

Unravelling Online Job Postings: A Powerful Way to Decipher Canada's Labour Market

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The logo consists of the letters 'LMIC' in a bold, sans-serif font. The 'M' and 'C' are white, while the 'I' is orange.

LMIC LABOUR MARKET
INFORMATION
COUNCIL

LMIC was created to address long-standing challenges in Canada's labour market information (LMI) ecosystem.

LMIC works to improve the **timeliness, reliability, and accessibility** of labour market information across jurisdictions.

By addressing gaps in accessibility and fostering collaboration across jurisdictions, we empower Canadians to make informed decisions about the world of work.

Our role in a dynamic landscape

Canada's labour market information ecosystem is dynamic, with contributions from governments, organizations, researchers, and private firms. We enhance collaboration, align priorities, and make labour market information more accessible.



What is Labour Market Information?

Labour market information (LMI) is anything that provides timely, relevant and accurate information about the labour market and helps you make important decisions related to that labour market. **LMI can be:**



Information based on numbers like detailed statistics related to employment wages and salaries, businesses and employees, industry sectors.



Occupational trends and future employment forecasts.

Connecting Skills:

Using Online Job postings to Unravel the Demand
for Skills in the Labour Market

Why understanding the connection between skills and occupation matters

- For job-seekers, job postings can be overwhelming or confusing.
- For employers, making sure job postings are communicating the right skills ensures they are finding the right candidates.



Why is LMIC working on this?

- We work to build consensus and understanding around what LMI is available, for what, and how it should be used.
- Online Job Postings (OJP) have rapidly become a source of LMI for all kinds of stakeholders, and demonstrating their potential and providing best practices is core to our mandate.
- The provinces, territories, and federal government all work with OJP, so sharing methodology is crucial for shared pan-Canadian understanding.



Why does this matter for you?

- Career Development Professionals (CDPs) are at the front lines of supporting Canadians' career ambitions and journeys.
- Key to this is empowering Canadians to become self-aware of their skills, being able to communicate them, and knowing which skills are most important for their desired career ambitions.
- Using emerging sources of LMI to find innovative ways to understand the relationship between skills and occupations could boost the confidence of CDPs and clients as they navigate their career journey.



Project Rationale

Problem

- The same language is used across job postings, so skills in OJPs make it hard to identify what is required for the job.
- If skills in postings don't represent reality, this limits the value of online job postings as a source of LMI.

Approach

- Find connections in OJPs to extract additional insights into the needs of the labour market.
- Examine changes in skill connections across occupations and regions.

Impact

- This research will show how we can enhance OJPs as an analytical tool.
- Show the importance of context when deciphering job postings.
- A step in using OJPs to identify skills shortage mismatches and demand.

CONNECTING SKILLS

What is a Skill?

Skills are abilities gained through knowledge and experience that help individuals perform tasks effectively.

Examples include:

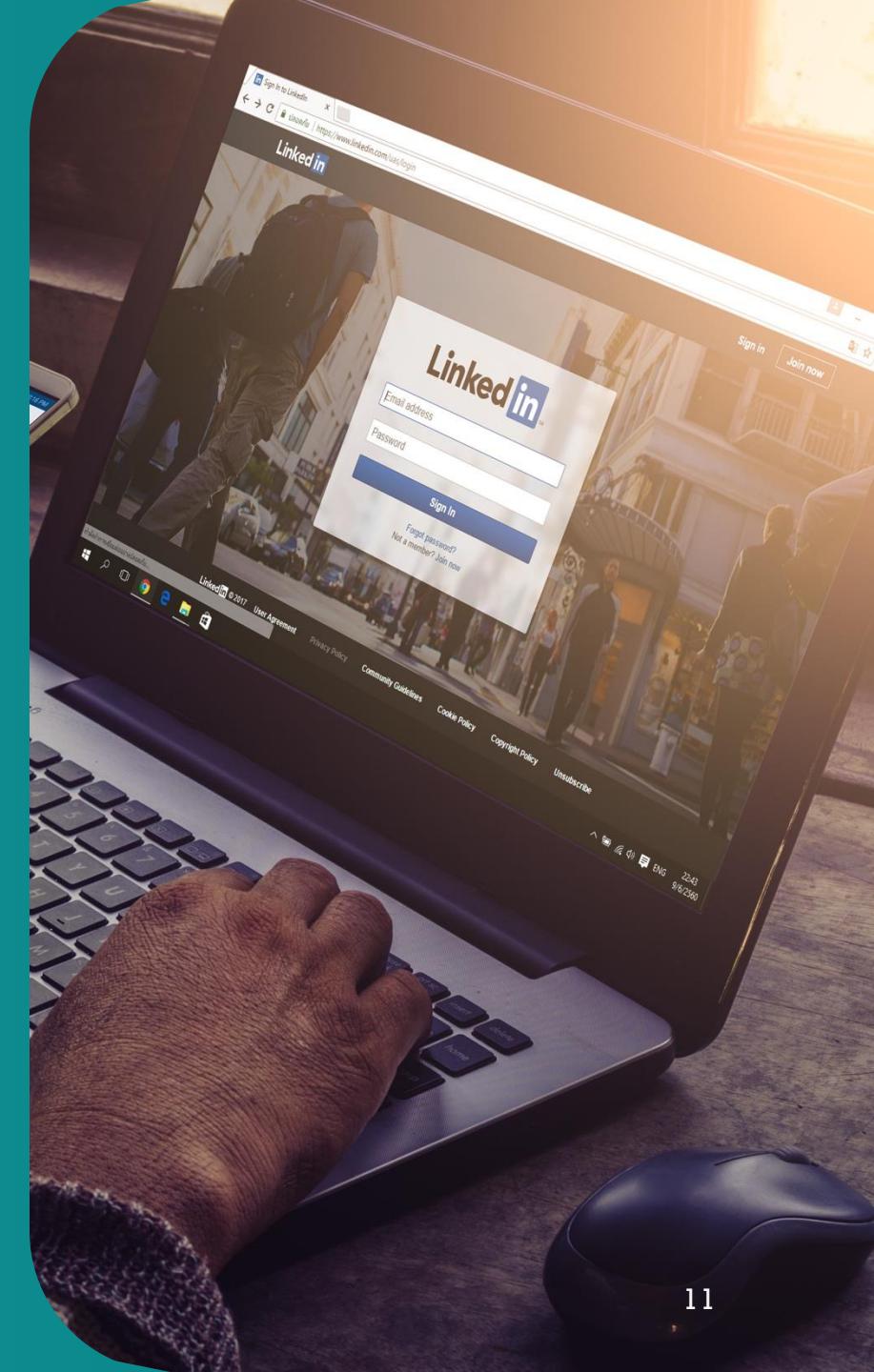
Soft skills – Communication, leadership, time management

