

THE IMPACT OF WORKING-FROM-HOME ON ENGINEERS AND ENGINEERING WORK PROJECT SUMMARY REPORT



ONTARIO
SOCIETY OF
PROFESSIONAL
ENGINEERS

PROJECT

New Barriers in Engineering and Technology Jobs:
The Uneven Impact of Working-at-Home on Recent Graduates,
Women, and Newcomers

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Research by



EXECUTIVE SUMMARY

This report examines the impact of working-from-home on engineers and engineering employers. The report draws on a literature review, a survey of 1,243 engineering professionals, focus groups with engineers, and interviews with engineering employers. Survey data indicate that, prior to COVID-19, 25.8% of respondents to the OSPE Survey worked from home at least part of the time. After the work-from-home advisories were issued by public health authorities in March 2020, the proportion of engineers who work-from-home at least part of the week rose to 97.0%.

The two-year, forced experiment with working-from-home produced marked changes in how most engineers expect to work in the future. Regardless of age, gender, or recency of immigration, almost two-thirds (63.7%) of engineering professionals want to continue working-from-home three days or more per week. Indeed, more than a quarter (26.1%) would prefer to work-from-home 100% of the time. Only 9.2% would like to see a full-time return to the office. The survey results indicate that roughly two in every five engineers agree that whether they remain with their current employer will depend on their employer offering at least a partial work-from-home option. The pattern is the same regardless of gender or age.

During the two years when the work-from-home advisories were in place, many engineers came to appreciate the opportunity that working-from-home afforded them to achieve a better balance between their personal lives and their careers. Many also welcomed the reduction in commuting time, and, to a lesser degree, the reduction in work-related stress. These are the primary drivers in the change in preferences and expectations. Many focus group participants describe their office workspace as prone to distractions and interruptions. Working-from-home provides the opportunity to concentrate and focus in a way that the office often does not.

Only a minority of engineers (20.5%) believe that working-from-home or wanting to work-from-home will harm their advancement prospects.

The conclusion is indisputable: the landscape has changed. There is no going back to the way things were before COVID-19.

Close to half (49.5%) of non-supervisory engineers report that their productivity increased while they were working-from-home, while only 12.2% report reduced productivity. Engineering supervisors were less sanguine about the impact of working-from-home on productivity. They estimate that productivity increased for somewhat more than a third (36.7%) of the staff who reported to them, but declined for around a fifth (19.5%). Employers were less confident about drawing strong conclusions on the impact of working-from-home on productivity. They focus on three concerns: the decline in mentorship of early career engineers, challenges in onboarding new hires, and sustaining their organization's culture when most engineering staff are working-from-home.

Focus group participants were clear that there is a *pronounced tendency to substitute additional work hours for previous commuting time*. At least over the past two years, this was not a cause for grievance. The most common observation was "I would rather be working at my laptop than commuting". Survey data confirm that most engineers worked more hours when working at home. It is an open question whether this is sustainable.

Of particular concern is the evidence that when engineers work the majority of days at home, the robustness and creativity of teams may be adversely affected. Survey evidence, focus groups, and interviews point to a decline in the quality of communications among co-workers, with subordinates, and with managers. "Whiteboarding", when connected remotely, is not a substitute for in-person brainstorming. There is less enthusiasm among team members. The survey found that close to one engineer in five (19.3%) that works in a team agreed with the statement: "working-from-home reduces the creativity of project teams". A somewhat larger proportion of respondents (22.9%) agreed with the statement: "working-from-home makes it more difficult to deal with problems that arise suddenly".

The challenge for many organizations will be accommodating the clear desire of a large number of engineers to work-from-home two or more days per week while maintaining the effectiveness of engineering teams which benefit from the proximity of the team members that an office facilitates.

The engineering profession has made considerable progress in implementing equity, diversity, and inclusion goals. The implications of the working-from-home trend for these goals are both complex and uncertain. Women may benefit disproportionately from the greater flexibility to balance family life and career. If so, the greater availability of working-from-home options will encourage more women to remain in the engineering profession. At the same time, changes in compensation strategies could widen the existing gender pay gap if in-person jobs command a premium. For early career engineers, the advantages that working-from-home offers may conceal a hidden cost, namely a decline in the quality or extent of professional mentorship. For newcomers, a similar pattern may be evident. The benefits of working-from-home may come at the cost of a more drawn-out learning curve for acquiring experience-based knowledge of “how things are done” in Canada. Engineers, employers, and professional associations need to be aware of these potential implications of a broad shift to implement working-from-home options.

The shift to more working-from-home may also have implications for the engineering labour market. These implications are uncertain, but the survey data suggest a few plausible scenarios.

1. It is reasonable to expect that there will be a misalignment between the jobs that many engineers currently have and their preferences for working-from-home. This may lead to a spike in engineering turnover as both employers and engineers seek better alignment between how organizations carry out their engineering work and the preferences of engineers.
2. Engineering employers must also deal with a dilemma. Employers that seek to preserve the robustness of their engineering teams by maintaining a strong in-office mode of operation will face recruitment and retention challenges that could also have cost implications. Conversely, organizations that choose to mitigate their recruitment and retention challenges by allowing flexibility to work at home will need a strategy to counter the potential adverse effects on the robustness of their engineering teams. Organizations will differ in how they deal with this dilemma and how successful their strategies are. Organizations that were previously “employers of choice” may have difficulty in retaining that status in the engineering labour market.

3. Over half (53.6%) of those surveyed “strongly agreed” with the statement that they would consider working for an employer in another city if that employer allowed them to work-from-home 100% of the time. Based on these survey findings and the reports from engineering employers that they are often challenged when trying to meet their skills needs, it is reasonable to expect that more organizations will experiment with hiring non-local engineers who work remotely 100% of the time.
4. Both employers and engineers are exploring new options. The trend to hire some engineers who work 100% remotely may also give rise to the gradual introduction in national organizations of more salary scales that are location sensitive.
5. Employers may also find that if they expect engineers to work on site or in the office most or all of the time, they will need to offer a premium. If more men than women take advantage of this premium the net result could be to widen the existing gender-based pay gap.
6. The difficulty in mentoring new hires when working-from-home predominates and may encourage some organizations to alter their recruitment strategies to focus on candidates who already have three to five years of experience. While this hiring strategy may be sound when viewed from the perspective of an individual employer, it tends to exacerbate system-wide skills shortages because the experience requirement creates a barrier for new hires. In the long run, this could accentuate the skills shortages that many organizations are currently seeing.

Some employers and some engineers, concerned by the downside risks of working-from-home options, may seek to return to the way things were before COVID-19. A key finding of this report is that a return to the way things were is not realistic. Attention should be focused on how to adapt to the changes in attitudes and expectations in a way that maximizes the advantages while offsetting the potential drawbacks. Successful organizations will be those that seek out and implement these strategies.



1. INTRODUCTION

On January 25, 2020, Canada reported its first confirmed case of a COVID-19 infection.

On February 28, 2020, the World Health Organization (WHO) increased the risk assessment of COVID-19 across all countries to “very high” – it’s highest level of alert.

On March 11, 2020, the WHO declared a pandemic. The following day, Ontario closed its public schools. Shortly thereafter, all other provinces followed suit.

On March 16, 2020, Canada closed its borders to persons who are not citizens or permanent residents. On the following day, Ontario and PEI declared states of emergency. Over the next week, all other provinces did the same. The emergency regulations banned most public events and closed indoor recreation facilities, libraries, private schools, daycares, theatres, and concert venues, as well as all bars and restaurants.

From the middle of March onwards, employers began implementing working-from-home. On March 23, 2020, Ontario and Quebec ordered all non-essential workplaces to close. Other provinces implemented similar directives shortly thereafter.

Without planning, Canadian employers unintentionally launched a national experiment in working-from-home. At the time, no one knew how long the work-from-home arrangements would be in place. With a brief respite in the summer and fall of 2020, COVID-19 and work-from-home continued. It became increasingly clear that working-from-home was part of the new normal. There was no going back to the world before COVID-19. How workplaces would adjust to new expectations was, and remains, unclear. Also are the implications for those who face greater barriers to full participation in the labour force.

