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Google's guide to innovation: How to unlock strategy, resources and technology



Google Cloud

Foreward

Growing a culture of innovation: Lessons from Google

by Vinton G. Cerf, VP and Chief Internet Evangelist, Google

Organizations are facing unprecedented change and challenges stemming from a confluence of natural and artificial conditions. These forces are driving many to rethink the tools and technologies they use, and the places they need to be, to grow, and to innovate.

Sustained competitive advantage cannot be achieved with technology alone

To create a more innovative business, you must rethink how people, structures, and processes interact every day—we refer to this as organizational culture. The teams you rely on to build must have systems and processes that keep them engaged, amplify their ability to produce, and keep them consistently forward-looking.

At Google, we've spent years thinking about how to maintain and improve a culture that fosters transformation and innovation. This has led to alignment around certain core principles that have informed our approach and supported Google's culture for two decades.

Measure, make decisions, and be transparent in that process

Measurement is at the heart of everything we do at Google. We measure everything—from how our systems are running, to how productive we are, to how people are feeling. All the data we gather is



extremely valuable, because it exposes problems faster than simply scratching our heads and wondering would. Once we gather that data, we still need to spend some time interpreting it, but at least we have a basis for judging how well our organizational structure is working.

A culture of measurement results in a collection of anecdotal information as well as quantitative data. Both are necessary to inform change. We perform a number of different measurements—for example, encouraging everyone to participate in an anonymous employee satisfaction survey every year. That data and that feedback loop facilitate our decisions to change how we're doing things, as needed.

Once we've gathered the data and made a decision, it's time to actually put those changes into motion. It's important to recognize that a feedback system only works when people believe changes will be made as a result of their feedback. So the trick is to ask the questions and then actually do something with the result.

Transparency is another important part of Google culture. It's important that we be transparent about the feedback we heard, and how we went about addressing it. Being transparent as a company increases customer trust on one hand, and employee trust on the other. It's important that people understand why we prioritized the changes we made. That's core to the company's DNA.

Don't be afraid of failure

Sometimes science learns more from failure than it does from success. Because if you ask why something didn't work, you often learn more than you would have if it actually did work. And so, even at Google, we try a lot of things out that don't work—and we learn from them and refine our practices. And eventually, we hope, we get to the point where things that we want to work actually do work. So science is a lot like that. Google is a lot like that as well.



You have to have the willingness to allow failure. I'm not suggesting we should fail all the time—that would be a problem! I'm talking about the freedom to try things out without absolute certainty of success. This is the fundamental difference between engineering and research.

With research, you don't begin knowing the answer. With engineering, you think you know the answer, and you just have to build it. But what can happen with engineering is that you build it and then it doesn't work. These two things interact in the most wonderful ways. The engineer says, "I built it and it didn't work." The researcher says, "Why not?" And the engineer says, "I don't know, can you help?" Together, they discover there's a fundamental reason why this particular path for implementation didn't work—and they learn from that. And then you get to develop a new design that takes this into account.

At Google, we'll go down a number of different paths as we explore new capabilities in the system, and we often encourage people often to go down these paths, even if they might end up at a dead end. And we share, blamelessly, with others the fact that there was a dead end, so everyone learns. That's how we advance everybody's ability to carry out their work.



Don't forget that culture is always a work in progress

Over time, as the mix of people joining the company changes and as the scale of the company gets bigger, we have to remind people about the cultural norms that we would like to maintain.

For example, one of the things that Google tries to accomplish is to give people the freedom to try things out, which resulted in a policy of allowing engineers to spend 20% of their time doing things that they weren't originally assigned to do. People use 20% time to learn outside their assigned duties and it actually acts as a stabilizing component of employee satisfaction. The idea of 20% diminished for

a while as we grew, until we reminded everybody that that 20% was fundamental to Google and was a cultural element we wanted to maintain. It's important to remember that you have to periodically refresh the cultural elements that matter.

