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MAKING PROJECT MANAGEMENT INDISPENSABLE FOR BUSINESS RESULTS.®

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GETTING IT DONE: Project Management in Action

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PM Network®

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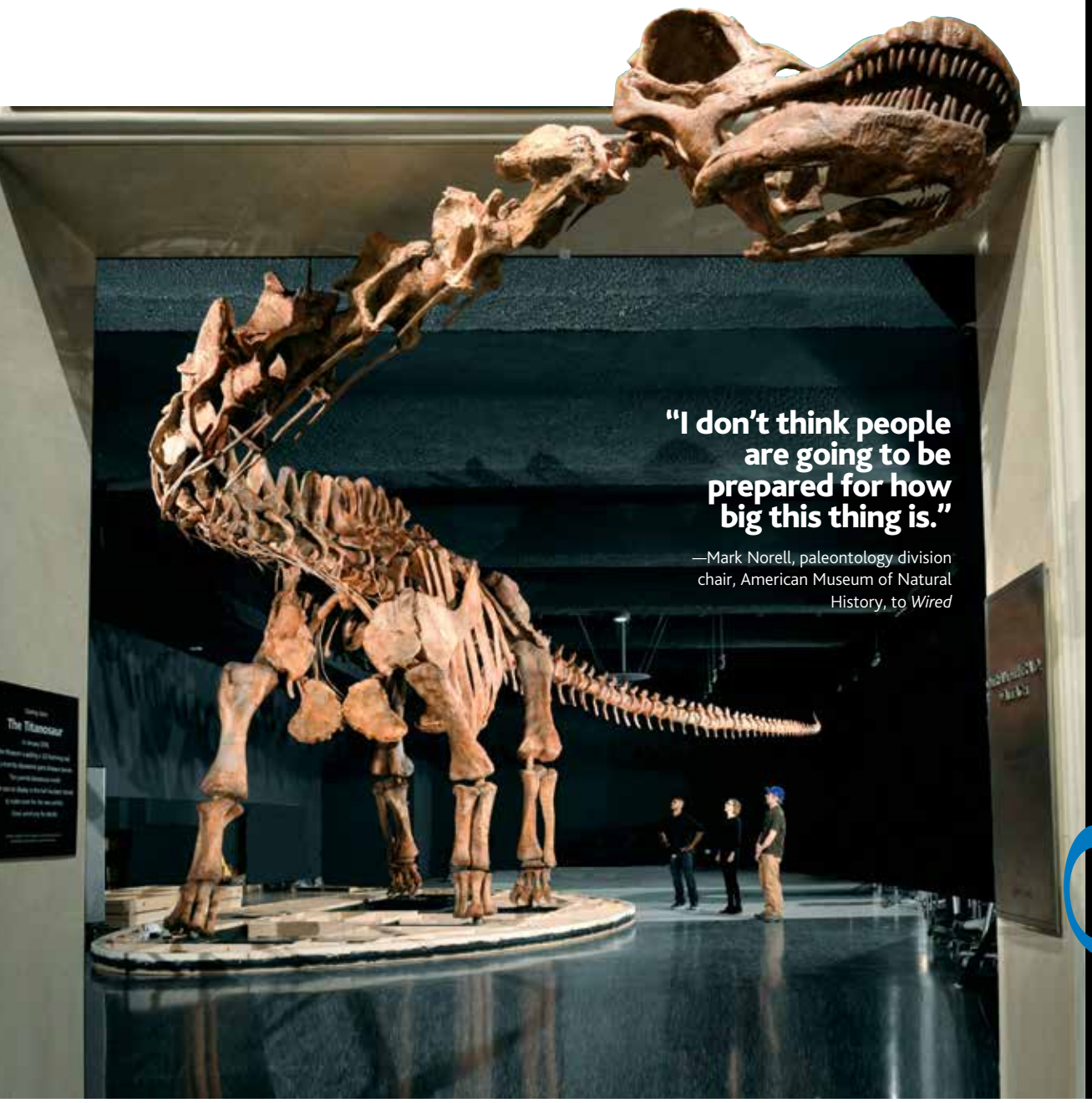


PHOTO © COURTESY OF AMNH/D. FINNIN

Kind of a Big Deal

The newest addition to the American Museum of Natural History is titanic. The permanent exhibit, which opened in January, features a skeletal cast of a recently discovered Titanosaur. Paleontologists say it was the biggest dinosaur to ever walk the earth. The colossal creatures weighed more than 70 tons—about the size of 10 African elephants. As recently as 10 years ago, scientists didn't believe a land animal could be that big.

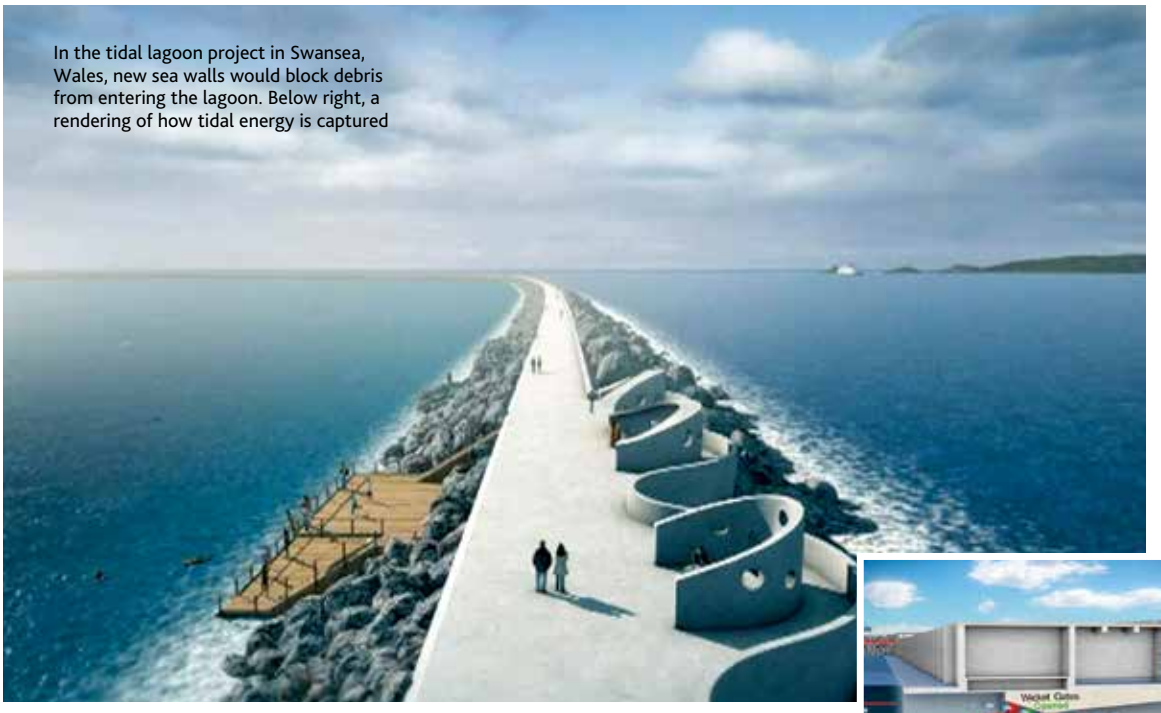
The Titanosaur's massive size presented challenges to the project team. The actual bones were too heavy to mount in the museum, so the team digitally scanned them and then created exact replicas with a 3-D printer. This much lighter set of bones could be rigged into a skeleton—but the team still had to get creative. This Titanosaur would have been able to peer into a fifth-story window—so the specimen's head now reaches into the exhibit entrance hallway, welcoming visitors.

PROJECT:
Titanosaur exhibit

LOCATION:
New York, New York, USA

LENGTH:
122 feet (37.2 meters)

BIG DIG:
The prehistoric creature was discovered in Argentina in 2014.



In the tidal lagoon project in Swansea, Wales, new sea walls would block debris from entering the lagoon. Below right, a rendering of how tidal energy is captured

Turning the Tide

The next big wave in renewable energy projects may be, well, waves. While tidal power has long lagged behind wind and solar initiatives, a growing number of organizations are now launching projects to generate power from the ocean. The biggest hot spot is the United Kingdom, but plans are underway in the U.S. and China as well. The global wave and tidal energy market is expected to reach US$10.1 billion by 2020, from just US$25 million in 2013, according to a Transparency Market Research report.

The ocean's appeal is clear: Unlike sunshine and the wind, tides are always predictable. Yet tidal power project teams must grapple with newer technology and a more complicated environment. Harsh marine conditions can create challenges that may not be apparent at first, warns Lekshmy Ravi, technical insights research analyst, Frost & Sullivan, Chennai, India. For instance, corrosive salt water and marine life may necessitate more time for feasibility testing and R&D to scrutinize the strength, performance and durability of underwater turbines and other materials.