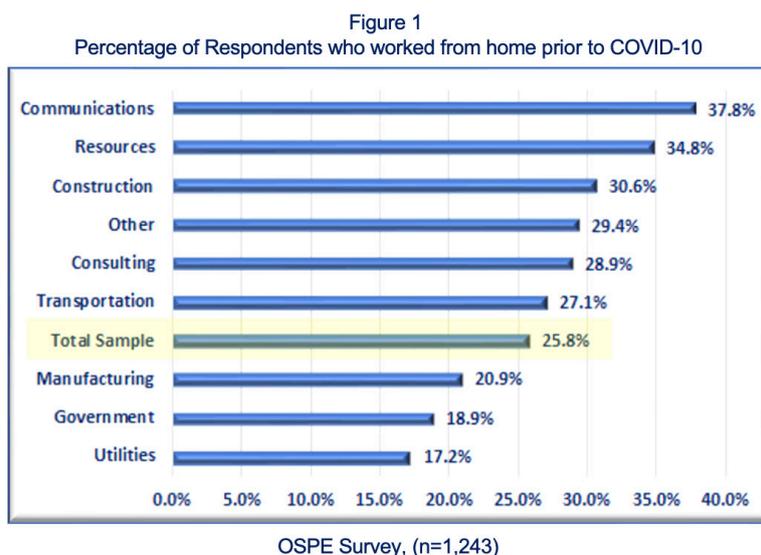
This report sheds light on the long-term impact of the working-from-home trend by focusing on engineering. The report draws on three prior reports which accompany this Project Summary Report. The first of these is a literature review. Of particular importance from the literature review is the research into the attributes of successful design teams and, by implication, how design teams may be affected when team members are connected remotely rather than interacting in-person. The second study presents the results of a survey of 1,243 engineering professionals. These survey results underscore the significant changes in expectations as a result of the experience of working-from-home in 2020 and 2021. Finally, this report also draws on the results of focus groups with engineering professionals and interviews with engineering employers. These highlighted the complexity of adapting to changed expectations.



2. SYSTEMIC CHANGE IN ATTITUDES

BEFORE COVID-19

Prior to COVID-19, 25.8% of respondents to the OSPE Survey worked from home at least part of the time. This proportion was somewhat higher for engineers who worked in planning and analysis, but lower for other types of engineering work. Although on-site work was predominant across all industries, there were, nevertheless, notable differences. Manufacturing, government, and utilities had the lowest proportion of engineers who worked from home (Figure 1). In the case of manufacturing and utilities, this is explained by the predominance of production or process management jobs which require engineers to be on-site. In the case of government, the predominance of office-based work reflects historic cultural norms.

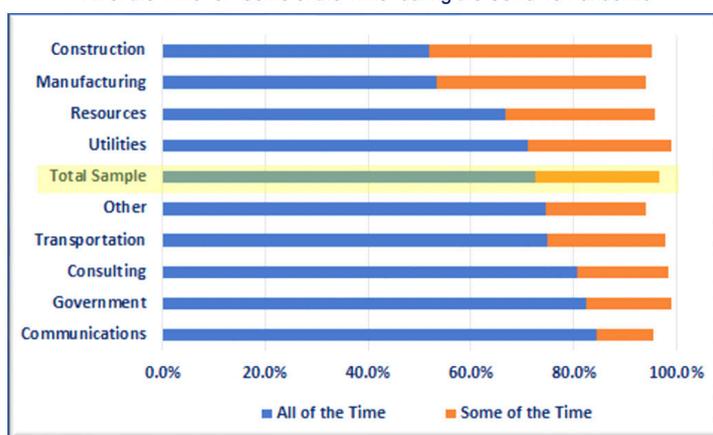


It is notable that, prior to COVID-19, women who are also parents had a lower incidence of working-from-home (19.6%) than most other groups. Engineers under the age of 35 (regardless of gender) also had a lower incidence of working-from-home. In part, this is attributable to the widespread view among engineering employers and engineering professionals that early career engineers benefit from their ability to regularly interact with more experienced engineers.

AFTER COVID-19

After the work-from-home advisories were issued, the proportion of engineers who worked from home at least part of the week rose from 25.8% to 97.0%. There was virtually no difference across industries, although industries that require an on-site presence for production or process management (construction, manufacturing, and resources) had a higher proportion of engineers who spent only a portion of the week working-from-home (Figure 2).

Figure 2
Percentage of Respondents who Worked from Home
"All of the Time" or "Some of the Time" during the Covid-19 Pandemic

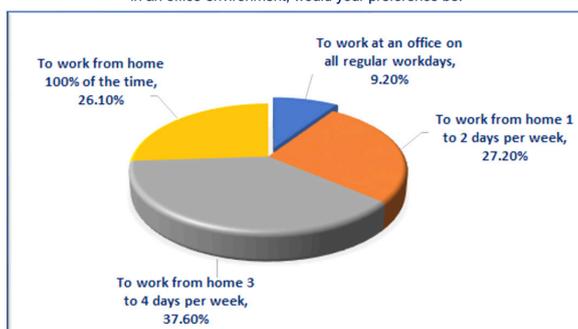


OSPE Survey, (n=1,243)

THE SHIFT IN VIEWS

The two-year, forced experiment with working-from-home produced marked changes in how most engineers expect to work in the future. Regardless of age, gender, or recency of immigration, almost two-thirds (63.7%) of engineering professionals want to continue working-from-home three days or more per week. Indeed, more than a quarter (26.1%) would prefer to work-from-home 100% of the time. Only 9.2% would like to see a full-time return to the office (Figure 3).

Figure 3
When public health authorities state that it is safe to return to work
in an office environment, would your preference be:



OSPE Survey, (n=1,243)

While there are some differences based on age and recency of immigration, Figure 4 shows that the preference to have a work-from-home option is strong among all groups.

Figure 4
When public health authorities state that it is safe to return to work in an office environment, would your preference be:

	To work at an office on all regular workdays	To work-from-home 1 to 2 days per week	To work-from-home more than 2 days per week	Total
Total Sample	9.2%	27.2%	63.6%	100.0%
Women	8.3%	29.4%	62.3%	100.0%
Men	9.9%	26.2%	63.9%	100.0%
Age: <35	6.9%	30.6%	62.5%	100.0%
Age: 35 to 54	10.0%	25.1%	64.9%	100.0%
Age: >54	10.9%	26.8%	62.3%	100.0%
Newcomer	4.9%	19.5%	75.6%	100.0%
Long Term Immigrant	7.4%	23.6%	69.0%	100.0%
Born in Canada	10.7%	29.6%	59.7%	100.0%
Non-Parents/Non-Guardians	9.3%	28.3%	62.4%	100.0%
Mothers/Female Guardians	9.6%	26.9%	63.5%	100.0%
Fathers/Male Guardians	9.6%	24.8%	65.6%	100.0%

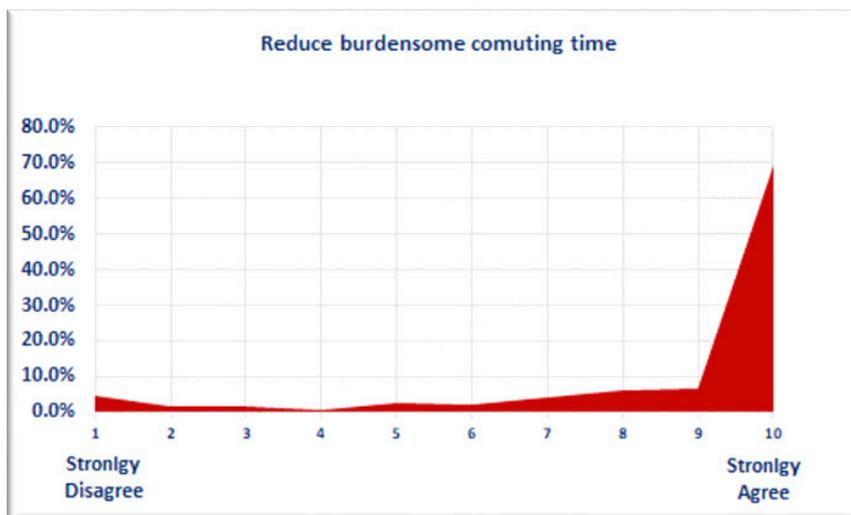
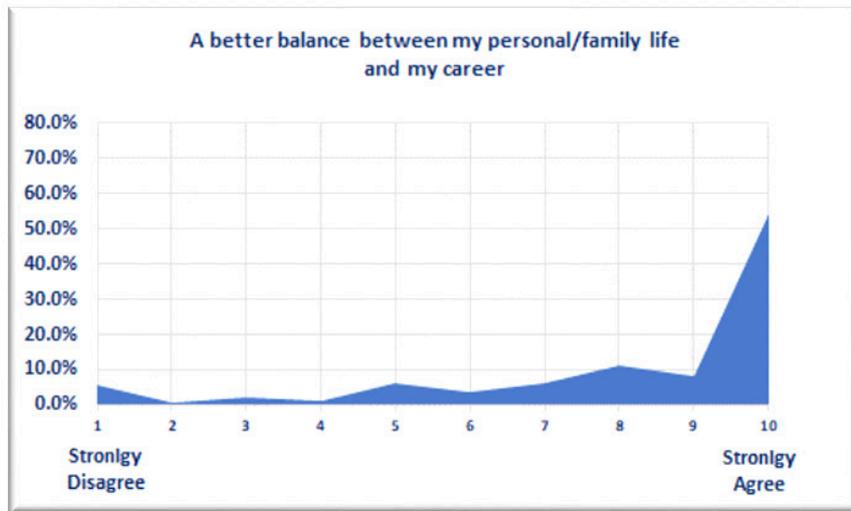
OSPE Survey, (n=1,243)

