

The Adaptive Hybrid:

Innovation with Virtual Work

Michael Arena, Glenn Carroll, Charles O'Reilly, John Golden, and Scott Hines discuss how remote work can undermine organizational innovation. They propose an approach which overcomes these limitations. Michael J. Arena, University of Pennsylvania

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Scott Hines, Amazon Web Services he COVID-19 pandemic instantaneously propelled many companies into virtual work. Surprisingly, many of these organizations seem to have maintained—or even improved their productivity during this time. Virtual work offers greater employee flexibility, greater access to diverse labor pools, and lower overhead costs. Many managers and employees have therefore embraced the benefits of virtual work.

Some organizations even hail the shift to virtual work as the new normal. After all, who would oppose increased productivity, happier, healthier workers, diverse labor pools, and lower costs? How wonderful if all these benefits of virtual work proved to be true and if there were no, or few, negative effects. But the immediate benefits may mask a serious problem: Can innovation thrive in a virtual context? Losses in innovation potential may not be easy to see in the short term, and by the time they surface, a company may find itself in trouble.

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Proximity is important to innovation; specifically, research shows that face-to-face interactions are critical.¹ And face-to-face connections often begin and grow through casual workplace interactions. These chance encounters foster the flow of new ideas,² especially through team connections.

We have combined the findings from several companies that are part of the Connected Commons³ research consortium, including Uber, Workday, Amazon, and Microsoft. Their research suggests that when working virtually, teams often become more insular and thus disconnected from other teams. This development affects their ability to innovate.

To mitigate these concerns about innovating in a virtual environment, we propose the Adaptive Hybrid Work Model. This method helps leaders to recognize a company or team's specific stage of innovation (ideation, incubation, or scaling), and then directs employees to work in-person or virtually according to the requirements of that stage. The model helps to strengthen the needed social network connections. whether bonding or bridging, for each specific innovation stage. Ideation generally relies on bridging to peers, while incubation emphasizes bonding capital within a unit, and scaling requires bridging to key resource holders. The model helps managers to restore the benefits of face-to-face interactions by bringing employees back into the workplace at key moments.

Innovating with Breadth and Depth

Innovation requires that workers have the ability to generate new ideas for improved products, services, and processes.⁴ But generating new ideas is not enough. For an innovation to be realized, the idea must be converted into an actual product, service, or process, demonstrated to work, and put into use.

Innovative projects go through three distinct stages: idea generation, idea incubation, and organizational scaling.⁵ Each stage requires a separate discipline. At the first stage, teams need a process by which they can generate new ideas. Second, they need a way to incubate an idea, validate it with users, and then determine how it can be valuable. Finally, they must find a way to acquire the assets and capabilities needed to scale the idea into a business that meets market demand. In short, innovation requires broad work throughout an organization as well as in-depth work by specific groups.

The single largest behavioral shift among employees working virtually was a statistically significant decline in curiosity.

During the pandemic, one technology company which contributed to the research project recorded a statistically significant drop in the hours its employees devoted to generating and scaling new ideas when they worked virtually. Employees reported that they spent 24 percent less time on idea generation and 11 percent less time on scaling these ideas compared to pre-pandemic work. Another technology company reinforced this finding when it discovered that the single largest behavioral shift among employees working virtually was a statistically significant decline in curiosity. Microsoft's comprehensive study of 61,182 US employees from December 2019 to June 2020, showed a similar pattern: virtual work reduced interactions between groups, limiting workers' access to new information⁶ and caused the organization to become more siloed, which in turn restricted innovation throughout the company.

As the pandemic went on, our research revealed that in one company employees also found it 15 percent more difficult to incubate new ideas. The Microsoft research reinforces these results by highlighting how employees working virtually shifted toward using asynchronous modes of interaction—sending more emails and many more IMs. These behaviors make it more difficult for employees to incubate new ideas or to integrate complex information and solutions. This loss was especially evident in the video game industry where 44 percent of developers said the pandemic delayed the launches of their games.⁷

We believe these employees changed their collaboration behavior because their social connections eroded. As Daniel Sussman of Harmonix put it, "Being remote has made it much harder for the team to collaborate directly, which has always been a big part of how we make games. Traditionally, Harmonix has designed and built games using a very iterative process. We have social build reviews where the team reacts to prototypes, new features, new art, or whatever. The move to remote has made that aspect of our process difficult."8 Netflix CEO Reed Hastings echoed that sentiment, saying that working remotely is 'a pure negative.'9

The success of each stage of innovation depends on social connections. Social connections tie people in the organization together, starting simply with how they communicate. Collectively, as these connections mature, they comprise an *organizational network* which helps creativity to flourish, generating the motivation and resources which convert ideas into actions, promoting innovation. A single employee's stock of personal resources—connections, friendships, favors, obligations makes up their *social capital*.

