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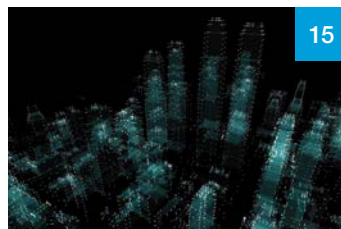# Advice from Silicon Valley: How tech-sector practices can promote innovation in government

Public-sector leaders recently met with leaders from the region's most innovative companies to learn about their culture of innovation firsthand. Here's what they heard.

Thomas Dohrmann, Ankur Ghia, and Elizabeth Murthy

For all the impact government innovation can have on people's lives, leaders at the national, regional, and local levels often feel constrained in bringing new technologies or ways of working to bear on their organizations. Long approval processes, a lack of resources, and time-consuming regulations can impede progress, and so does the task of assessing what innovations would be worth adopting.

To improve the functioning of government in areas such as resource allocation, talent management, and organizational culture, its leaders could learn from the experience of any number of companies and industries. But few are as synonymous with innovation as the technology sector—and even among technology hubs, Silicon Valley stands out. In March 2018, McKinsey and The Aspen Institute brought together a group of senior government leaders and tech-industry executives for two days of immersion in and discussion about innovation.[1]

What government leaders took away from the established tech heavyweights and disruptors who participated in the meeting could transform the way the public sector functions. Tech executives encouraged government leaders to be bold in vision but iterative in delivery—to think big but start small. They encouraged these public-sector executives to become obsessed with their end users: citizens, yes, but also companies, organizations, and foreign visitors and investors. They recommended cultivating talent and practices with an eye to the future rather than anchoring them in the present. And they encouraged public-sector leaders to harness the insights of others: around the world, governments are tackling the same challenges, some with great success. What follows captures highlights of the group's discussion on these themes.

Be bold in vision but iterative in delivery
Despite operating on a massive scale, governments tend to innovate incrementally. Bold moves can be catastrophic if they go wrong. Yet incremental moves and marginal improvements are not likely

to improve people's lives in a meaningful way—and may not generate the momentum to survive legislative or administrative processes.

As one of the tech leaders at the conference suggested, the challenges governments face will get even bigger and more complex as populations grow, age, and become more diverse. For governments, he argued, innovation of the necessary magnitude means breaking away from incremental improvements and aspiring to make something ten times, not 10 percent, better. Silicon Valley companies have a reputation for creating organizational cultures that aim to have an impact far greater than they do elsewhere. Although an aspiration to improve performance ten times over doesn't always realize results at that level, even an impact two or three times current levels would have a significant effect on people's lives.

The tactical aspects of achieving big goals include the following:

- *Think big but start small.* A practical-minded public-sector leader might argue that the bigger the goal, the more daunting the delivery challenge. The Silicon Valley executives at our conference offered a solution: fast, flexible ways of working; a focus on what they call minimally viable products, which offer just enough features to satisfy early adopters; and rapid user testing. Amazon, for example, describes what it calls a "two pizza" rule of thumb that keeps working teams small enough to communicate effectively and generate ideas and pilots rapidly: two pizzas should be enough to feed any team. These are core elements in a delivery model that helps innovators to control the scope, scale, and focus of projects. Pilots that carefully manage these three elements reconcile the need for bold aspirations with feasible, value-driven delivery. In fact, starting small and eventually scaling can be more effective than rolling out all at once.

Breaking bold aspirations into small, functional pieces of deliverable innovation would allow governments to lower the risk of innovating with programs while improving performance. Overcoming the initial start-up costs to launch a bold effort can be the most difficult part. Once the program gets going, the keys are to establish ambitious milestones along the way and to appoint the right leadership.

- *Make room for failure.* Many readers know that innovative tech firms do not view rapidly developed, unsuccessful pilots or tests as true failures. Instead, they understand how this kind of failure helps organizations to deploy their resources more intelligently. Failed tests and pilot projects are an essential part of building the knowledge base and controlling future risk. The emphasis is not on whether things will fail but rather on whether they fail quickly and enlighteningly. Indeed, Silicon Valley innovators would argue that longer-lasting projects with little or no testing increase the level of risk by obscuring the factors that lead to failure.

  Shorter testing cycles and small-scale pilots allow teams to correct their course, enable companies to launch more successful products more quickly, and lower the cost of development. Silicon Valley executives thus greatly favor a rapid test-and-learn model over the longer plan-and-test model, which, in their experience, can cost more and last three to five times longer.

- *Don't wait for the perfect moment.* Contextual challenges with technology, such as poor data quality, unstructured data, and legacy IT architectures, often dissuade public-sector leaders from pursuing innovation while they await a more user-friendly context down the road. Yet a massive, multiyear modernization or transformation effort is rarely needed for real impact. Instead, governments can adapt products, architectures, data structures, and other technology elements as they innovate.

  Some start-ups, for example, have partnered with large government entities (such as the Centers for Disease Control and Prevention, the US Department of Defense, and the state of California) to ingest, clean, and unify otherwise disparate data sets. This approach allows them to develop and test use cases quickly, without waiting for major changes to underlying databases or technology platforms. First, prove that an idea has value through an active use case, build upon it to determine the direction of change, and then decide which bigger tech changes might unlock additional value. Governments that take this approach need waste little time waiting for technology updates that may be slow to materialize.

Become obsessed with your end user

Perhaps Silicon Valley's greatest strength is its obsession with end users—customers. Tech firms in the Bay Area attribute their past success to this user-centric focus. The Silicon Valley executives at the conference were adamant about the need for a close consumer-facing, individual-user perspective, both on today's users and on the next wave about to come online. This obsession helps companies to offer high-quality products that users believe in, instilling more trust in the company that offers them and creating a more powerful impetus to provide the feedback needed to continue prioritizing the user experience. A high-quality product that solves a real need is valuable to individual customers and can achieve blistering adoption rates.

In the public sector, that approach requires governments to adopt the citizens' perspective, intentionally and rigorously, in decision making. In itself, this calls for a rigorous approach to seeking

An empathetic, citizen-obsessed perspective will allow public-sector leaders to create programs and products that generate significantly better outcomes at a significantly faster pace.

out and understanding what citizens experience and requires governments to develop channels that customers can use to share their perspectives and ideas. Pilot projects, for example, are opportunities to start conversations with customers or citizens about the product being developed, even if that means launching, early on, a minimally viable product available only to a subset of citizens. Silicon Valley thrives on feedback loops designed to improve both individual products and the organization's understanding of the customer perspective. Governments can benefit from this kind of citizen feedback, even when it isn't favorable.

Such a paradigm shift can be challenging, but an empathetic, citizen-obsessed perspective will allow public-sector leaders to create programs and products that generate significantly better outcomes at a significantly faster pace. That perspective could also help governments to prune their strategic initiatives by eliminating efforts and investments that have little or no impact on customers.

Build talent assets and practices for the future
Public-sector leaders often focus on the barriers they perceive in attracting top talent to government: relatively low salaries, frustrating bureaucracies, and regulatory hurdles that impede fast-paced progress. But as the Silicon Valley executives at our conference noted, what motivates the workforce is changing. Our definitions of work and career are being reshaped around a gig economy. Talented

employees increasingly prefer to change roles frequently, viewing work as a collection of experiences rather than a single track to follow throughout the course of a career. Millennials in particular aspire to do more than punch in and out on the job; more than two-thirds want to make a positive difference in the world and to find an employer whose values match their own.[2]

In Silicon Valley, supporting that employee-value proposition requires innovative companies to harness the energy and influence of top performers to make rapid progress—enabling them to break down barriers that prevent others from doing the same. Government bureaucracies can be risk averse and slow to react, and they reward workers who adhere to procedure. But Silicon Valley encourages top talent to role-model a bias for action. Innovative companies there create safe environments for teams to pilot action-oriented behavior, to experiment with what works for them, to learn from other organizations that do all this well, and to build success cases. Once there is a clear fit with one part of the organization, these companies expand innovations rapidly to other parts.

Governments could also capitalize on the changing nature of work rather than remaining captive to it. Indeed, they may have an inherent advantage over the private sector in their value proposition for these workers. As one public-sector participant observed, governments have the best missions and the best

purpose. Their missions are transformational and affect people's lives. For millennials, that's a motivator—and governments can build on this mind-set to create talent-sharing opportunities across agencies and even across the public and private sectors.

Harness the power and insights of those around you

In Silicon Valley, empire building—aiming to own and control an end-to-end product for a company's own users—usually falls flat. Organizations have more success building on existing technologies, participating in partnerships to avoid reinventing the wheel, and borrowing liberally from the good ideas of others. Ridesharing apps, for example, are unabashed borrowers: they pull geolocation data from mapping services and integrate existing payment platforms into the passenger experience. Such apps have become the hubs to deliver a service that would have been outside the portfolios of geolocation and payment companies. But the products of these companies improved with the data and the customer feedback funneled back to them from the ridesharing apps, creating a mutually beneficial ecosystem.

Ridesharing provides a related example for the public sector. One Silicon Valley executive observed, for example, the value of government partnerships with Uber Technologies to provide traffic data. The ridesharing service's anonymized data on average travel times between and within specified zones, he noted, were both more "live" and more accurate than what the public sector could access elsewhere. Transit and transportation agencies could get, free of charge, better and faster information than they have now, allowing them to focus on adding value through policy and decision making.

Government leaders should look outside their organizations to find better, cheaper, or faster

solutions that already exist and could improve the quality of desired outcomes—or even create ecosystem benefits the organization might not have imagined. Moreover, the agile organizational models prevalent in Silicon Valley help companies there assemble the right people quickly to solve the problem at hand, regardless of organizational reporting structures, hierarchies, or presumed resource constraints. Government can bring the same "solve it now" mentality to problems that otherwise might languish for years, but it takes leaders with a bias for action and collaboration to get things started. Silicon Valley has adopted these agile organizational models for years. Some companies have wholly eliminated standing meetings and opted for real-time collaboration to make decisions on important topics immediately.

■ ■ ■

Public-sector organizations may have diverse missions and different internal and external barriers to change. But across government, leaders with an appetite for fostering innovation can be champions for their organizations—and for each other—by starting small, gaining traction, and sharing their successes and learning across organizational lines. ■

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[1] The Insight to Innovation (i2i) conference was held in San Francisco, California, on March 7–8, 2018.