Of particular importance to engineering employers is the finding that *close to two-thirds of engineers that want at least a partial work-from-home option also report that whether they remain with their current employer will depend on their employer providing a work-from-home option.*

WHY THE CHANGE?

During the two years when the work-from-home advisories were in place, many engineers came to appreciate the opportunity that working-from-home afforded them to achieve a better balance between their personal life and their career. Many also welcomed the reduction in commuting time and to a lesser degree the reduction in work-related stress. The OSPE Survey explored the relative importance of each of these factors in reshaping engineers' views on their preferred working arrangements. To gauge the intensity of feeling, the survey asked engineers to rank their disagreement or agreement with these potential benefits on a ten-point scale. Figure 5 illustrates the findings.

Figure 5
 Percent of Engineers who Disagree or Agree with
 Potential Advantages of Working-from-home



OSPE Survey, (n=1,243)

The survey data show that a *large majority of engineers are strongly drawn to the potential of working-from-home to afford them the opportunity to achieve a better balance between their personal life and their career.* Similar results are evident for the reduction in commuting time. The survey results also indicate that a reduction in work-related stress is a factor behind the new preference for working-from-home, but is not as important as achieving a better balance between personal life and career and reducing commuting time.

Participants in focus groups expanded on their motivations for preferring to work-from-home. Many focus group participants described their office workspace as prone to distractions and interruptions. *Working-from-home provided the opportunity to concentrate and focus in a way that the office did not.*

The layout of offices affects the degree to which employees are subject to distractions and interruptions. Organizations differ in the amount of space they allocate per employee and whether they divide that space into traditional offices, open workspaces, or cubicles. Most organizations assign specific workspaces, but some have gravitated to “hot-desking” (also termed “hotelling”). In the “hot-desking” model, workspace is booked on an as needed basis. Some studies indicate a decline in the amount of office space per employee. One analyst suggests that, since 2010, there has been a reduction of around 18%.

There will be changes in the physical layout of the office.
We will see more co-working spaces along with more
quiet spaces where you can concentrate.
- Focus Group Participant

¹ Norman G. Miller, “Workplace trends in office space: implications for future office demand”, Burnham-Moores Center for Real Estate, University of San Diego, Journal of Corporate Real Estate · September 2014

Cushman & Wakefield, “Trend: Office Space is Shrinking”, February 15, 2013. <https://commadv.com/default.aspx?p=90570&naid=13086>

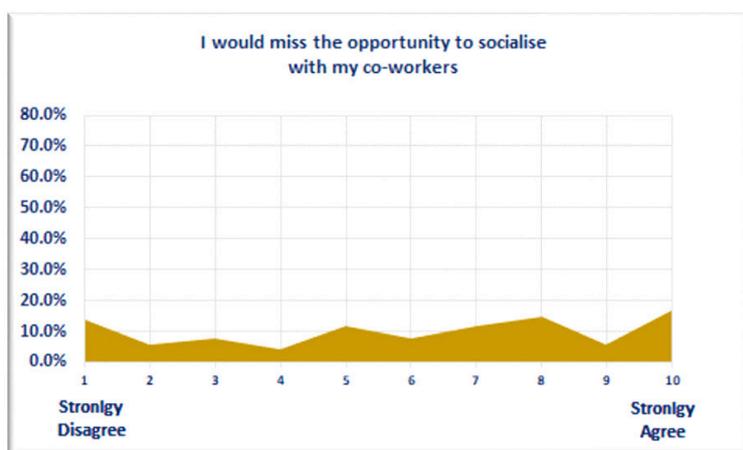
Fostering a return to the office in the context of personal preferences which now favour working-from-home may require employers to make the office a more attractive place to work than it was before COVID-19. For engineers, in particular, this means greater appreciation of their need for workspaces that are conducive to concentration and computationally intensive work.

The focus groups suggest that only a minority of engineers are keen to return to the ‘world as it was’. Successful employers will understand this and re-think how office workspaces are designed and used.

Engineers did cite advantages to working in an office. Approximately a third of engineers report that working-from-home reduces the quality of their interactions with colleagues, persons who report to them, and managers. While this was not a majority of respondents, the survey data supports the view that, for a sizeable minority of engineers, the office environment supports higher quality interactions and that this is valued.

Engineers also recognize that the office provides an opportunity to socialize with co-workers. While this is appreciated by many engineers, its value and importance should not be overstated. Figure 6 shows that engineers are comparatively evenly distributed across a one to ten ranking of whether they disagree or agree that they would miss the opportunity to socialize with co-workers.

Figure 6
Percent of Engineers who Disagree or Agree that
They would miss the Opportunity to Socialize with Co-Workers



OSPE Survey, (n=1,243)

NAIOP, the Commercial Real Estate Development Association, "Trends in Square Feet per Office Employee" (Spring 2015).
<https://www.naiop.org/en/Research-and-Publications/Magazine/2015/Spring-2015/Business-Trends/Trends-in-Square-Feet-per-Office-Employee>

The attraction of socializing with co-workers is somewhat age related. A greater proportion of engineers aged 45 or older would miss the opportunity to socialize than is the case with engineers under the age of 45.

Only a minority of engineers (20.5%) agree with the statements that working-from-home or wanting to work-from-home will harm their advancement prospects. Women and engineers under the age of 35 are the least likely to believe that working-from-home or wanting to work-from-home will harm their advancement prospects.

HOW STRONGLY DO ENGINEERS FEEL ABOUT WORKING-FROM-HOME?

It is evident from both survey data and focus groups that engineers understand that there are advantages and disadvantages to both office-based work and working-from-home. It is equally evident that over the past two years, they have re-evaluated these advantages and disadvantages. Most either hold a different view than before COVID-19 or, if they always preferred working-from-home, now hold that preference more strongly. This is evident when engineers are asked about how important the option to work-from-home is in their future career plans.

Eliminating commuting gives me an additional two hours every day.
- Focus Group Participant

Figure 7 summarizes the results from two survey questions that asked engineers about the importance of a work-from-home option in determining whether they will stay with their current employer and how important such an option is when considering a new job. The questions were structured so that respondents could express their degree of agreement on a one-to-ten scale where ten was “strongly agree”. Respondents who recorded an eight, nine or ten are deemed to agree and considered more likely to act on their preference.

