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COVID-19 and construction: Early lessons for a new normal?

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Executive Summary

This research was commissioned to provide a rapid 'snapshot' of the impact of COVID-19 on construction. There are opportunities for further work to build on the findings: to improve understanding of the impact of the changes made, what benefits may arise from their adoption long term and what measures might be needed to ensure that new 'good behaviours' are retained.

The response to COVID-19 seems to have been rapid and effective on the six projects studied for this research. Site layouts and working practices have seen substantial changes in a short space of time and these changes have been successful and generally well received. There is emerging evidence of additional benefits to worker effectiveness and productivity and a perception of improved safety and health.

More time is spent planning work tasks; with frontline workers typically deployed in smaller groups than usual and trades working in sequence rather than side by side. This has led to increased worker effectiveness and productivity, and improved housekeeping on most sites. It has helped to mitigate project challenges arising from other COVID-19 impacts, such as a reduced workforce and problems with material supply. There may well be long term gains from maintaining these ways of working.

There is a perception that general safety and health risk might have been reduced as a consequence of increased planning, fewer workers and improved housekeeping. Changes made to induction processes and to welfare and hygiene arrangements were reported and have the potential to improve the safety, wellbeing and motivation of the workforce if maintained longer term.

At the same time, there have been very high demands on many of the staff involved in managing or re-planning sites and projects, with adverse impacts on wellbeing for some. It is important that relevant employees have time and opportunity to recover and regroup, particularly as a 'second wave' of COVID-19 could make further demands.

There have been increased expectations on the supply chain, and particularly black hat supervisors, with increased responsibility for worker engagement, briefing, induction; and increased communication between trades to facilitate safe working. This highlights the long-term importance of supporting and developing these individuals and the responsibility on Tier 1 contractors to help their supply chains develop.

Employees who were able to work from home did so, and substantial benefits were reported in terms of cost, productivity and flexibility. However, if home working is to remain widespread in future (which appears likely), it needs to be carefully managed for the best outcomes, as there was also some evidence of social isolation, unclear expectations and over-working. Occasional working from home for site-based staff is likely to be at least as important as designating some staff as home workers.

Increased use of technologies for remote meetings and virtual site visits has been very successful. These have good potential for long term use to enable cost savings, improved productivity and enhanced engagement.

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Preliminary Research Study by Loughborough University

01.

Overview

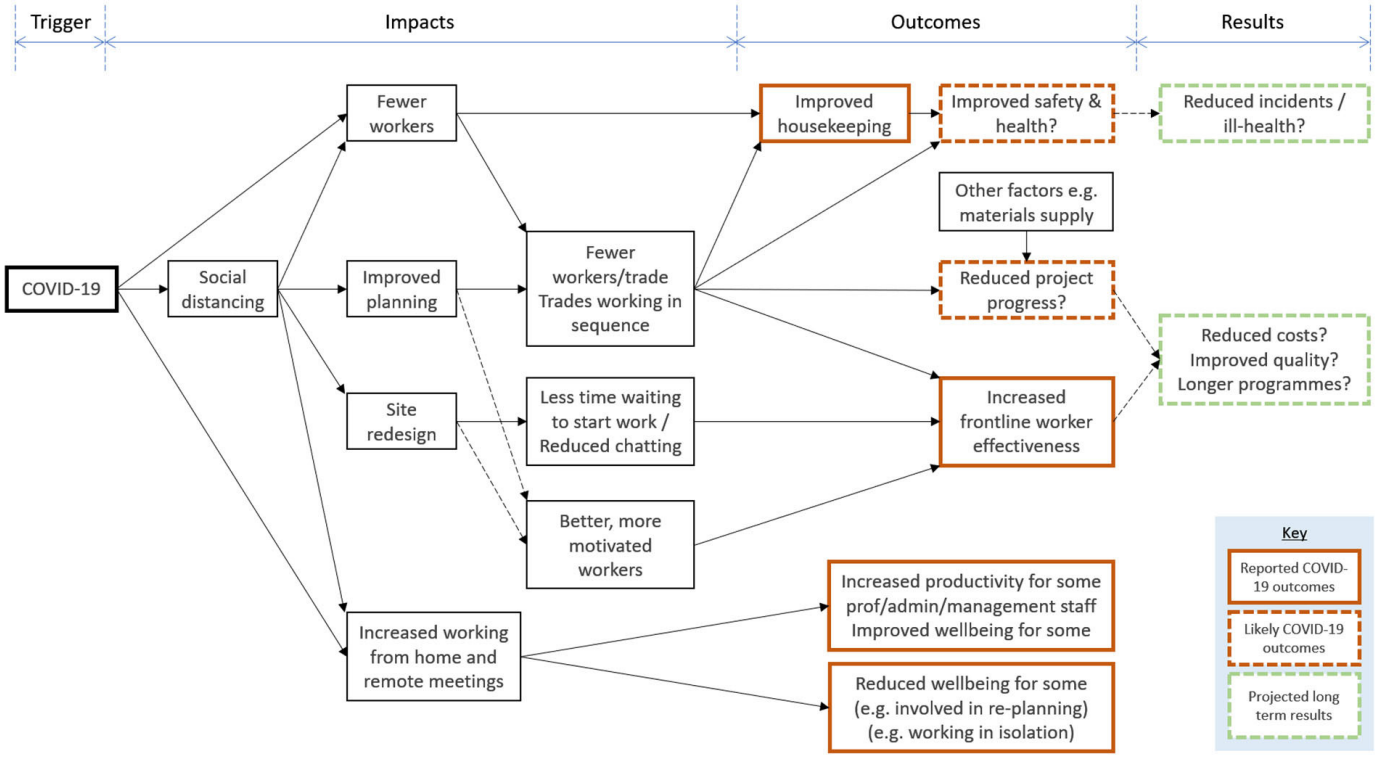
COVID-19 has led to significant changes to construction work over recent months. There have been suggestions that productivity and 'normal' (non-COVID-19) safety and health might have improved as a result of these. The Loughborough team was commissioned to investigate some of the changes made and their impact, and to consider whether their continued adoption post-COVID-19 might offer long term benefits.