[2] *Redefining the C-suite: Business the millennial way*, American Express Services Europe, 2017, americanexpress.com.

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Sustaining high performance beyond public-sector pilot projects

Public institutions can turn remarkable short-term efforts into meaningful long-term results.

Andreas Bernecker, Julia Klier, Sebastian Stern, and Lea Thiel

All pilot projects come to an end—and therein lies the rub. In the short term, we've seen public-sector managers achieve remarkable results with small, dedicated projects, testing programmatic and operational changes even with a small budget and on a limited scale. But when those projects end, the strong results often do, too, as organizations fall back into old patterns of behavior and lose momentum.

One explanation for this may be the so-called observer effect. Behavioral psychology suggests that individuals participating in such projects work harder because they know their managers are watching more closely than usual. The challenge is to sustain that level of performance over the long term—which comes down to the strength of the organization's performance-management system. In fact, effective performance-management systems are particularly relevant for public-sector organizations, which are steered by budget priorities rather than profits, sales, or market share. Held accountable to taxpayers, they are limited in their use of financial incentives, and their efforts are often complicated by short-term political priorities.

So it didn't surprise us when a recent McKinsey survey suggested that public-sector officials are less likely than their private-sector counterparts to agree that their organization's "current performance management has a positive impact on individual employee performance."[1] While the survey's sample size was small, its findings were consistent with our experience with more than 500 projects in public-sector organizations that sought to improve performance-management systems and practices.[2] We've distilled seven critical lessons to sustain the performance of public-sector institutions beyond the original pilot project (Exhibit 1). While some of them may seem obvious, we frequently observe public-sector organizations encountering challenges when trying to implement them.

1. Define meaningful performance metrics

To perform at the highest levels, public-sector employees need a clear view on current performance, problems, and processes, as well as future goals. Such transparency is more common in focused, short-term pilot studies, where everyone is keenly attuned to the success of the experiment. But it can be rare in the broader public organizations they return to, where managers often think in functional or bureaucratic silos. And that complicates efforts to establish and communicate meaningful performance metrics, set stretch targets, and create cross-organizational mechanisms to change the way people work. Moreover, many public-sector organizations have a data problem. In some, performance metrics are drowned out by the flood of incoming information, while in others, the data needed to establish metrics in the first place may not even be available.

To address this, public-sector agencies need first to identify which strategic moves will best meet their overarching mission and then identify metrics for tracking progress for each strategic dimension. Business heads, functional heads, and even regional leaders should contribute to the process so that metrics are relevant ones that employees will use. They should consider financial factors, such as how cost-efficient processes are, but also nonfinancial ones, such as measures of quality and customer satisfaction. Performance metrics should be limited to only those that can be consistently defined and measured. Where possible, they should allow individuals to see their direct effect on performance. That can be a powerful motivator, since public employees often derive considerable personal purpose from working for the common good.

The improvement can be substantial. After one large European labor agency adopted these practices, its improving finances even allowed it to lower workers' and employers' contributions to unemployment

Exhibit 1

Seven ways to sustain high performance in the public sector.

Create transparency   **Involve managers in the solution**   **Empower the people**

1 Define meaningful performance metrics
High-achieving organizations need targeted indicators of performance that can be measured accurately and

2 Set stretch targets
Organizations can motivate employees to reach for optimal performance by clearly communicating stretch targets that reflect

3 Create digital tools for sharing information
Key performance indicators and stretch targets should be visible and shared in real time to change the way people work across the

4 Institute motivational dialogues
Managers should not simply review targets during performance dialogues; they should also offer incentives and support

5 Use agile methodologies
Working in fast-moving project-review cycles, or sprints, can help organizations launch perfomance-improvement

6 Emphasize nonfinancial incentives
Organizational leaders need to map incentive plans to the behaviors required to achieve high levels of

7 Build the skills for success
Capability building is a critical foundation for ensuring that high performance can be sustained long term

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insurance. Managers credit their success to limiting the number of core performance indicators to fewer than ten, such as the share of unemployed workers placed in employment, the rate of successful staffing at companies with fewer than 100 employees, and an indicator for customer satisfaction to make working on service quality a top priority. The agency made sure that the selected indicators indeed reflected the organization's mission and strategic objectives and could also be influenced by individual performance.

A common challenge is that the ultimate goal may not be measurable in the short term—consider long-term population health, for example. In such cases, organizations should focus on the most practicable indicators of performance they can measure. In our experience, finding such measures tends to be easier in more operational settings—for example, when tracking throughput of files or cases handled. For long-term population health, vaccination rates or child mortality may be useful proxies.

2. Set stretch targets

Traditionally, managers of public-sector institutions tend to set discrete, nonaspirational objectives for their teams. So even if pilot-project managers set stretch targets to encourage stronger performance, they were probably too easy. Among survey respondents, those in the public sector were more likely than their private-sector counterparts to describe performance targets as attainable. Further, managers assign employees in regional offices or back-office functions to specific targets relating to their own roles without communicating those targets openly to all staff. In part, this is because perfor-mance goals are often derived from specific laws rather than entrepreneurial objectives. As a result, employees often perceive performance with regard to their own teams or geographies meeting static targets rather than the performance of the overall organization.

Stretch targets can help boost employee engagement and motivation—as well as performance.[3] Instead of simply asking employees to work harder, organizations should encourage their employees to innovate and think "outside the box" to meet their stretch targets. One example comes from the senior-management level at a large public-sector service agency. During a national crisis, senior managers decided and publicly announced that the agency would formally process one million cases in a given year. That target was integrated into a narrative of solving a national crisis and was made explicit not only within the agency but also to the general public. Ultimately, the agency fell short of its target, but it still processed about 700,000 cases in that year—about 2.5 times the number from the previous year.

Of course, publicly communicating stretch targets at the risk of failing to achieve them can have consequences in media coverage and in the organization's standing in public opinion. Managers, therefore, need to strike a balance between being perceived as overambitious and being perceived as sluggish for having no stretch goals at all.

Such overarching goals should be clearly communicated from the top in a compelling narrative that reflects the organization's values and vision. Also, the target-setting process should be a recurring process as organizational leaders achieve immediate goals and look toward new ones. Our data suggest that public-sector organizations revisit employees' performance goals annually. That's less frequent than seen in private-sector institutions, which tend to readjust their goals biannually, quarterly, or even monthly.[4] However, in particular in a unionized civil-service environment, it is key to involve employees early and often.

3. Create digital tools for sharing information
Performance metrics and stretch targets are only meaningful if employees pay attention to them.

In the context of a pilot project where everyone knows what's being measured, that's usually a given—workers know their performance is being closely monitored. But more generally, where stretch targets exist, the consensus-driven, nonjudging culture of many public institutions often lacks the kind of rigorous performance management that would enable them to change the way people work. Managers can remedy this by creating mechanisms that allow employees at all levels to share relevant performance-management information in real time. In our experience, several such mechanisms work well.

For example, a digital situation room can increase transparency into employee and organizational performance. This can be created by developing a fully digitized platform that employees can log in to, at any time, from any device, to find real-time performance data. This enables a common, centralized view of the institution's processes, achievements, and bottlenecks. One state-owned travel and logistics organization in Europe implemented just such a platform in 2016. Employees from more than 150 locations can now log in to the digital situation room using their smartphones, tablets, or computers for critical reports on dimensions such as punctuality, customer satisfaction, and passenger information. A year in, the approach has received positive user feedback, and the organization is seeing improved performance. For example, the punctuality of long-distance transportation has increased by more than seven percentage points.

4. Institute motivational dialogues
Short-term pilot projects tend to be studies in collaborative experimentation, where workers and managers are in constant dialogue regarding project progress and next steps. But conventional performance reviews in public institutions tend to focus more on past performance than on fostering a culture where everyone works toward overall organizational goals.

Motivational, cross-cutting, solution-oriented dialogues can help public-sector leaders cast their feedback on employee performance in a more forward-looking light. This includes identifying the root causes of problems, instead of merely treating symptoms. It includes helping employees break problems down so they can be addressed in manageable parts—and identifying any required counteractions. Leaders at one European service agency, for example, planned such a dialogue using precise agendas, a limited group of clearly defined participants, and rigorous preparation and follow-up work to enable constructive and goal-oriented discussions. The structured and outcome-oriented discussions resulted in a set of clearly defined key to-dos, with assigned responsibilities for tracking progress.

Of course, to ensure that these dialogues are successful, it is critical for public institutions to build supportive cultures. Such cultures encourage candid, frequent conversations among employees and managers and equip everyone with the tools needed to make them happen, such as structured communication techniques and the ability to master more challenging feedback conversations. The effectiveness of performance management, and dialogues in particular, rests on managers' capabilities, where there is clearly still room for improvement. Survey respondents from the public sector were more likely to disagree with the statement that their organizations' managers are effective at coaching and developing employees.

Targeted capability building can help address this: for instance, a large European public-sector service agency established a leadership-coaching module that offered step-by-step guidelines on how to conduct successful performance dialogues as well as hands-on role-playing exercises. Performance of key projects led by future leaders who participated in these trainings improved significantly, and the capability-building modules received positive feedback from participants for their effectiveness.

5. Adopt agile practices

Broad-based efforts among public-sector institutions to improve performance often fall short of expectations. They often lack top-management support and clear timelines. They exhibit a low degree of collaboration among relevant stakeholders across departments as well as a stodgy resistance to change. And their lengthy planning and predefined delivery stages often result in delays and inflexibility.

Ideally, teams should move more quickly and efficiently. Rather than attempting to introduce all elements of agility across an entire organization from the outset, we recommend an intermediate approach, starting with some of the hallmarks of agile ways of working. These include faster and more adaptive cycles of iteration, testing, revision, and relaunch. And they include definitions of success from the customer's or citizen's point of view. In this approach, organizational leaders and teams come together every few weeks to review progress on relevant initiatives and address questions that have come up. This forces top managers

Motivational, cross-cutting, solution-oriented dialogues can help public-sector leaders cast their feedback on employee performance in a more forward-looking light.

to be closely involved in any changes that are being implemented. The increased frequency of interactions with senior leaders empowers employees to implement changes more quickly. And teams are able to own an outcome from end to end, with team members representative of the key stakeholders or value streams.