"The success of smaller demonstration plants will propel the immediate adoption of tidal stream and tidal barrage technologies," Ms. Ravi said in a July statement. (A tidal barrage is a dam-like structure that captures tidal energy moving in and out of bays or river mouths.)

Technical hurdles aren't the only challenges teams must overcome. In Swansea, Wales, stakeholder buy-in took center stage during the planning phases of a US$1.5 billion tidal lagoon project expected to generate enough energy for 150,000 nearby homes for the next 120 years when complete.

"Swansea Bay is a great tourist destination loved by the people of southwest Wales, so the idea of building a power station here was very challenging," says Ioan Jenkins, development director, Tidal Lagoon Power, Swansea, Wales. "Trust is everything, so we tried to make it clear from the beginning that we've got nothing to hide."

Transparency permeated every part of the team's communication plan. Environmental studies on how the project might impact everything from water quality to fish migration to noise were published on the project's website. The team also invited environmental experts to answer questions at town hall-style meetings, some of which drew 300 or more local stakeholders, and smaller workshops with industry stakeholders.

Team leaders took care to emphasize project benefits that mattered to specific audiences. While environmental groups might care more about carbon emission

The global wave and tidal energy market is expected to reach **US$10.1 billion** by 2020, from just US$25 million in 2013.

Source: Transparency Market Research

"We had to be open to all positive criticism."

—Ioan Jenkins, Tidal Lagoon Power, Swansea, Wales

reductions resulting from the project, water-sport enthusiasts would hear about how new sea walls would block debris from entering the lagoon.

With the project's construction phase slated to begin later this year, many residents are now heralding the project as a major creator of jobs in an area plagued by high unemployment. And stakeholder feedback has helped shape the barrage's walkway, fishing spots and visitor center, which will help turn the power plant into something of a public amenity. "We had to be open to all positive criticism. We want to learn everything we can to make sure we deliver the promise we made," Mr. Jenkins says.

Success at Scale?

North of Swansea, at the northern tip of Scotland, is the site of the world's most ambitious tidal power project. Atlantis Resources is planning the globe's largest tidal energy operation: an array of 269 turbines on the seabed adjacent to a piece of coast called the Pentland Firth, which U.K. parliament member Alex Salmond said could one day be "the Saudi Arabia of tidal power." The £51 million project would deliver 398 megawatts of power into the grid. A proof-of-concept project is now underway to test turbine equipment and grid integration; the full-scale project may launch this year.

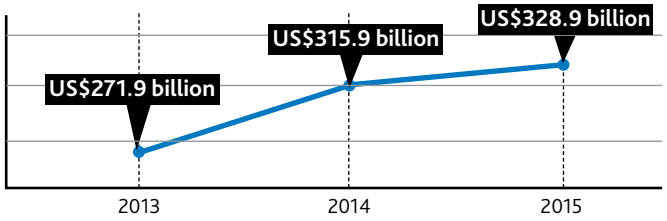
And more than an ocean away, China's lengthy coastline has turned it into something of a tidal project hotbed. The priciest and most high-profile initiative is a proposed US$30 billion dynamic tidal power wall designed with curved blades to allow marine life to pass through unharmed. With joint funding from the Netherlands government and eight Dutch companies, the project is currently in a lengthy feasibility phase. It's slated to be complete by 2020, by which time tidal power could be a substantial piece of some coastal countries' energy portfolios. *—Kate Rockwood*

Renewable Resilience

Despite the plummeting prices of oil and gas, investments in renewable energy projects hit an all-time high in 2015.

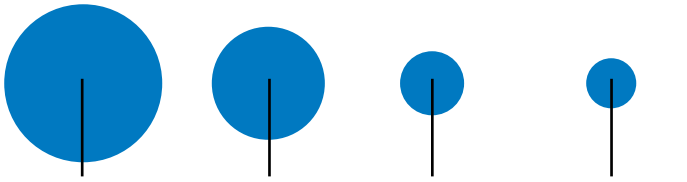
AN ENERGIZED MARKET

Global clean energy investment totals in recent years:



CHINA'S PORTFOLIO PIVOT

China led all countries in clean energy project investment in 2015.



China US$110.5 billion

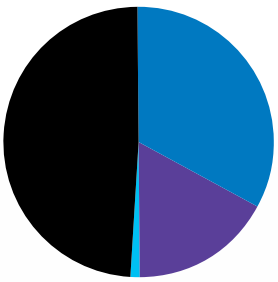
United States US$56 billion

Latin America US$17.5 billion

India US$10.5 billion

SUN AND WIND ON TOP

Breakdown of global project investments by category:



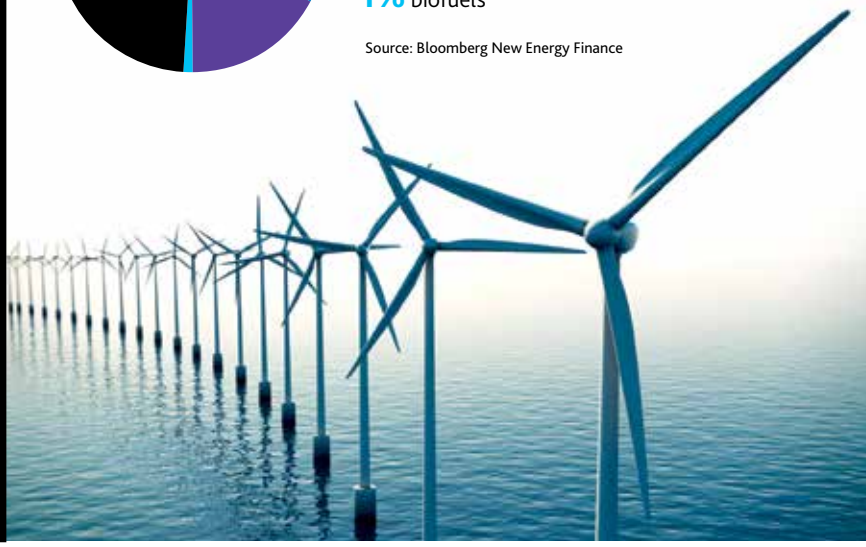
49% solar power

33% wind power

17% other (e.g., hydroelectric and waste-to-energy)

1% biofuels

Source: Bloomberg New Energy Finance



Bumps in the New Silk Road?

"[China has] had major difficulties in the past with engaging stakeholders in these places where projects are carried out."

—Scott Kennedy, Center for Strategic and International Studies, Washington, D.C., USA

More than two years after China unveiled its massive and sprawling One Belt, One Road program, project plans are taking shape—but geopolitical roadblocks loom. The ambitious infrastructure program, also known as the New Silk Road, is a revival of one of the ancient world's longest trade routes. It would span more than 60 countries, linking China to Europe and other parts of Asia by both overland and maritime paths.

Although the Chinese government and the country's state-owned enterprises have sponsored hundreds of large infrastructure projects around the world in recent years, the One Belt, One Road program is on an unprecedented scale. There are 900 projects planned or currently underway, according to the China Development Bank, which will invest US$890 billion in the program.

"In China, we say that connectivity is the shortcut to prosperity. That is what we have experienced in recent decades," Fu Ying, chairperson of the Foreign Affairs Committee for the National People's Congress, wrote in *The Huffington Post.*

But building out the connectivity to support China's export-oriented economy isn't as simple as just laying concrete or dredging a port. "China doesn't have any problem with the technical components of big infrastructure projects abroad, but they've had major difficulties in the past with engaging stakeholders in these places where projects are carried out," says Scott Kennedy, director, project on Chinese business and political economy, Center for Strategic and International Studies, Washington, D.C., USA. Leaders of China-backed projects have also been criticized for their use of Chinese workers and Chinese companies to complete projects, rather than opening bids to local companies and labor.

"They don't demonstrate a natural affinity for engaging all the different stakeholder groups abroad, because they don't do it at home," says Mr. Kennedy. For example, talks with labor unions or local worker groups tend to be reactive rather than proactive.

Geopolitical Headwinds

Even if One Belt, One Road project leaders can mature their stakeholder management practices, benefits realization for specific projects and international support for the larger program may prove elusive. For many countries along the planned routes, more robust commerce would bring a welcome economic boost. But success is far from guaranteed in areas struggling with internal political strife and/or poverty. Some areas slated as project sites for high-speed railways, highways and power plants lack a robust middle class or existing infrastructure that may be needed to realize the benefits of project investments.