Overall, the COVID-19 changes reflect a phenomenal effort by site staff, frontline workers and occupational safety and health professionals. The success of these interventions was underpinned by:

- Advance planning, so that many sites made changes ahead of government policies and guidance
- Rapid decision making and action, low bureaucracy, strong teamwork and flexibility
- Huge site reconfiguration
- Long hours and very high pressure on many staff[1]

Some of the key impacts, outcomes and potential longer-term results of COVID-led changes are summarised below. Where these are positive, they arise mostly from extending or embedding known good working practices rather than from adopting new methods.

"this isn't actually too bad; this is how we should have done this in the first place"



[1] *This has impacted on wellbeing for some – and will need careful management moving forward*

This report covers the following topics: improved planning, improved productivity, improved tidiness; safety and health; management, relationships, and engagement; welfare/hygiene; induction; working from home; increased use of technology; specific tasks; and further research.

What we did:

- Representatives of six projects and two specialist suppliers were interviewed
- On five projects, the discussions were broad, about overall changes made to site operations
- On the sixth site, the focus was on specific changes to task planning for one specialist subcontractor
- In total, 33 people were interviewed; 26 interviewees worked for a tier one contractor (e.g. construction directors, construction managers, OSH managers/directors) and seven for the supply chain. Seven interviewees were OSH professionals

02.

Improved planning, improved productivity, improved tidiness

All five study sites had increased the time spent planning work and tasks. There was a widespread view that planning in this way was beneficial, albeit time consuming: in most cases, it contributed to increased worker effectiveness and improved site tidiness.

Planning

Sites had to plan work more thoroughly to ensure there were not too many workers in each area. This is a change from current practice: several interviewees observed that usually, *"when someone is running behind on their programme, the first thing we say is we need more labour".*

Measures taken included:

- Better forward planning e.g. a regular six-week look-ahead
- More detailed planning for specific tasks
- Work sequencing, allocating only one trade at a time to an area and reducing overlapping interfacing
- Increased and more detailed liaison between trades where they both needed access to an area

Housekeeping

Housekeeping was perceived to have improved on most sites, leading to better productivity, better motivation, and reduced risk of incidents. This was partly a consequence of improved planning, and trades working alone but there were also other factors:

- *"[They] see how tidy it is…do the work… clear up after themselves"*
- Work sequencing makes it more obvious who has left waste behind, and easier for sites to enforce; it reduces blaming others (with a knock-on positive impact on relationships)
- Fewer workers, with fewer materials
- Better planning of materials, 'Just in Time' procurement
- Better tidying, higher expectations to keep walkways clear
- Better (closer) provision of bins
- Tidiness in welfare also generally improved, partly due to increased cleaning, also improved personal responsibility for rubbish

Productivity

Overall project progress i.e. whether, and to what extent, projects had fallen behind the pre-COVID-19 expected programme was variable. It was influenced by a range of factors including having fewer workers on site, difficulty getting materials, and specialist suppliers being closed due to lockdown. Some tasks took longer than usual due to the need for workers to maintain social distancing (see section 9).