Stay open

If I were trying to give advice to an enterprise CIO, one of the things I would say is this: Don't think that you have all the answers. In fact, the probability is very high that you don't have very many of them at all. Take advantage of opportunities to share knowledge with your colleagues, your friends, even your competitors to better understand what others have learned in order to solve the same problems you have. Openness is your friend. The same thing is true when it comes to not taking all the credit. It's important to acknowledge other people's contributions because it gives them the incentive to continue contributing. And so this kind of openness of spirit is just as important as openness of ideas.



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Introduction

Solving for innovation when the pressure is on

2020 has been a year of sweeping, fundamental change that has shaken organizations to their cores. Seemingly overnight, entire industries were redefined, budgets shifted, and priorities changed completely. Technologies once considered cutting edge—virtual meetings, telemedicine, and digital banking, to name a few—have seen mass adoption.

And this year of change has touched every industry. Facing unprecedented digital traffic for web-based unemployment services, [the State of New York](#) moved to the cloud to scale to meet this demand in just over 48 hours. [Yahoo Finance](#) shifted overnight to delivering eight hours of live broadcast remotely. [Telus International](#) transitioned tens of thousands of employees to remote work in one day. Under normal circumstances, these shifts likely would have taken years.

As the world continues to change, opportunities will emerge, and with them, the influential companies of the next decade and beyond are being determined—today. [McKinsey research has shown](#) that in the wake of the current crisis, organizations that were prepared to be agile and to innovate are performing better than those who had not. The decisions being made in the present moment will determine which organizations will weather the change—or even take advantage of it. The good news is that there are steps any organization can take right now. At Google, we've spent many years thinking about how to make teams more effective and innovative, and we've found that success comes down to these fundamentals:

- **Agile teams and technology** — in most cases, legacy systems and infrastructure are not doing organizations any favors. Agile teams need an open platform that allows them to transform business applications or build new ones, delivering value to customers faster, more reliably, with greater scale.

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- **Data-driven intelligence** — each year organizations are generating more and more data that's often unorganized, scattered across silos, or completely inaccessible. Organizing that data, and being able to quickly derive meaningful insights from it is the key to unlocking critical business value.
- **A culture of collaboration and innovation** — technology is only one part of the equation. Organizations also need the right people and processes, which also means having the right tools to make collaboration and knowledge sharing seamless.

This guide explores these three essential concepts to help you and your teams better succeed in this time. People have always powered technology, and today that's especially true as teammates must collaborate and solve big problems together, even if they're not in the same room. Fostering a culture of innovation helps lead to identification of new opportunities and quick action to create new ideas and get ahead of the competition.



Chapter 1

Building agility into apps and infrastructure

For decades in IT, business continuity and disaster recovery plans have been designed around a single for example, a natural disaster, a building shutdown, or a certain type of failure. Plans to get the business back up and running have been historically [tied to legacy hardware and software](#), as well as legacy ideas about how and where employees worked. But, as the 2020 global pandemic has revealed, business continuity plans didn't always take into account modern considerations.

The impact of COVID-19 has also not been uniform for all businesses. Almost overnight, entire industries were redefined, with some seeing dramatic spikes in demand, while others saw business come to a standstill. Either way, the definition of business continuity has changed. It's no longer just about having the right backup and disaster recovery plans in place, but ensuring you have the right IT stack that will provide you the right mix of reliability, agility, and visibility. Cloud computing has played a crucial role in enabling businesses and governments to quickly apply solutions to respond to the crisis and get their operations going. This agility allows Google Cloud and our customers to react quickly and provide rapid solutions to problems that used to take months, if not years, to solve.

The magnitude of these changes are not new to Google Cloud. Each year during Black Friday and Cyber Monday, for example, we work closely with ecommerce companies such as Shopify, retailers like The Home Depot, and many other businesses to support them through extreme swings in demand. We also work with many customers in digital media and gaming that see dramatic spikes during successful product launches. For example, relying on Google Cloud, game developer Phoenix Labs was able to plan for rapid scale in demand as they launched their game, Dauntless, across five continents, eventually supporting more than 16 million unique players.



To build agility into your apps and infrastructure, there are a couple of proven cloud technologies and approaches to consider:

Embrace hybrid and multi-cloud

Hybrid cloud and multi-cloud are no longer a matter of “if,” they’re a matter of “when.” Multi-cloud computing lowers the risk of vendor lock-in, and can provide service resiliency and migration opportunities, in addition to the core cloud benefits of agility, scalability, and elasticity. For example, Loblaw digital [reduced compute resources by one third](#) with efficient VMs.