This approach can have a powerful effect on public-sector organizations' performance—and the impact can be significant. One European public health-insurance payer, for instance, has been undergoing a transformation of its core processes since 2014. Each week, two or three of the leaders of the organization's highest-priority initiatives present status updates to top management in sprint-review meetings. These meetings provide a suitable framework for the product owners and team members to discuss open challenges directly with top management, resulting in clear decisions and directions. Indeed, this approach to transformation has helped the payer generate savings totaling several hundred million euros every year.

6. Emphasize nonfinancial incentives

The effectiveness and efficiency of both public- and private-sector organizations are a direct reflection of the people who work there. Employees need training and appropriate incentives to deliver their best performance—an area where public institutions face limitations. For example, public-sector salaries may sometimes be less competitive than those in the private sector. And demographic change further intensifies the challenge of attracting sufficient talent to the public sector. As the baby-boomer generation retires, public organizations increasingly have to compete with attractive private-sector companies for a small pool of young, qualified individuals.

Nonfinancial incentives can help public organizations to engage and motivate employees. In fact, we believe they should emphasize nonfinancial levers more than financial ones—and not just because of limited funding structures. Research has found that nonfinancial incentives can be more effective for motivating employees than monetary rewards.[5] Our survey data suggest that public-sector organizations may already be ahead of the private sector in using nonfinancial rewards. For example, public-sector organizations are more likely than their private-sector counterparts to use more flexible work models—such as flexible hours and telecommuting—to reward and recognize employees' performance and are more likely to offer additional learning opportunities.

Some employees are also motivated by the emotional validation they receive when they are recognized for good performance and for the sense of mastery they gain as they develop new capabilities. Positive psychology—such as the "progress principle"—shows that creating forward, progressive momentum through meaningful work can help maximize employees' performance.[6] Such an approach could work particularly well in the public sector, where employees are often intrinsically motivated by a sense of purpose or a contribution to society. Strengthening positive incentives for high performers, such as more autonomy, freedom to work independently, opportunity to lead special projects or task forces, and chances of gaining attention or recognition, can further boost employees' motivation.

7. Build the skills for success

To ensure that organizational performance remains high in the long term, leaders in public organizations must develop new capabilities—filling skill gaps in various functional areas, for example, or training existing employees to work differently. In fact, our research shows that successful government transformations were three times as likely to train initiative leaders in change-leadership skills. They were also twice as likely to offer broader capability-building programs to employees involved in the transformation.

Yet our survey data suggest that public-sector managers typically fall short in at least three important interpersonal skill dimensions: giving feedback, motivating employees, and supporting their development. Public-sector participants in our survey were less likely than private-sector participants to agree that managers at their organizations were trained in these skills.

To address this, we have seen several public organizations follow a so-called field-and-forum approach to capability building. Instead of just providing training and assuming it will trickle into organizational practices, a field-and-forum approach provides classroom training in a series of workshops and then structurally implements it in the field with hands-on practice. The European labor agency, for instance, used this approach to train more than 150 managers successfully, leading to a positive effect on performance (Exhibit 2). More than 65 percent of the agency's regional units reported that performance of training participants improved. Also, 93 percent

Exhibit 2 **Capability building using a field-and-forum approach can improve performance.**

Implementation example[1]

2 days of training in forum

Work on practical case in field

Field

Forum

Development of individual learning plan

Reflections in teams

2 days of training in forum

Follow-up of individual learning plan
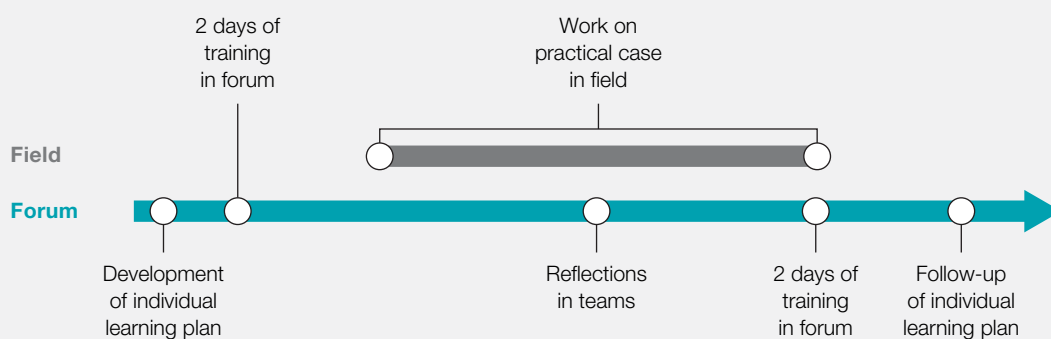
Performance improvement

65%
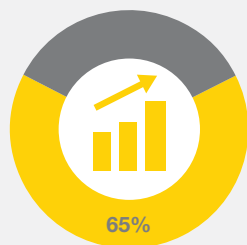
Share of regional units reporting that performance of participants improved after training

93%
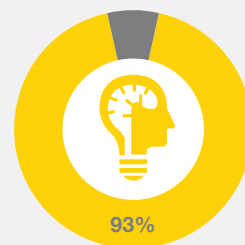
Share of training participants who reported getting valuable inspiration on implementing new capabilities

[1] Implementation occurred over 1 year and included more than 150 managers from all regional units and headquarters.

of training participants reported that they received valuable inspirations for how to implement new capabilities in their daily work.

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Adherence to these seven lessons should ultimately result in better services across the board. Not every organization will need to start from scratch, but our experience suggests that all will benefit from heeding these principles. ◼

1 The worldwide online survey was in the field from July 18 to July 28, 2017, and garnered responses from 1,761 participants representing the full ranges of regions, industries, company sizes, functional specialties, and tenures. Of the participants, 63 said they worked in the public sector and another 27 were employed in the private sector but reported working for a government agency or department. See Sabrin Chowdhury, Elizabeth Hioe, and Bill Shaninger, "Harnessing the power of performance management," April 2018, McKinsey.com.

2 While this article draws on in-depth case studies from a sample of European countries, we believe the findings to be relevant for most developed economies.

3 Mark Tubbs et al., "Goal setting: A meta-analytic examination of the empirical evidence," *Journal of Applied Psychology*, August 1986, Volume 71, Number 3, pp. 474–83.

4 Ibid.

5 Martin Dewhurst, Matthew Guthridge, and Elizabeth Mohr, "Motivating people: Getting beyond money," *McKinsey Quarterly*, November 2009, McKinsey.com.

6 Teresa Amabile and Steven Kramer, *The Progress Principle: Using Small Wins to Ignite Joy, Engagement, and Creativity at Work*, first edition, Boston, MA: Harvard Business Review Press, 2011.

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Asking the right questions to define government's role in cybersecurity

There is no one-size-fits-all approach for governments to manage cybersecurity. But asking some key questions can help leaders get started.

Mary Calam, David Chinn, Jonathan Fantini Porter, and John Noble
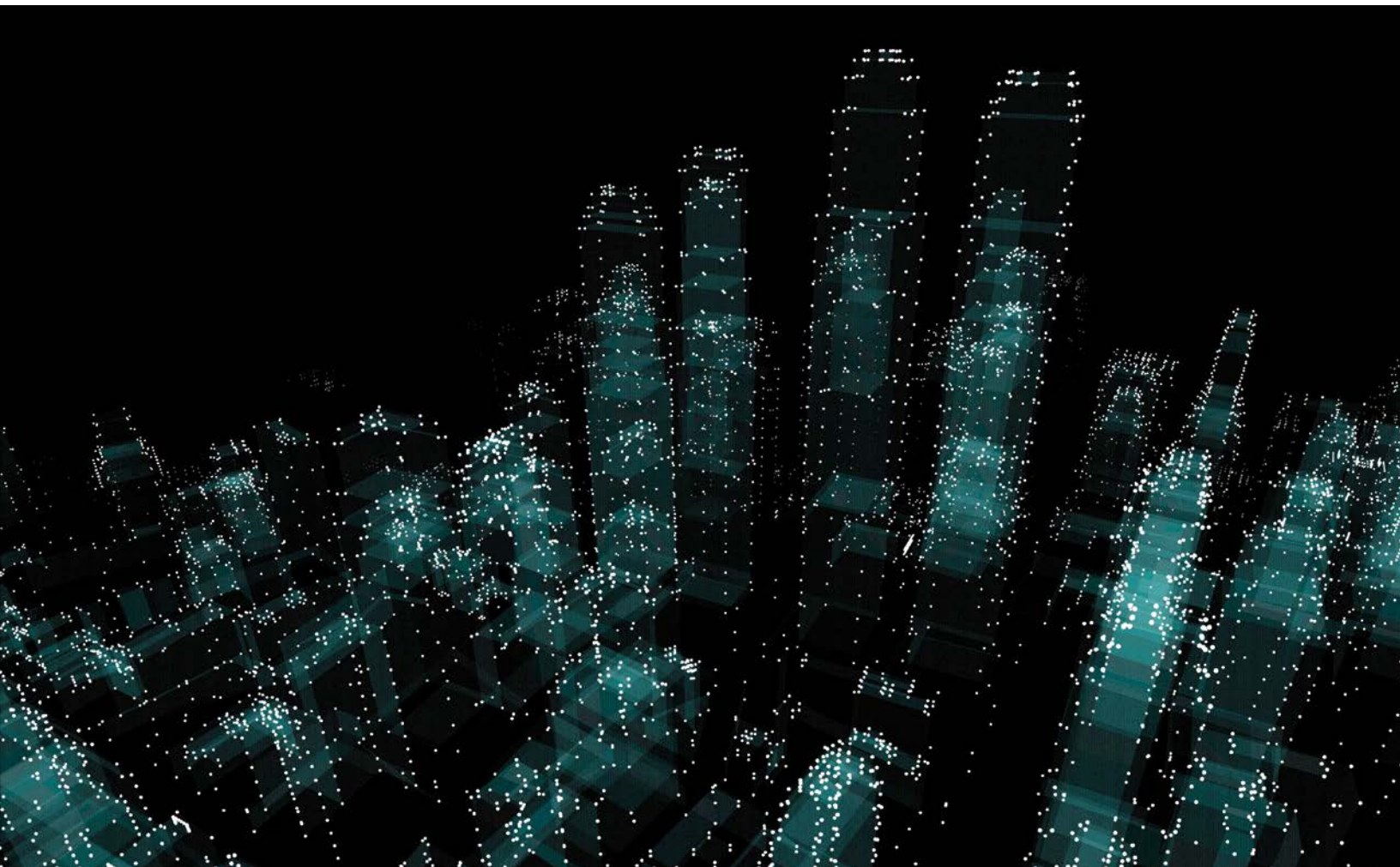
© cherezoff/Getty Images

Government leaders are increasingly aware that promoting prosperity and protecting national security include providing cybersecurity. That means demonstrating that a nation, state, region, or city is a safe place to live and do business online. And it includes deterring cyberattacks, preventing cyber-related crime, and protecting critical national infrastructure while also maintaining an environment that makes technological progress easy.