Figure 7
Percent of Engineers who Agree on the Importance of a Work-from-home Option
in Determining whether to remain with Current Employer and/or Choosing a Future Job

	Whether I remain in my current job will depend on my employer allowing at least a partial work-from-home option	In choosing a future job, an important consideration will be whether the employer allows at least a partial work-from-home option
Total Sample	44.6%	65.9%
Women	45.8%	71.1%
Men	44.0%	64.3%
Age: <35	46.3%	69.70%
Age: 35 to 54	45.2%	67.5%
Age: >54	40.4%	58.9%
Newcomer	56.1%	72.1%
Long-Term Immigrant	53.1%	71.3%
Born in Canada	39.2%	63.0%

OSPE Survey, (n=1,243)

The conclusion is clear. *The landscape has changed. There is no going back to the way things were before COVID-19.*

3. PRODUCTIVITY

Productivity is an elastic term. This is especially so when the term is applied to professional work like engineering. It is difficult to draw a clear-cut boundary between the amount of professional work completed and the quality of that work. Innovation, which is valued by many organizations, is especially difficult to measure. This chapter focuses on productivity defined narrowly. Quality and innovation will be considered in the next chapter. For the purpose of this chapter, productivity refers to the amount of engineering work undertaken in a normal day. Understood in this way, productivity can increase or decrease because of a change in efficiency or a change in the number of hours worked. (Accuracy and re-work issues will be addressed in the next chapter).

There are no reliable measures of engineers' productivity. Consulting firms rely on billable hours, but this is not commensurate with productivity as it does not reflect unreported overtime or work that is not billable, such as business development. We rely, therefore, on perceptions but do so with the understanding that perceptions are not always accurate. This caution is particularly important because the views of engineers, engineering supervisors, and employers sometimes differ on the impact of working-from-home on productivity.

VIEWS OF ENGINEERS AND ENGINEERING SUPERVISORS

Close to half (49.5%) of non-supervisory engineers report that their productivity increased while they were working-from-home, while only 12.2% reported reduced productivity. Engineering supervisors were less sanguine about the impact of working-from-home on productivity. They estimated that productivity increased for somewhat more than a third (36.7%) of the staff who reported to them, but declined for around a fifth (19.5%). More than half (57.2%) of engineering supervisors, however, reported that their own productivity increased. A decline in personal productivity was reported by 14.1% of engineering supervisors (Figure 9).

Figure 9
Impact of Working-from-home on Productivity

	Total Sample	Non-Supervisors' Personal Ratings	Supervisors' Ratings of Subordinates	Supervisors' Ratings of Own Productivity
	n=1425	n=394	n=513	n=510
Decreased	12.4%	12.2%	19.5%	14.1%
No Change	33.6%	38.3%	43.8%	28.6%
Increased	54.0%	49.5%	36.7%	57.3%

OSPE Survey, (n=1,243)

A slightly higher proportion of women reported an increase in productivity compared to men (57.4% vs 52.5%). Engineers in the age group 35 to 54 were somewhat more likely to report an increase in productivity than engineers over the age of 54 (56.6% vs 50.6%). Engineers under the age of 35 were intermediate between these two groups. Overall, neither age nor gender appear to have a significant effect on perceived changes in productivity.

The groups with the largest proportion reporting gains in productivity were newcomers (73.2%) and women who are also parents of children under the age of 18 (60.0%). A somewhat greater proportion of engineers in manufacturing reported gains in productivity (60.0%) while a much lower proportion of engineers in the transportation sector reported productivity gains (39.1%).

Engineers whose primary job focus is contract management or regulatory administration reported gains in productivity more often (62.9% and 61.8% respectively). Fewer engineers working in design reported productivity gains, although the proportion reporting those gains was still high (48.4%). Work organization does not appear to have a significant impact on self-reported productivity gains.

After the team decides the design strategy, tasks are taken on by each team member. Then you go and do the work.

I get more work done at home.

- Focus Group Participant

The focus groups suggested that the productivity question is more complex than suggested by survey data. In focus groups, engineers saw the principal advantage of working-from-home as the absence of distractions when doing computationally intensive work. However, this was not a universal experience. One engineer reported that the distractions of having young children around made it difficult to work at home. Another engineer acknowledged that they had to hire a nanny to take care of the young children so they could do their work. Some younger engineers commented that their living situations were not set up to accommodate a long-term working-from-home arrangement.

VIEWS OF EMPLOYERS AND MANAGERS

Employers were less confident about drawing strong conclusions on the impact of working-from-home on productivity. While they thought that most employees committed the same or more hours to their jobs, some employers were also concerned about a minority that was either less productive or exerting less effort when working-from-home. In the long run, this can damage morale as well as the effectiveness of the teams that play such a central role in most types of engineering work.

Employers agreed that conventional metrics do not indicate any widespread productivity problems. Consulting firms acknowledged that billable hours had not been adversely affected by the shift to working-from-home. An employer that used a software application to verify that its engineering staff were working as expected found that they were.

Employers focused on three concerns. The first of these concerns was junior engineers. Employers and engineering managers strongly believe that early career engineers need to work alongside more experienced engineers to acquire the practical skills and know-how that they do not learn at university. Working-from-home, they believe, reduces this informal learning and thereby draws out the learning curve for younger engineers. To put the matter simply: *regardless of what younger engineers think about themselves, their professional development is slower and they are less productive when they are physically removed from more experienced engineers.*

When working-from-home, younger engineers may be working the same or more hours than when they were at the office. Employers acknowledged that these younger engineers may believe that they are as productive or more productive as when working in the office. However, the concern of many employers and engineering managers is that the growth in value of those work hours is slower when the work is carried out in isolation from more experienced engineers.

At a personal level, the advantages of working-from-home outweigh the disadvantages. But at a professional level, the calculus is less clear
- Focus Group Participant

The second concern raised by employers and engineering managers was that the process of “on boarding” new hires is much less effective when carried out remotely. Remote working arrangements may be sustainable when the engineering staff are familiar with one another because they previously worked together in the office. However, introducing a new person into an engineering team can be problematic when there is no opportunity to build trust and collegiality.

Onboarding new employees has definitely been less effective.
- Engineering Manager

The third concern identified by employers was the challenge of sustaining their organization’s culture when most engineering staff are working-from-home. An organization’s culture reflects the way that management wants tasks undertaken. Engineers readily observe differences in culture when comparing organizations. Many organizations see their culture as an important source of competitive advantage in attracting and retaining professional staff. Sustaining that culture is therefore an important managerial goal in many organizations. Employers and engineering managers expressed concern about the weakening of personal relationships when work is undertaken remotely and the lack of a connection that home-based workers have to the organization’s goals.

Some people simply don't do well when working
in an on-line environment.
- Engineering Manager

When comparing the views on productivity of engineers with the views of engineering managers and employers, it was evident that they were talking about two different things. Engineers were focused on the volume of engineering work that they could do in a normal day. A large majority reported that, understood in this way, productivity increased when engineers worked from home. Engineering managers and employers, however, were focused on long-term trends. They were concerned that early career engineers will develop more slowly, and that the integration of new hires into the organization will be less effective. They were also concerned that their organization's culture will lose its vitality. *In the long run, if these concerns are validated, the implications for the productivity of engineering organizations will be negative.*

MORE HOURS?

In the OSPE Survey, approximately two-thirds of those who reported an increase in productivity also reported that they worked more hours when working-from-home. In fact, fewer than one engineer in five (18.6%) reported that their productivity increased and they also worked the same or fewer hours per day. This finding suggests that, in many cases, the source of the increased productivity may actually be an increase in hours worked rather than a change in the amount of work completed per hour. Indeed, a majority (56.4%) of survey respondents reported that they worked more hours when working-from-home (Figure 10).

Figure 10
Change in Productivity vs. Hours Worked

	Decreased Productivity	Same Productivity	Increased Productivity	Total
Fewer Hours	3.9%	1.8%	2.0%	7.7%
Same Hours	3.9%	15.5%	16.6%	36.0%
More Hours	5.3%	15.9%	35.2%	56.4%
Total*	13.1%	33.2%	53.8%	100.1%

*Total exceeds 100.0% owing to rounding.

OSPE Survey, (n=1,243)

A somewhat greater proportion of women reported working more hours than men: 60.6% vs. 54.1%. For women who are also parents, the proportion reporting that they worked more hours when working-from-home was 75.0%. For engineering supervisors, the increase in hours worked was equally notable. Almost three quarters (73.8%) of engineering supervisors reported working more hours when working-from-home.

The evidence of an increase in hours worked when working-from-home raises two questions. First, was the increase uniquely related to COVID-19 restrictions and the absence of other opportunities? And second, is the increase in hours sustainable?

The focus group participants were clear that there is a pronounced tendency to substitute additional work hours for previous commuting time. At least over the past two years, this was not a cause for grievance. The most common observation was “I would rather be working at my laptop than commuting”.