A range of mitigating measures were put in place. One project introduced a second shift to step up construction whilst still having fewer workers on site at any one time. Other tasks were rescheduled or carried out in different ways: one site used offsite manufacture to reduce the need for workers to be in close proximity, although this increased direct costs.

Individual or gang productivity/effectiveness was considered to have improved to some extent on all five main sites: i.e. there was higher output per worker, even if total site output was reduced by having fewer workers.

"50% workforce reduction but only 30% reduction in output"

"with the productivity and the new ways of thinking we believe we only need 7 ½ people to do the same as 10 people"

Factors seen as contributing to this improvement included:

- Better and more detailed task planning
- More space, fewer people, and less overlap of trades in the workplace improves gang/task productivity
- Better planning by workers e.g. preparation of workplaces re tools and materials
- Less double handling of materials
- Fewer people 'hanging around' waiting to start work/tasks
- More streamlined worker flow due to workers staggering their start times, reducing the need to queue for site access or changing rooms
- People chatting less (due to distancing, one-way walkways etc), less talking on phones
- On one site there was a perception that those who had returned to site were the more motivated workers, the 'team-players'
- Some workers may also have been enthusiastic and energised at returning to work after furlough

"they used to come in, get changed, go to the canteen, sit around then come back to their toolbox. Now there is a flow, they come to site, get changed, go to their workstation… people are forward thinking, there is no dilly-dallying"

Opportunities for construction

A strong finding from the research was the perceived benefit of more sequencing of trades and reduced overlaps, also reducing the number of workers assigned to a particular task or area. The general view was that this had a positive impact on workflow, work quality and worker effectiveness/productivity. This approach has a lot in common with Lean methodologies in manufacturing, which seek to reduce waste and improve productivity and quality. Changes reported in this research related mostly to the planning and execution of particular tasks. Additional benefits may be achievable with earlier planning i.e. incorporating these approaches at project design stage. Increased use of offsite manufacture might also align with this.

"you wouldn't get the job because you'd be two or three months out [in your tender], so you are pushing water up the hill, and it will revert back to where we were before"

Whilst such changes may be beneficial in cost and quality terms, it was also acknowledged that working this way is likely to take longer and might extend programme times. Consideration will be needed within the sector, and in discussion with clients as to whether this is a realistic way for construction to move forward.

Long term adoption of these working styles might also have workload implications for some staff in management and specialist roles which would need to be factored in. It is similarly important to consider the impact on the frontline workforce. The perception of interviewees was that workers were happy with this way of working and appreciated being able to get on with their work efficiently. However, in the longer term there may be a risk of increased worker fatigue if there are fewer opportunities for informal down time, particularly in jobs which are physically or mentally demanding.

Increased planning was necessary to sequence tasks more effectively. It also led to improved understanding of tasks – planning in greater detail, with less decision-making 'on the hoof'. Planning to this level is not new, but it is perhaps one of those features which separates excellent projects from the rest and would benefit from being adopted more widely.

The benefits seen in tidiness and housekeeping partly related to having fewer staff and more sequenced work. However, they also reflected a change in culture, and improved enforcement on some sites and therefore could be sustainable. Planning had an impact here also, in ensuring that materials were not delivered before they were needed.

Some changes in shift time were reported, either staggered starts (to support social distancing) or the addition of a second shift, to increase productivity. Increased variability in work patterns could have substantial benefit longer term in the sector, allowing workers greater flexibility to work in ways which support their commuting or family needs.

03.
Safety and health

On all sites, it was reported that COVID-19 risk at work was well managed and that workers felt safe; they were often very pleased to be able to go to work, and grateful for the efforts made to keep them safe. However, it was also acknowledged by many that COVID-19 risk management has been poor in some parts of the construction sector.