It is a tall order. National security and criminality are different—and multifaceted—in the digital arena. Tools developed by governments to provide security are seized, weaponized, and proliferated by criminals as soon as they are released. Malware-development utilities are available on the dark web, enabling criminal activity by even those with only basic digital skills. Cyberthreats cross national boundaries, with victims in one jurisdiction and perpetrators in another—often among nations that don't agree on a common philosophy of governing the internet. And complicating it all, criminal offenses vary, legal-assistance arrangements are too slow, and operating models for day-to-day policing are optimized for crimes committed by local offenders.[1] Even relatively low-level threats can have impact on a vast scale.

Each country is addressing the challenge in its own way, just as companies tackle the issue individually. Approaches vary even among leading countries identified by the Global Cybersecurity Index, an initiative of the United Nations International Telecommunications Union. Differences typically reflect political and legal philosophy, federal or national government structures, and how far government powers are devolved to state or local authorities. They also reflect public awareness and how broadly countries define national security—as well as technical capabilities among policy makers. Despite such differences, our work with public- and private-sector organizations suggests a series of questions government leaders can ask to assess how prepared they are.

Who is accountable?

An effective national cybersecurity ecosystem crosses traditional institutional boundaries and includes a wide range of departments, agencies, and functions, both military and civilian. Many countries have yet to clarify who is accountable across all dimensions of cybersecurity or to impose a single governance structure. That lack of clarity can result in a confused response to crises and inefficient use of limited resources.

In our experience, a single organization should have overall responsibility for cybersecurity, bringing operational activity and policy together with clear governance arrangements and a single stream of funding. Particularly when responding to a cyber-attack, clarity of leadership and decision making is vital to ensure the correct balance among helping victims recover quickly, taking measures to protect others (by increasing resilience and attacking the source of the attack), and performing a criminal investigation of those responsible. While some national and state governments have consolidated accountabilities into a clear structure, such as Estonia's Cyber Security Council, or have well-established and tested crisis-response mechanisms that they have adapted for use in cyberevents, as in Sweden, many others do not.

Key skills are often in short supply. Knowledge of the threat, resources, and authority to make decisions may all sit in different places across government. This reduces operational effectiveness and can also result in weak legislation, bad policy, and lack of investment. Some countries are starting to address these challenges. Germany, for example, has strengthened its Bundesamt für Sicherheit in der Informationstechnik (Federal Office for Information Security) to lead its national cybersecurity strategy and establish shared cybersecurity services for the government.

The United Kingdom's National Cyber Security Centre (NCSC) is also widely cited as a model for

government-level cybersecurity. It brings together analysis, assessment, and crisis response to provide advice to critical national infrastructure organizations, businesses more broadly, and the public (exhibit). Its operating model involves both access to highly sensitive intelligence and dissemination of public information. And it brings together cybersecurity experts from government and the private sector in a single body.

Questions governments can ask include the following:

- Are lines of accountability and remits clear—both for policy and for crisis response?

- Is it clear how government priorities are decided and communicated?

- Is there a coherent, cross-government strategy? Is it reviewed and refreshed regularly?

- What performance metrics does the government have for the strategy? How are they monitored?

- What information does the government publish about progress on cybersecurity?

- Do the responsible parts of the government come together regularly to agree on plans and review progress?

How centralized should you be?

Some countries have consolidated their audit and regulation functions in a centralized agency. Japan, for example, has its Cyber Security Strategic Headquarters, and Romania has its Association for Information Security Assurance. Others, such as India, have dispersed audit functions across multiple bodies. Both models can work, but as India's *National Information Security Policy and Guidelines* illustrates, a decentralized model—in this case, ministries are tasked to self-audit and bring

Exhibit

The National Cyber Security Centre leads the UK government's cybersecurity work.

Responsibilities:

Protect the United Kingdom's critical services from cyberattack

Manage major cybersecurity incidents

Improve the underlying security of the UK internet through technological improvement and advice to citizens and organizations

Sample functions:

Develops knowledge and distills insight on cybersecurity into practical guidance for public consumption

Responds to cybersecurity incidents to reduce the harm they cause to people and organizations

Applies industry and academic expertise to build capability in the cybersecurity system

Secures public- and private-sector networks

Provides a single point of contact for government agencies, departments, and organizations of all sizes

Collaborates with law-enforcement, defense, intelligence, and security agencies and international partners

Source: National Cyber Security Centre, ncsc.gov.uk

in external auditors—requires clear national guidelines and standards. Israel's benchmarking and accreditation arrangements have also been key to raising standards across all sectors.

At the very least, governments can insist on reporting of cyberevents by victims and on sharing

Governments do not have a monopoly on (or even the largest role in) cybersecurity. Open and trusting relationships with the private sector and academia are essential.

of vulnerabilities by suppliers through a single reporting, analysis, assessment, and response hub. In Germany, for example, federal legislators have sought to amend the law to require companies to register any cyberincidents in which they are a victim. Australia introduced a notifiable-data-breaches scheme in 2017, making it a legal requirement to notify affected individuals and the Office of the Australian Information Commissioner of serious data breaches.[2] Ideally, governments will also make it easy for citizens and businesses to report such breaches through an automated platform to facilitate responses, advice, and feedback. Such platforms will also increase transparency around threats and steps to mitigate them.

Sectoral regulators have a more significant role to play in raising cybersecurity standards than has perhaps been recognized. There are moves toward a more regional approach to regulation, reflecting the cross-border digital world—for example, the EU Commission's proposals to develop a regionwide framework of cybersecurity standards.

Questions governments can ask include the following:

- To what extent do data-protection and -privacy regulations reflect the challenges of the digital age?

- How coherent is the approach to cyberregulation across different sectors of the economy and the wider information- and communications-technology supply chain? What advice does the government provide?

- Does the criminal law adequately address offenses committed online?

- How closely have policies and regulation been developed in partnership with private-sector operators who will be affected?

How can you work with the private sector?

Governments do not have a monopoly on (or even the largest role in) cybersecurity. Open and trusting relationships with the private sector and academia are essential. Governments need commercial organizations to put more emphasis on cybersecurity, particularly as many companies operate across shared digital platforms. When companies and academic institutions have more knowledge, expertise, and capability, governments can work with them to develop the knowledge and tools needed to strengthen the ecosystem.

Many attacks could be prevented by basic security precautions and maintaining up-to-date patches, yet relatively few countries have invested significantly in education or training programs. One that has is Israel. Its investment in cybersecurity and integration of it into the educational curriculum, its extracurricular activities for high-school students, and its national military service have created a thriving, globally competitive, professional cybersecurity market. The Israeli government has also worked with the private sector, both to build capability and awareness and to grow the economy through the cybersecurity sector—by investing in R&D, for example.

Another example is Singapore, in which the National Cybersecurity R&D Programme supports public–private research partnerships. These are funded by $190 million Singapore dollars ($137.85 million) in the national strategy for developing research and the creation of the National Cybersecurity R&D Laboratory at the National University of Singapore.

And working with industry is also key to the United Kingdom's NCSC, where sharing of information and expertise includes a unique collaboration between a highly classified intelligence organization and the private sector. Its Cyber Essentials framework is a unified tool for assessing and guiding the development of cybersecurity for private-sector companies. Any company bidding for government contracts must confirm that it is compliant with the scheme. In conjunction with the Centre for the Protection of the National Infrastructure, NCSC also accredits companies under the government's cyberincident-response scheme as providers of technical-mitigation services.

Beyond that, few countries have made efforts to improve cybersecurity in small and medium-size businesses. These are likely to have the least resources and knowledge to build their own cybersecurity. Cybersecurity vulnerabilities in these companies can reduce their own economic value. But they can also be a weak link for bigger firms, creating vulnerabilities as they provide goods and services, including to governments.

Questions governments can ask include the following:

- To what extent does the government sponsor or invest in cybersecurity R&D?

- To what extent does the government support cybersecurity training, education, and awareness-raising for businesses, those in work, those in education, and those in the general population?

- Does the government engage the private sector or academia in its cybersecurity work? How effective are these partnerships?

- Does the government provide a platform for information sharing among organizations?

- What guidance on cybersecurity does the government provide to private-sector companies? How clear and coherent is that government advice to multiple stakeholders outside the government?

Are you operationally ready?

Countries vary dramatically in their ability to deal with cyberattacks and how they manage crises. It is often unclear how citizens and businesses should report cyberattacks or seek help. That confusion results in chronic underreporting and makes it hard to know the true scale of the problem and to build understanding to prevent future attacks.

To make matters worse, few countries yet have a workforce with sufficient cybersecurity skills to match demand. A study of the global information-security workforce estimates that the world will fall 1.8 million short of the number of cyberskilled individuals needed by 2022.[3] Those who do have the relevant skills command premium salaries. And what cybersecurity skills others have are often concentrated in small pockets, such as in the intelligence agencies, and not available to governments more broadly. Most governments would do well to invest now in recruitment and training and to adopt more flexible approaches to recruitment and retention from outside the traditional sources of talent. For the short term, consolidating existing scarce resources into a single place, as the United Kingdom's NCSC has done, can boost the value of available expertise, bringing the most highly skilled cyberexperts together as a single, government resource.

Some governments are taking a proactive stance on cyberdefense. From 2009, for example, the Australian government consolidated the internet gateways of various departments into seven certified "lead-agency gateways." These provide an initial foundation for consistent cybersecurity and a reduced attack surface.[4] The UK government launched a suite of initiatives in 2017 known as Active Cyber Defence, designed to "protect the majority of people in the UK from the majority of the harm caused by the majority of attacks, the majority of the time." As a result, UK-hosted phishing attacks fell by about 20 percent in the 18 months prior to February 2018, even as global volume itself rose by nearly 50 percent.[5]

Law-enforcement capabilities are often the least effective part of a government's response. Law-enforcement agencies spend up to 95 percent[6] of their budgets on staff, allowing only limited investment in technology. Staffing models are often highly traditional, making it more difficult to bring new technical skills into the organization at the scale and pace needed to address the volume of business that is cybercrime. Criminal-investigation techniques, such as seizure of company servers in evidence, can hinder recovery from attack.

