THE IMPACT OF WORKING-FROM-HOME: PERSPECTIVES OF ENGINEERING PROFESSIONALS AND ENGINEERING EMPLOYERS – INTERVIEWS AND FOCUS GROUPS SUMMARY

ONTARIO
SOCIETY OF
PROFESSIONAL
ENGINEERS

Research by

EXECUTIVE SUMMARY

This report draws on the results of five focus groups with engineering professionals and nine interviews with engineering human resources managers and employers. The focus groups and interviews were conducted in February and March of 2022 by researchers from Prism Economics and Analysis. Sixteen engineering professionals, all OSPE members, participated in the focus groups. Both the interviews and the focus groups were conducted electronically. With our commitment to confidentiality, neither the names of the participants in the focus groups nor the names and organizations of the interviewees are being published.

Focus group composition was determined by inviting all members from OSPE's committees and task forces to volunteer to participate. Unfortunately, not enough immigrants volunteered to make observations about this community (the group is addressed in the survey findings and project summary reports in this series). As well, even though a focus group was held composed of only women, there was no significant difference in observations between women and men, so all findings apply to both groups. Employers and managers interviewed were either OSPE members in these positions or volunteers from the Engineering Human Resources Association of Ontario.

AMONG THE FINDINGS ARE:

- The prolonged experiment with working-from-home has led to permanent changes in both how most engineers expect to work in the future and how organizations plan to adapt to those changed expectations.
- Most engineers reported either an increase in productivity when working from home or no impact on their productivity. The main sources of the increase in productivity are fewer distractions and the elimination of commuting time. A minority of engineers, however, reported a decline in their productivity or the productivity of their teams
- Employers are more cautious in drawing conclusions on productivity. They stress the complexity of the problem. In their view, the impact on productivity is affected by the type of engineering work, the experience of the individuals involved, and their personalities.

- Working-from-home has likely had a negative impact on engineering work that requires team-based brainstorming. The magnitude of that impact is unclear. Some organizations view the loss of creativity as a significant long-run risk to their operations.

- Communication with clients, colleagues, and subordinates is more challenging when conducted remotely. There is less certainty that someone has actually understood the points being conveyed.

- There was a broad consensus among both engineering employers and engineering professionals that the shift to working-from-home was associated with a decline in mentoring of early career engineers. This poses a significant challenge to replenishing the skill pool.

- Several of the managers interviewed commented on the challenge of sustaining their organization's culture. Onboarding new hires is especially challenging.

- There is an emerging tension between the preference of many experienced engineers to work from home and the need for junior engineers to work alongside their more experienced colleagues. There is no point in the junior engineers being in the office if the experienced engineers are all working from home.

- Decentralizing engineering work may increase the risk of design or computational errors. If this is the case, organizations will need to consider strategies to strengthen quality control and review procedures.

- Working-from-home increases the importance of communication skills for engineering managers. Instructions and expectations that were previously communicated in-person need to be more explicit when communicated through remote technology.

- Working-from-home will require new human resources management policies pertaining to times for contacting staff and their expected availability.

- The potential for many types of engineering work to be carried out remotely will have long-run implications for the engineering labour market. These potentially include a widening of the search pool for new hires and the introduction of location-based pay scales.

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Findings

1.   There have been permanent changes in both the expectations of engineering professionals and how engineering-intensive organizations will operate in the future.

Prior to COVID-19, remotely connected teams were commonly used in large organizations with a national or global reach. For these organizations, the implementation of work-from-home advisories had only a moderate impact on their operations. This was not the case, however, for the majority of engineering professionals and engineering employers. *The two-year, forced experiment with working-from-home has led to permanent changes in both how most engineers expect to work in the future and how organizations plan to adapt to those changed expectations.*

> Working-from-home has become embedded. It is now part of how we work. After two years, there's no going back.

Based on experience, engineers judged the impact of working from home on productivity as complex. They cautioned against making overly simplistic generalizations. Some engineering professionals report that their productivity increased, largely because of fewer distractions and the elimination of commuting time. Others reported no material change in their productivity. On the other hand, some engineers reported that either they were less productive or that there was a decline in the productivity of their teams. Having young children was a challenge for some engineering professionals.

Engineering employers were even more cautious about drawing conclusions. They believe that individual circumstances and personalities are important in determining how well or how poorly individuals adapt to working from home. As well, employers noted that some types of engineering work were more easily undertaken in a work-from-home setting while other types of engineering work required being on site. One employer suggested that the gains in productivity were attributable to staff working more hours when at home.