Technical skills – Coding, data analysis, financial modelling



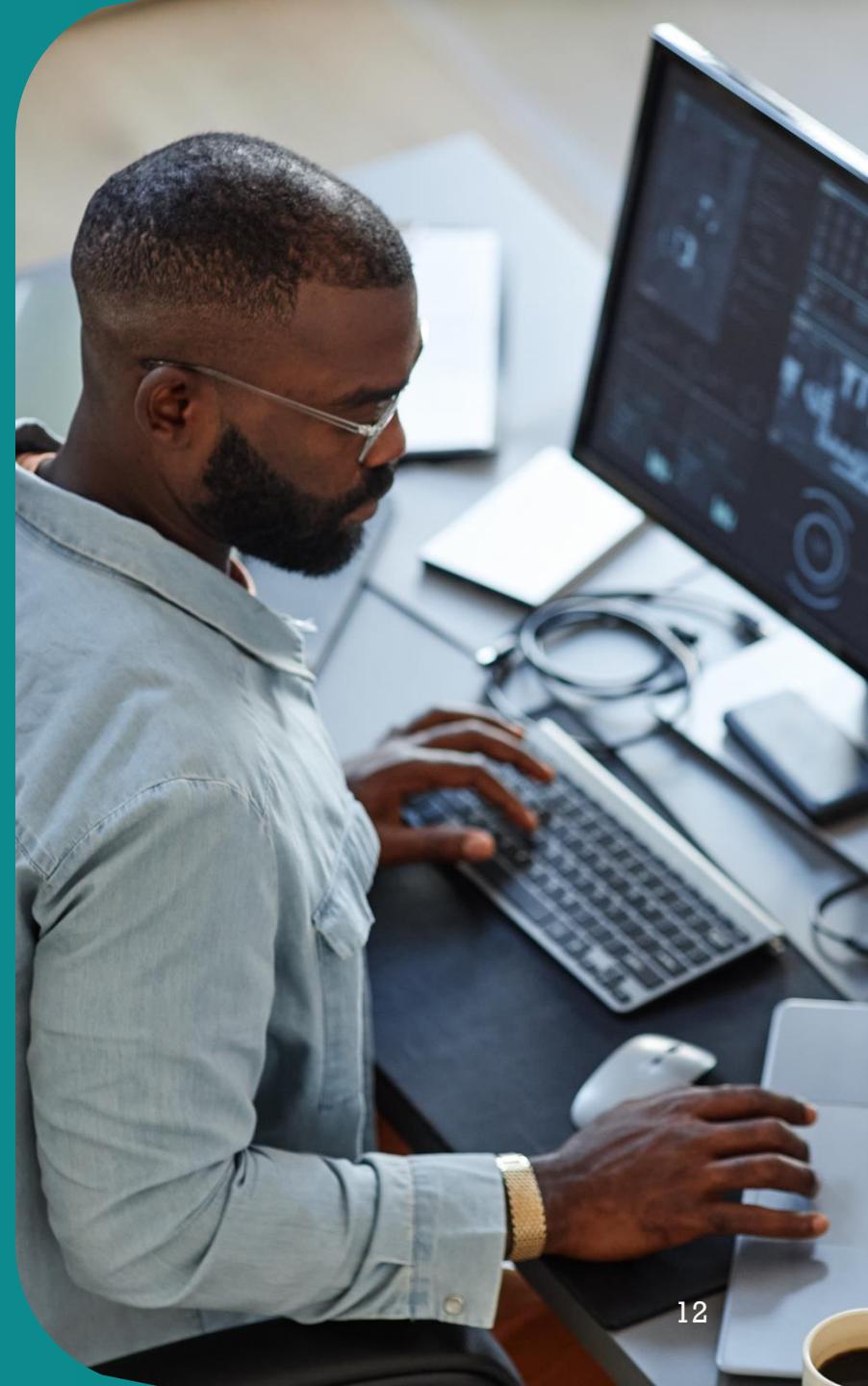
What are online job postings?