Questions governments can ask include the following:

- What are the emergency-response arrangements for a major cyberattack?

- Is there a national emergency-response team? Are there emergency-response teams for key sectors?

- What arrangements are there for the sharing of information to prevent and respond to a cyberattack? Are there clear reporting mechanisms for alerting the authorities to a cyberattack? What happens when a report is received?

- How often are response arrangements tested and exercised?

- How will the government ensure rapid recovery from a cyberattack?

- Which agency or agencies have responsibility for investigation of cyberattacks and online crime? What capabilities and capacity do those agencies have?

- What capabilities and capacity does the government have to gather intelligence on cyberthreats, assess them, and disseminate the analyses in a way that shapes action?

Where is multinational cooperation possible?

The transnational nature of cyberattacks means that even effective state or national coordination might not be sufficient. Mutual legal-assistance treaties were constructed for the predigital age, and mechanisms are too slow to keep pace with investigation of online crime. In 2013, a UN report on cybercrime estimated that mutual legal assistance took 150 days on average.[7]

Differences in political and ideological positions might make further progress on establishing international norms for the internet impossible. Instead, norms agreed by coalitions—such as the Tallinn Manual, sponsored initially by NATO—might emerge to shape responses to state-based attacks. Bilateral partnerships between other states, such as the one between the Czech Republic and Israel that focuses on the protection of critical assets and encourages private-sector innovation, are also developing. And a proposal before the European Parliament would strengthen its Agency for Network and Information Security in leading the union's cybersecurity efforts, including by having the agency act as a coordination hub for crises.

Questions governments can ask include the following:

- In which international forums on cybersecurity does the government participate?

- What arrangements with other nations does the government have to share information, best practices, or alerts?

- Does the government collaborate with other governments to prevent or investigate cybercrime? How effectively does it use mutual-legal-assistance mechanisms for cybercrime?

How have you defined critical national infrastructure?

If governments address no other aspect of cyber-security, they must protect critical infrastructure. Many, such as the United States, have started to address cybersecurity from this perspective.[8]

What exactly constitutes critical infrastructure and the proper role of government in protecting it are not universally agreed upon. Some countries, such as France and Israel, have a centralized, regulatory approach toward companies perceived as critical. Both have legislation defining what is critical and related obligations. France formally designates both public and private companies as critical operators, which must then meet a range of specified security requirements —and it defines the category broadly to include more than 250 public and private operating companies across 12 sectors.[9] Others, such as Switzerland, are more decentralized. In the

United States, the Department of Homeland Security coordinates a national infrastructure-protection plan and requires sector-specific agencies to develop sector-specific plans. The Office of Infrastructure Protection offers tools and training for companies that are considered critical infrastructure. In the Czech Republic, the implementation of a cyber-security legal framework has facilitated a more directive approach.

The digital world extends the definition of critical national infrastructure, lengthening the list of sectors and activities that are essential to the smooth functioning of the economy. Companies within those sectors might also have critical dependencies on other organizations, themselves outside the definition of critical national infrastructure. Yet few countries have domestic hardware and software industries of any scale, leaving them potentially vulnerable to cyberattack through foreign-owned infrastructure. Government decisions about inward investment might increasingly have to balance economic advantage with cybersecurity considerations.

Questions governments can ask include the following:

- Is there an agreed-upon definition of the critical national infrastructure?

- By what means does the government ensure the cybersecurity of critical infrastructure?

- How does the government support the companies and organizations it defines as critical?

The digital world extends the definition of critical national infrastructure, lengthening the list of sectors and activities that are essential to the smooth functioning of the economy.

- How does the government ensure compliance with security standards? How is that compliance measured?

- Is there a mechanism to ensure that cybersecurity is taken into account when considering major foreign-investment propositions?

■ ■ ■

Government's role in cybersecurity will only grow as the global demand and dependency on the internet and internet-connected devices continue to increase. With increasing threats and fewer opportunities to fail, governments must rise to the challenge to protect both national security and economic prosperity. ■

1 *Real lives, real crimes: A study of digital crime and policing*, Her Majesty's Inspectorate of Constabulary and Fire & Rescue Services, December 2015, justiceinspectorates.gov.uk.

2 "Notifiable data breaches scheme," Office of the Australian Information Commissioner, oaic.gov.au.

3 *2017 Global Information Security Workforce Study*, Center for Cyber Safety and Education, iamcybersafe.org.

4 "ASD certified gateways," Australian Signals Directorate, February 2017, acsc.gov.au.

5 Ian Levy, "Active Cyber Defence – one year on," NCSC, February 5, 2018, ncsc.gov.uk.

6 Review of published police-department budgets.

7 "The mutual legal assistance problem explained," blog entry by Gail Kent, February 23, 2015, cyberlaw.stanford.edu.

8 Interview with Daniel Prieto, former director of cybersecurity and technology, US National Security Council.

9 *The critical infrastructure protection in France*, Secrétariat Général de la Défense et de la Sécurité Nationale, January 2017, sgdsn.gouv.fr.

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How developing economies can get more out of their infrastructure budgets

Governments in developing economies often lack the capacity to conduct thorough reviews of proposed capital projects. A streamlined approach can identify those ready for funding.

Rima Assi, Nicklas Garemo, and Arno Heinrich
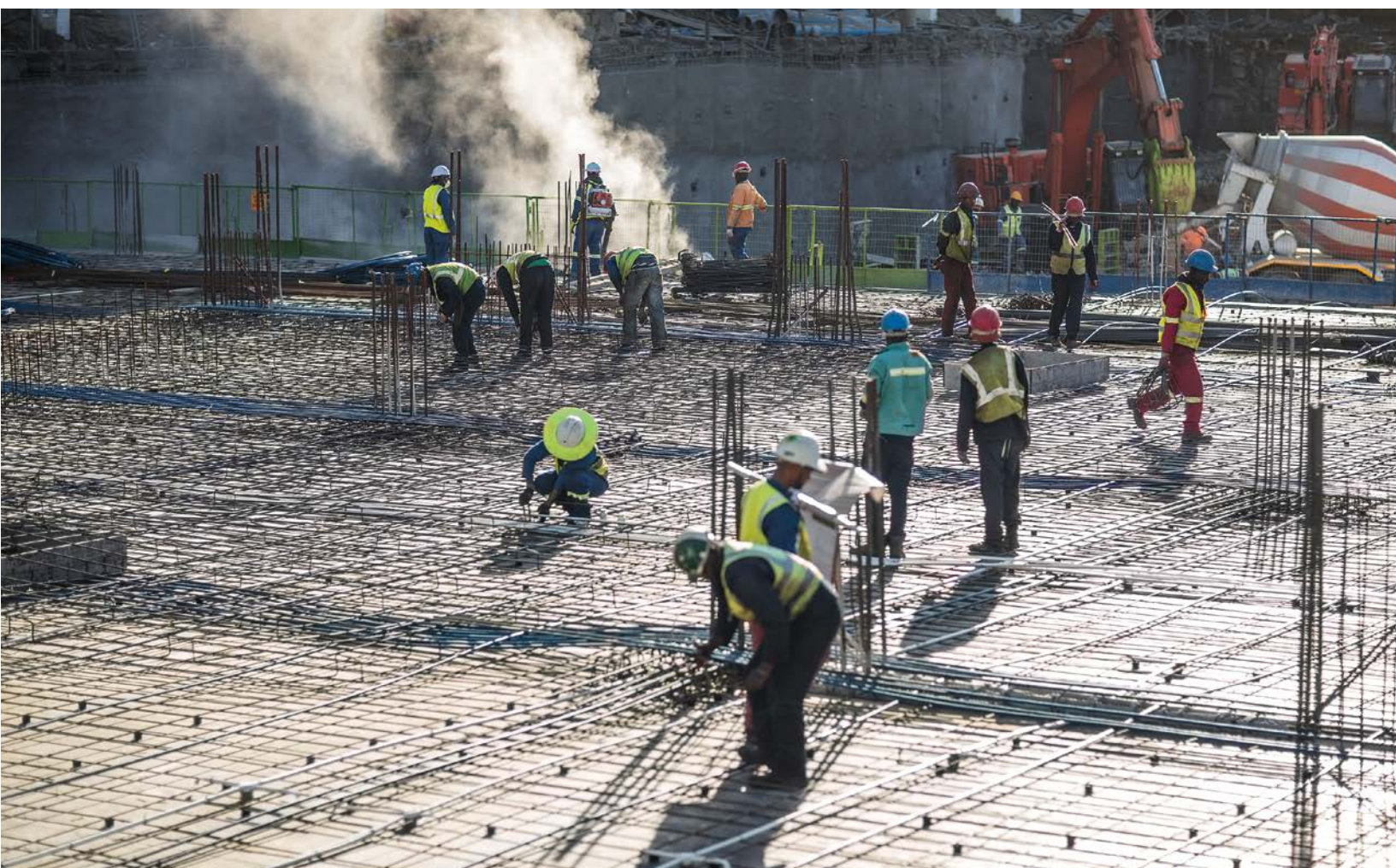
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In developed economies, policies and practices for balancing diverging interests in public infrastructure spending are well established. South Korea, for example, established the Public and Private Infrastructure Investment Management Center in 1999 to conduct feasibility studies on large public investments and expanded its mandate to include appraising and managing public–private infrastructure partnerships in 2005. Since then, the center has reduced project overruns by 82 percentage points. Similar units include the United Kingdom's Infrastructure and Projects Authority, Germany's Bundesrechnungshof, and Australia's Infrastructure Australia.

But in developing markets, many governments have yet to build a capacity for conducting extended project reviews and feasibility studies, because talent is scarce or internal priorities conflict. As a result, these governments often end up funding ill-prepared, poorly designed capital projects, whose scope often diverges from real demand. Overlaps between projects are not uncommon—and actual project costs often exceed forecasts. In fact, nearly 40 percent of the money devoted to global investments around the world is spent ineffectively as a result of bottlenecks, a failure to innovate, or market failures.[1] In developing economies, these ineffective expenditures amount to over $1 trillion a year.

It may be too much to ask that every proposal get a full-scale, in-depth evaluation that takes months to complete. Even in developed markets, that's not always possible. But it is possible for finance ministries to conduct more streamlined financial assessments of the preparedness and design of projects in only days or weeks. Indeed, we have seen developing countries in Africa and the Middle East embark on such programs by adapting centralized control units and the required level of governance to their own circumstances.