Social Capital. Bonding social capital facilitates interactions within a group while bridging social capital creates connections with those outside the group. Social network theorists have found that bonding capital arises from strong ties, relationships that are characterized by frequent close and reciprocal interactions. These ties help the group to function well. Groups with strong bonding capital are able to move quickly through conceptual iterations by sharing ideas, challenging assumptions, and building better products. Bonding capital is the superglue that

holds trusted peers together. Bridging capital, meanwhile, is often the result of weak ties, casual relationships with infrequent interactions, and helps workers to coordinate actions across groups. Social network analysts have demonstrated that seemingly trivial weak ties often carry a surprisingly rich information exchange, connecting people to a diversity of colleagues who often possess different information. Employees build bridging capital through external connections and resources outside their immediate group. This bridging capital supports change by helping employees to generate new ideas or scale products. A balance of both bonding and bridging capital facilitates innovation.

Organizational Networks. We can map organizational networks by recording who talks to whom (the communication network) or who asks for advice from whom (the work advice network). By mapping

out organizational networks, we illustrate how each kind of social capital supports innovation. Consider the network in Figure 1. Each dot represents an individual. The colored clusters of dots indicate different groups. Groups with dense internal connections have high levels of bonding capital. Connections between groups indicate bridging capital.

This figure illustrates a balanced network that is well positioned to innovate both widely and deeply. Each of the groups has strong bonding capital and the network as a whole shows solid bridging capital between them. An organization must have both forms of social capital in order to innovate. The balanced connections in Figure 1 will help the network to work broadly throughout the organization, while each cluster can also dive deep when necessary. Each stage of innovation requires particular connections to be dominant so





it is important for managers to be aware of these requirements and use them to design an agile organization.

Understanding Networks and Innovation

Faced with market and other environmental shifts, organizations need to generate new ideas, test them rigorously, and marshal the resources to promote the promising ones. Research shows that these abilities are supported by different kinds of dominant social connections depending on the substance of the innovation project and its stage of development.¹⁰

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Connections for Generating Ideas. Bridging capital is often critical to the process of generating new ideas. Bridge connections give the innovating team access to novel ideas, new insights, and unique information, enhancing discovery. In a study of managers at a large electronics company, researchers found that the value of a given idea corresponded to the particular employee's bridging capital.¹¹ Employees who were well connected to other groups and encountered diverse perspectives tended to generate better ideas. During the ideation stage, bridging connections are often created and maintained through chance encounters and unplanned "water-cooler conversations."

Connections for Incubating Ideas. Bonding capital forges cohesive teams which become powerful incubators for ideas. Bonding connections generally include many redundant links within a given team, indicating deep, trusting relationships. People who trust each other are comfortable experimenting openly, building out, and refining ideas. In a study of inventors, bridging capital was found to help them generate ideas, but also to hamper their development of those ideas because casual acquaintances are less likely to engage in deep development activities.¹² If ideas are to become useful, they need iterative adjustments and refinements. Small, cohesive teams with high levels of trust are best able to achieve such fine tuning.

Scaling Connections. In order to scale a small viable product concept across an organization and create maximal impact, a team requires both resource acquisition and execution. The team's bridging capital is critical to garnering the higher-level support and resources that newly crafted ideas need, allowing its members to generate excitement and diffuse their idea.

The bridging ties the team needs to scale an idea differ from

those used during ideation. Ideation bridging uses chance connections between people and ideas, whereas scaling requires employees to have purposeful connections in order to get permissions, endorsements, and resources. Both types of bridging connect a person to groups outside their own, but they differ in intent and managerial level. The bridging used during ideation is generally lateral: employee-to-employee ties in which authority is unimportant. Scaling bridges are vertical, connecting the team to managers with the authority to make decisions and allocate resources.

How Virtual Work Affects Innovation

Imagine an organizational network with much less balance than that shown in Figure 1, a network with fewer bridging and bonding connections. Figure 2 shows just such a network, in which 36 percent of



Figure 1's connections have eroded. The bridging connections are particularly reduced, making it much more difficult for people to generate new ideas and to scale those they have. However, bonding connections have also decreased, impeding people's ability to build and incubate ideas. During the pandemic, many members of the Connected Commons research consortium experienced network erosion similar to this while working virtually.