- Online job postings (OJPs) are digital advertisements for job openings that employers post online.
- We can ‘scrape’ online job postings from the web and use their information to create organized datasets.
- Sometimes, machine learning or AI is used to clean, organize, and create taxonomies of skills out of the data from these job postings.
- This creates an employer-centric perspective of demand for jobs and skills in the labour market.



Why are OJPs a potent source of LMI?

- Offer high-frequency data — this data can be as recent as a few weeks after validation procedures
- Provide a high level of granularity at a local level that administrative surveys do not
- Share insight into what and how employers are seeking
- Can be used for strategic workforce planning, strategic enrollment, understanding acute and local labour market dynamics, etc.



What are some limitations of OJPs?

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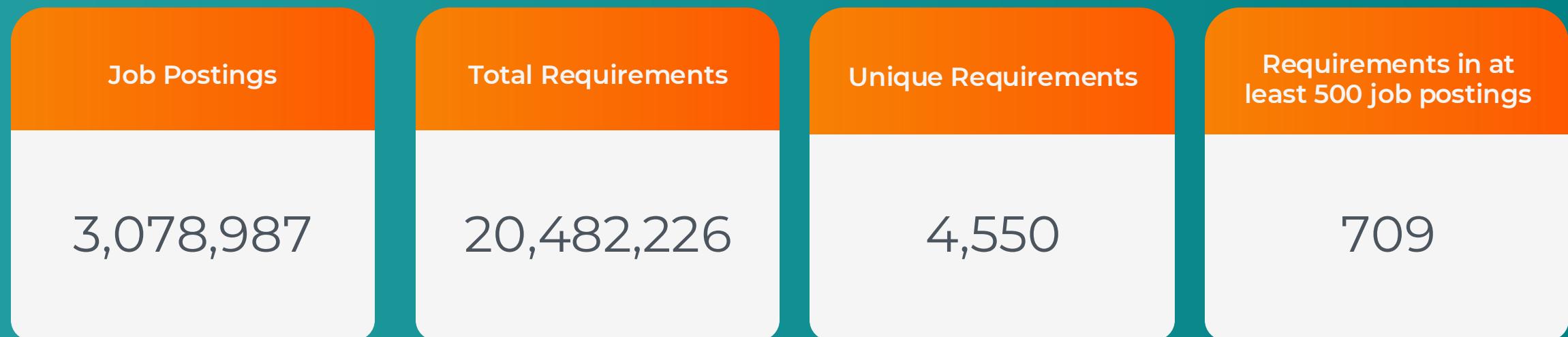
A First Look:

Online Job Posting Data on Skills

2023 Online job posting in data

Online job postings provide a rich source of big data, which presents both opportunities and challenges for accurately measuring job vacancies.

LMIC has partnered with Vicinity Jobs to access data from job postings across the web.



Counting Skills:

Using Frequency Counts to Identify
Demand for Skills

Let's Count Skills!

1

A first and most simple way to look at skills is to count them.