Most focus group participants and many employers commented that working-from-home blurs the boundary between work and personal life. It was reported that some engineering managers communicate work requirements during evenings and weekends and expect that work to be undertaken promptly, even though it falls outside of normal working hours. At the same time, some engineering and human resources managers who were interviewed expressed concern that the extra hours their staff were working would lead to burn-out and prompt a search for alternative employment. The problem, it was suggested, was not employer policy, but the demanding attitudes of some managers who may face significant demands for deliverables. These pressures are common in engineering work. However, working-from-home appears to accentuate the problem in some cases.

Some managers expect their staff to be available 24/7
when they are working-from-home.
- Focus Group Participant

Some engineers in the focus groups commented that the degree to which the boundary between work and personal life is blurred depends, at least in part, an individual's home circumstances. Those who have the advantage of a dedicated home office may be more able to "shut the door" (literally or metaphorically) at the end of the workday. Those who live in more cramped quarters – often early career professionals – may find the separation between workspace and personal space more difficult to maintain.

Some managers whom we interviewed also expressed the concern that stress-related mental health problems could become more acute in a work-from-home environment because managers have less opportunity to meet with staff in-person and the individuals may have less opportunity to raise workload issues with their managers.

Both the comments of focus group participants and the observations of managers whom we interviewed suggest that *organizations will need to recognize the need to respect boundaries between work and personal life and institute appropriate policies or guidelines for both managers and professional staff.*

The evidence that the perceived increase in productivity was attributable, to a significant degree, to substituting work hours for commuting hours raises questions about the long-term sustainability of the productivity increase. It is possible that engineers will be content with increasing the effective length of their workday in exchange for the advantages of not commuting to work. It is also possible that over the long run, engineers will either want those hours back or expect to be compensated for them. There will likely be considerable complexity in future trends. At this stage, it is too early to predict how things will unfold.

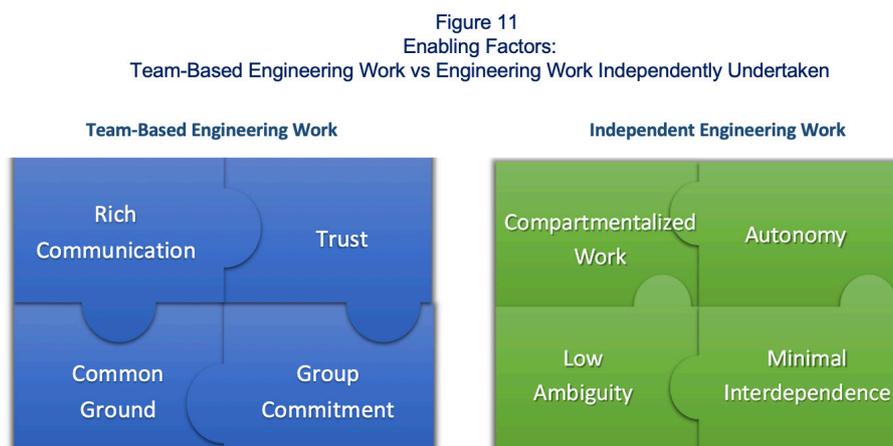


4. TEAMS

Teams are the most common form of carrying out engineering work. In the OSPE Survey, 61.1% of respondents reported that they work in a project or engineering team. It is therefore critically important for organizations that rely on teams to understand the likely impact of working-from-home on the effectiveness of those teams.

VIEWS OF ENGINEERS AND ENGINEERING SUPERVISORS

There is an extensive literature on the factors that support robust teams in engineering and other technical fields. There is also literature on the factors that enable work to be undertaken independently. Based on this literature, Figure 11 compares the enabling factors for team-based engineering work and for engineering work that is independently undertaken.



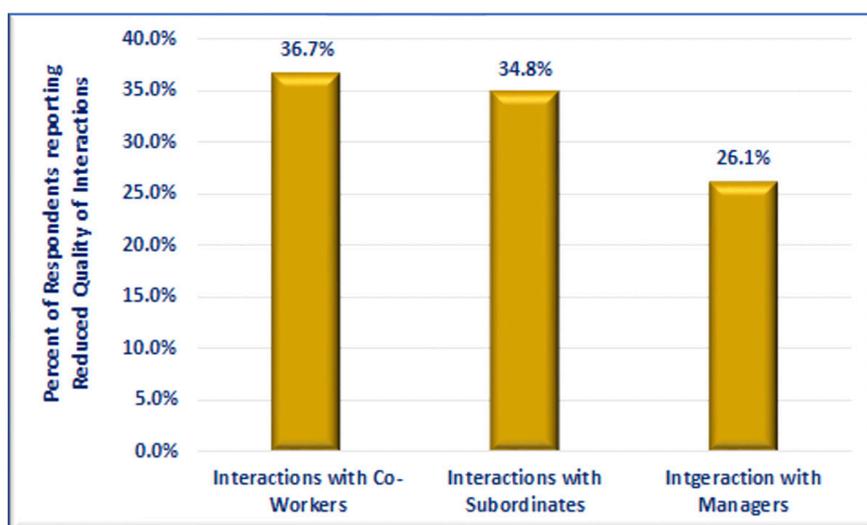
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IMPACT OF WORKING-FROM-HOME ON ENABLING FACTORS

“Rich communication” refers to the channels or modes that are used to communicate information. In-person communication involves more than just speaking. Intonation, body language, facial expressions, and the physical setting (meeting room, board room, coffee room, etc.) all contribute to the communications process. A shift to remote connections narrows the communication channels and necessarily reduces the richness of communications compared to in-person settings. It is notable, therefore, that in the OSPE Survey a significant minority (ranging from 26.1% to 36.7%) reported a decline in the quality of their interactions with their co-workers, persons who report to them, and managers. This has potentially negative implications for engineering teams when remote connection plays a greater role in the functioning of those teams (Figure 12).

When you connect remotely you can't see reactions or read people as well. It is harder grasp changes in intonation. You are not sure if people understand.
- Focus Group Participant

Figure 12
Percent of Respondents reporting Reduced Quality of Interactions with Co-Workers, Subordinates and Managers when Working-from-home



OSPE Survey, (n=1,243)

“Trust” is critical for the open exchange of views in a project team. Team members will not offer critical comments if they fear repercussions or marginalization. Wilemon and Thamhain comment that “without a high level of trust, project personnel are often reluctant to give negative or constructive feedback to fellow team members”. The literature finds that that face-to-face interaction remains the most effective way for groups to establish trust among their members. It is therefore concerning that the OSPE Survey found that almost one engineer in five (18.4%) that works in a team agreed with the statement: “working-from-home reduces the build-up of trust with co-workers”.

When working-from-home, I reach out to colleagues less often.
- Focus Group Participant

³ Wilemon, D. L. & Thamhain, H. J. (1983). Team Building in Project Management. *Project Management Quarterly*, 14(2), 73–81.

⁴ Allen, T. D., Golden, T. D., & Shockley, K. M. (2015). How effective is telecommuting? Assessing the status of our scientific findings. *Psychological Science in the Public Interest*, 16(2), 40-68.

Team leaders compared their experience of “whiteboarding” when developing design strategies using platforms like Teams with their experience of in-person whiteboarding. Brainstorming using remote technology is feasible, but most viewed it as inferior to in-person brainstorming. Six reasons were suggested:

The whiteboard feature in Teams is not a substitute for
whiteboarding with a group.
- Engineering Manager

First, it is more difficult to read the doubts or enthusiasm that individuals communicate through their body language. This is accentuated when individuals turn off their video either for reasons of privacy or to conserve on bandwidth.

Second, remote communication inhibits the development of team cohesion and enthusiasm.

Engineers who have outgoing personalities can function in any setting. Individuals who are more introverted – and that is a lot of engineers – do less well in a remotely connected team.

- Focus Group Participant

Third, remote communication allows individuals to only “half attend” a meeting while doing other work.

Fourth, individuals who are naturally more reticent find it easier to remain silent when meetings are organized remotely.

Fifth, there may be a tendency to engage with colleagues less frequently.

Sixth, technology for remote communication has improved as has comfort with using the technology. However, there are still frequent problems with poor internet connections or individuals not being fully trained on the technology.