Red Flags on U.K.'s Project Field

35%

Percentage of the United Kingdom's major infrastructure projects due to be delivered within the next five years rated as being in doubt or unachievable by the National Audit Office

Source: U.K. National Audit Office, *Delivering major projects in government: a briefing for the Committee of Public Accounts,* January 2016

One Belt, One Road

Costs and impacts

US$600 BILLION/YEAR
from 2015 to 2019

4.4 BILLION
people affected in 65 countries

$2.5 TRILLION/YEAR
potential trade among countries touched by the project within 10 years

Source: *Foreign Affairs*, April 2015

Geopolitical tensions increased by China's growing sphere of influence could also prove problematic. Russian leaders, for instance, have expressed concerns that the program will fuel Chinese influence in Central Asia. And any Chinese-backed projects that move forward in Sri Lanka (part of the proposed maritime route around the Indian subcontinent) may cause Indian leaders wary of China's reach as well as local politicians to bristle. Corruption allegations related to Chinese-backed projects in Sri Lanka drew attention during the island's most recent national election.

The Chinese government, for its part, sees mutual benefits in the program. "China's 'Belt and Road' is an open and inclusive initiative for regional cooperation and not a geopolitical tool," Chinese Foreign Ministry spokesperson Lu Kang said in a December statement.

As its purpose and impact is debated across Asia, the program is becoming more tangible. In mid-2015, China's Silk Road Fund announced its first investment: a 720,000-kilowatt hydroelectric power project in northeast Pakistan that is part of a US$46 billion initiative to connect China to the Pakistani port of Gwadar via a new 3,000-kilometer (1,864-mile) route. The US$1.7 billion project is slated to be complete by 2020—and the two countries held a ceremony marking the start of construction in January. *—Kate Rockwood*

"China's 'Belt and Road' is an open and inclusive initiative for regional cooperation and not a geopolitical tool."

—Lu Kang, Chinese Foreign Ministry

Open for Business

Apple's decision in late 2015 to make its Swift programming language open source only cemented open source's status as the dominant software development method.

From tech giants like Microsoft, IBM and Facebook to startups, open is the new normal. Seventy-eight percent of survey respondents said they now run all or part of their enterprise operations on an open-source software platform, according to the *2015 Future of Open Source Survey*, published by Black Duck Software and North Bridge. That's nearly double the percentage from 2010. And almost half of respondents said they plan to release internal tools as open source, up 18 percent from 2014.

But project leaders just starting to work on open-source projects must learn to adapt to the approach's unique structure and governance.

"Leading these projects requires a high level of diplomacy," says Paul Holland, PMI-ACP, PMP, director, open source program office, PMI Global Executive Council member Hewlett Packard Enterprise, Fort Collins, Colorado, USA. "At times, it's less about features and requirements than about working with open-source community vendors and partners. And the community developers care less about schedules than about high-quality software."

In addition, an open-source project team typically releases code more quickly than if it were working on proprietary software. "Open-source software communities are very forgiving of rough code," says Greg Stein, vice chairman, Apache Software Foundation, Austin, Texas, USA. "In fact, it's far more preferable to release rough code than to hold it for six months of polishing."

"Leading these projects requires a high level of diplomacy."

—Paul Holland, PMI-ACP, PMP, Hewlett Packard Enterprise, Fort Collins, Colorado, USA

Yet open-source software projects require more effort, especially regarding collaboration, Mr. Stein says. Frequent code releases must be accompanied by a clear plan to build and engage the global community of coders. "Sure, the company may provide people to form the initial community, but many more are needed to discuss and develop the software. Building that community requires effort from the host company." Project teams typically appoint a community manager or developer to answer questions, take feedback and track change requests.

Also, while the sprint to write and release code may be shorter, the early planning stages of liaising with legal and procurement departments can take more time than with other software development projects.

"Open-source software is licensed and has corresponding rules for use and distribution, so if someone from the project team downloads code from the Internet and agrees to terms and conditions without reading them, you are making a legal decision and very quickly can put your company at risk," says Mr. Holland. There are more than 70 open-source licenses, and sifting through the legalese of even the most common types can be daunting. "If you don't understand open-source licensing—or even if you do—the legal team should be involved."

The Talent Dividend

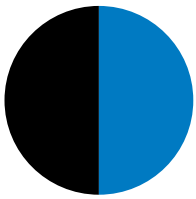
Still, the ubiquity of open source shows that many organizations believe coordinating across legal and project teams and appointing community managers is worth the effort. For one thing, having a number of minds working on the code can mean more creativity and rigorous testing—in other words, better quality.

And having a portfolio of open-source projects can help attract top-tier talent to the organization. Half of Facebook employees say the company's open-source software program contributed to them wanting to work there.

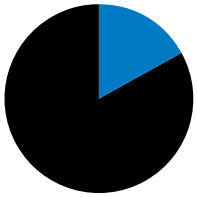
"The professionals who are drawn to open source tend to be very versatile, because you have to have a broad view of software and product development to be successful," says Mr. Holland. "It's where legal teams and strategy teams bump into project, program and portfolio professionals. It's very exciting, but it can be overwhelming for people who don't like to work across those functions." *—Kate Rockwood*

Feeling Vulnerable

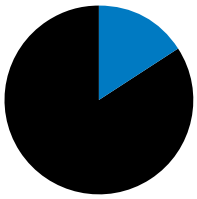
Even as they've dived into using open source code, many organizations still have concerns about the practice and lack formal procedures regarding it, according to the *2015 Future of Open Source Survey*.



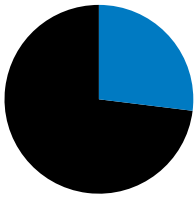
More than 50%
are not satisfied with their ability to understand known security vulnerabilities in open-source components.



Only 17%
plan to monitor open-source code for security vulnerabilities.



Only 16%
have an automated code-approval process.



Only 27%
have a formal policy for employee contributions to open-source software projects.

Boutique Boom

In the Airbnb era, many consumers are tiring of cookie-cutter hotel rooms. So industry giants such as Marriott and Hilton are launching projects to create more personalized accommodations. But so-called boutique hotels, which alter or eliminate many of the features of traditional hotels, can require project teams to spend more time in planning.

"The world of travel has changed, and today the expectation of good design, technology and personalized experience is more critical than ever for consumers," says Vicki Poulos, global brand manager of Moxy, Marriott International, Washington, D.C., USA.

As part of Marriott's global program to build 10 of its Moxy hotels by the end of this year, project teams are including a floor-to-ceiling signature "art wall" in each room to reflect the hotel's location. Sites include cities in Germany, Norway and the United Kingdom.

InterContinental Hotels Group's fast-growing Hotel Indigo boutique brand also aims to reflect local surroundings and culture. Sixty-three projects are in development, which would more than double the existing locations. And in 2014, Hilton debuted two new boutique brands, Curio and Canopy.

"People wanting a more unique experience is a huge trend that's impacting everything we're doing."

—Doug Demers, B+H Architects, Seattle, Washington, USA

"People wanting a more unique experience is a huge trend that's impacting everything we're doing," says Doug Demers, managing principal, B+H Architects, Seattle, Washington, USA. The firm is working on hotel projects with global brands such as Starwood and Hilton, as well as boutique brands such as Noble House.

But all this uniqueness doesn't make planning easy for project teams.

"The project schedule requires more time for upfront activity, including more robust market and locality analytics, and a lot more time spent focusing on user experience," Mr. Demers says. Hotels with well-established brands and robust internal resources might require 10 percent more time on the early design phase, he estimates. Smaller portfolios with fewer onboard brand resources or more unique locations might take as much as 20 percent more time.

No Reservations

150
Number of Moxy hotels Marriott plans to open in Europe by 2020

50+
Number of AC boutique hotels Marriott plans to open in the U.S. and Latin America by 2018

7%
Portion of InterContinental Hotels Group's pipeline of approved or projected projects that consists of boutiques

3.1%
Annual growth of independent or small-brand boutique hotel inventory in the U.S.

11.5%
Annual growth of nationally franchised boutique hotel inventory in the U.S.

76.8%
Rate of U.S. boutique rooms booked in first three quarters of 2015, compared to 67.1% for non-boutique rooms

W Hotel in Amsterdam, the Netherlands

Historic Buildings, Redesigned Interiors

Making these boutique projects even more challenging is sponsors' desire to restore historic buildings rather than construct new ones. For example, boutique brand Hyatt Centric renovated a 1927 office building in Chicago for its first hotel in 2015. The project team incorporated features of the original building, along with a cow path by the front entrance dating to the 19th century.

Project teams are also rethinking interiors, throwing out the default project plan for lobbies and rooms. For Starwood Hotels' W Hotel in Amsterdam, which opened in 2015, the traditional lobby format has been supplanted by "creative incubator" spaces, where locals can showcase art or fashion.