> Often, at the office, there were so many distractions and meetings that I barely got anything done. I had to take work home to get it done in the evenings and on the weekend.

Many engineers came to appreciate the advantages of reducing or eliminating their commuting time. At the same time, they also came to appreciate the advantages of a quiet environment in which they could concentrate. While a minority of engineering professionals 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.

> 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.

The relationship between working-from-home and balancing the demands of family life is also complex. Some engineering professionals reported that working-from-home made it easier to deal with family issues, especially demands around young children. 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 spoke about the advantages of working from home, but acknowledged that they had to hire a nanny to take care of the young children so they could do their work.

Organizations that think they can restore the workplace to before COVID-19 are mistaken. Those organizations will suffer a loss of engineering talent and serious difficulties in replacing that talent. 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.

> Working from home makes it much easier to juggle family.

2. For engineering work that is design and computationally intensive, working from-home has supported an increase in the amount of this work that engineering professionals are able to undertake.

There are many types of engineering work. Some engineering work requires being physically present to manage or inspect a process. However, a large fraction of engineering work – perhaps most types of engineering work – entails developing or reviewing technical designs and specifications. Engineers describe this work as computationally intensive and requiring attention to detail.

> 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.

Engineers describe pluses and minuses to doing computationally intensive design work or reviewing designs in an office environment. The positives are the ready availability of resources, the reliability of IT systems, and the accessibility of colleagues with experience or specialized expertise. The negatives of the office are distractions and interruptions. These are most evident in open office lay-outs, including cubicle lay-outs.

> My work involves a lot of spreadsheets and calculations. A quiet
> environment without distractions is a big advantage over a cubicle.

Prior to COVID-19, many engineering professionals had become inured to these distractions and interruptions. They were part and parcel of working in an office. When the work-from-home advisories were put in place, there was an abrupt change. Some engineers found that they could accomplish more when working at home because of the comparative absence of distractions and interruptions. However, there were other engineers who did not share this view. Some found that working-from-home was a net negative. They looked forward to returning to an office environment.

> When you work from home, the measure of
> success is output, not time.

The elimination of commuting time was an important source of productivity gain for those engineers who report that they could accomplish more when working from home. Many engineers reported substituting additional work hours for their previous commuting time. This did not appear to be a cause for grievance as the most common observation was "I would rather be working at my laptop than commuting".

> Eliminating commuting gives me an additional two hours every day.

Some engineers reported that it was easier to contact colleagues for their input on a particular issue when working-from-home. In an office environment, that often meant going to the colleague's work location, only to find that they were engaged in a telephone conversation or in a meeting. By contrast, when colleagues were working at home, they indicated their availability on Teams or some other collaboration platform. Other engineers, however, reported that it was more difficult to contact colleague when everyone was working-from-home and that they had fewer interactions with their colleagues.

> It's actually easier to get hold of people when they are working
> remotely because Teams tells you that they are available for a call.

3. Working-from-home has likely had a negative impact on engineering work that requires team-based brainstorming to develop design strategies. The magnitude of that impact is unclear.

Both engineering professionals and engineering employers also highlighted drawbacks to working-from-home. Foremost among these was the sense that teams that connect only remotely are less effective at brainstorming and less innovative. While this view is not universally shared, it is widely held.

> Productivity increased, but creativity declined.

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.

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.

> With remotely connected teams, it is more difficult to
> generate enthusiasm.

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

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

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.

> 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.

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.

> When working from home, I reach out to colleagues less often.

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.

4.   Communication with clients, colleagues and subordinates is more challenging when connected remotely.

Most engineers in the focus groups reported that communicating remotely creates challenges. This is true regardless of whether the communication is with clients, colleagues, or subordinates. A number of reasons were cited. As noted earlier, remote communication makes it more difficult to read body language and changes in intonation. As a result, *one cannot be certain that the individual has actually understood the points you were trying to convey.*

In an office setting, when tasks are delegated, it is feasible to check on progress informally without being intrusive. When you are physically separated and must communicate remotely, supervision necessarily becomes more scheduled and more intrusive.

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

5.   The professional development of engineers with less than five years of experience, and especially those with less than two years of experience, is likely to be hampered by weaker mentorship when working-from-home predominates.