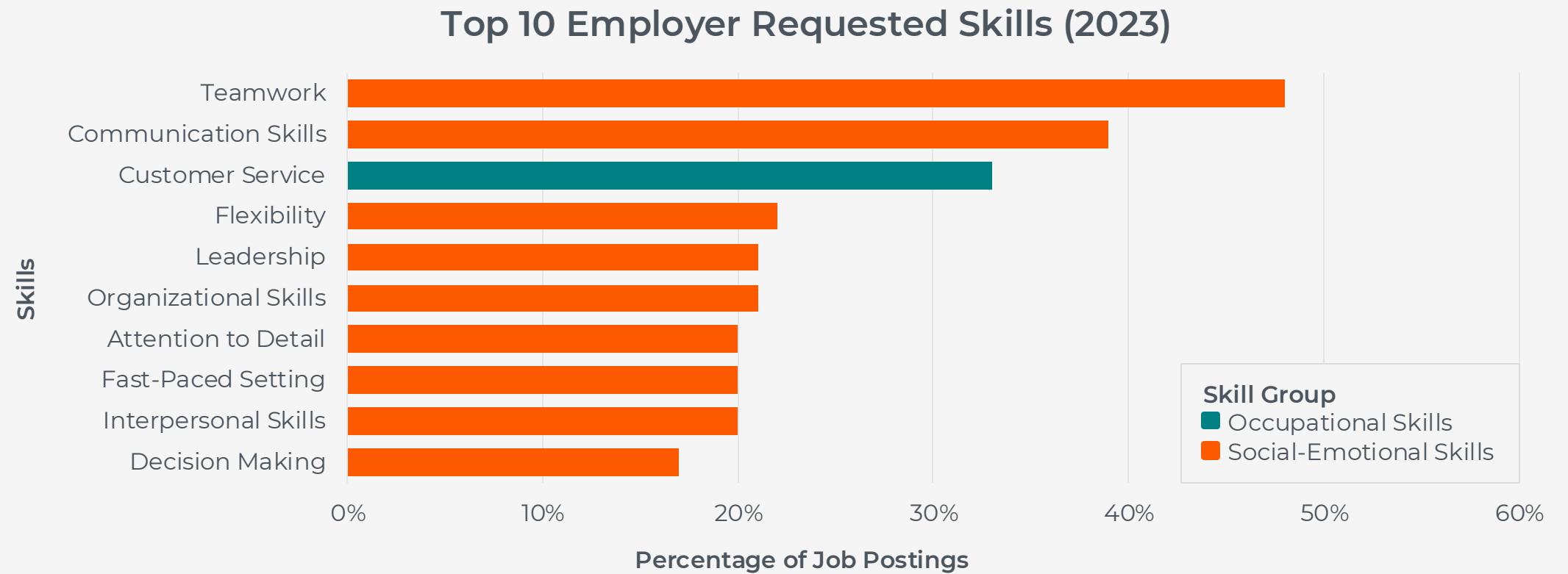
2

Frequency counts are easy to interpret and explain.

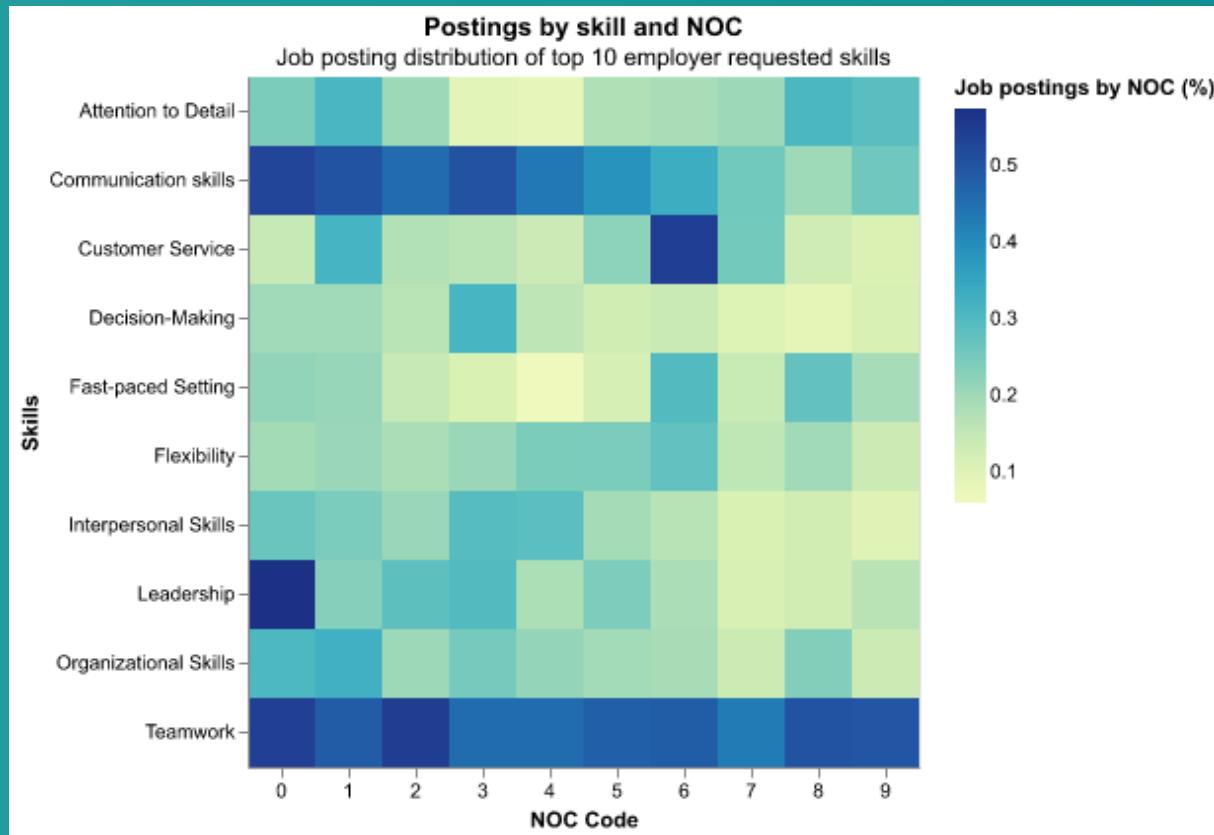
3

This is important, as we can understand the basics of our data at the highest level, and this can help us think about questions we want to dive deeper into.