In terms of general safety and health, there was very little clear evidence of changed risk, compared to pre-COVID-19. Some interviewees identified reasons why risk might be lower, these included:

- More, earlier, and more detailed planning
- Fewer people on site
- Much tidier sites - better housekeeping
- Fewer people in each work area
- Less overlap of trades in work areas
- Clearer and better marked walkways and one-way systems
- Heightened awareness of OSH

A small number of interviewees were concerned that non-COVID-19 safety and health might have deteriorated, and one reported seeing evidence of this (on various project sites, not specifically those studied here).

Possible reasons given were:

- Distraction or reduced focus on 'ordinary' safety and health (for individuals and projects) due to the attention paid to COVID-19
- People returning from furlough and not being 'site-ready'
- Low visibility of senior managers on some projects

Given the success of interventions to reduce COVID-19 risk (social distancing, revised working practices) it is worth considering whether this is transferable – what can we learn about improving safety and health management more generally?

How did people perceive COVID-19 risk?

There were a range of perceptions reported:

- Many were very anxious about the risks from COVID-19; some were unconcerned, considering it 'a myth'
- The fact that COVID-19 risk is widespread and high profile, makes it easier to motivate people to take it seriously
- Although some were concerned for themselves, most worries were about risk to family
- Many were keen to get back to earning; desire to return to work was reportedly greater amongst the self-employed
- Initial anxiety is now fading, habits are changing back: particularly as pubs have reopened suggesting 'normality'

How was worker behaviour influenced?

The behaviour of workers was not evaluated in this study. However, there were a range of ways in which sites reportedly managed and enforced risk-reducing behaviour such as social distancing:

- Mostly, they used encouragement, cajoling, reminding; recognition of 'human nature'
- There was a need to constantly re-educate and remind
- Workers also reminded each other e.g. if they got too close
- Designing out risk was helpful – one-way systems, putting up barriers, removing chairs
- One site took a 'robust' zero tolerance approach to non-compliance; but still had to remind people

Many commented that management was made harder by low clarity e.g. unclear government guidance. Construction-specific guidance, once published (e.g. by the Construction Leadership Council), was identified as being helpful, as was guidance from parent companies in some cases. Inconsistency and mixed messages (e.g. pubs reopening) made it harder to enforce rules about social distancing.

Opportunities for construction

With COVID-19, as with more traditional safety and health hazards, there was a tendency for many to feel personally invulnerable to harm. Messages that emphasise to workers the impact of accident or ill-health on their families, and/or the financial impacts are therefore important.

COVID-19 has highlighted the benefit of consistency and clear messaging. It is essential that standards of safety and health on sites are enforced by all parties to the same standard. This also illustrates the benefit of consistency across the sector, and the importance of major players developing their supply chains rather than focusing only on high standards on individual projects.

The inevitability of fade or fatigue (even for a high-profile hazard such as COVID-19) highlights the need for constant reminders, encouragement, and reinvigoration of safety and health messaging; and for consistency, so that new behaviours are embedded as habits. However, it also illustrates the benefits of design solutions to remove reliance solely on behaviour change.

There have been very high demands on many site and support staff to implement changes to adapt to COVID-19, with adverse impacts on wellbeing for some. It is important that they have time and opportunity to recover and regroup, particularly as a 'second wave' of COVID-19 could make further demands.

04.
Management, relationships and engagement

Changes in how sites worked with their supply chain were reported. For example, one site developed a more hands-off, facilitative relationship with their subcontractors; while another had taken more control and was more directive about what work was done when. There were also some reported changes to worker engagement.

"contractors were more productive because they weren't being dragged into meetings, not being asked to write the same report week after week"

Worker engagement

Many interviewees observed that engagement with the frontline workforce was usually good and was not substantially changed as a result of COVID-19. They also mentioned that most engagement was done through black hat supervisors and, again, that was still the case. However, there were some examples of increased engagement. For example, on one site, there was a substantial increase in the use of the reporting app by frontline workers, with submissions being both COVID-19 related and more general OSH issues. This was due to increased encouragement to use the app, high responsiveness to worker suggestions and sharing responses and feedback on site noticeboards.

On another site, a group of workers were asked how to redesign a task, whereas such discussions would usually be conducted through their supervisor. On one or two sites, on-site meetings (between Tier 1 and the supply chain) had replaced some site office meetings: this also allowed more engagement with the frontline workforce, particularly the quieter ones who might not speak up at other times. Tier 1 attendance at supply chain/point of work briefings was also mentioned frequently as being helpful, although this was already standard practice for some interviewees.