There is no consensus on the degree to which remotely connected teamworking impairs the development of innovative solutions. *Some employers and managers whom we interviewed believe that the loss in creativity is a significant problem.* Others believe that the downside of remotely connected teams is more than offset by the productivity advantages. Organizations also differ on the importance that they attach to innovation. Organizations whose engineering work is primarily regulatory or related to contract management seem to be less concerned about the impact of remote working on the propensity to innovate. They are more concerned with preserving the quality of their engineering work. Other organizations, however, view the potential loss of creativity as a significant long-run risk to their operations. The OSPE Survey confirms the validity of these concerns. The survey found that close to one engineer in five (19.3%) that works in a team agreed with the statement that “working-from-home reduces the creativity of project teams”. A somewhat larger proportion of respondents (22.9%) agreed with the statement that “working-from-home makes it more difficult to deal with problems that arise suddenly”.

CONTRAST WITH INDEPENDENTLY UNDERTAKEN ENGINEERING WORK

In the OSPE Survey, 22.8% of the participants reported that they work mainly on their own. For these engineers, the transition to working-from-home poses fewer challenges. Their tasks are likely compartmentalized. They already work with a high degree of autonomy, and they do not require regular and frequent interactions with colleagues. As long as the assignments, their purpose, and the deadlines are clearly articulated (“low ambiguity”), the shift from the office to working-from-home should have little impact on the quality of the engineering work. In fact, nearly a third (32.2%) of these engineers reported that they worked at least one day per week from home prior to COVID-19.

MAINTAINING ROBUST ENGINEERING TEAMS

The challenge for many organizations will be accommodating the clear desire of a large number of engineers to work-from-home two or more days per week while maintaining the effectiveness of engineering teams which benefit from the proximity of the team members that an office facilitates. The focus groups with engineers, the interviews with engineering employers, and the OSPE Survey point to two potential errors. The first is overstating the importance of engineering team members working in close proximity to one another. Almost a quarter (23.5%) of engineers who work in a team reported that prior to COVID-19 they worked at least one day per week from home. While a significant minority reported a decline in the quality of their interactions with co-workers, subordinates, and managers, this was not the experience of the majority of engineers. Nor did the majority of engineers report that working-from-home reduced levels of trust. In many organizations, even prior to COVID-19, some members of project teams routinely participated remotely. Engineering teams undoubtedly benefit from in-person communication. However, *the research indicates that it would be overstating matters to suggest that engineering teams can only function in a robust way if team members always work in close proximity to one another.* At the same time, the research also cautions that there are serious risks to the robustness of engineering teams if in-person interactions are wholly set aside in favour of remote communication. The decline in the robustness is likely to be subtle and to emerge over time.

Organizations that rely on engineering teams will need a thought-out strategy. If these organizations resist offering at least a partial work-from-home option, they risk a spike in engineering turnover and a decline in staff morale. On the other hand, if these organizations implement a work-from-home option without a strategy, the research suggests that the robustness of their engineering teams is likely to suffer.

Among the strategies that employers and engineers cite are: *hybrid models whereby there are core days when all engineers are in the office, regular get-togethers where team members can meet informally, electronic lunch-and-learn sessions to share insights and technical information, and training in communications skills.* The latter appears to be particularly important. The focus groups and interviews suggest that the major change when team members work-from-home is that interactions need to be scheduled and structured. For individuals who are used to informal communication, this can be a challenge. The future success of engineering intensive organizations will depend to a significant degree on how successfully they manage the transition from office-based operations to more flexible models. Preserving the robustness of engineering teams is critical.

When we are connecting remotely, communication with colleagues
is more intentional. It has to be planned.
- Focus Group Participant



5. IMPLICATIONS FOR EQUITY, DIVERSITY, AND INCLUSION

The transition to more flexible workplaces that incorporate a work-from-home option has potential implications for equity, diversity, and inclusiveness in the engineering profession. The implications for three groups were examined in this research: women, early career professionals (new graduates), and recently arrived newcomers who obtained their engineering education outside Canada. These groups are not mutually exclusive. Nor are they fully encompassing of the equity, diversity, and inclusion challenges in the engineering profession. This research therefore is only a partial contribution. Nevertheless, the research identifies issues that may have a more general application.

WOMEN

Women comprised 14.3% of engineers working in engineering, based on the 2016 Census. This share has likely increased. The share of women who were awarded undergraduate engineering degrees increased from 17.9% in 2016 to 21.9% in 2020. Previous research has shown that some women who enter the engineering profession leave the profession because a non-engineering career is sometimes easier to balance with family commitments. This is especially the case for women who are also parents of children under the age of 18.

For women engineers, the transition to more flexible work arrangements that include a work-from-home option potentially enables better balance between their career and their personal life. *Almost three-quarters (73.4%) of women agreed that at least a partial work-from-home option would enable them to achieve a better balance between their personal/family life and their career.* For women in the age group 35 to 44, this proportion increased to 81.2%. Roughly one female engineer in five (20.2%) would accept a somewhat lower salary for the advantages of a work-from-home option. Two female engineers in five (42.3%) agree that whether they remain with their current employer will depend on that employer offering at least a partial work-from-home option.

Focus group participants offered additional comments. It was noted that women in engineering with young children are more challenged balancing family and career responsibilities. Working-from-home is not a practical alternative to accessible childcare. For individuals who do not have access to childcare or do not favour it, the support of a nanny or other family member is likely to be needed. The distractions of caring for young children can be at least as challenging, if not more so, than the distractions and interruptions that occur when working in an office.

The proportion of women willing to accept a lower salary (20.2%) increased to almost a quarter (24.3%) among women who are also parents. If women disproportionately take advantage of work-from-home options and if employers offer a lower salary or benefits package to remote workers, the impact could be to widen the gender pay gap that already prevails in the profession.

The findings from this research have three implications for women in engineering. First, the *increased availability of work-from-home options is likely to encourage more women to remain in the engineering profession. This will strengthen trends to greater gender inclusiveness. Second, employers that are seeking to increase the proportion of women in their engineering staff will need to offer a work-from-home option. If they do not, the survey evidence suggests that they will lose women engineers and be unfavourably positioned when endeavouring to recruit women engineers. Third, if pay structures remunerate remotely connected staff less favourably than on-site employees, the existing gender pay gap might increase.*

⁵ Engineers Canada, Trends in Engineers Enrolment and Degrees Awarded, 2016 to 202

EARLY CAREER PROFESSIONALS

Engineering is an applied science discipline. Undergraduates acquire theoretical knowledge through their university studies. However, understanding how to apply that theoretical knowledge requires experience and also mentorship. *Experience on its own is not sufficient. Experience must be accompanied by mentorship.* The need for mentorship along with experience is not unique to engineering, but it is fundamental to the professional development of an early career engineer.

There is a consensus among both engineering employers and engineering professionals that the shift to working-from-home during the COVID-19 pandemic led to a decline in mentoring of early career engineers (i.e., engineers with less than five years of experience).

Some organizations are making efforts to counter the decline in informal mentorship by formalizing the process. This may provide support to younger engineers, but it is unlikely that scheduled meetings with a mentor can substitute for the informal, *ad hoc* learning that occurs when a junior engineer works alongside a more experienced colleague. Similarly, more structured lunch-and-learn sessions, although useful, cannot replace experience-based learning.

Informal mentoring and coaching is definitely suffering. This now
needs to be structured and scheduled.
- Engineering Employer

One option that has been suggested is to require junior engineers to work in the office. This option is unlikely to achieve the desired results. In the first place, the OSPE Survey indicates that a clear majority (61.6%) of engineers under the age of 35 would prefer to work three or more days at home. More than a quarter (26.4%) would prefer to work 100% of the time at home. Introducing a policy of requiring all junior engineers to work five days per week at the office is likely to prompt a spike in turnover and lead to hiring challenges that more than offset any benefits from the policy. Moreover, requiring junior engineers to work in the office only makes sense if they are working alongside more experienced engineers. *There is little value in having junior engineers in the office if the more experienced engineers are working-from-home.*

Hybrid models whereby all engineering staff work in the office on specified days are another strategy which some employers hope will counter the decline in mentoring. Core days when all engineers are working in the office will undoubtedly support informal mentoring on those days. However, *it appears unavoidable that a shift to working-from-home necessarily entails a reduction in mentoring early career engineers. While the damage to mentorship can be reduced, it is difficult to see how that damage can be entirely avoided.* It is therefore appropriate to ask what are the likely consequences of less mentorship.