Percentage of Jobs Requiring Top 10 Skills (2023)



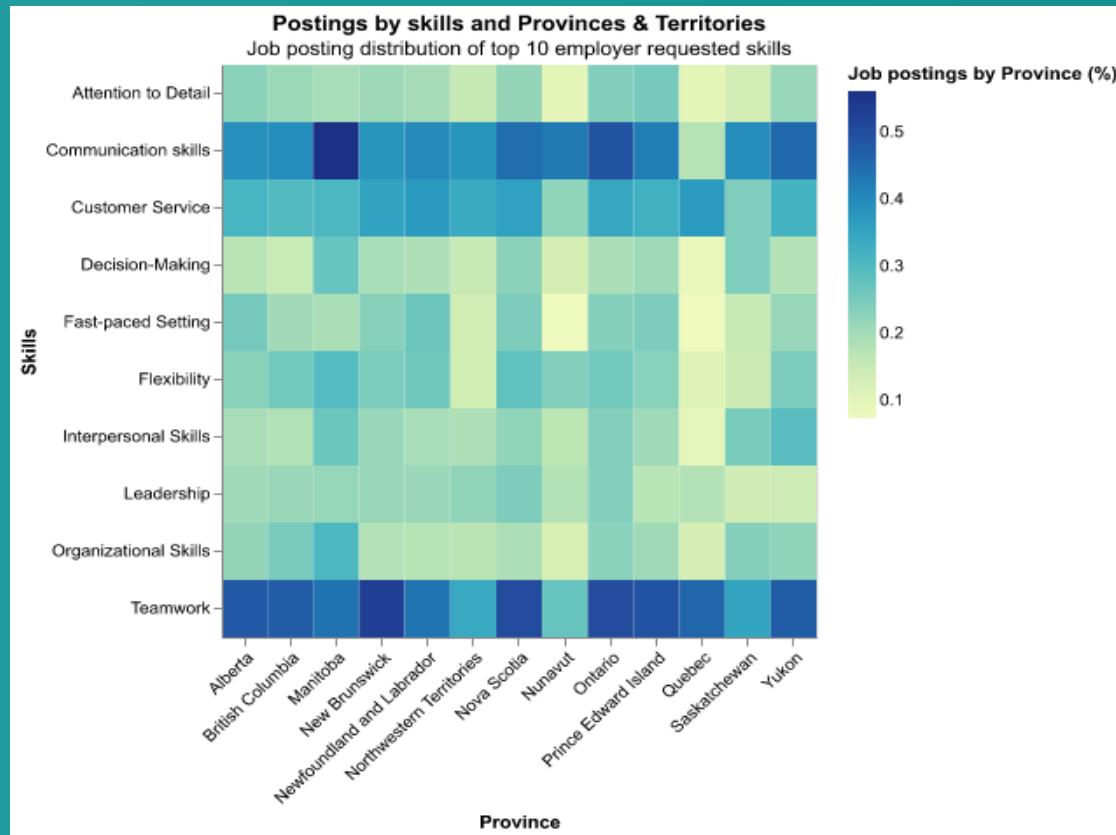
Job Postings by Commonly Requested Skills



NOC Legend:

0. Legislative and senior management occupations
1. Business, finance and administration occupations
2. Natural and applied sciences and related occupations
3. Health Occupations
4. Occupations in education, law and social, community and government services
5. Occupations in art, culture, recreation and sport
6. Sales and service occupations
7. Trades, transport and equipment operators and related occupations
8. Natural resources, agriculture and related production occupations
9. Occupations in manufacturing and utilities

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Connecting Skills: How to **Identify and Measure** Skill Associations

IDENTIFY AND MEASURE

Why go beyond frequency counts?

- There are many ways to examine the relationship between skills and occupations
- So far, we have looked at frequency counts, a descriptive statistic
- To better understand the nuances and nature of relationships between skills and occupations, we need to use **inferential statistics**.



Pointwise Mutual Information

- The inferential technique to better understand the relationship between skills we used is called **Pointwise Mutual Information (PMI)**.
- PMI measures the frequency of skills co-occurring to identify relationships between them.
- **Normalized Pointwise Mutual Information (NPMI)** is a variation of PMI that we use in this study as it creates an output that is much easier to interpret than PMI.



How do we interpret NPMI?

NPMI = -1

indicates that the skills never occur together.

NPMI = 0

indicates that the skills are independent.

NPMI = 1

indicates that the skills always occur together.



Connecting Skills:

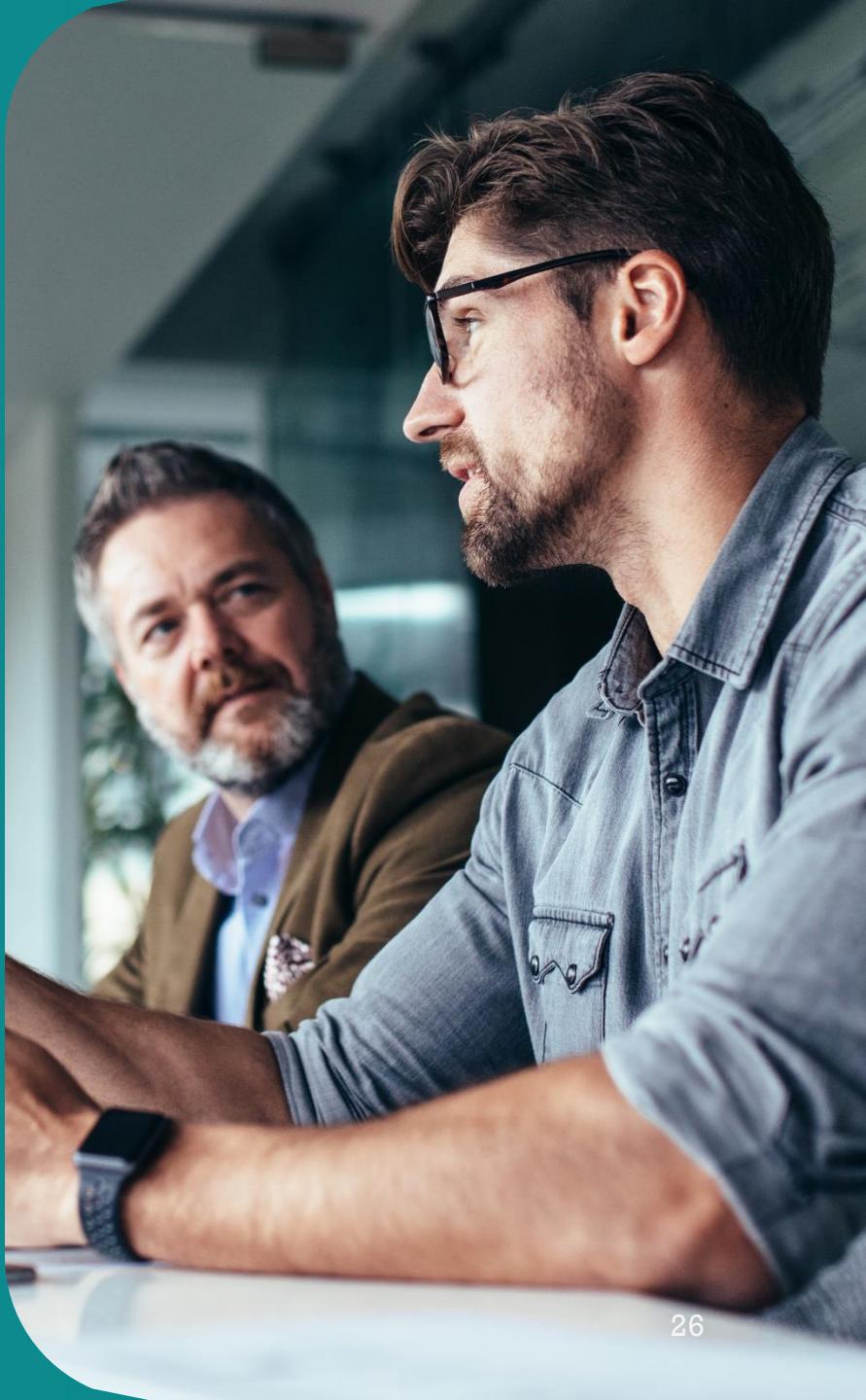
How to **Connect** Skills

CONNECT

Let's Connect Skills!

Using communication as an example

- Communication was one of the most commonly requested skills across all job postings.
- Communication is something we would expect to be connected to many other kinds of skills.