For other boutique hotel projects, conference rooms and business centers—once a standard design feature—are being reconsidered. Traditional check-in counters are now absent, with slim kiosks taking their place. In rooms, bulky armoires are being replaced with wall hooks, and downsized desks often double as a nightstand. These kinds of requirement shifts can mean a downsized project budget: At hotel chain Best Western, the Vib boutique brand built rooms that are both smaller and simplified. The construction cost per room? Around US$60,000, about half the typical cost for a regular room. *—Kate Rockwood*

Belgrade Reimagined

To proponents and detractors alike, the €3.5 billion Belgrade Waterfront project is a symbol.

Supporters say the development under construction in Serbia's capital represents the future of a city that has yet to recover from NATO's 1999 bombing. Meanwhile, opponents say it represents a glitzy attempt to sweep Belgrade's socioeconomic troubles out of view.

One of the largest building programs the Balkan Peninsula has ever seen, the Belgrade Waterfront broke ground in late 2015 and will include two 20-story luxury condo towers, the first W Hotel in Serbia, the Balkans' largest shopping mall, offices and a museum. Completion is slated for 2030.

"We need something big to make a cut-off between the past and the future, and this is that big thing," Belgrade Mayor Sinisa Mali told Bloomberg News in 2015. "After that, people will stop talking about wars, about Kosovo, but about Serbia as a new place to live, to reside, to do business."

Critics say the hulking complex being developed by Abu Dhabi, United Arab Emirates-based Eagle Hills will destroy Belgrade's architectural legacy and has already displaced families. They also point out that new condos will be out of reach for most city residents, who earn an average of just US$428 a month. *—Brigid Sweeney*

"We need something big to make a cut-off between the past and the future, and this is that big thing."

—Sinisa Mali, Belgrade mayor, to Bloomberg News

A rendering of the Belgrade Waterfront project

A road sign in Australia

Crossing to Safety

Martin Magnusson's team needs kangaroos. In charge of Volvo's collision avoidance initiatives, Mr. Magnusson and his team have launched a research project to develop a kangaroo detection system. But the project requires data: lots and lots of recordings of kangaroos in various light and weather conditions, to train the vehicle's sensory system to distinguish between a marsupial and debris floating in the wind. That has required the team to slowly drive the winding roads of Tidbinbilla Nature Reserve near Canberra, Australia to encounter and record kangaroos about to cross.

As vehicle-wildlife crashes continue to plague roads—41 kangaroo collisions happen every day in Australia, and 1 out of every 20 vehicle wrecks in the U.S. involves animals—projects like Volvo's aim to prevent these accidents. But getting enough data has been a struggle.

"It's quite hard to collect data from real animals just driving past them," says Mr. Magnusson, of Gothenburg, Sweden, who also spearheaded a project to build the Volvo S90's vehicle detection system for larger mammals. "If you look at moose, elk, reindeer, they probably run away and try to escape [when a car drives by]. It's been a real challenge."

In addition to using live animal data, Mr. Magnusson's project team created an augmented reality program that could help train the system to identify animals by overlaying virtual fauna on top of what the system sees in real life. "Augmented reality helps us to set up more-or-less impossible situations without any danger and is an important verification platform to us," he says.

Darren Quinn, project manager for Parks Canada Agency, Radium Hot Springs, British Columbia, completed a CA$14.5 million project aimed at reducing large-animal collisions in his province's Kootenay National Park. The initiative, completed in two phases in 2013 and 2015, included installing 15 kilometers (9.3 miles) of fencing that prevents creatures from crossing the driving lanes of Highway 93 South and building nine underpasses that allow wildlife to safely access habitat on each side of the highway. Motion- and heat-sensing cameras monitor each of the underpasses to help the project team study how readily animals take to their new route and if there are any problems.

But convincing forest-dwellers to take a new path can be tricky, especially since adaptation times vary from species to species. The Kootenay wildlife crossings are largely based on a similar project from Banff National Park in Alberta, where 82 kilometers (51 miles) of fencing, 38 wildlife underpasses and six overpasses prevent roads from disrupting animal habitats. Data from the Banff project shows that new crossings have reduced wildlife-vehicle collisions by more than 80 percent, though it typically takes two to five years for animals to adapt to the new route—and they hardly agree on whether over or underpasses are better. Species like wolves and deer tend to prefer short, high overpasses, while black bears and cougars like long underpasses.

Despite the Kootenay wildlife crossings still being

41
kangaroo collisions happen every day in Australia, and **1 out of every 20** vehicle wrecks in the U.S. involves animals.

in the adaptation period, Mr. Quinn says he's been "pleasantly surprised" by the number of animals and array of species using them soon after construction.

The nearly two years of data gathered during the project has shown over 1,600 successful wildlife crossings in the first three underpasses by medium to large animals, Mr. Quinn says. "It's a huge success."

Overcoming Costs

Long before such benefits to wildlife can be realized, however, organizations sponsoring road crossing infrastructure projects must work with stakeholders to gather support for the initial outlay. Animal underpasses are expensive to construct, though generally easy to maintain, Mr. Quinn says.

And some organizations have had to cope with unexpected costs after project closing. Michael McVaugh, a traffic and safety engineer with the Colorado Department of Transportation, Durango, Colorado, USA, serves as project manager for the state's animal detection system. At three locations along U.S. Highways 160 and 550, his team has installed 2 miles (3.2 kilometers) of a specialized underground cable that detects changes in the Earth's magnetic field. When larger animals disrupt the field, the system illuminates roadside signs alerting drivers that an animal may be crossing. Unlike underpasses, the cable system doesn't require any behavioral changes for animals, so there's no adaptation period.

"It's quite hard to collect data from real animals just driving past them."

—Martin Magnusson, Volvo, Gothenburg, Sweden

But that doesn't mean the detection system works flawlessly. When the project began in 2008, the team had a budget of over US$1 million for researching, testing and installing the system (which no state had created before). But the organization wasn't prepared for the high cost of protecting and repairing the cable.

"Burrowing species like moles, pocket gophers, prairie dogs, they like to chew on the detection cable," Mr. McVaugh says. "We've had a problem with maintaining the system to this point, because of the ongoing impacts from burrowing species. Each time the cable is chewed on and compromised, the system is disrupted and detections are impacted."

Colorado is currently investing in wildlife crossings similar to those used in Canada. Despite the cost of maintaining the detection system, Mr. McVaugh believes the project can provide data to make future infrastructure buildouts more effective. "It's been an ongoing learning process," he says.

—Christina Couch

Carbon Credit Stumble

An international tool for reducing climate-change-causing carbon emissions appears to have lost its edge. Created through the U.N.-backed Kyoto Protocol in 1997, the Clean Development Mechanism (CDM) lets developing nations earn carbon credits through emission-reducing projects and then sell credits to industrialized countries needing to offset their carbon emissions. But the credits haven't produced enough revenue to sustain many CDM projects. *By Brigid Sweeney*

Less than 3%
of CDM projects earn enough revenue to keep them going.

26%
of CDM projects have received a positive return on their initial investment.

36%
of CDM projects will aim for U.N. renewal.

BIGGEST BARRIERS TO BENEFITS

1. Low certified-emission-reduction (CER) prices
2. Costs related to CDM procedures and requirements
3. Uncertainty around CDM procedures and requirements
4. Technical barriers
5. Administrative barriers

TWO PATHS TO SUCCESS

1. Support in identifying international help
2. Support for direct marketing of CERs

Source: *Analysing the Status Quo of CDM Projects: Status and Prospects*, Ecofys and NewClimate Institute, 2015

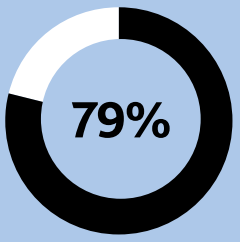
On the Defense

As cybersecurity threats grow, organizations around the globe are spending more on projects to prevent breaches. *By Novid Parsi*

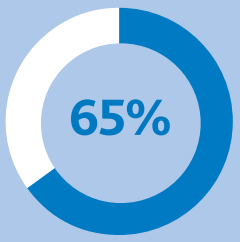
THE GROWING THREAT

38%

Increase in cybersecurity incidents detected worldwide from 2014 to 2015



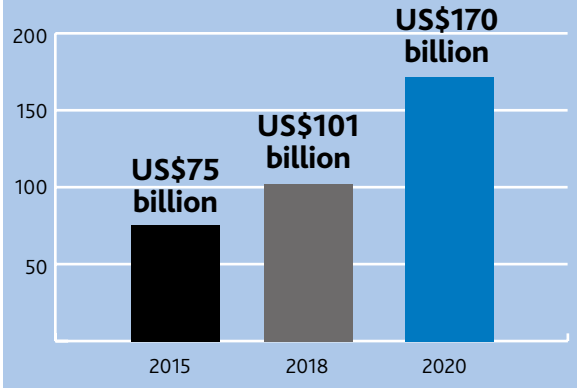
of surveyed organizations had security incidents during the previous 12 months.



of CEOs say their organizations' cybersecurity risk management approach isn't meeting the challenge.