In the video game industry, we can see the direct effects of this deterioration. Companies in Korea and Japan were able to work primarily from the office through early 2021 and so maintained both bridging and bonding capital. Many of their competitors in Europe and the Americas, meanwhile, were forced to work virtually and lost first bridging connections and then bonding connections. The result? Product launches were delayed 4.4 times more than before the pandemic at video game companies that worked virtually through early 2021. By contrast, companies that guickly resumed in-office work reported roughly half the delays they had seen before the pandemic.¹³ As Chad Grenier of Respawn Entertainment said, "Aside from technical challenges, there's a creative hurdle. You lose the hallway conversations. You lose the people sitting on a couch and discussing something for an hour or two. You miss the lunch conversations."14 Both technical and creative difficulties result from fewer bridge connections made during hallway encounters and fewer bonding interactions while sharing a room with close colleagues.

More broadly, research shows that the pandemic damaged social capital networks. During its initial stages, one technology company found that bonding capital among close collaborators increased by 40 percent.¹⁵ The Connected Commons research shows a similar pattern. However, as time passed, bonding capital dropped off by more than 25 percent, perhaps as a result of burnout, exhaustion, and employee churn. Meanwhile, Humanyze, a company that tracks its clients' internal communication patterns, found that bridging connections began to deteriorate immediately, declining by almost 30 percent during the first few months of the pandemic.¹⁶

Research suggests that people are generally able to sustain bonding capital when interacting virtually. Close colleagues are generally stakeholders or informational resources in joint projects and these bonds strengthen over time, which may account for the initial increase in these relationships. However, as new employees are hired and familiar colleagues move to different groups, bonding capital gradually erodes in a virtual context, impairing the incubation of ideas. Lateral interactions, meanwhile, suffer immediately while serendipitous interactions are nearly eliminated. Yet when an employee spends only one or two days in the office each week, serendipitous interactions can increase by as much as 25 percent.¹⁷

Managers and executives suffered nearly three times the erosion of bridging connections that average employees did.

What about scaling? Since it requires mostly vertical bridging connections with managers, the scaling stage may not be expected to unravel the way ideation does. Yet we found that vertical connections might be at the greatest risk of all. Bridging connections dropped precipitously at one large technology company, with the erosion disproportionally affecting leaders. Managers and executives suffered nearly three times the erosion of bridging connections that average employees did (3.5 times for executives and 2.7 times for managers).

This drop might initially seem surprising, but it makes sense if you think about it. During such challenging times, most leaders have had to focus on taking care of their own teams and organization. The result was a decline in bridging connections for leaders. With a finite number of working hours leaders have found it difficult to maintain connections with other leaders from across the organization. In the long-term, this erosion of bridging connections may cost organizations their ability to scale new products and ideas.

Table 1 summarizes this danger by describing the predominate network connections needed for each phase of innovation to succeed, as well as the expected impact of virtual work upon those connections.

The Adaptive Hybrid Model

Facebook, Twitter, and Spotify are leaning heavily into virtual work. Meanwhile JPMorgan Chase and Goldman Sachs are reverting back to office work. Jamie Dimon, JPMorgan's CEO, said virtual work "doesn't work for those who want to hustle. It doesn't work for spontaneous idea generation. It doesn't work for culture."18 Still others recognize the value of combining virtual work with occasionally bringing employees back into the office to facilitate faceto-face interactions. Salesforce. for example, has determined that most employees should be in the office one to three days a week.¹⁹ This approach, however, leaves vital connections to chance. If one employee from a given team chooses to be in the office on Monday and

Table I. Networks by Innovation Phase			
Innovation Phase & Employee Group	Network Connections for Effectiveness	Impact of Virtual Work on Connections	
Ideation—All	Lateral bridging ties	Makes lateral bridging much harder, especially that driven by chance encounters	
Incubation—All	Bonding ties	Strengthens bonding initially—but later weakens it as group members change and new hires are added	
Scaling-Managers	Vertical bridging ties	Impact on vertical bridging depends on number of face- to-face interactions and the intentions of leaders	

Wednesday, while another selects Tuesday and Thursday, they are unlikely to forge the bonding ties they need to incubate ideas. Likewise, if a manager of the development team comes in on different days from the manager of a critical marketing team, their opportunities to nurture the vertical bridging ties necessary for scaling will be limited.