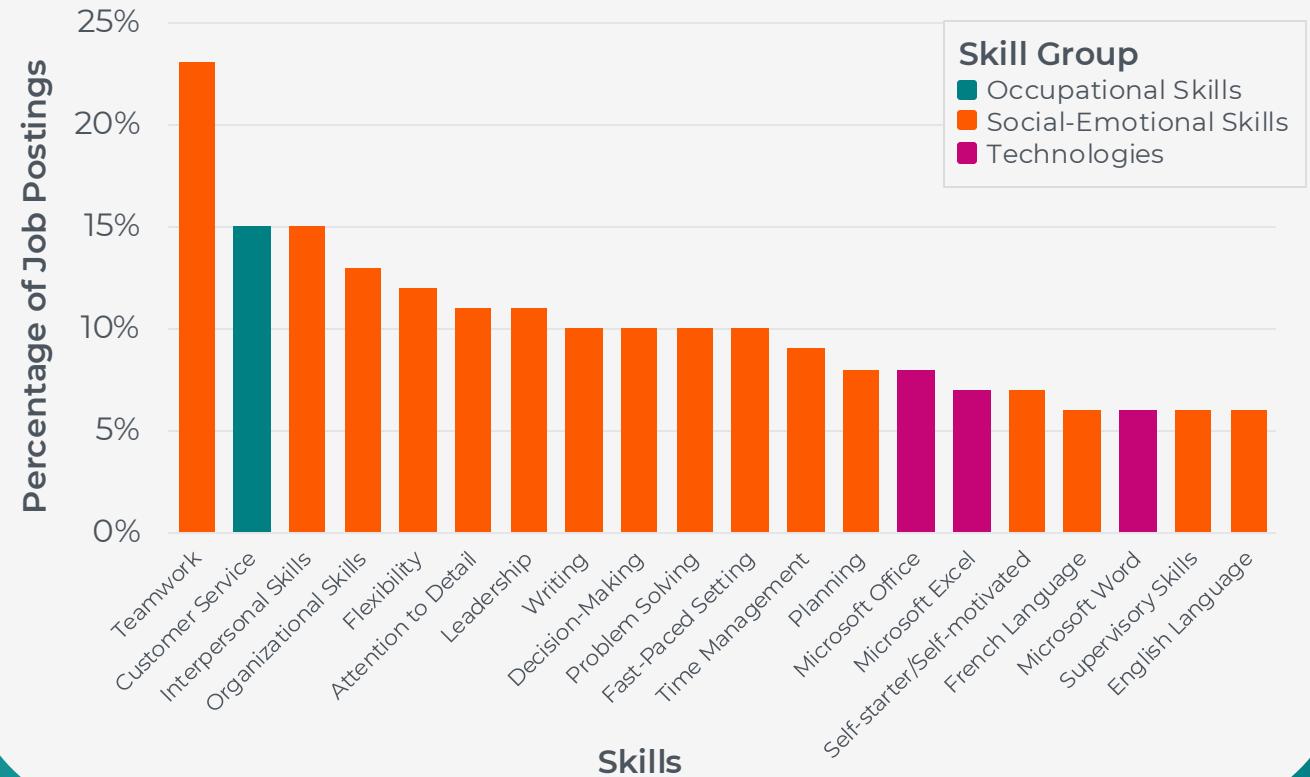
Frequency Count

To explore communication's relationships with other skills, we first looked at the frequency with which skills co-occurred with communication.

Reminder:

A frequency count simply tells you how often something happens or appears in a set of information.

Top 20 Employer Requested Skills, Coupled with Communication (2023)



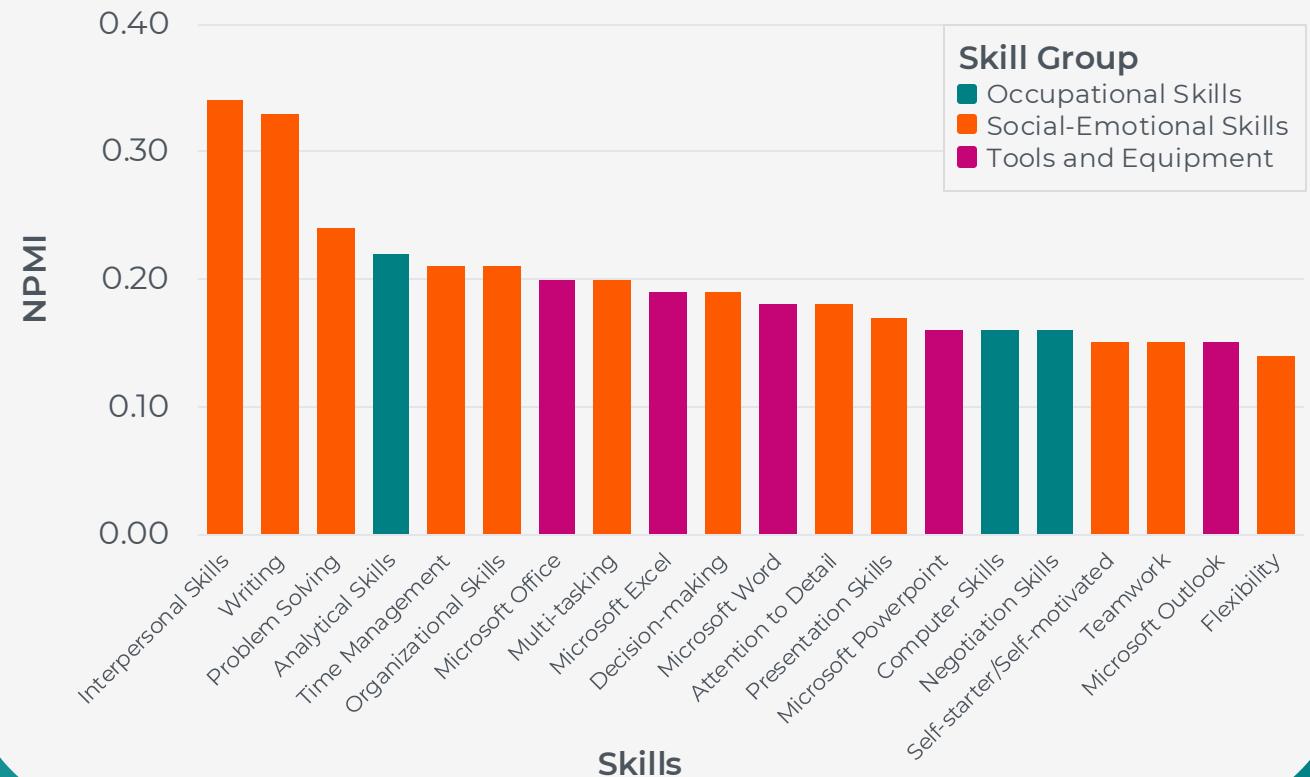
NPMI

To explore communication's relationships with other skills, we first looked at the frequency with which skills co-occurred with communication.

Reminder:

NPMI is a way to measure how strongly two skills are connected based on how often they appear together compared to how often they appear separately.

Skills with Strongest Association with Communication (2023)



Connecting Skills:

How to **Predict** Skills

What do we mean by 'predicting' skills?

- NPMI skill associations provide valuable insights into connections between skills but do not fully capture the specific relationships with other skills due to the broad applicability of a skill like communication.
- To address this, we use a predictive measure to understand the directional relationship between communication and other skills.