There was a broad consensus among both engineering employers and engineering professionals that the shift to working-from-home was associated with a decline in mentoring of early career engineers, (i.e., engineers with less than five years of experience). While organizations recognize the reduction of mentoring as a consequence of the shift to working-from-home, there is no consensus on what strategies organizations can adopt to counter the reduction of informal mentoring.

> Informal mentoring and coaching are definitely suffering.
> This now needs to be structured and scheduled.

Some organizations are drawn to a hybrid model which would require employees to be in the office on core days (usually Tuesday to Thursday). Other organizations have sought to formalize and structure the mentoring process by assigning mentors and expecting them to initiate regular mentoring sessions. Other organizations have increased their use of structured training and lunch-and-learn sessions

> 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.

Still other organizations appear to accept that while a reduction in mentorship can be partially countered, some decline in the support given to early career professionals is unavoidable. This, in turn, leads these organizations to assign a higher importance to the ability of new hires to be self-starters who can still thrive with less support from more experienced engineers. Human resources managers 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. This is likely to increase the competitive advantage of graduates from co-op programs or programs with internships and candidates who already have experience. *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. In the long run, this could accentuate the shortages that many organizations are currently seeing.*

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

6.   Working-from-home makes it more difficult to sustain an organizational culture and to introduce that culture to new hires.

An organization's culture reflects the way that management wants tasks undertaken. Engineering professionals 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 goal of management in many organizations.

Several of the managers interviewed commented on the challenge of sustaining their organization's culture when working-from-home and remotely connected teams are the predominant way of carrying out engineering work. They expressed concern about the weakening of personal relationships and the lack of a connection to the organization's goals. Particular concern was expressed about the challenge of introducing new hires into an organization during the period when work-from-home advisories required keeping office-based work to a minimum. Some companies developed additional online courses for staff and scheduled regular lunch and learn or remotely connected social events to counter what are viewed as the negative effects of working-from-home on the organization's ability to sustain its culture.

> Onboarding new employees has definitely been less effective.

7.   There is an emerging tension between the preference of many experienced engineers to work from home and the need for engineers with less than five years of experience to work alongside experienced engineers in an office environment.

The interviews and focus groups pointed to an emerging tension. It is clear from the focus groups and from the reports of managers that a large majority of experienced engineers want to continue working from home at least for two or three days of every week. At the same time, it is acknowledged by both engineers and employers that early career engineers need to be mentored, both formally and informally, by experienced engineers.

> There is no point requiring junior engineers to be in the office if the experienced engineers are not there to mentor them.

This requires regular interaction, much of which is ad hoc and informal. Office settings facilitate this interaction. Remote work inhibits it. Organizations that embrace working remotely 100% or allow staff to choose when and whether they will work in the office are implicitly sacrificing some of the opportunities for early career engineers to collaborate informally with experienced engineers. Conversely organizations that opt for 100% office-based work risk losing some or many of their experienced engineers to organizations that offer more flexibility. Organizations therefore need to find a balance between the aspirations of experienced engineers for flexibility in work arrangements and the need of early career engineers to work alongside their more experienced colleagues. One interviewee noted that there is no point in the junior engineers being in the office if the experienced engineers are all working from home.

> Working-from-home is sustainable, but the way
> that we are doing it is not.

The current view of most managers appears to be that a hybrid model with core hours for office-based work is the best way to balance the mentoring requirement with the need for more flexibility to attract and retain experienced staff.

8. The decentralization of engineering work may contribute to an increase in design or computational errors. While these errors can be caught, an increase in working-from-home may require engineering employers to concurrently strengthen their review and quality control procedures.

Some engineering managers working in design teams or project management commented on an increase in the number of errors in technical drawings following the shift to working-from-home. It is not clear why the shift to working-from-home should be associated with an increase in errors. Indeed, these reports are somewhat counter-intuitive. One of the acknowledged advantages of working-from-home is that it reduces distractions and enables engineers to concentrate. This ought to have led to a reduction in the incidence of errors and deficiencies. However, more than one engineer pointed to the opposite outcome. While survey data provide strong support for reports on increased productivity, there is a dearth of empirical findings on the impact of working-from-home on the incidence of errors and deficiencies.

The findings from these focus groups, however, should be read as a "red flag" that decentralizing engineering work may increase the risk of design or computational errors. If this is the case, organizations will need to consider strategies to strengthen quality control and review procedures.

9.   Working-from-home increases the importance of communication skills for engineering managers.

Employers and focus group participants who are also managers commented on the need for clear communication of expectations when delegating responsibilities. While clear communication is always important, there is a sense that instructions that would have been understood clearly had they been conveyed in-person, were sometimes less well understood when conveyed through remote communication. Remote working arrangements, it was suggested, make it important to be more precise about deadlines and expected deliverables.