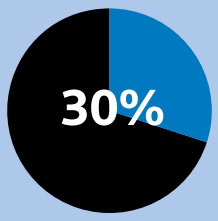
MOUNTING THE COUNTERATTACK

Global cybersecurity spending is projected to rise quickly:

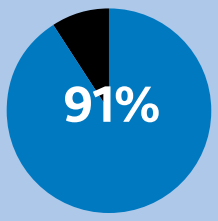


24%

Increase in global information security budgets in 2015



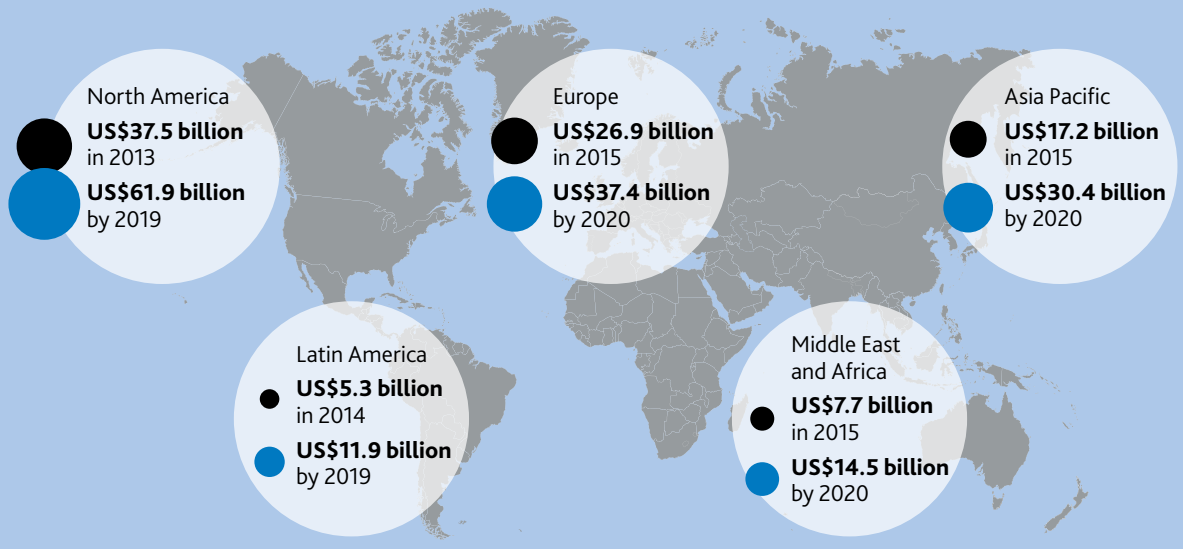
of IT budgets will focus on risk, security and compliance by 2017—tripling the 2011 level.



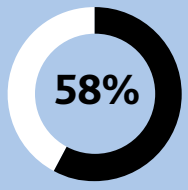
of organizations have sponsored risk-based security framework projects to prioritize risks and gauge the maturity of cyber-security practices.

WORLD ON WATCH

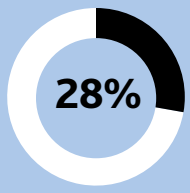
In the years ahead, organizations in every region will be spending more on projects to prevent damaging cybersecurity breaches.



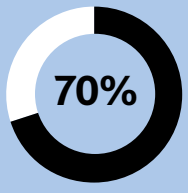
VIEW FROM THE C-SUITE



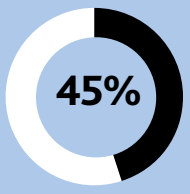
of CIOs predict cybersecurity and data privacy will have a significant impact on their business through 2017.



rank managing cybersecurity and information risk among their organizations' top three tech priorities for the next year.



rank their current level of cybersecurity investment as medium to high.

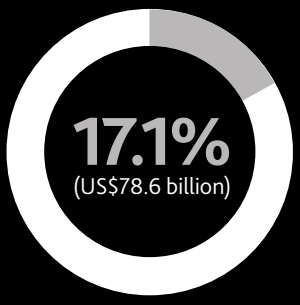


of CIOs in the public sector rank cybersecurity as a top priority—well above the 18% who rank it as highly across all industries.

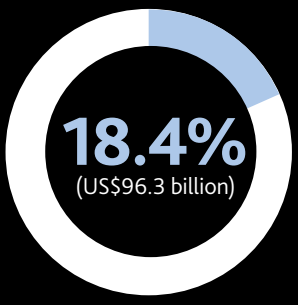
INDUSTRY SPOTLIGHT: FINANCIAL SERVICES

US$458 billion
global IT spending in 2015

US$522 billion
global IT spending by 2018



was devoted to risk management in 2015.



is projected to be devoted to risk management by 2018.

Sources: Deloitte, *2015 Global CIO Survey*; Gartner, 2015; IDC, *Worldwide IT Spending 2013-2018: Worldwide Risk IT Spending Guide*; MicroMarketMonitor, Cyber Security Reports, 2015, 2016; PwC, *The Global State of Information Security Survey 2016*

Voices

PROJECT TOOLKIT

Reaching Outside

Outsourcing services on a project can cut costs and bring in specialized talent. But it also can complicate project teams and result in less control over outcomes. We asked project practitioners: ***What's the best way to approach outsourcing work and manage contractors?***

STAY SELECTIVE

"Not all project activities are suited for outsourcing. There are several factors to keep in mind when considering hiring a contractor. Activities that are outside the expertise of the current team are obvious candidates for outsourcing. However, even when there is a team member capable of completing the task, hiring an outside vendor may still be more time- and cost-efficient. For example, organizations may want to bring in a contractor to avoid using resources from other more valuable initiatives.

Also, it's crucial to remember that responsibility is not outsourced. We may outsource activities in an operational sense, but as project managers we still maintain complete responsibility for the quality, timing and cost of the project. This means that if the project is at risk, you always should take control. In serious situations, don't be afraid to change or upgrade vendors/contractors when necessary. This may not be cheap, but the cost to make changes will be even greater down the road. Every day going in the wrong direction generates more costs."

—Aldo Zegarra Aguilar, PMP, project manager, Mer Group, Lima, Peru

THINK OUTSIDE THE BOX

Share your outsourcing strategies on the PMI Project, Program and Portfolio Management LinkedIn Group.

SECURE AN INVESTMENT

I use a method called vested outsourcing. It's built on ensuring that all stakeholders have a vested interest in the success of your initiative. When we request bids, our critical success factors are clearly stated. I expect all bidding vendors to base their proposal on these tenets. The selected vendor is expected to agree to penalties for nonfulfillment.

A key part of this method is making the outsourced professionals feel like part of the team. They should have incentives tied to their performance, our performance and the project itself. The idea is to spend less time directly managing outsourced professionals, build checks and balances into the project, utilize their subject matter expertise and thus eliminate any threats that team members perceive from freelancers.

Team members sometimes feel threatened by vendors who have more technical prowess or expertise. It's important to be sensitive to their fears and available to listen to and alleviate their concerns. Everyone on the team must understand that the goal can only be reached if everyone is allowed to excel."

—Michael Boyle, PMP, PfMP, founder and CEO, Procurro Solutions, Vienna, Austria

STRUCTURED PAYMENTS

A good way to outsource work on a project is to link the business benefits to payment terms via structured payments per earned value and the schedule. Treat vendors as business partners with collaborative and transparent decision-making."

—Sunil Chainani, PMP, project manager, Medline Industries, Mundelein, Illinois, USA

CLOSE SUPERVISION

During my first project at my company, I needed to coordinate the design of the systems that detect and extinguish fires in the power and control room. There was no engineer on my team with expertise in that area, so we turned to contractors. I researched the applicable design criteria and standards so I could ensure the contractors complied with all requirements.

That knowledge and focus on compliance came in handy again on a similar recent project to install a fire extinguishing system inside a power and control room. Once again, we had to bring in specialized contractors. However, one of the contractors forgot to install the supervisor pressure switch, a key component required to verify the gas pressure doesn't drop below a certain value, rendering the extinguishing system useless.

I detected the error during a routine on-site inspection and then submitted a claim to the contractor, who installed the switch. My research on the task prior to outsourcing helped me to solve that issue and avoid a potentially disastrous omission."

