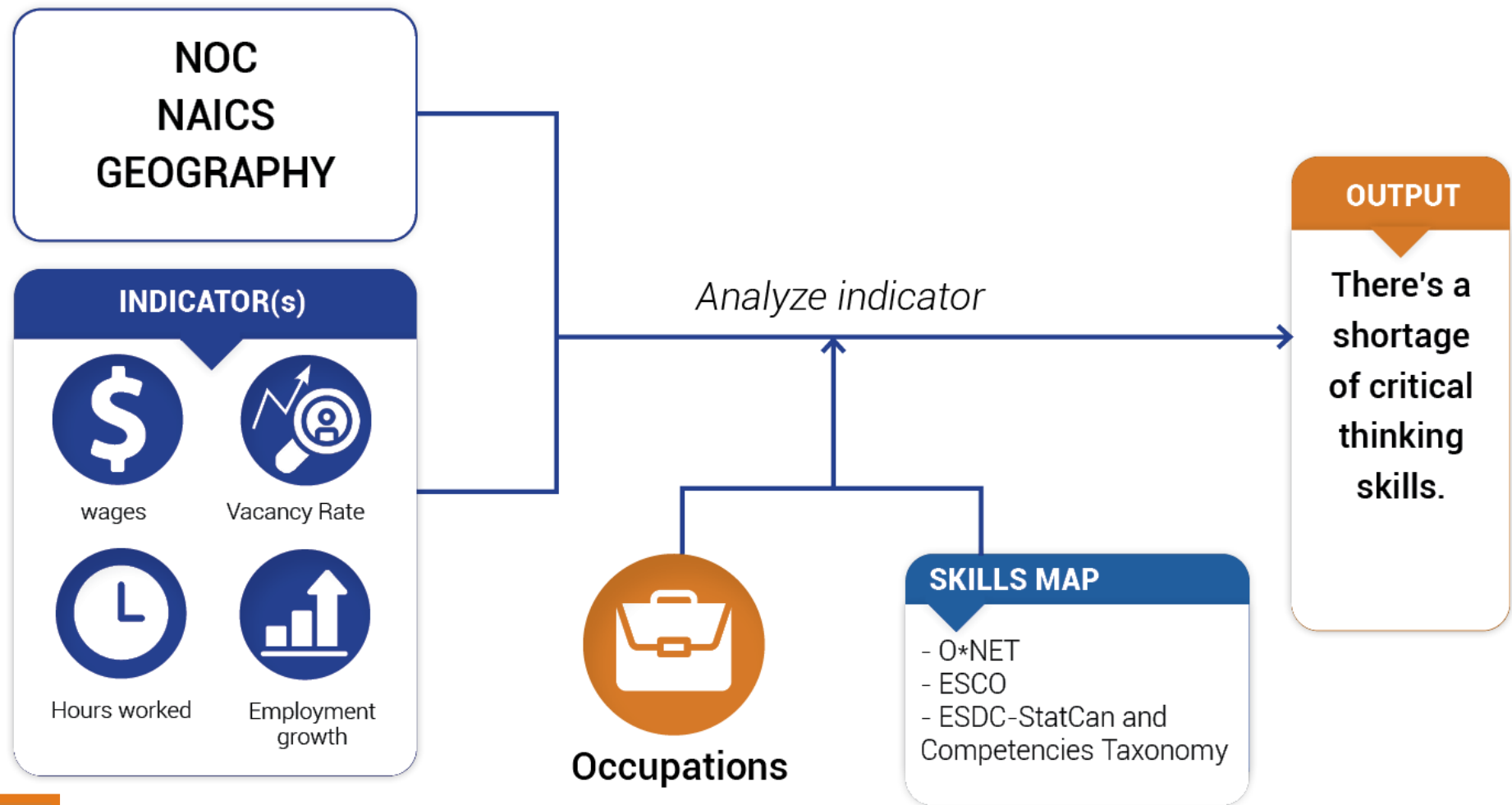
“People talk about skills all the time, soft skills, transferable skills, but I have no idea what they are talking about....”

# Where do we from here: Approaches to linking Skills to Occupations

| Potential Approaches |  | Description   |
|----------------------|--|---|
| <b>Approach 1:</b>   | <b>Develop concordance between NOC and US occupations and use O*NET skills</b> | Rely on US skills taxonomy to develop observations about skills content of Canadian occupations                                 |
| <b>Approach 2:</b>   | <b>Leverage web-scraped data</b>   | After coding online job postings with NOC, the data are empirically associated with skills (e.g., incidence rate)               |
| <b>Approach 3:</b>   | <b>Expert review of workers/employers surveys</b>                              | Experts review results from worker and/or employer self-assessment of skills. Experts then assign skills ratings to occupations |
| <b>Approach 4:</b>   | <b>Hybrid of the above</b>   | To be determined  |