"I've taken to walking out [on site]…you can do an 'at the coalface meeting', I'm doing a lot more of those….. instead of saying there are three gangs, they are Jim and Bob and Sue; so you have that personal side…..And the operatives can see you with their manager, so it's that human side of it"

Where sites/individuals reported increased engagement on site, this was always found to be beneficial.

Supply chain

Overall, there were increased expectations on the supply chain and particularly on black hats, and increased engagement by the supply chain:

- Increase in black hat responsibility for worker engagement, briefing, induction
- Increase in black hat responsibility overall, to enforce behaviours of workers
- Increase in expectation for black hats to work together and communicate between trades
- There was also a big increase in the supply chain checking that sites were safe for their workers to return, suggesting an improved ownership of OSH by subcontractors
- Additionally, supply chains were required to demonstrate to the Tier 1 that they had suitable COVID-19-secure work plans in place.

Senior managers

On some sites, there was a reported lack of senior leadership visibility due to them working from home. This was seen as a lack of support to on-site employees in one or two cases, e.g. failure to understand the challenges the site was facing, and there was some conflict between those on site and those working elsewhere (one interviewee referred to the 'bedroom brigade'). There were also a small number of suggestions that low visibility of senior managers may have had an adverse impact on site behaviours in some cases; offset by an observation of the benefits of not having too many senior managers visiting site in their 'shiny new PPE'.

Conversely, there were observations on some sites that templates and guidance from their parent organisation had been very helpful when they were planning adaptations. One site reported that several senior managers from a subcontractor had worked on site alongside frontline workers for several weeks. As a consequence, they developed a better understanding of some of the challenges faced by their workforce and were able to redesign office systems to make life easier and improve efficiency.

Opportunities for construction

The benefits of effective involvement of specialist subcontractors and frontline workers in work scheduling and task design has been highlighted in best practice publications for many years. This study re-emphasises these benefits and suggests that 'normal' (pre-COVID-19) practice was not making best use of this latent expertise.

There is an opportunity to increase the expectation that supply-chain employers or front-line workers would play an active role in maintaining and improving site practices rather than just relying on the Tier 1 contractor's systems and processes.

Senior management engagement on site has also been a characteristic of good project management and this is strongly supported by this study. However, it needs to be more than just a token involvement. Senior managers working alongside frontline workers could be a brave but potentially game-changing initiative.

The significant role of black hat supervisors has also been highlighted. COVID-19 changes in many cases have expanded this role and, in the main, black hats have risen to the challenge. However, this study has highlighted the need for more and improved training and an increase in overt support and encouragement for the role would bring additional benefits.

05.
Welfare/hygiene

All sites had made substantial changes which improved hygiene and cleanliness. These were appreciated and considered to have value beyond COVID-19 to make sites more pleasant and reduce risk from other illness e.g. flu, legionella. Some saw that worker behaviours improved e.g. increased personal responsibility for housekeeping in a cleaner environment. The main changes were:

- More facilities for hand washing, sanitising
- More cleaners (one site went from 4 to 26!)
- Improved worker handwashing/hygiene
- Increased welfare capacity
- Welfare redesign
- Staggered starts, to improve worker flow through welfare facilities

Practice example:
On one site, the welfare facilities have been redesigned with cubicles and lockers rather than tables and chairs. This allows greater occupancy with COVID-19 social distancing; and is also easier to keep clean and tidy.

Opportunities for construction

There was strong agreement that the improved standards of hygiene provision and welfare facilities were a positive step forward. Some identified these changes as the key thing they would like to keep post-COVID-19. Benefits were seen for infection risk, worker behaviour and productivity (due to reduced waiting time for facilities). There is already recognition in construction of the importance of good facilities, and many projects in recent years have focused on this (e.g. Tideway, Elephant Park in London).

Priority should be focused on welfare facilities meeting a good standard. Poor provision is known to be a demotivator and will have an adverse impact on worker engagement and commitment to a project.

06.
Induction

All sites made changes to how they carried out induction in response to COVID-19. The majority of interviewees saw benefits from the changes, suggesting that usual (pre-COVID-19) induction arrangements are not considered to be particularly good.