We suggest using the Adaptive Hybrid Model instead. The Adaptive Hybrid Model is a framework in which managers strategically determine who is around and when. Managers and their organizations need to adapt to each phase of innovation, ensuring connections between the right people. To do so, they must learn to recognize which stage of innovation (generation, incubation or scaling) a project team has reached. They can then direct employees to work in-person or virtually as that stage and their current social capital require. A sophisticated manager would identify the set of people critical to each stage of innovation and ensure that they had opportunities to meet in person. By bringing the appropriate people together during each stage, the model can help them overcome the social distance inherent in virtual meetings.

Our research into employee communication patterns throughout the pandemic demonstrates that individuals participate predominantly in activities that require either bridging or bonding capital. When

they collaborate to build products and iterate solutions, employees need direct access to one another. Yet during the incubation phase, these same teams can rely on their existing bonding capital and work virtually without loss of efficiency. One Amazon Web Services (AWS) development team quickly adapted traditional agile methods to a virtual context by creating an agile swarming tool which enabled developers to use regular sync-ups to minimize the amount work in progress awaiting completion at any time. During a sprint, or effort to complete particular tasks on a schedule, managers used these sync-ups to shift teams to high priority work, using a virtual work board to organize necessary tasks. They also launched anytime calling to encourage teammates to connect quickly online in real-time so they could solve problems collaboratively.

At other times during the incubation phase, team members need to gather face-to-face so they can benefit from and build upon their bonding capital. Uber's People Analytics team noticed that employees were struggling to build the deep, trusting relationships they needed to solve complex problems. They used a combination of network analytics and employee sentiment to help teams better understand when they should consider coming together in person for face-to-face concept reviews, shared days in the office,

and so forth. R.J. Milnor, head of People Analytics, said, "Increasing collaboration is not the problem. The challenge is to get more intentional about when and why teams need to meet face-to-face, to solve more complex challenges and incubate new ideas."

Bridging activities, on the other hand, require interactions between teams, combing and diffusing ideas throughout the network. The employees who anchor these bridges need, from time to time, to be in the office together so that they can forge both the lateral and vertical bridging capital needed for robust ideation and efficient scaling. One field-based sales leader at AWS said that, "Our first couple of attempts at facilitating the full innovation cycle of ideation, development, and implementation failed because we got stuck at ideation in the virtual working model." So, she decided to reinvent the process in keeping with the company's COVID safety guidelines. The next time she saw a major customer need, she selected specific people to bring together in person for an ideation session. She knew that working in a real room would generate the energy to create breakthrough ideas. She also knew that those ideas would require healthy debate if they were to become meaningful solutions. She therefore pulled together critical employees from specific teams for an in-person innovation summit. Once they had some momentum and agreed on a big idea, she switched to a series of virtual blitzing sessions whose purpose was to build out and incubate the idea. She also broke the larger group into "two-pizza teams," groups small enough to need only two pizzas for a meal, and assigned each one specific milestones and deliverables. This design reduced employees' temptation to virtually multi-task while increasing their focus on development. Once the

individual elements of the solution were fully developed, she brought the larger group back together so they could synchronize and discuss how the resulting solution could be diffused and scaled. During this second in-person gathering, she and the team successfully aligned key stakeholders and created a deployment roadmap.

We do not want to give the erroneous impression that all innovation-related activity must occur in person. Managers can intervene either virtually or in person to further innovation. However, research does suggest that, when working virtually, bonding capital requires less effort to sustain than bridging capital.²⁰ In both cases, managers need to be deliberate in intervening and facilitating the right set of interactions between the right people. Better questions about the intent of the engagement and about current levels of social capital will produce better interventions. The Adaptive Hybrid Model helps managers to ask the right questions.

For example, before leaping into a decision a manager might ask: what stage of the innovation process have we reached with this particular product or solution? If it was the idea generation phase, they would need to build bridges to other teams that should be involved and figure out whether that can best be done in person or virtually. If they are at the beginning of the incubation phase, the manager might ask: how well do this team's members know each other? If they are not well acquainted, perhaps the manager should schedule a face-to-face kickoff session. Or, before attempting to scale a new solution, a manager might ask: have key stakeholders bought in? If not, then an office-based demo might be useful. See Table 2 for more suggestions for managers at each stage of innovation.