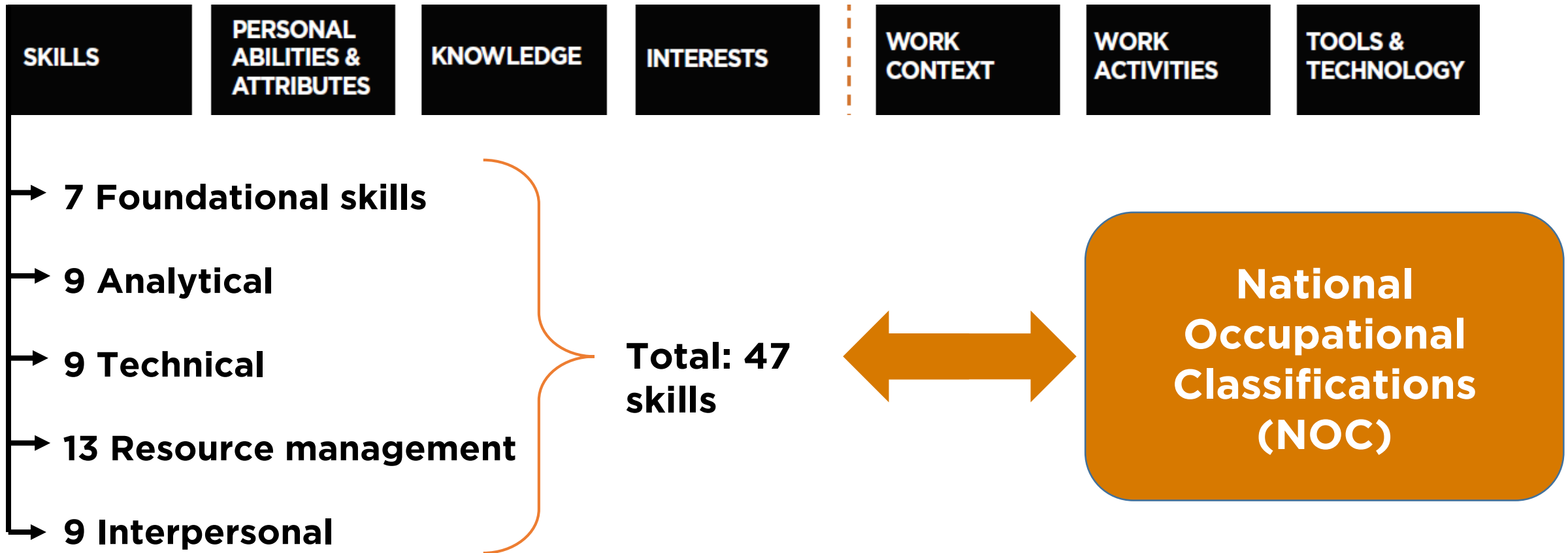
# Where can we go from here?

## 1. Leverage a skills-occupation mapping





# Linking ESDC Skills to NOC



# Limitations

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- Skills are generic, high level skills that may not reflect those skills asked for by employers
- Skills are not dynamic; it's the same set of skills. Important and complexity ratings may change over time, but not the skills themselves.
- Timeliness is a factor
- Still limited to the level (or lack thereof) of granularity of the indicators

# Where can we go from here?

## 2. Web-scraped data



# Example: Vicinity Jobs NOC code 4162 (Economists, etc.)

| Item                    | Type             | Incidence |
|-------------------------|------------------|-----------|
| 1. Communication skills | skill            | 53%       |
| 2. Teamwork             | skill            | 47%       |
| 3. English language     | Work requirement | 38%       |
| 4. Forecasting          | Work requirement | 34%       |
| 5. Data Analysis        | Work requirement | 22%       |
| 6. Decision making      | Skill            | 19%       |
| 7. EViews               | Work requirement | 9%        |
| 8. Writing              | Skill            | 6%        |
| 9. MATLAB               | Work requirement | 3%        |

# Challenges/Limitations



- Distinguishing between “skills” and non-skill work attributes (e.g., work requirements, abilities, knowledge, etc.) is challenging
- Different machine learning algorithms yield different results
- Representativeness: only those jobs that are posted will be captured by scraping, leading to over- and under-representation of certain regions and occupations
- Postings may include skills not actually needed for the job
- Posting alone doesn't indicate whether demand has been met

# Where can we go from here?

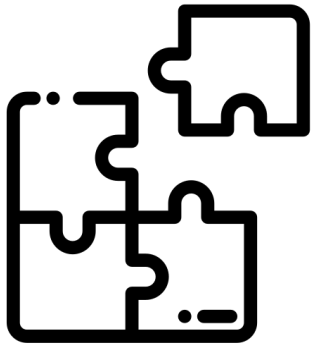
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3. More sophisticated means of asking employers directly

4. Hybrid approach

# Concrete next steps

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- Refine our terminology – development of an appropriate solution requires a better articulation of the problem
- Be more precise in our understanding and communication with respect to skills
- More local, granular labour market information (but please, no more surveys)
- Linking jobs to skills – enable a more meaningful discussion
- Questions remain as to how to address supply-side



# End notes

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1. (Humphrey, 2018)
2. (Barnow, Trutko, & Piatak, 2013)
3. *ibid.*
4. (Arrow & Capron, 1959)
5. (Blank & Stigler, 1957)
6. (Shah & Burke, 2005)
7. (Cappelli, 2015)
8. *ibid.*
9. (Green, Machin, & Wilkinson, 1998)
10. *ibid.*
11. (Labour Market Information Council, Employment and Social Development Canada, & Statistics Canada, 2019)



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