Migrate legacy applications

Your particular architecture will dictate which workloads or apps you’ll want to migrate. If you’re running apps like SAP or Oracle on-premises, you can migrate those to the cloud to add flexibility and reduce hardware dependency. Google Cloud offers a number of solutions, such as [Google Cloud VMware Engine](#) and [Bare Metal Solution](#), and managed services for [SQL Server](#) designed specifically to bridge the legacy-to-cloud path, add resilience, and reduce legacy hardware management. These moves are simple and don’t require rewriting code or starting from scratch to get the benefits of cloud. For example, [Kaeser Kompressoren SE](#) needed a consistent platform to deploy and manage existing on-prem SAP workloads, like SAP Data Hub, but also wanted to be able to tap into other services running in Google Cloud to get more value from those environments. They chose [Anthos](#), our application modernization platform, because it offered the flexibility to incrementally modernize legacy application on-premises without business disruption.



Adopt an open cloud architecture

Vendor lock-in is usually a place you don't want to be, particularly when it comes to cloud. Using an open cloud architecture can help you avoid lock-in and make it easier to respond to change, because unlike cookie-cutter solutions available from proprietary systems, it enables greater innovation and differentiation.

Reduce risk

A multi-cloud management platform like Anthos lets you modernize the apps you've already built with standards-based containers that you can deploy wherever you see fit. At the same time, Anthos lets you plug into innovative developer services, so you can spin up new apps quickly if business needs change quickly or new opportunities emerge.

Build cloud-native apps

Managed serverless technologies let developers focus on code, not on underlying infrastructure, so your apps can scale up and down, and you only pay for what you use. Using microservices, meanwhile, lets you build apps from reusable components that you can deploy, manage, and secure individually.

Follow DevOps and SRE practices

Migrating to cloud or choosing better technology can help move your business toward a more resilient place. But the intersection of people and technology also offers opportunities to add resilience and



respond better to any incidents. At Google, we follow [site reliability engineering \(SRE\) practices](#), with extensive disaster recovery planning and testing as a key principle. The rigorous testing and constant communication around any outage creates a culture of blameless partnership.

When you're stuck in a cycle of break/fix, budget restrictions, or constant license and hardware refreshes, it can be hard to envision what you want your infrastructure to look like. But what if you started with a vision of what your technical and business leaders could do if their tools weren't holding them back? Would it mean rehauling your services or offerings entirely? Would it mean broadening your customer base dramatically or opening up new revenue channels? Dream big, then start identifying where you can make changes to improve your business's overall readiness and resilience.



Chapter 2

Powering your business with data

Data has become a critical asset for organizations looking to enable smarter decision making. It has never been more important than it is right now, with the increased digitization of many business activities. But forward-looking companies are realizing that the value of data goes beyond displaying numbers on reports and dashboards. These organizations are using modern data solutions to infuse key operational workflows with data, driving enormous value for their business.

Analytics are a powerful tool, but insights have little value if they don't result in action. Collecting and storing data isn't enough to push your company forward; you have to choose and implement intelligent products that can integrate with business processes and transform insights into real-time action. Big data is in our DNA: Google has been at the forefront of data-powered innovation for years, with the mission of organizing the world's information and making it universally accessible and useful. Google was built to process and analyze large datasets, and the same technology that makes this happen is available for all businesses through our smart analytics platform.

With a modern data analytics platform—ideally cloud-native and open source-friendly solutions such as [BigQuery](#) and [Looker](#)—you can get to the heart of what users and customers want from you, speeding up product development with actionable insights, discovering new revenue streams by bringing data applications to market, and delivering a better customer experience with data-driven workflows.

For example, the fan data engineering team at [Major League Baseball \(MLB\)](#) is responsible for managing 350+ data pipelines to ingest data from third-party and internal sources and centralize it in an enterprise data warehouse. This enables them to do everything from creating machine learning models for predicting future fan purchase behavior, to generating revenue projections and churn rate analyses for MLB.tv subscribers, to personalizing the news articles shown to fans on MLB.com based on their favorite teams.