- Two sites briefed smaller groups than usual. This was seen by some as improving worker engagement, but unlikely to be sustainable
- One site made induction shorter and more focused
- One site moved induction online
- All sites increased the role of the supply chain in briefing/ inducting their workers
- Some also reported that they did more 'coal face' engagement to compensate for reduced induction time
- Many interviewees commented that the ability of the briefer to engage workers was key (having suitable skills, having suitable authority, not being bored)

Practice example:
On one site, all workers returning to site after seven days or more go through OSH induction, followed by a COVID briefing given by the Construction Director. He 'pulls no punches' in emphasising the expectations on the workforce to comply with the rules, and the consequences of not doing so (removal from site).

Opportunities for construction

There is an opportunity for the sector to review how induction is provided, as there are recognised disadvantages to current models.

Interviews highlighted how many different elements fall under the general banner of 'induction': orientation to site; site culture; supply chain culture; practicalities (ID, evidence of competency, Occ-Health etc.); expected behaviour; knowledge of OSH risks; engagement with site, belonging. A useful approach might be to separate these elements out and review how each can be best addressed, whether that be in a site briefing or in some other way.

07.
Working from home

The increase in working from home for those in suitable roles, , was identified as a generally positive trend, with potential for long term use, but with some potential downsides. This mirrors experiences reported widely in the media.

- Improved productivity and reduced distraction were reported (these factors were also reported by those who remained working in the offices, which now have fewer occupants)
- Reduced travelling, improved work-home balance
- Reduced costs (for individuals and projects)
- Social isolation and poorer wellbeing/mental health for some
- Risk of over-working for some
- Lost benefits of 'grapevine' interactions

Practice example:
One site has a mental health ambassador who arranges social Zoom calls so staff who are at home can talk about things other than work with their colleagues.

It is likely that there will be increased remote working in future: several interviewees who had previously been highly suspicious that working from home equated to watching daytime TV were now strongly in favour and would seek to embed its use on future projects.

Opportunities for construction

Working from home was found to offer substantial benefits in terms of cost, productivity and flexibility. However, if it is to become more widespread in the longer term, it needs to be actively managed for the best outcomes.

- Suitable workspace and equipment will be essential e.g. not working on laptops at the kitchen table
- Extensive working from home will not suit everyone; suitability is more about individuals' preferences and circumstances than about particular job roles
- Regular 'site days' will be essential to maintain relationships, ensure employees stay up to date and maintain team cohesion to avoid any 'us and them' mentality
- Occasional working from home for site-based staff is likely to be at least as important as designating some staff as home workers
- Working from home should not turn into 'living at work'
- Clear expectations are needed regarding expectations and working hours; hours might be variable and flexible but must still be constrained

08.

Increased use of technology

The biggest change in technology use was the increase in remote meetings. This is another area where the changes made in response to COVID-19 may well become permanent. Many commented on how effective remote meetings had been and were amazed at how they and their colleagues had adjusted, even those with relatively low IT literacy. Remote meetings were used to keep in touch with home-working colleagues; to keep in touch with colleagues on other sites (e.g. black hats working for a particular subcontractor but on different projects); and to connect more widely e.g. with suppliers/representatives who might work across a large geographical area. In addition to reducing time needed for travel, remote meetings were seen as being more efficient (e.g. one hour rather than two or three), with less time wasted getting cups of tea or having toilet breaks, and less chit chat. The fact that there were fewer meetings overall was also identified overall as a benefit – many meetings now just do not happen, involve far fewer people or have been replaced by site-based discussions.

However, there were also downsides, with a roughly 50:50 split between those who favoured remote meetings and those who did not. For example, remote meetings are not always a good substitute for face to face discussions 'around a table with drawings'. Additionally, several people had noticed individuals who were uncomfortable speaking up in remote meetings, while others emphasised the need for good management of online meetings.

As well as remote meetings being used for discussions, several sites reported an increase in the use of camera/video techniques to share information with those who were elsewhere, for example:

- To show absent workers round the site and reassure them about COVID-19 secure measures in place
- To allow remote architects/designers to examine product samples
- To update the client on project progress, and engage other stakeholders
- To train workers in new working methods.

Those who had used these methods said they would continue to do so, with benefits of improved engagement, lower time and travel costs. Remote site visits can also engage external visitors without too many coming onto site, which can impair project progress.

Practice example: On one project, a manager using his phone was able to show over 100 colleagues elsewhere how the site had been reconfigured to address COVID-19 risk, so that the measures could be duplicated on other sites.