—Angel Machado, project manager, Elektromek C.A., Valencia, Venezuela

ALL ABOUT VALUE

When it comes to IT outsourcing, value-based outsourcing is an effective approach. This is when the outsourcing company and the service provider are vested in mutual success and work together to bring about improvements in their relationship.

To implement this approach, the service provider looks at how it can best apply processes, technologies and capabilities to drive value to the company that is outsourcing. This commitment to deliver results, such as a commitment to reduce costs, improve service or increase market share, shifts risk to the hired contractors. In exchange, the company doing the outsourcing commits to allowing the service provider to earn additional profit—above and beyond industry average profits for their service area—for achieving this incremental value."

—Prem Nair, PMP, senior IT project manager, Kaiser Permanente IT, Pleasanton, California, USA

Optimized Outsourcing

Outsourcing can deliver competitive advantages—and headaches. Here are the most common issues encountered with outside help—and how organizations around the world troubleshoot them.

Top problems:

Reactive instead of proactive: **49%**

Poor service quality: **48%**

Lack of innovation: **37%**

Unqualified resources: **36%**

Lack of responsiveness: **34%**

Most common steps to resolve problems:

Escalated issues to vendor leadership: **63%**

Enhanced governance processes: **58%**

Provided additional training: **40%**

Restructured/negotiated the deal: **39%**

Source: *Global Outsourcing and Insourcing Survey*, Deloitte, 2014

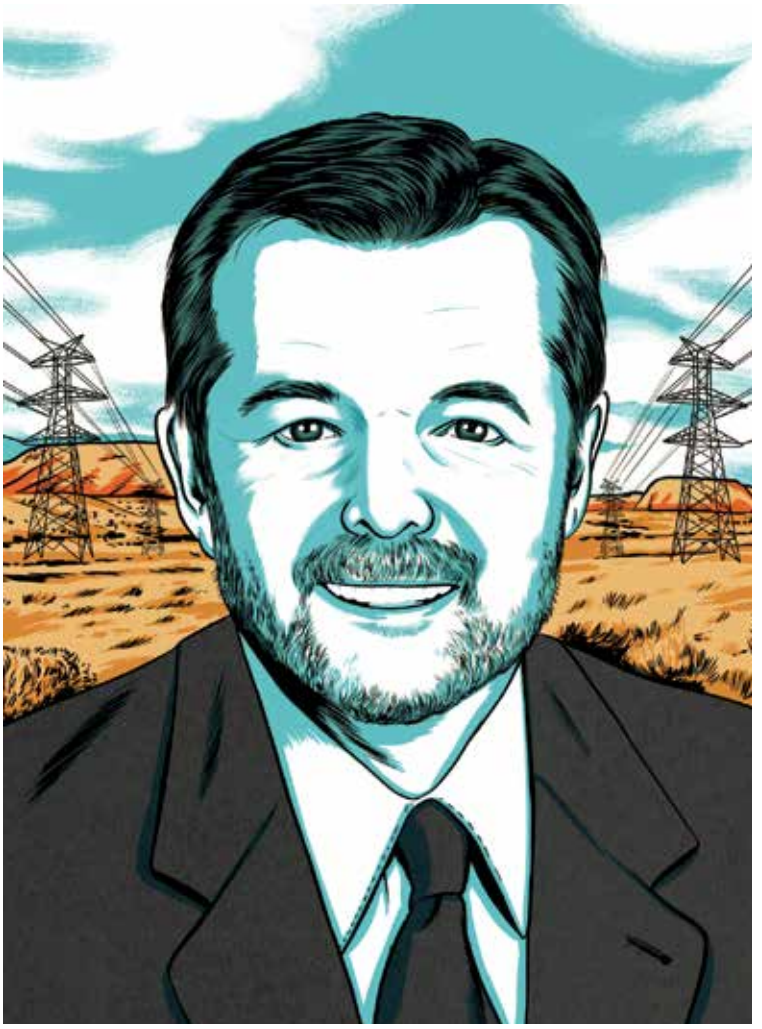


ILLUSTRATION BY JOEL KIMMEL

Change of Power

Tom Wray, founding partner, Southwestern Power Group, Phoenix, Arizona, USA

The southwest United States is full of sunshine and wind. But while turbines and solar arrays are increasingly capturing that renewable energy, the region lacks transmission infrastructure to bring it to market. SunZia Transmission LLC wants to change that.

The organization's US$1.6 billion to US$2 billion SunZia Southwest Transmission Project will deliver two electric transmission lines stretching 515 miles (829 kilometers) as well as several substations along the way. The goal of the megaproject, slated for completion in 2021, is to carry renewable energy across the Southwest and into New Mexico, Arizona and Southern California to reduce dependence on fossil fuels.

Tom Wray, a founding partner of Southwestern Power Group, a majority owner of SunZia Transmission, has shepherded the initiative through a complex federal permitting and environmental review process. The organization began project planning in 2006 but didn't receive federal approval until 2015—and state permits still aren't in hand.

How does the project meet the market's needs?
We're providing the means to deliver solar and wind energy resources to markets that demand them. For instance, in 2015, California raised its renewable energy standard so that by 2030, 50 percent of all energy generated and consumed by retail customers must be from renewable sources. SunZia will be a tool for California's utilities to meet that higher renewable standard, which is by far the most aggressive in the country.

How have changes in the regulatory climate affected the project?
In 2015, the Environmental Protection Agency took two big steps that will lead to a greater reliance on renewable energy in this country. First, it lowered the acceptable level of harmful ozone produced by power plants. This will limit, if not eliminate, the ability of utilities in Arizona to build gas-fired plants for the generation of electricity. Second, and more significant, the agency's Clean Power Plan will greatly reduce pulverized coal generation, which customers in California and Arizona have relied on for decades.

What do these changes mean for the project?
They've increased the demand for the renewable power that SunZia will deliver. The way to secure stable and adequate power while reducing coal power will be a combination of strategically placed gas generation and high-capacity wind energy that will survive the daily drop-off that you get with solar generation: Wind in New Mexico can generate power well into the evening, nicely complementing the deteriorating availability of the solar resource. There's an increasing need for transmission projects that will take that wind energy from very remote locations and deliver it.

How does your project plan address the growing demand for renewable energy over time?
The current scope of the project includes two alternating-current transmission lines, but we have an optional scope to allow one of those lines to be either constructed as or converted to a direct-current line. That would allow the project's total transfer capacity to increase from 3,000 megawatts to 4,500 megawatts.

When we originally scoped the project, we planned to make that decision based on commercial reasons. The market will decide.

How did the federal approval process affect the project's scope?
With projects subject to federal oversight and permitting, it's very difficult to control scope creep. The government has to thoroughly vet reasonable and feasible alternatives to the proposed action. We started out with a plan that would best fit the project's needs, and we also suggested alternative plans. As more people provided comments, more alternative routes were added and analyzed, so the scope of the environmental impact statement grew.

The best we could do was to try to convince federal agencies that certain routes are simply not reasonable or feasible. It's like leading by following.

Why did it take almost two years between the government's final environmental impact statement and federal approval?
The U.S. Army's White Sands Missile Range conducts low-altitude tests over private, state and federally managed land some 35 miles (56 kilometers) north of the proposed route—which essentially created an impasse with the Department of Defense.

In the end, we were able to reach a resolution by agreeing to bury 5 miles of the overhead line near the missile range, clearing the way for the Bureau of Land Management to conclude its environmental investigation. To my knowledge, there's never been anything quite like this resolution—and I've been in this business for 43 years. We're very proud of that.

What made the difference in achieving that outcome?
It was hard work and not giving up, despite obstacles that many of us thought were insurmountable. Also, we had a lot of folks in the current presidential administration who are big believers, as we are here and as I am personally, in the value of renewable energy resources for the future of this country.

The relationships we developed with the administration, the departments of Interior and Defense, and Congress have been priceless to us in terms of moving this project forward. **PM**

Small Talk

What's the one skill every project manager should have?
Patience. If you're impatient, you might rely on imperfect information that leads to decisions that a project manager will regret.

What's the best professional advice you ever received?
You can't have it both ways, and you cannot have more than there is.

Which film has special meaning for you?
Saving Private Ryan. It's an inspiring movie—especially the captain's persistence in carrying out his mission to bring that young man back to his mother.

The Next Step

Looking to make a big career change? Here's what it will take.

By Lindsay Scott

One day I'd like to move from being a project manager to a program manager. What development steps should I be thinking about to make that happen?

I see program management as one step removed from hands-on project control and delivery. Program managers need a greater understanding of business strategy and execution in order to achieve the desired benefits of the program while ensuring the associated projects remain aligned to the evolving business needs.