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When it comes to modernizing your analytics, there are a few things to keep in mind:

Choose analytics products that scale cost-effectively

Your data analytics products, like databases and data warehouses, should respond to shifts in the business by scaling up or down in seconds, without the need to manually manage your infrastructure. That way, you're not paying for unused capacity, or running out of capacity at important moments. With serverless cloud analytics solutions like BigQuery and our other data analytics products, you can quickly answer queries and run your analytics with agility—all while [lowering your total cost of ownership](#).

Select tailored solutions that are designed specific for your industry

Packaged analytics solutions created to support your industry make it faster and easier to solve common challenges. Google Cloud offers packaged horizontal and vertical solutions like [real-time AI](#). Google Cloud also offers packaged, priced, and supported partner solutions that can help improve contact center operations, automate document processing, and more. For example, Carrefour, one of the largest grocery retailers in France, needed to ensure they had the right products, in front of the right shoppers, at the right store location. With Google Cloud, [Carrefour developed an assortment recommendation tool](#) that helped the chain support a more personalized selection at the store level, giving store directors the autonomy to influence inventory needs as well as visibility into the merchandising decisions by each of their franchise stores. In addition to retail, we also have solutions that support industries like healthcare, manufacturing, financial services, and media & entertainment.



Look for analytics tools that leverage AI and ML for improved intelligence

Some of the most innovative capabilities found in analytics solutions are AI-based. These are designed to simplify management and operations, improve experiences, and drive new insights. AI can help empower a new set of developers and data scientists who can build analytics-based applications as well as unlock insights in new ways. Using AI, business users can deliver self-service visualizations and build ad hoc exploration.

In addition, analytics tools with AI and ML built in, such as BigQuery ML, make it easier to extend the benefits of ML beyond very specialized teams. For example, as part of our collaboration with the NCAA in 2019, we relied on BigQuery ML to [train, evaluate, and serve ML models](#) that could make more accurate predictions on what would happen during each of the Final Four games. With BigQuery ML, you can train models using standard SQL in BigQuery, and hand the training and serving off to underlying managed infrastructure, reducing complexity as well as a significant amount of work hours.

Bring data to the tools people already use

A modern approach to data analytics recognizes that different people with different roles and skill sets need data in different ways. For example, our BigQuery interface uses standard SQL, so data analysts can use their existing skills and knowledge to write queries and create reports, interactive dashboards, and more. They can also manage pipelines and load data themselves, plus train and run AI and ML models using SQL with BigQuery ML, so they're less reliant on data engineers or data scientists.

For those without SQL expertise, BigQuery offers integration with a spreadsheet interface with Connected Sheets. And Data QnA, our natural language interface for your data, makes it even easier—anyone can simply ask questions of their data, no expertise or reliance on data analysts needed. A modern data analytics solution can support all the ways in which people experience data.



Protect your data and operate with trust

Invest in data analytics products with robust security, governance, and reliability controls that offer high availability, so your business data is protected wherever users are. In this climate, part of being agile and maintaining business continuity is placing trust in analytics products that store, replicate, and back up data automatically. With so many businesses operating remotely, data protection is an essential outside the office walls and across locations. Look for analytics products that have fine-grained identity access management as well as data encrypted at rest and in transit by default. In addition, it's important to look for solutions that lower the cost of downtime. Google Cloud provides service-level-agreement guarantees that are unmatched in the industry. BigQuery supports 99.99% availability SLAs for data warehousing.

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Chapter 3

Enabling workforce productivity outside the office

The challenge of remote work during COVID-19 was monumental for many businesses. Not only did many struggle to keep their own workforces safe and connected, but they grappled, too, with the need to support customers and provide the right level of service in a time of need. It shed a stark light on the need for having the right tools to enable distanced work.

Now, as online meetings and remote collaboration become increasingly common, the question becomes what work will look like in the post-pandemic world. COVID-19 laid bare what had already become true: People and organizations need more adaptable ways of working. This has made the technology we rely on at work more important than ever.