The initial assessment of project preparedness

As a first step, a government must ensure that all projects have been thought through at a sufficient level of detail. This may sound obvious, but projects that fail to describe their rationale properly, don't evaluate alternative solutions, or lack detailed budget plans are hardly uncommon. What's more, implementing ministries often lack strong capabilities in project planning and rely instead on the private-sector organizations that design and implement such projects to review their own work. The resulting incentive structures, far from optimizing costs, tend to inflate the scope and specifications of these projects.

When the finance ministry in one African country reviewed proposals to build new roads, for example, it found a number of them significantly exceeded benchmark costs—often coming from design firms that consistently produced designs with higher costs. When a more thorough evaluation isn't feasible, a streamlined one- or two-day review can help. Typically, an oversight body would pose a series of straightforward questions assessing how clearly a problem is defined, along with a capacity–demand analysis and a consideration of alternative solutions. This kind of evaluation would examine a proposal's financial aspects, like planned budgets and cash-flow requirements. It would also probe the operational elements: a realistic implementation plan, compliance with regulatory requirements, and interdependencies and overlaps with other projects. The government of the country in the example, knowing that it lacks this capability, is now setting up an in-house unit to oversee contracts with design companies and challenge their products.

The impact can be considerable. One government in another developing economy took this approach with more than 250 projects in its portfolio and found that only a quarter of them were adequately prepared.

Most frequently, project owners failed to quantify the capacity–demand analysis and alternative ways of meeting future demand. As a result, they were granted only enough of their requested budget to conduct studies to increase their preparedness.

A deeper review of project design

Once the initial assessment—often of hundreds of projects— narrows down the pool, finance ministries can conduct a more thorough review of each project's overall design. That, too, can be streamlined. The finance ministry of the country in the example developed a way to conduct reviews that lasted just two weeks. In that time, it identified opportunities to reduce costs by an average of 20 to 40 percent, without reducing outputs. During the reviews, which will now be a standard part of the annual budgeting process, the cost-review unit of the finance ministry met with owners of projects and tested their design through a series of questions aligned with the initial assessment exercise described above. These included the following:

- *Public priorities.* Does the scope of a project focus on services and features that people really want? Is there evidence that the project is truly needed and meets the country's socioeconomic objectives?

- *Capacity and demand.* Does capacity match future demand? Are the expectations for demand realistic? Can alternative solutions reduce demand?

- *Costs.* Do unit costs reflect benchmark levels? Can costs be cut by adjusting a project's time frame (to reduce the need for tight deadlines) or by calibrating the schedule to the availability of capital?

- *Productivity.* Could existing assets improve operations?

- *Funding.* Are the funding requirements realistic? Are there any opportunities for private-sector funding? Will the assets generate revenues that could fund the project? Can implementation be deferred or slowed down to stretch out the need for funding?

These project reviews can be significant: a two-week review of a public convention complex, for example, identified $1.7 billion in potential savings (Exhibit 1). Elsewhere, one ministry of health's $300 million request for additional beds for intensive-care units (ICUs) was nearly halved after reviewers considered benchmark utilization data. They found that the proposal's assumption about the average length of stay per ICU bed was twice as high as the benchmark, mainly because facilities lacked intermediate beds and had nowhere to send discharged patients. As result, the ministry of health was advised to procure lower-cost intermediate beds and fewer ICU ones.

Or consider a proposal by another country's housing ministry to develop affordable housing. In-depth reviews found that the proposed design included features—such as skylights, longer driveways, and larger bedrooms—that increased costs but would not necessarily be valued by residents. The optimized design featured more bathrooms, but (unlike the original proposal) with showers instead of tubs; more but smaller bedrooms; and shorter driveways with less internal parking. These homes were better aligned with the expectations of likely residents but cost 15 percent less—so the ministry could build more homes on its $4 billion total budget.

These two-week reviews are not the only way to improve a project's value. Others include standardized project design and materials; value engineering, which aspires to make design specifications reflect the expected life span of

Exhibit 1   **A two-week capital-expenditure review of a public convention complex identified $1.7 billion in savings.**

Capital-expenditure review

	Lever	Key question
Capacity-demand analysis	Aligning capacity with future demand	Do capacity estimates meet or exceed benchmarks?
	Reducing demand	Are there less expensive alternatives that would reduce demand?
	Utilizing current assets	Can some demand be met by or diverted to current assets?
	Optimizing scope	Is project unnecessarily complex?
Budget estimates	Optimizing costs	How do unit costs compare with regional and global averages?
Multiplicity of solutions	Considering alternative sources of funding	Can contributions from not for profits and private donors be solicited?
Implementation plan	Assessing timing and options value	Can some costs be deferred?
Other	Generating revenues	Can usage fees generate revenue to support construction?

Potential savings impact, $ billion

Savings opportunities

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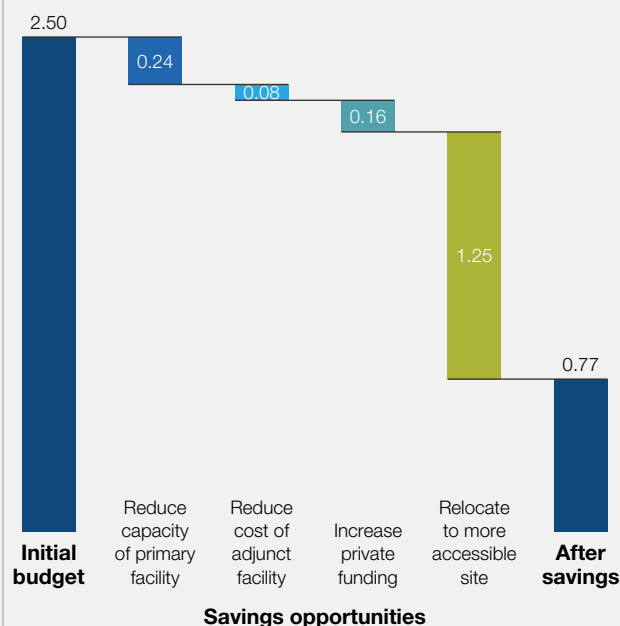
projects; frame (or framework) agreements to procure frequently used materials over time; and stage gates to ensure project overviews. When there's enough time, a more targeted three-month review of project portfolios can also be powerful (Exhibit 2).

Lessons learned

As with any project review, the time spent on assessments must be weighed against the resulting need to delay critical projects. In our experience, any such effort must necessarily be conducted transparently. The examination of the portfolio should be informed by public priorities, a realistic assessment of demand and funding, and detailed cost modeling. In addition, any capital-planning process should take into consideration some simple and intuitive lessons:

- *Review projects as early as possible.* The sooner projects are reviewed, the greater the opportunity to influence their scope without incurring significant opportunity costs. Once groundwork begins, it will be too late for significant changes. Ideally, reviewers should be involved during a project's idea-generation phase and ought to undertake their first deeper assessments on the initial business plan and high-level design.

Exhibit 2   **When time allows, a fuller review of capital-expenditure proposals can be invaluable.**

Demand-to-capacity analysis over 3 months

Systemwide objectives
- Identify and select systemwide objectives
- Define performance metrics for system and entire sector

Zoning system
- Define nodes
- Group nodes into transport zones
- Define main transport corridors for country

Socioeconomic model
- Gather socioeconomic data for goods and people
- Develop socioeconomic models and forecasts that embody country's strategic targets

Current network model
- Model current transport network with software support
- Input current socioeconomic data

Current demand (real)
- Collect people and freight-traffic data (through GPS data, mobile-phone data, traffic counters, etc)
- Consider all transport modes
- Run model to assess current demand vis-à-vis network supply
- Calibrate model outputs by using data collected

Future demand (synthetic)
- Set strategic outputs on basis of country's overall objectives, as well as sector-specific strategies
- Set time horizon for forecast and analysis
- Input forecasted socioeconomic data for transport zones
- Conduct selected interviews to define end users' transport preferences

Reiterate/ syndicate

Future network
- Conduct capacity-gap analysis on current network
- Analyze sector-specific strategies to harmonize interventions across modes
- Run model for future state
- Define and prioritize interventions to bridge gap and maximize country's economic returns

Interface analysis
- Identify and analyze major intermodal nodes
- Assess current and future need for intermodal hubs and links

Financial assessment
- Define high-level budget estimate for selected projects
- Define capital-deployment plan

- *Proceed concurrently with no-regrets moves.*
  Even a two-week process can be time consuming
  when many projects must be reviewed. To avoid
  significant delays in implementing projects,
  managers can conduct parallel, agile assessments
  in the early phases. No-regrets tasks, such as
  conducting pilot studies, can continue concurrently
  as projects await thorough assessments.

- *Give the reviewing entity a strong mandate.*
  Project owners need strong incentives to
  collaborate with the review process. The strongest
  one, in our observation, is to link reviews directly
  to funding decisions: no review, no funds.

  ■ ■ ■

Governments that don't have a dedicated function
specifically intended to conduct full-scale reviews
of capital projects can conduct more streamlined
ones. That will help ensure that only well-prepared,
well-designed proposals are funded and that they
are aligned with public priorities. ■

[1] Jonathan Woetzel, Nicklas Garemo, Jan Mischke, Priyanka Kamra, and Robert Palter, *Bridging infrastructure gaps: Has the world made progress?*, McKinsey Global Institute, October 2017, McKinsey.com.

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Automation and the future of the African American workforce

Without concerted effort, automation could heighten disparities that already harm minority workers.