Practice example: At one site, the use of Disperse[2] data capture techniques was enhanced. This allowed the site team to monitor worker numbers (not individuals) and how effective social distancing was e.g. to identify pinch points and support revised site layouts and work planning.

Opportunities for construction

Construction has been quite slow in adopting some technologies, such as remote meetings and virtual site tours. There is a big opportunity here to embed this, with cost savings, improved productivity and enhanced engagement.

It will be important to get the right balance between face to face and remote meetings. It will also be important for companies to upskill their workforce on how to make best use of the technology, and how to chair or participate effectively in remote meetings. Attention is also needed to ensure that the informal networking and social aspects of meetings are not lost as these are important for both wellbeing and operational effectiveness.

[2] *Disperse is a technology which combines work schedules and drawings with on-site photographs, aiming to improve construction workflow*

09.
Specific tasks

Most changes to specific tasks were either time neutral (e.g. installing glass doors, whilst using the door as a barrier to separate workers), or slower (e.g. excavating a hole with only one worker at a time; using a gin wheel to raise and lower scaffolding rather than chaining). There was no particular learning to come from these, although the interviews did highlight some conflicting views about how tasks should generally be done e.g. whether there is a material health and safety difference between chaining and a gin wheel/brake wheel; and when and where it is acceptable to cut scaffold tubes to length.

There was variation in how sites managed tasks which could not be done whilst maintaining social distancing. Some delayed them to later in the project; some used masks; and some allocated 'working pairs', identified by hi-vis jackets or arm bands. These were individuals who lived or travelled together so that working together did not increase infection risk.

There were reported benefits from the process of having to think about tasks in more detail, and the improved planning that resulted.

Opportunities for construction

Construction has a tendency to stick with 'what we've always done', unless something significant causes disruption. However, this study has highlighted the flexibility of the sector and its workforce in being able to find ways to solve problems and to change how tasks are done when required.

There may be opportunities to challenge more – to look at individual tasks and reflect on whether there are better ways of approaching them; and to look at how work is typically planned and sequenced on projects and whether there are better ways of running projects.

10.
Additional research

This study was commissioned to give a rapid 'snapshot' of the changes made in response to COVID-19 and what the impacts have been. It has highlighted areas which might benefit from further investigation, to test and extend the findings and to explore targeted solutions:

- Working back up the project chain to evaluate what could be done by designers to facilitate some of the new ways of working and exploiting CDM opportunities
- Engagement with frontline workforce and black hats to understand their perspective of the changes made for COVID-19. This is particularly important if changes are to be longer term, to establish if they hold similar views to those interviewed here about the benefits of particular approaches
- Further investigation to develop guidance on how the learning from this work could be applied to SMEs
- Further investigation on induction processes: how these vary, the benefits of different approaches and how these could be developed across the sector
- Further investigation on best practice standards for welfare and hygiene across the sector to identify what is required beyond legal compliance to ensure workers are not demotivated.
- Further investigation into how behaviours relating to COVID-19 align with, or conflict with, traditional safety and health measures

Where do we go from here?

An emerging challenge for the industry is to understand how some of these changes caused by COVID-19 may alter the way the sector functions in the longer term. Some broader research opportunities are:

- As the initial shock of COVID-19 wanes, to identify what triggers or mechanisms may be put in place to encourage these new 'good behaviours' to be retained by the workforce
- To explore how client expectations have facilitated a shift in focus to more OSH-related issues, and to use current good practices to build a business case with potential implications on work programmes and contractual arrangements
- To further develop and test specific interventions within a project through the use of double-loop learning, which can then be fed back into the organisation

11.
Final thoughts

The way in which the construction sector has adapted to the challenges of COVID-19 has highlighted its flexibility, resilience, and ability to solve problems. It has enabled several projects to move forward with innovations which might otherwise have taken several years to embed. It has also inspired many to raise their game and has challenged some conventional thinking about the ways in which projects are planned and undertaken.

There is, however, a high potential for things to drift back towards 'business as usual' as COVID-19 related constraints are relaxed and as commercial pressures once again come to the fore. It is strongly recommended that individual companies and projects conduct a 'lessons learned' review before long to capture the changes made and ensure that positive changes are captured and embedded. The 'Opportunities for Construction' outlined in this report may provide pointers for further consideration.

It is equally important that the sector takes full advantage of this uninvited learning opportunity, engaging in wider discussions about the culture and accepted norms of construction and what benefits might accrue from rethinking these.

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