All of the communication, relationship building and people management of project management are augmented in program management. There are relationships with executives, peers, project managers, program management offices, stakeholders and so on. The transition can be interesting in the early days. Being able to step back from the day-to-day details of projects and learn how to manage project managers is a master class in all those soft skills—asking the right questions, building trust, adjusting to the dynamics of a new role, etc.—you've acquired over the years.

The transition to program manager needs to include time spent as a senior project manager. It is imperative that you gain experience on large, risky or complex projects, because this experience will be crucial when managing a program of work. Working as a senior project manager should also expose you to a wide range of projects, and having this breadth of experience is what really counts when you're overseeing the delivery of a program.

As you plan your transition, you must also include technical program management training to ensure you understand current best practices. Specific training should center on, for example, how to set up the program infrastructure (including governance arrangements), how benefits management works and how to manage interdependencies and resource management across the program.

Finally, becoming a program manager largely will depend on your current organization. It is very rare to leave one organization as a project manager and start somewhere else as a program manager. Organizations tend to promote from within; program management requires insight to that particular organization, so who better to take the role than an existing employee? If your organization does not currently run programs, now might be the time to seek out a more senior project manager role with an organization that does.

I've been away from the working world for two years with a serious illness. I'm recovered now, but I'm finding it difficult to get back into a project manager role. Any advice?

It's about finding the right match for where you are in your life. You might want to immediately get back into a role like the one you used to have. That will happen eventually, but the first step back into the working world doesn't have to be at that level. You might find it easier to start slow in a position where you know you can excel. For example, consider supporting roles in project management like assistant to the project manager. Find a role that you're comfortable with and in six months to a year, re-evaluate if you're ready for a bigger challenge. It's always easier to find a new job when you have one, so

CONSIDER YOUR CAREER

Don't travel down your career path alone. Find advice and direction here. Send job questions to **pmnetwork@imaginepub.com.**

you'll be in a much better position to go for the roles you think you should be doing. You also could consider short-term roles rather than holding out for a permanent position.

Make it clear on your résumé about your period of illness. Being upfront and transparent is better than being vague about your period of unemployment. There are organizations out there that won't see that gap as a barrier. Many people have career gaps in their working life for all sorts of reasons. You're looking for the kind of organizations that understand that. It can sometimes take longer to find one, but it will be worth the wait.

I've come to a point in my career when I think it's time to try working for myself. Any advice for making the transition?

First, be clear about what you can offer to the marketplace and how you can bring that to future clients. This tends to be based on your experience and what business challenges you can solve. Being able to decisively communicate the value you offer as a project manager is crucial to making it on your own.

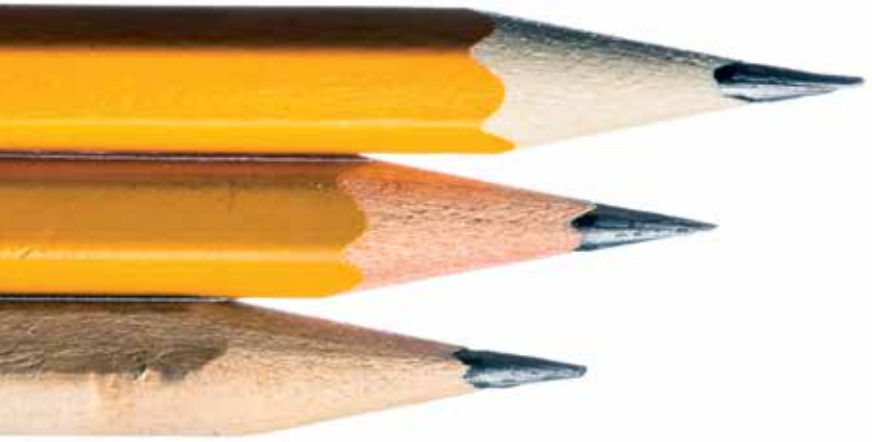
Second, you need to decide whether you should contract or consult. Pursuing the consultant route will mean you have to build and maintain your intellectual property—your toolkit of tried and tested documents, templates, tools, processes and techniques—because it's what organizations are paying you for. This position is much more visible within an organization, and you could be working multiple assignments at once, as consulting engagements rarely require full-time commitment. Compensation can vary—some engagements pay based on results, others pay a day rate. Consulting may be more difficult, but the rewards can be great as you build a sustainable business.

On the other hand, contracting is much easier to get started in. Contract project manager roles are widely advertised, so if you have experience in an area that is popular with lots of organizations, it will be easier to get things up and running. You'll be working five days a week, charging a day rate, concentrating on delivering a single assignment and then moving on to the next job.

Whatever method you choose, you will still need to attend to small business matters. It can be easy to neglect the actual running of your business—getting invoices paid, marketing for future opportunities, paying taxes, setting up insurances, etc.—when you are out there delivering your services. And you need time to start your new venture, which will mean no income for a while. This can make people hesitant to start out on their own, so it's worth thinking about what nest egg (three to six months' salary) you may need to make you feel comfortable and confident in getting started. **PM**

Lindsay Scott is the director of program and project management recruitment at Arras People in London, England.

It is imperative that you gain experience on large, risky or complex projects, because this experience will be crucial when managing a program of work.



Practice Test

Prep for the PfMP exam using the portfolio management skills you already have mastered.

By Teresa (Terri) Knudson, PMP, PgMP, PfMP

I'm sure many of you have been wondering … and I'm thrilled to say that I passed! I earned my PMI Portfolio Management Professional (PfMP)® certification.

In preparing for the exam, I learned just how applicable and versatile my skills as a portfolio manager can be. Here are some ways you can leverage your portfolio expertise to prepare for the big exam:

Just as you do for your portfolio, you should develop targets for your studies.

1. DEVELOP A STRATEGY

To begin with, you need to strategize how you are going to approach your exam preparation and determine what objectives you are wanting to accomplish. Originally, I had prioritized studying rather low compared to all my other activities. There's always more fun things to do, and besides, I had a whole year. But just like your project portfolio, you need to perform regular reviews to assess your priorities, resource allocation and value of the outcome. Once I did this, I significantly increased the priority of this project within my personal portfolio.

2. ESTABLISH A GOVERNANCE MODEL

Governance is an important part of every portfolio management plan. Incorporating that same idea of accountability can be helpful in preparing for your PfMP® exam.

It always helps to identify others who will oversee your efforts and make sure you are meeting your targets. My governance ended up coming from multiple sources—the main ones being my family and coworkers, who regularly requested status updates.

3. ESTABLISH PERFORMANCE METRICS

Just as you do for your portfolio, you should develop targets for your studies. Tapping into this skill will help you monitor your progress and whether you will meet the intended goals.

Performance metrics might include measuring how long it takes you to re-create the PMI portfolio management process groups and knowledge areas—without peeking. One metric I also found useful was tracking the results of the practice exams that I took. This can be a definite motivator to focus your efforts.

4. DEVELOP A COMMUNICATION APPROACH

Communicating your status and progress ties directly to your governance model and performance metrics. For me, this involved providing communication to my "oversight groups"—including regular updates to my mom.

5. MANAGE RISKS

Portfolio managers are well-equipped to analyze risks. When it comes to prepping for the test, a few key risks to consider are work conflicts, family obligations and your own health and wellness. It's best to find ways to mitigate these risks by developing a plan that balances them with your preparation efforts. My approach was to fast-track preparation into a six-week period that worked around critical work and family events. By doing this, I was then able to more fully focus on studying and make that the top priority.

Obviously, each of us has different approaches to studying. But your project and portfolio management skills can provide value to your personal portfolio, so use them to ensure your push for certification is successful. **PM**

Teresa (Terri) Knudson, PMP, PgMP, PfMP, is the director of the enterprise portfolio management office at the Mayo Clinic, Rochester, Minnesota, USA. She can be reached at knudson.teresa@mayo.edu.

Skin-Deep

Are you fixing problems or fixating on buzzwords?

By Jesse Fewell, CST, PMI-ACP, PMP, Contributing Editor

If you're confused by all the buzzwords associated with agile methods, you're not alone. We're told we have to track "velocity" using "sprints" toward delivering "epics." People can get so worked up about implementing funny terms that they fail to make meaningful changes in organizational behavior. Here are four examples of how the big picture can get lost.

Backlogs of everything. A primary driver of agile methods is preserving the executive discretion to deal with change. Whether it be misunderstood scope, dependency delays or attrition, we want to fix a strategy and flex on the details. We can do that with techniques like progressive elaboration, continuous improvement and delegating more to the team.

Unfortunately, that agile book you read only mentioned those fancy new artifacts. Here's a tip: When creating a backlog, hold off on trying to nail down microscopic project details a full year in advance.