David Baboolall, Duwain Pinder, Shelley Stewart III, and Jason Wright
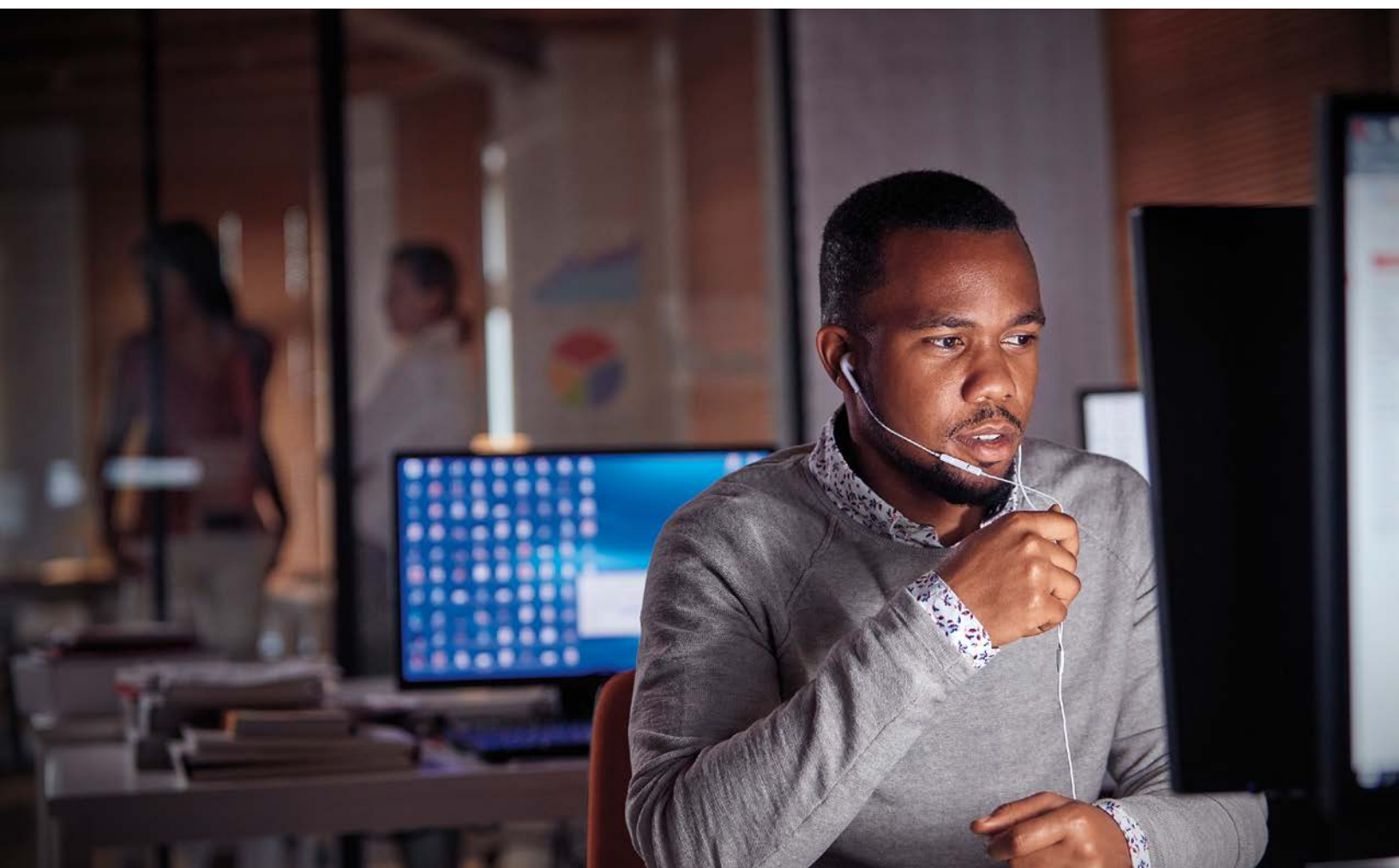
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How automation affects the US workforce is largely a question of which jobs and activities can be most easily automated. At a macro level, change will take time to occur. It's not likely that a million truck drivers will be thrown out of work in the next few years, because the technologies to automate these roles have not matured, nor have companies developed business cases to use them.

But at the micro level, change can happen quickly as individual workers are displaced—which is more likely in some types of roles than in others. The kinds of support activities performed by service workers, administrative-support workers, operatives, laborers, and helpers are, not surprisingly, more easily automated than are the directive activities performed by executives, professionals, technicians, and sales and craft workers.[1] And that leaves African Americans especially vulnerable.

In fact, when we overlaid racial representation over automation assessments of nearly 2,000 different detailed work activities in more than 800 occupations, we found that African American workers are disproportionately concentrated in the kinds of support roles most likely to be affected. Moreover, we found that efforts to ease a general workforce transition into an automated future could wind up worsening existing racial disparities in income, opportunity, and wealth.[2]
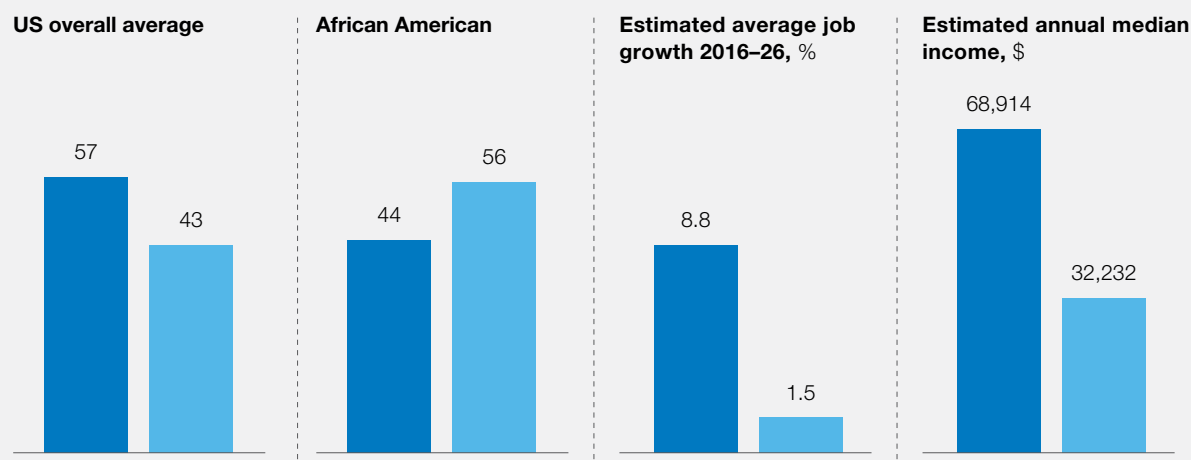
A vulnerable workforce

Representation of the African American workforce in directive and support roles is proportionately opposite that of the general population, despite increasing evidence that inclusion and diversity are sources of competitive advantage. While a majority of the general population are employed in directive roles, a majority of African American workers are in support roles (Exhibit 1). Even without the effects

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Exhibit 1   **More African Americans are in slow-growing, low-paying support roles than in fast-growing, high-paying directive roles.**

Distribution by type of role, % of workforce

■ Directive[1]   ■ Support[2]

US overall average
Directive: 57
Support: 43

African American
Directive: 44
Support: 56

Estimated average job growth 2016–26, %
Directive: 8.8
Support: 1.5

Estimated annual median income, $
Directive: 68,914
Support: 32,232

[1] Examples of directive workers include executive and senior officers and managers, first and middle officers and managers, professionals, craft workers, sales workers, and technicians.
[2] Examples of support workers include administrative-support workers, laborers, helpers, operatives, and service workers.

Source: US Bureau of Labor Statistics, 2016; US Equal Opportunity Commission; McKinsey Global Institute analysis

of automation, this distribution exacerbates racial wealth inequality. For example, support roles are predicted to grow at 1.5 percent over the next decade, significantly slower than the 8.8 percent growth predicted for directive roles over the same period. Moreover, workers in support roles are paid less, with an average wage around $32,000, compared with nearly $69,000 for workers in directive roles.[3]
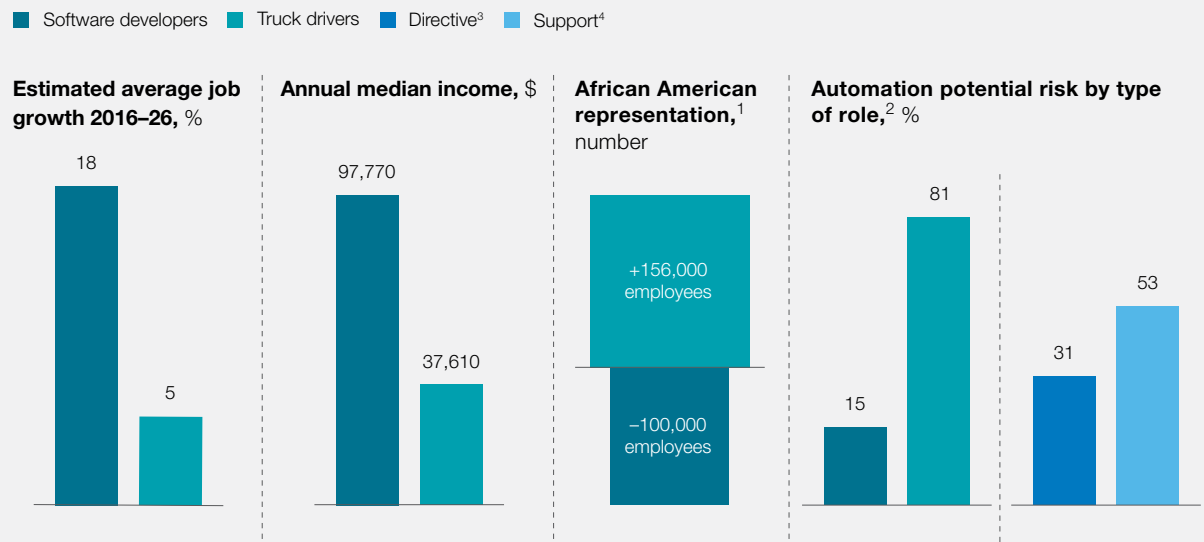
As the effects of automation play out, the racial distribution between support and directive roles is likely to become more concerning, and African Americans are especially vulnerable. That's because a much higher percentage of the time spent on the support roles they work in will be automatable as companies adapt and develop technology—53 percent, compared with 31 percent for directive roles. Among the occu-

pations we analyzed, that amounts to an estimated 459,000 more jobs that could be automated.

For example, African Americans are overrepresented in the category of truck drivers—that is, there are roughly 156,000 more African Americans driving trucks than their number in the total US population would predict. Given that overrepresentation, automation of that occupation would disproportionately affect African Americans, yet all African American truck drivers are vulnerable—as many as 581,000 workers. Eventually, as much as 80 percent of a truck driver's work hours—the field's "automation potential"—could be automated as technology rapidly evolves (Exhibit 2). By contrast, African Americans are underrepresented among software developers by around 100,000 employees

Exhibit 2

Since support roles are more likely to be automated, African Americans are at greater risk relative to the average US employee.