Table 2. Adaptive Hybrid Intervention Framework

Innovation Stage	Social Capital	Potential Interventions
Idea Generation	Do we <i>have the existing</i> bridging capital to generate new ideas, insights, and learning?	 Virtual customer listening session Virtual cross-team brainstorming Video concept reviews
	Do we <i>need to build</i> bridging capital to generate new ideas, insights, and learning?	 Face-to-face ideation session Face-to-face innovation summits Face-to-face design thinking interviews
Idea Incubation	Do we <i>have the existing</i> bonding capital necessary to facilitate the development and refinement process?	 Agile swarming Virtual blitzing Virtual anytime call Hot debate on the topic
	Do we <i>need to build</i> bonding capital that is necessary to facilitate the development and refinement process?	 Face-to-face Two-pizza team scrum Face-to-face wicked problem deep dive Social build reviews Face-to-face new employee check-ins
Organizational Scaling	Do we <i>have the existing</i> bridging capital necessary to drive adoption and buy-in across the broader organization?	 Video pitch sync-ups Virtual business reviews Cross-team check-ins
	Do we <i>need to build</i> the bridging capital necessary to drive adoption and buy-in across the broader organization?	 Face-to-face sync-up Face-to-face prototype demos Face-to-face deployment roadmap reviews

In order to make the most of both bonding and bridging connections, companies need to devise work routines that are both intentional and adaptive.

The company Workday has already embraced the Adaptive Hybrid Model. Co-CEO Chano Fernandez believes it will be the business model of the future. As he puts it, Workday will be in the office for the "moments that matter," bringing people together intentionally at certain times.²¹ For example, Workday recently brought the senior management team together for an in-person session to ensure bridges between leaders. Inna Landman, Senior Vice President for Talent Acquisition, People Ops, and Insights at Workday said that, based on our research, "Our managers and leaders are recognizing the need for being intentional in creating a successful hybrid work model. They're incredibly responsive to the idea that with these practical tips we'll be able to meet employees' needs for flexibility while harnessing the power of being together for specific moments that matter." In order to make the most of both bonding and bridging connections, companies need to devise work routines that are both intentional and adaptive.

The Adaptive Hybrid Model helps managers to decide deliberately how employees should work, virtually or in person. When properly used, the model allows organizations to maintain the productivity benefits discovered during the pandemic while facilitating the effective incubation of existing ideas. It also cultivates both the lateral and vertical bridging ties needed for ideation and scaling. The COVID-19 pandemic made us more aware of these issues, but the model is applicable in a far broader range of circumstances, perhaps even in all innovation by large, globally-dispersed organizations.

Attorneys like to say that hard cases make bad law. The pandemic has put us all in a hard situation and, given the uncertainty in which we now live, it would be dangerous to make irreversible choices about how we will organize work in future. One obvious limitation of our analvsis is the likelihood of surprises both good and bad—ahead. We may develop technology for applications like virtual reality so fast that remote work outpaces our current methods and new kinds of remote social interactions become possible. Conversely, we may discover more and more deficiencies of remote work which could change the office/home calculus entirely. Many observers are already predicting that remote workers will draw less attention from managers than in-office workers and will therefore suffer in regard to promotions and rewards. If so, working from home will be less attractive to some employees regardless of its other benefits. The preferences of both managers and workers may also be affected by organizations' changing compensation policies with respect to remote workers. Some of these changes could make it easier for organizations to preserve the social capital needed for innovation, while others may make it harder still. Finally, we should mention that most of the evidence for the Adaptive Hybrid Model comes from technology firms. Some industries. such as manufacturing or natural resources, and some organizational arrangements are operating under sufficiently different conditions that they will need to adjust the framework to fit industry conditions. Assigning individual employees to multiple teams, for instance, may complicate a firm's efforts to implement the model. Clearly, this is not a time for permanent, irreversible decisions.

Conclusion

The full impact of the shift to remote work which the pandemic inspired may take years to understand. While virtual work may create greater employee flexibility, better access to diverse labor pools, and perhaps even improved productivity, organizations should also consider the broader implications. The erosion of the social capital that bridges groups within an organization and the loss of local interactions threatens to undermine innovation. Some online platforms, like Microsoft, claim they can recreate the water cooler virtually,²² but we will remain skeptical until more evidence appears.

The easiest way to answer questions about remote work would be to enact blanket rules, such as, "everyone needs to be in the office two days a week." But leaders should resist that temptation. They need to first consider the risks to long-term innovation. To promote successful innovation, we must all consider new ways to cultivate bridging capital and reinforce bonding capital, ways like the Adaptive Hybrid Model.



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