10.   Working-from-home will require new human resources management policies pertaining to times for contacting staff and their expected availability.

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 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. Some 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 also may face significant demands for deliverables.

> Some managers expect their staff to be available 24/7 when they are working from home.

The degree to which the boundary between work and personal life is blurred depends, it was suggested, at least in part on the individual's home circumstances. Those who have the advantage of a dedicated home office may be more able to "shut the door" at the end of the workday. Those who live in more cramped quarters – often early career professionals – may find this separation between workspace and personal space more difficult.

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 of guidelines for both managers and professional staff.

11.   The potential for many types of engineering work to be carried out remotely will have long-run implications for the engineering labour market.

Employers almost universally report challenges in retaining and recruiting experienced engineering professionals. This may reflect a cyclical upturn in demand. However, participants in focus groups and interviews with engineering employers also point to other trends that are likely exacerbating retention and recruitment challenges.

> When we went virtual, we lost many of our older engineers who
> missed the connectedness that came from in-person teams.

The shift to working-from-home appears to have triggered a "sorting" phenomenon in the engineering labour market. Interviews, focus groups and survey data all confirm that many engineering professionals welcome the shift to working-from-home.
These same sources also confirm that some engineering professionals disklike the decline of office-based work. This has led to an asymmetry between the preferences of some engineers and the work arrangements favoured by their employer. This asymmetry, in turn, leads to a "sorting" phenomenon whereby engineering professionals may leave their current jobs to find employment that aligns better with their preferred work arrangements. This churning may last for a few years. Its effect is to exacerbate turnover.

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

> Everyone is struggling to find experienced engineers now. We have
> started hiring engineers who will work remotely. This is definitely
> helping us to meet our skill needs.

The challenges in recruiting experienced engineers is prompting some organizations to consider hiring engineers who live in another city and who will work 100% remotely. Interviews and focus groups suggest that this option is not favoured by a majority or employers.

> 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.

Only a minority of the engineers in the focus groups found the option of working this way attractive. However, it is equally clear that hiring engineers to work 100% remotely is being tested by some organizations. Several participants in the focus groups reported that they would consider this option or knew individuals who had taken a job that entailed working remotely 100% of the time.

> Employees who live in Toronto want to move to somewhere where
> they can afford to buy a house and work remotely.
> We are seeing more of this.

Housing prices in Toronto may be contributing to the attraction of working remotely. With a greater reliance on remote working, an engineer can purchase a home in a lower cost population centre but continue to work for an employer in a large urban centre that pays a salary commensurate with where the organization is located.

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

While the primary motivation for recruiting persons who live in another city is to meet skill needs, some employers are also considering whether their compensation strategies need to reflect where their professional staff live. This would imply paying staff who live in lower cost regions and work remotely 100% of the time less than staff who live in expensive urban centres and work in the organization's office. It is not clear to what degree location-based pay within Canada would alter pay structures.

EXECUTIVE SUMMARY

The working preferences for engineers have changed substantially over the COVID-19 pandemic. Working-from-home has become and will remain an entrenched part of the employment landscape. The shift to remote working has been seen as a broadly positive development. Employees have cited the reduction of commuting time, access to a distraction-free working environment, and better work-life balance as among the largest benefits. Employers have appreciated having access to a larger talent pool, increased tools for retention, and improved productivity. This change has also created issues for which there are no consensus solutions. Among the largest of these issues are:

- Changes in brainstorming, creativity, and innovation
- Changes in communication
- Changes in productivity on an individual and organizational level
- The maintenance of organizational culture
- The development of early career engineers
- The shifting of the labour market

How employers and employees respond to these, and other changes induced by the shift to working-from-home, will be major features of the engineering profession.

Focus group participants have made it clear that it is incumbent on employers to accommodate their working arrangement preferences. If employers wish to remain competitive in the recruitment and retention of skilled professionals, they will need to be responsive to the desire of engineers for greater flexibility in working arrangements, or else, offer compensation or considerations in lieu of these benefits. The long-term implications of the COVID-19 pandemic and working-from-home on engineers and the engineering profession are unknown. The next several years will represent a period of major change, adaptation, and experimentation. Continued observation of trends in this arena are vital to understand which problems are being addressed, which are not, and which solutions have generated new problems in their place.

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