■ Software developers ■ Truck drivers ■ Directive[3] ■ Support[4]

Estimated average job growth 2016–26, %

18

5

Annual median income, $

97,770

37,610

African American representation,[1] number

+156,000 employees

−100,000 employees

Automation potential risk by type of role,[2] %

81

53

31

15

[1] The difference between the number of African Americans in given job classifications and the number predicted by their proportion of the US population.

[2] Percentage of employee time that can be automated by adapting currently available technology, as calculated by multiplying the automation potential of each role by the number of employees in each role.

[3] Examples of directive workers include executive and senior officers and managers, first and middle officers and managers, professionals, craft workers, sales workers, and technicians.

[4] Examples of support workers include administrative-support workers, laborers, helpers, operatives, and service workers.

Source: US Bureau of Labor Statistics, 2016; US Equal Opportunity Commission; McKinsey Global Institute analysis

nationwide. That field has an automation potential of 15 percent. Between the two—and intimately connected to projections of automation—the truck-driver category is projected to grow only 5 percent between 2016 and 2026, with a median wage of nearly $38,000, while the software-developer category is projected to grow by 18 percent, with a median wage of nearly $98,000.

Even in job categories that can't be easily automated and where African Americans are overrepresented, the advantage is muted. African Americans are overrepresented among nursing and home-health aides by around 420,000 employees, predominately women. Although the field has only a 16 percent automation potential and is among the fastest-growing job categories, it also has among the lowest median wage levels, at around $26,000. Fields offering higher wages today may be at greater risk of automation. For example, among postal-service workers, African Americans are overrepresented by about 55,000 employees, with an average wage of $57,000. That higher wage, plus a 73 percent automation risk, explains the category's negative growth rate of 13 percent.[4]

How to help

As the effects of automation concentrate more African American workers in low-wage jobs, the existing income and wealth gaps between African American and nonminority families are likely to grow. Nonminority workers already earn around 1.5 times more than their African American peers with the same educational backgrounds.[5] And the average nonminority family has ten times the wealth of the average African American family.[6]

Retraining in just five occupation categories would mitigate nearly 60 percent of the risk to the African American workforce (Exhibit 3). But since African American workers have access to

fewer economic resources to address potential displacement on their own, it will take collaboration across the private, public, and social sectors to promote retraining opportunities for African Americans.

Private sector

Companies can lead in two ways. First, they can focus on diversity, equity, and inclusion (DEI) to help future African American workers move into and advance in job roles with a lower risk of automation. Many companies see diversity and inclusion as sources of competitive advantage and financial outperformance.[7] By focusing on DEI today—addressing various forms of bias that inhibit career growth, for example, or emphasizing inclusion and representation—companies are more likely to retain talented minorities who can progress through the managerial pipeline.

Second, companies can ensure access to reskilling opportunities for low-income workers to prevent displacement. For example, Etsy, the online global marketplace, offers three-month scholarships to its Recurse Center for women who lack training in programming. This initiative was launched to address the underrepresentation of women in Etsy's workforce. Since the program's inception, Etsy has increased the number of women on its engineering team by about 500 percent.[8] Other companies can launch similar efforts to retrain and reskill African American employees.
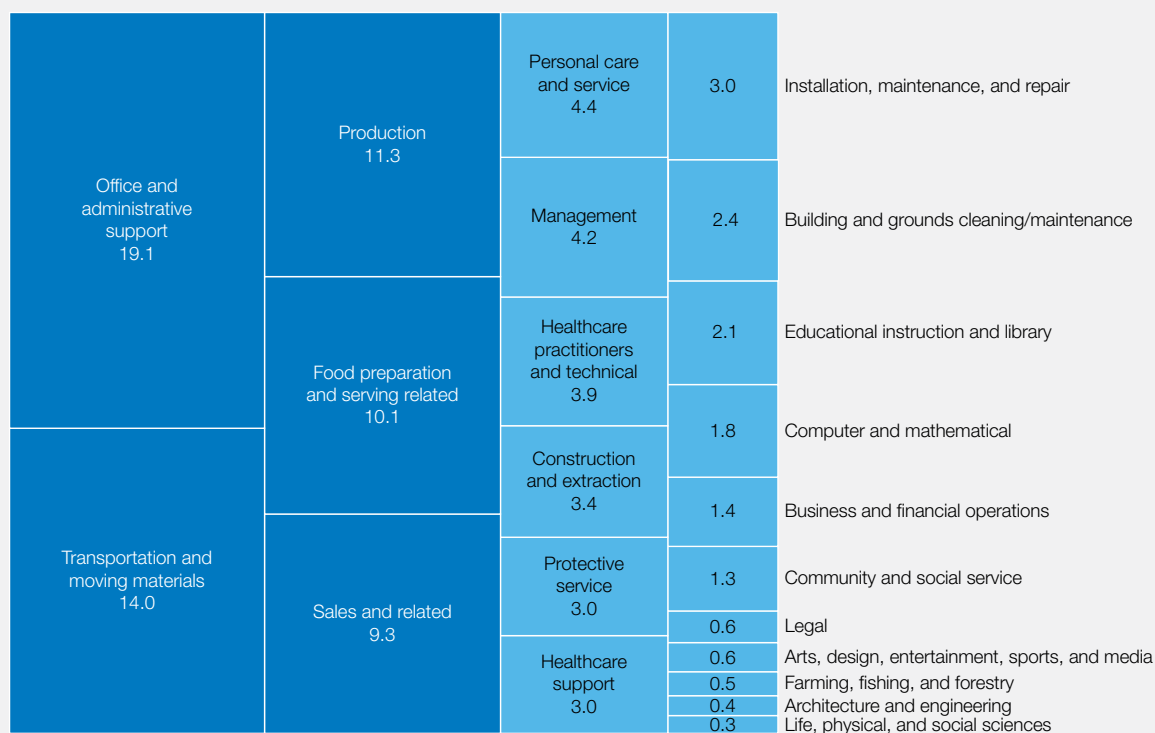
Public sector

The public sector—especially educational institutions—could offer more access to reskilling opportunities for African American workers, enabling future workers to select higher-paying career pathways. Reskilling and training in low-income communities, often through community colleges, have potential for great impact, and several organizations are already finding success in cross-sector collaboration. The Kansas Advanced

Exhibit 3

More than 60 percent of the automation risk for the African American workforce is concentrated in five occupation categories.

Top occupations that drive automation risk for the African American workforce,[1] % of total automation risk

Office and administrative support 19.1	Production 11.3	Personal care and service 4.4	3.0	Installation, maintenance, and repair
		Management 4.2	2.4	Building and grounds cleaning/maintenance
	Food preparation and serving related 10.1	Healthcare practitioners and technical 3.9	2.1	Educational instruction and library
			1.8	Computer and mathematical
		Construction and extraction 3.4	1.4	Business and financial operations
Transportation and moving materials 14.0	Sales and related 9.3	Protective service 3.0	1.3	Community and social service
			0.6	Legal
		Healthcare support 3.0	0.6	Arts, design, entertainment, sports, and media
			0.5	Farming, fishing, and forestry
			0.4	Architecture and engineering
			0.3	Life, physical, and social sciences

[1] As calculated by dividing the number of employee hours that can be automated in each occupation category by the total number of employee hours that can be automated in the African American workforce.

Source: US Bureau of Labor Statistics, 2017; US Equal Opportunity Commission; McKinsey Global Institute analysis

Manufacturing Program, for example, provides low-income unemployed and underemployed workers access to employer-driven-training programs in advanced-manufacturing industries by working with public workforce agencies, employers, industry groups, and colleges.[9]

Social sector

Not for profits and other social-sector organizations may need to increase their support for communities of color, especially those that are low income, in gaining access to reskilling opportunities and high-

paying careers. Some programs do exist today, but the impact could be increased if reskilling were combined with career-related education. Examples of successful existing models include Project QUEST (Quality Employment Training through Skills Training) in San Antonio, whose mission is to understand and meet current and emerging employer needs. The organization enables low-income adults in community college to get an associate degree or an accredited occupational certificate, with a focus on industries that offer family-sustaining wages and career-advancement opportunities. An evaluation of the six-

year impact of the program found participants earn over $5,000 more a year annually than peers who did not enter the program.[10]

African American community

The African American workforce itself, along with the broader community, should support the initiatives and ideas outlined in this article by partnering with or sponsoring the associated institutions. Beyond providing financial resources, there is an opportunity to provide perspective and insight on how to reach and serve communities of color. In Washington, DC, for example, an organization called Opportunity@Work seeks to help skilled, talented, overlooked Americans find jobs in today's world.

■ ■ ■

Technology will change the nature of work across the spectrum as more and more work activities are automated. African Americans are among the most vulnerable to this change. Collaboration across the private, public, and social sectors can help. ■

[1] Categories defined by the US Equal Employment Opportunity Commission, "EEO-1 job classification guide 2010," eeoc.gov.

[2] Adapted from McKinsey's presentation at the Black Economic Forum, presented in partnership with Beta Iota Boulé and the Executive Leadership Council, Martha's Vineyard, MA, August 9–10, 2018.

[3] "Employment by detailed occupation," Employment projections, US Bureau of Labor Statistics, January 30, 2018, bls.gov.

[4] "Postal service workers," *Occupational outlook handbook*, US Bureau of Labor Statistics, April 13, 2018, bls.gov.

[5] Eileen Patten, "Racial, gender wage gaps persist in U.S. despite some progress," FactTank: News in the numbers, Pew Research Center, July 1, 2016, pewresearch.org.

[6] Lisa J. Dettling et al., "Recent trends in wealth-holding by race and ethnicity: Evidence from the survey of consumer finances," FEDS Notes, Board of Governors of the Federal Reserve System, September 27, 2017, federalreserve.gov.

[7] Sundiatu Dixon-Fyle, Vivian Hunt, Sara Prince, and Lareina Yee, *Delivering through diversity*, January 2018, McKinsey.com.

[8] Meghan Casserly, "Double-standards: How Etsy upped its female engineers by 500%," *Forbes*, February 8, 2013, forbes.com.

[9] Christin Durham, "How local workforce systems can support lifelong learning," Urban Wire: Job Market and Labor Force, Urban Institute, June 5, 2018, urban.org.

[10] Tazra Mitchell, "Research note: Sectoral skills training programs for low-income workers can yield sustained earnings and employment gains, new evaluation finds," Center on Budget and Policy Priorities, June 20, 2107, cbpp.org.

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