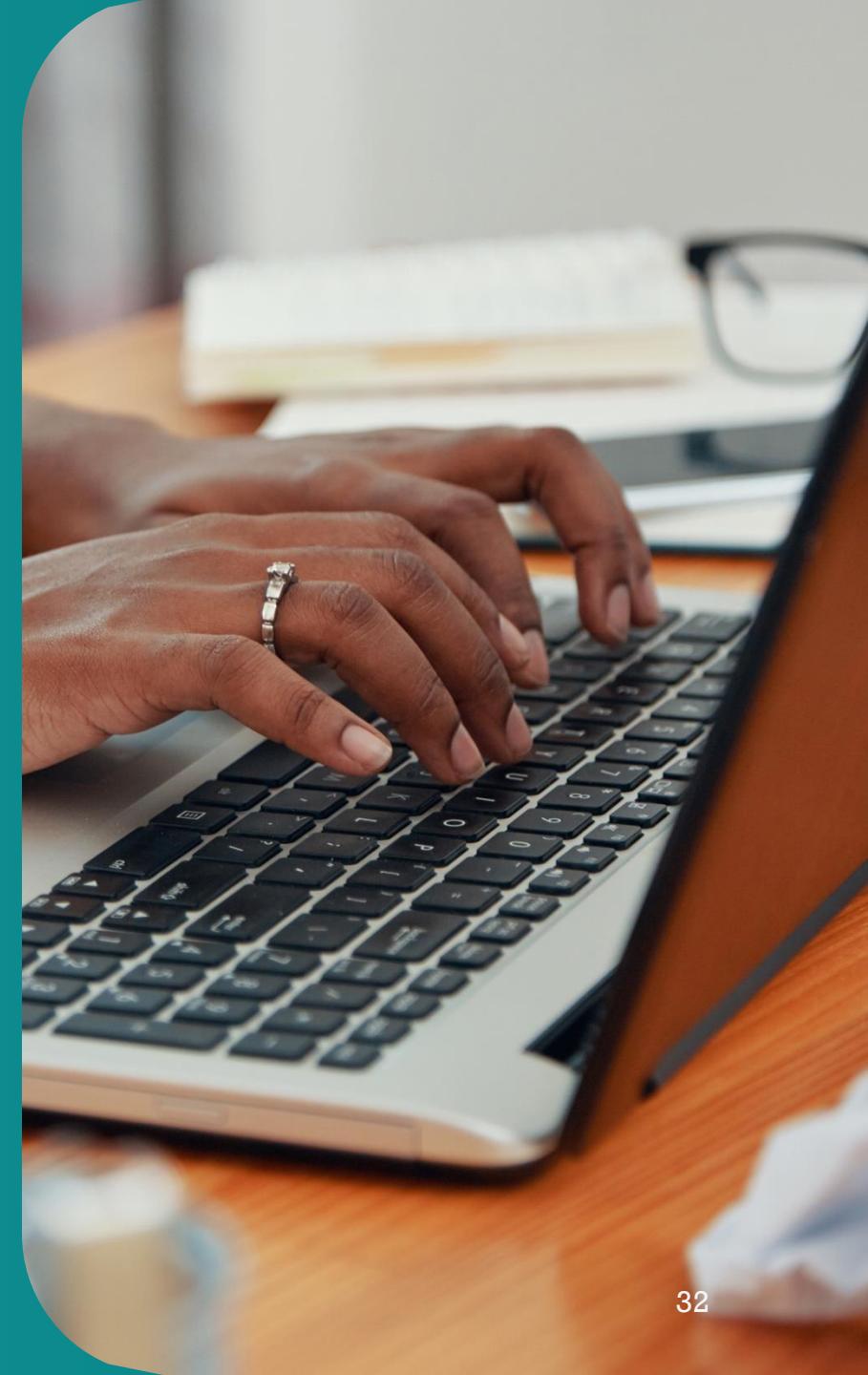
Let's Predict Skills!

We'll keep using communication for our example.

	Confidence	Postings
Writing	83%	348,071
Analytical skills	78%	156,238
Presentation skills	78%	58,246
Negotiation skills	78%	43,951
Conflict management skills	76%	34,113
Interpersonal skills	75%	541,346
Research skills	74%	33,765
Microsoft Access	73%	24,372
Multi-tasking	70%	214,137
Microsoft Outlook	70%	93,044

So, what does this tell us?

- Writing stands out as the top predictor for communication skills.
- The confidence level of 83% means that approximately eight of every 10 postings requesting writing skills also mention communication skills.
- This strong connection aligns with the high NPMI association between the two.
- Writing is intrinsically tied to communication, reinforcing the need for writing skills.



What can you take away from this research?

OJPs offer a rich source of employer-perspective data to better understand the current needs of the labour market

- We can use OJPs to better understand in-demand skills in different occupations
- There are multiple methods for measuring the relevance of skills
- Using NPMI allows for a more nuanced interpretation of in-demand skills



Canadian Job Trends Dashboard

Background:

The Canadian Job Trends Dashboard (CJTD) enables the exploration of LMI based on trends found in online job postings across Canada.

- Developed in response to surveys identifying work and skill requirements as the most in-demand LMI.
- Powered by Vicinity Jobs data, updated regularly with historical records since January 2018.



Examples

Questions you can explore with the CJTD:

- What occupations are in highest demand in my region?
- Which skills are most sought after locally?
- What are the top requested skills for “X” occupation?
- Which occupations most frequently require “X” skill?
- How has demand for “X” skill or “Y” occupation changed over time?



Questions?

Thank you for your time and interest.

For more information or to
continue the conversation,
please contact:



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