It is too early to predict how organizations and early career engineers will adjust to an environment in which mentorship is less available. However, some changes seem likely. In the first place, the turnover of younger engineers is likely to increase as they seek out workplaces that are more suited to their professional development needs and as employers replace younger engineers that are performing less well in a decentralized, remotely-connected environment. Second, as employers develop more experience with managing a remotely-connected workforce, hiring strategies will strive to identify candidates who are better suited to that environment. Employers suggested in interviews that they would look for “self-starters” who can still thrive with diminished support from more experienced engineers. Human resources managers, therefore, will look for indicators in a candidate’s résumé that they have the ability to be productive in an environment that offers less support than in the past. Third, the change in hiring strategies is likely to further increase the competitive advantage of graduates from co-op programs or programs with internships as well as candidates who already have experience. These candidates are already preferred. However, *graduates from traditional undergraduate programs and graduates without Canadian experience are likely to be further disadvantaged when hiring strategies align with the reduced ability of organizations to support early career professionals.*

For new hires, the increase in working-from-home means that firms will be looking for self-starters that do not require a lot of supervision and support. We will be looking for ways to identify candidates who have these qualities.

- Engineering Employer

The impact of working-from-home on the professional development of early career engineers may suggest a greater role for structured mentorship programs within employers and also a need to review the role of internship in the engineering profession and the supports provided to interns. It may be appropriate for the provincial and territorial regulators of the engineering profession to consider establishing a recommended standard for the administration of internships by engineering employers.

NEWCOMERS

In the 2016 Census, approximately 4.9% of engineers had immigrated to Canada in 2016 or four years prior. Some of these internationally-educated professionals were recent graduates. Others had prior professional experience before immigrating to Canada. Previous research has shown that Canadian engineering employers place a high premium on Canadian experience because so much of engineering requires knowledge of “how things are done” in Canada. This includes knowledge of Canadian codes, technical standards, business practices, etc., as well as understanding the culture of Canadian workplaces. Few employers, previous research suggests, take issue with the technical skills of international engineering graduates (IEGs). The obstacle to their integration into the Canadian engineering labour market is their lack of knowledge of “how things are done” in Canada. This type of knowledge is gained primarily by working alongside experienced engineers. *The widespread implementation of working-from-home is likely to slow down the acquisition of this practical knowledge and thereby draw out or jeopardize the process of integration into the Canadian engineering labour market.* It is concerning, therefore, that the OSPE Survey found that newcomers showed the highest propensity to favour working-from-home or working 100% remotely.

EQUITY, DIVERSITY, AND INCLUSION

The engineering profession has made considerable progress in implementing equity, diversity, and inclusion goals. The proportion of women in undergraduate engineering programs, while still less than parity, has increased. Both universities and the profession are seeking to build on this progress. Roughly four engineers in ten (40.8%), based on the 2016 Census, are immigrants. Members of racialized groups account for almost a third (32.8%) of engineers. The evidence from this report is that a significant shift to working-from-home is likely to become the “new normal” for large segments of the engineering profession. For some, working-from-home will mean being 100% remotely connected to their employer. For others, working-from-home will characterize a portion of their work week – perhaps the majority of it. Given the significance of this change in how engineering work is undertaken, it is appropriate to ask how this trend will affect equity, diversity, and inclusion in the engineering profession. This report suggests that the implications are both complex and uncertain.

By enabling engineers to achieve a better balance between their personal or family life and their career, working-from-home options potentially offer a significant advantage, irrespective of age, gender, or recency of immigration. Women may benefit disproportionately. If so, the greater availability of working-from-home options will encourage more women to remain in the engineering profession. At the same time, changes in compensation strategies could widen the existing gender pay gap. For early career engineers, the advantages that working-from-home offers may conceal a hidden cost, namely a decline in the quality or extent of professional mentorship. For newcomers, a similar pattern may be evident. The attractions of working-from-home may come at the cost of a more drawn-out learning curve for acquiring experience-based knowledge of “how things are done” in Canada. Engineers, employers and professional associations need to be aware of these potential implications of a broad shift to implement working-from-home options.



6. THE FUTURE OF THE ENGINEERING LABOUR MARKET

The OSPE Survey, the focus groups with engineers, and interviews with engineering employers suggest that the changed preferences and expectations for working-from-home will have potentially important implications for the engineering labour market. Six of these potential implications are of particular importance.

1. A SPIKE IN TURNOVER

The preference for a working-from-home option appears to be strong irrespective of gender, age, or recency of immigration. Two-thirds of engineers who express a preference for working-from-home also indicate that the availability of a working-from-home option will determine whether they remain with their current employer. An even larger proportion report that the availability of such an option will be an important factor in choosing a new job. Employers' responses to this change in preferences for working-from-home will vary. Some will allow more or less unrestricted choice, others will opt for a hybrid model with core days in the office. And still others will insist on a more or less complete return to the office. Some jobs will lend themselves to working remotely while others will not. Given this complexity, it is reasonable to expect that there will be a misalignment between the jobs that many engineers currently have and their preferences. This may lead to a spike in engineering turnover as both employers and engineers seek a better alignment between how organizations carry out their engineering work and the preferences of engineers.

People have more options now. We have 30 engineering jobs that must be carried out on site. Five of these engineers have quit because they want a job that allows them to work-from-home.

- Engineering Employer

I would accept a hybrid model with two or three days in the office.

But, if I had to return to the office full-time, I would quit.

- Focus Group Participant

2. COMPETITIVE REPOSITIONING OF ORGANIZATIONS

For engineering employers, the marked shift in preference for a working-from-home option poses a strategic dilemma. While not definitive, there is reason for engineering employers to be concerned that working-from-home will erode the robustness of their engineering teams, make it more difficult to onboard new hires, and weaken organizational culture. At the same time, engineering employers that do not offer a working-from-home option will be unfavourably positioned when trying to recruit or even retain engineering talent. The dilemma is how to make the trade-off. An employer that seeks to preserve the robustness of its engineering teams by maintaining a strong in-office mode of operation will face recruitment and retention challenges that could also have cost implications. Conversely an organization that chooses to mitigate its recruitment and retention challenges by allowing considerable flexibility to work at home will need a strategy to counter the potential adverse effects on the robustness of its engineering teams. Organizations will differ in how they deal with this dilemma and how successful their strategies are. Organizations that were previously “employers of choice” may have difficulty in retaining that status in the engineering labour market. Conversely, other organizations may emerge as more attractive options for recent graduates or experienced engineers seeking new challenges.

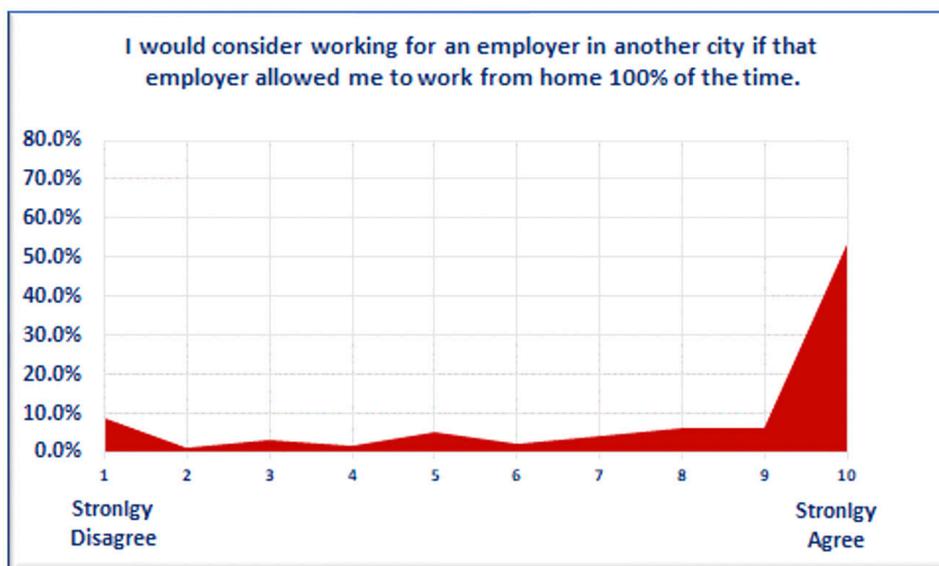
Organizations that think they can restore the workforce to before COVID-19 are mistaken. Unless they offer salary premiums or bonuses, those organizations will suffer a loss of engineering talent and serious difficulties in replacing that talent. While a minority of engineers miss the connectedness that comes from office-based work, most have little enthusiasm for returning to “cubicle world” with its lack of privacy and frequent distractions. The challenge for management and for organizations is not how to get back to where they were before COVID-19. Rather, the challenge is to define what the future of engineering work and engineering workplaces will look like. Organizations that succeed will attract and retain talent. Those that do not adapt will face chronic hiring and retention problems.