Organizations that had already begun making the leap to cloud-based collaboration fared better when COVID-19 hit. For example, energy solutions provider Viessmann was able to keep up their production by relying on Google Workspace as they converted their employees to remote work within a 48-hour span. Viessmann has even developed a ventilator in significantly less time during the lockdown, and the fact that Google Workspace helped their engineers easily collaborate played a critical role in accelerating the launch process.

Many organizations have also turned to digital collaboration tools as they sought new ways to serve customers while keeping their workers safe. St. Louis-based Schnucks found themselves shifting from a neighborhood grocery chain to an essential service almost overnight. Schnucks supported both corporate and front-line workers with an information hotline and created a virtual dispatch center for their transportation team—all through Google Meet. Similarly, Italian bank Credem (Credito Emiliano S.p.A) used Google Workspace to continue to provide financial services to customers without meeting face to face by creating a “virtual branch,” with video-based customer support using Google Meet.

The more organizations do now to enable collaborative cloud-based tools and flexible ways of working, the more successful they'll be in the long run.

The workplace we return to once COVID-19 is over may look very different than the one we knew before the pandemic. The tools we've embraced to weather the change—like collaborative documents and virtual meetings—are likely to remain pervasive even after we emerge from the pandemic. The more organizations do now to enable collaborative cloud-based tools and flexible ways of working, the more successful they'll be in the long run.

Some practical tips all businesses should keep in mind:

- **Make it easier to get work done, no matter where you are** — remote working has significantly increased the demands on all of us—in both our professional and our personal lives—and many people feel overloaded with too much information and too many tasks across too many different tools. Choose a cloud-based productivity solution that's designed to keep people focused on the task at hand and minimize distractions—whether that means noise cancellation in Google Meet or a new integrated communications experience in Gmail.
- **Make every meeting more inclusive** — it's more important than ever to support your teams by helping people feel connected and supported. Keep meetings small and focused, so everyone has an opportunity to contribute. Encourage your team to keep their video cameras on so you're communicating fully (including those nonverbal cues) and leverage tools like live captioning in Meet to help everyone follow along.
- **Empower teams to use collaboration tools that work for them** — different teams have different needs for communicating and working together—for example, a creative team might need to collaborate on large media files and provide feedback in real time. Solutions like [Google Workspace Essentials](#) that can meet their collaboration needs but still tightly integrate with tools a business already uses—like Microsoft Office, Slack, and Salesforce—can offer teams more flexibility.



- **Think beyond location when it comes to security** — the recent shift to remote work has highlighted the need for IT teams to help employees get work done from home while protecting their organization's sensitive data. At Google, we employ a "zero trust" access approach called BeyondCorp, which allows our extended workforce to work successfully from untrusted networks on a variety of devices without using a client-side VPN. We also build security into all of our products and expand on those protections regularly—for example, we've recently rolled out a number of new security features in Google Workspace.
- **Put creating apps in the hands of the people who use them** — many of your employees use certain data and apps each day—and, as a result, they're experts in what might make those apps even more useful. No-code platforms like AppSheet allow them to create and customize the apps they need without requiring specialized developers or overburdening IT departments.

In only a few short months, organizations that had only held the occasional online meeting or companywide virtual town hall are now conducting the majority of their business through these technologies. The faster we embrace these changes, the better prepared we all are.



Conclusion

Looking ahead

As Vint Cerf said in the foreword of this guide, technology alone does not guarantee success; you need a culture that supports change and acceleration—which paves the way for innovation.

At Google, we've spent two decades thinking about how to organize and optimize for innovation, and we want to share the best of what we've learned with our customers. In fact, we work in close collaboration with them through a combination of courseware, workshops and bespoke advisory services, to facilitate success in things like:

- Building teams and communities
- Designing spaces that foster creative thinking
- Generating and managing idea pipelines
- Accelerating release cycles

Many companies have had to make decisions with a lot of impact so far this year, and there are more decisions to come. Google Cloud is here to help make these changes, with products that make the shifts easier. Take a step toward thriving in this digital age with a modern cloud infrastructure.

Take the next steps: Learn customer tips and lessons from across retail, manufacturing, healthcare, finance, and more, and let us help you architect a cloud solution that will grow with you for the next decade (or longer). [Talk to a partner today.](#)

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