3. MEETING SKILLS NEEDS THROUGH REMOTE CONNECTEDNESS

Working-from-home 100% of the time severs the traditional spatial link between the location of an employer and the location of employees. If an engineer wishes to work-from-home 100% of the time, there is no reason to confine their job search to local employers. Conversely, if an organization accepts some of its staff will work remotely 100% of the time, that organization does not need to confine its hiring to the local labour market. It is therefore notable that a large proportion of respondents in the OSPE Survey are open to working 100% remotely for a non-local employer. Figure 13 shows that over half (53.6%) of those surveyed “strongly agreed” with the statement that they would consider working for an employer in another city if that employer allowed them to work-from-home 100% of the time.

We are no longer tied to the local talent pool. With remote working,
we can recruit from anywhere.
- Engineering Employer

Figure 13
Percent of Respondents who would consider
working 100% Remotely for an Employer in another City



OSPE Survey, (n=1,243)

Based on these survey findings and the reports from engineering employers that they are often challenged when trying to meet their skills needs, it is reasonable to expect that more organizations will experiment with hiring non-local engineers who work remotely 100% of the time.

4. LOCATION-BASED PAY

The most common practice in national organizations is for engineering pay scales to be set at a national level. Thus, engineers with comparable qualifications and responsibilities earn the same salary regardless of where they are located. There is no evidence in Canada that organizations are currently planning to implement location-based pay scales. Location-based pay was put on the table by major technology firms (Alphabet, Amazon, Google, Microsoft). These firms indicated their pay scales for employees working in Silicon Valley reflected the high cost of living in that region of the United States and that employees who relocated out of Silicon Valley should not expect to be paid the same premium. Both legal and morale considerations will make most Canadian organizations reluctant to implement pay reductions for incumbent employees who choose a partial or 100% work-from-home option. The OSPE Survey, not surprisingly, indicates that the overwhelming majority of engineers would not accept a lower salary in exchange for a work-from-home option. However, location-based pay could be implemented in a more subtle way. Pay scales could be changed for new jobs that involve connecting remotely from another city.

Up until now, we have always had a national pay scale.
We are considering location-based pay.
- Engineering Employer

Both employers and engineers are exploring options now that the public health advisories have been lifted. It is too early to say whether the shift to more prevalent working-from-home options will lead to the introduction of location-based pay scales by national organizations. However, the gradual introduction of more location sensitive salaries is a possible trend.

5. SALARY PREMIUM FOR ON-SITE JOBS

The OSPE Survey indicated a strong preference on the part of engineers for a working-from-home option. The survey also found that whether such an option was offered would factor into engineers' decisions to remain with their current employer and also their assessment of alternative opportunities. Finally, the survey also found that approximately 16.7% of engineers would accept a somewhat lower salary to have a working-from-home option. Among women this proportion was 20.7% and among women who are parents, the proportion rose to 24.3% (Figure 14).

⁶ BBC, "The tussle over location-based pay", Alex Christian, January 31, 2022. <https://www.bbc.com/worklife/article/20220127-location-based-salary>

Figure 14
Survey Participants' Responses to Statement:
I would accept a somewhat lower salary to have at least a partial work- from-home option

	Disagree	Neutral	Agree
Total Sample	57.1%	26.2%	16.7%
Women	56.7%	22.6%	20.7%
Men	56.9%	28.0%	15.2%
Age: <35	55.3%	31.7%	13.1%
Age: 35 to 54	58.2%	24.1%	17.7%
Age: >54	57.5%	23.3%	19.3%
Newcomers	41.9%	39.5%	18.6%
Long-Term Immigrants	54.4%	24.2%	21.5%
Born in Canada	59.2%	26.4%	14.5%
Non-Parents/Non-Guardians	57.3%	25.3%	17.5%
Mothers/Female Guardians	54.2%	21.5%	24.3%
Fathers/Male Guardians	57.8%	29.7%	12.5%

There are two ways to read these data. The first is that the data portend salary reductions for engineers that seek a job with a working-from-home option. This seems unlikely, especially in the current market when employers are challenged to meet their skill needs. A second way to interpret the survey results is that the data may suggest the need for a salary premium when an organization wants its engineers on-site all of the time or the majority of the time.

It is too early to say whether differences in engineers preferred work arrangements and the preferences of organizations will lead to a restructuring of relative salaries. However, the emergence of a salary premium for jobs that require engineers to be on site all of the time or most of the time is a plausible scenario.

6. EXACERBATED SKILLS SHORTAGES

It was noted that a shift to working-from-home would have negative implications for mentoring early career engineers and that, as a result, some organizations might alter their recruitment strategies to focus on candidates who already have three to five years of experience. While this hiring strategy may be sound when viewed from the perspective of an individual employer, it tends to exacerbate system-wide skills shortages because the experience requirement creates a barrier for new hires. In the long run, this could accentuate the skills shortages that many organizations are currently seeing.

Most commentary thus far has focused on challenges that the shift in preferences for working-from-home poses for individual employers. The research presented in this report also suggests that the shift in engineers' preferences and the apparent strength of that shift will also have implications for the engineering labour market.



7. CONCLUSIONS

When the public health advisories to work-from-home were issued in March of 2020, few observers expected the changed working arrangements to last for two years. Fewer still anticipated that the experience of working-from-home would have such a significant impact on attitudes and expectations. After two years, however, it is clear that there is no going back to the way things were prior to COVID-19. There is now a widespread preference for at least a partial work-from-home option and a general trend on the part of many employers to accommodate that preference. This report explored the implications of these changes for engineers, for their employers, and for how engineering work is carried out. The findings presented in the report have implications both for engineers and for their employers.

For engineers, the opportunity to work-from-home at least part of the week holds out the prospect of a better balance between family and personal life and career. Working-from-home also reduces both the cost and the time burden of commuting. Working-from-home also affords many engineers the opportunity to work with fewer interruptions and distractions. These advantages are attractive to a large majority of engineers. They are especially attractive to women. It is not surprising, therefore, that survey evidence reveals not only a strong preference for a work-from-home option but also indicates that many engineers would quit their current job if that option is not provided. An even larger proportion of engineers will give importance to such an option when considering alternative opportunities.

There are also important implications for engineering employers. In the first place, employers will need to adapt their recruitment strategies to the changed expectations of engineers. Teams, which are the most common way of carrying out engineering work, may experience a loss of robustness if strategies are not put in place to offset the downside of working remotely rather than in-person. There is also evidence in survey data that a significant minority of engineers – perhaps as high as one in five – are challenged by the shift to working remotely. Employers also report difficulties onboarding new hires and developing strategies to preserve the organization's culture.

The shift to working-from-home also has implications for equity, diversity, and inclusion in the engineering profession. For women, the advantages of a better balance between family and personal life and career may be especially important. However, if salary scales adjust to favour on-site employment, the effect could be to widen the existing pay gap. For newcomers, despite their strong preference for working-from-home, the reduced connectedness may slow down the process of integration into the Canadian engineering profession. For early career engineers, the reduction in mentorship that seems unavoidable may also have long-term consequences.

Some employers and some engineers, concerned by the downside risks of working-from-home options, may seek to return to the way things were before COVID-19. A key finding of this report is that a return to the way things were is not realistic. Attention should be focused on how to adapt to the changes in attitudes in a way that maximizes the advantages while offsetting the potential drawbacks. Successful organizations will be those that seek out and implement these strategies.



THE IMPACT OF
WORKING-FROM-HOME
ON ENGINEERS AND
ENGINEERING WORK
PROJECT SUMMARY REPORT



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