Self-defeating teams. The Agile Manifesto emphasizes the value of "individuals and interactions." So it makes sense to empower and equip people with everything they could possibly need to do good work. We get so wrapped up in that methodology flowchart sometimes, we forget to ask team members what will help them excel.

If you've changed your title from project manager to ScrumMaster and still find yourself having to tell everyone what to do, you might be missing the point. Create the space to help team talents grow.

Non-collaborative user stories. User stories are a popular aspect of the agile approach. But if you don't have everyone in the conversation, you're not using stories to their full potential. Stories are most valuable when collaborating with key members of your team and the customer. To create insight and alignment, bringing people to the table is better than using a requirements template.

Slowed by sprints. Time-boxing techniques such as sprints and iterations let us gather incremental empirical feedback on the quality of work performed so problems can be fixed sooner. But these techniques don't work if you're waiting until the last minute to pull people together. Many projects wait to integrate anything only until after building everything. That delays value and increases risk. Instead, integrating each sprint's results and lessons learned should be an ongoing process throughout the project.

Agile approaches challenge us to develop our talent to deliver the right value as soon as possible. If you find yourself buzzword-compliant but struggling to change organizational behavior, then your agile methods might be only skin-deep. **PM**

People can get so worked up about implementing funny terms that they fail to make meaningful changes in organizational behavior.

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Confidence Builder

Focus on contractors and suppliers to manage construction risks.

By Sidd Mukherjee, PMP

If a crystal ball that could predict all project risks existed, perhaps no one would want it more than project managers for construction megaprojects. Unfortunately, even as these projects grow more complex and laden with risks—thanks to dynamic factors like shifting shareholder expectations, regional uncertainties, disruptive technologies and environmental scrutiny—this omniscient tool remains a dream.

The good news is that a number of risks can be controlled or influenced through the right management of contractors and suppliers. This is because 70 to 75 percent of expenditures in capital megaprojects in the heavy engineering sector are made through these vendors.

Here are the techniques for building risk control:

Contractor Screening: Many project managers are surprised how big of a role this plays in risk management. While safety statistics, performance records, prior experience and availability are the obvious selection criteria, others are often overlooked: financial stability, client feedback, cultural fit and even peer feedback.

A few years ago, I had to decide to eliminate the lowest bidder on a project because the bidder's financial statements indicated its debts were going up, revenues were falling and management salaries kept increasing. Obviously, the bidder was recklessly pricing the work to win. Hiring such a contractor is risky. If it became insolvent during the project, we would suffer delays and end up paying the subcontractors.

When engaging a new contractor for a critical activity, I always make sure someone from the project team contacts its past clients to get an opinion of its performance. (The prospective contractor's permission is solicited prior to contacting its clients.)

Bid Evaluation: This step is not just about building mathematical tables that score either the technical capability of different bidders or compare the prices. It should also include efforts to bring all bidders on the same platform for comparison and seek clarifications on any ambiguous aspects of the bid. An added precautionary step is to quantify the risks that arise as the bids are being evaluated. For instance, if I'm considering a new contractor, I know that schedule progress could become a risk because the contractor is unfamiliar with the work site. I quantify such risks by adding a few extra weeks for completion and adding a contingency amount for those extra weeks of work.

As part of the evaluation process, I also always organize an interview session with the key personnel of the short-listed bidders. This not only screens for technical competency but also checks that the leadership team is a group we can work well with.

Contract Administration: All the hard work and savings realized in the award phase of a project can dissolve if costs balloon way beyond budget. To keep the cost baseline maintained, project managers have to manage the performance of the contractor groups. It starts with onboarding the contractor properly. Two-way feedback and regular team-building exercises can also help during the administration phase. So will timely payment and regular performance reviews.

Of course, even better than maintaining the cost baseline is getting the work completed below budget through incentivization and practicing supplier relationship management techniques with the contractor. Achieving this will require establishing key performance indicators and joint risk management, plus developing early warning indicators and an incentive plan for innovative techniques. It also involves developing the contractor's capabilities.

Support Framework: Although all cars have the same basic mechanisms, superior support systems in a high-end car enable better engine performance and turn stability. Similarly, contracting approaches may be comparable across projects, but the support framework has to be superior on a megaproject. This includes having the right people, user-friendly automation tools, consistent processes and balanced governance. These four items are the wheels that provide traction and keep the project moving.

The good news is that a number of risks can be controlled or influenced through the right management of contractors and suppliers.

Application of Risk Mitigation Tools: These tools act as a safety net in case the above steps fail or in case of any catastrophic event during the project execution. They can be broadly classified into the following groups:

- Securities: parent company guarantee, bond, letter of credit
- Insurance: general liability, comprehensive, cargo, workers' compensation, etc.
- Indemnification: people, property, third parties, pollution, etc.
- Retention and holdback: building a reserve fund by holding back contractor payments (subject to agreement of contractor)

At the start of the project, it is important for project managers to know the details of coverage and applicability of all these risk mitigation tools.

By properly collaborating with contractors and the internal support groups, project managers can steer through uncertainties and risks in an organized way, instead of taking a "we'll cross that bridge when we come to it" approach—which tends to lead to chaos. **PM**

Sidd Mukherjee, PMP, is a freelance project contracts manager in Calgary, Alberta, Canada.

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DISRUPTING

affic

FOR NEXT-GEN VEHICLES TO HIT THE ROAD, PROJECT MANAGERS MUST TAKE THE WHEEL.

BY SARAH FISTER GALE

THE NEXT GENERATION OF VEHICLES IS BEING TRANSFORMED BY DISRUPTIVE TECHNOLOGY—AND SO ARE THE COMPANIES THAT MAKE THEM.

As Google and Apple join the race to deliver the first self-driving cars and next-level electric vehicles, conventional automakers are being forced to compete—and collaborate—in new and innovative ways.

Auto manufacturing heavyweights are partnering with telecom providers, Internet companies, universities and government agencies to share ideas, resources and costs, and accelerate the pace of delivery. The appetite for change is robust, with the global vehicle industry spending US$102 billion annually on R&D.

Projects that plan to deliver the first self-driving cars by 2020 are incorporating a spate of sensor and connectivity features that drivers could use to control smart-home features or communicate with drones from their cars. Already, self-driving mass-transit buses have completed test runs in China, Greece and Singapore.

The intersection of the Internet of Things, autonomous driving technology and smart communication applications is changing the nature of automotive projects, says Egon Daxbacher, PMP, Pernambuco ER&D Center implementation project manager, FCA Group, Recife, Brazil. For instance, he sees the car of the future as an extension of the owner's smartphone. In the right environment, a self-driving car could choose its own destination, such as a convenient parking spot or the nearest hospital, and then transport its passengers there. These cars also could integrate with personal agendas and social networks, allowing their owners to spend their commutes working or connecting with friends and family. Projects that deliver this type of freedom are what will set automakers apart in the near term, Mr. Daxbacher says.

"Autonomous vehicles, among other projects, will rule the R&D efforts in the future," he says. "We need to optimize the time that you spend in the car and the services the car can provide to you."

With so many pieces in motion, automakers are relying on skilled and experienced project and program managers to keep costs low while managing diverse stakeholders and unforeseen risks. The automotive revolution has forced manufacturers to alter their approach to project planning, says Christophe Midler, research director and chairman of innovation management at École Polytechnique, a science and engineering university in Paris, France.

"Managing projects in such a collaborative, cross-functional space isn't easy, but it is necessary for automakers to make these innovations a reality," Mr. Midler says. "You need to be willing to try new things, to learn from failure and to adapt your project process to the lessons learned."

AT THE INTERSECTION

Adaptation is well underway with electric vehicles. The first generation of plug-in electric cars proved the technology was viable, but the next generation needs to address many consumer pain points. For instance, projects by Tesla and other automakers are poised to deliver models as early as 2017 that will double the single-charge driving range for electric vehicles to at least 200 miles (321.9 kilometers).

PHOTO BY CLAUS LEHMANN

"Autonomous vehicles, among other projects, will rule the R&D efforts in the future. We need to optimize the time that you spend in the car and the services the car can provide to you."

—Egon Daxbacher, PMP, FCA Group, Recife, Brazil

Environmental concerns are driving green tech innovations across the automotive industry, says Amit Dadhe, PMP, senior engineer, project management, Mercedes-Benz Research & Development Center, Pune, India.

"This includes finding alternative energy sources to drive the power train of the vehicle, such as fuel cells, and improving the commercial viability of existing energy sources so they will be affordable to the large customer group in developing countries," he says. "Companies are also reducing vehicle weight by innovating stronger, lighter materials and styling vehicles to reduce air resistance and improve fuel efficiency."

But the industry's bleeding edge goes beyond the drive train. The car's computer is now the focus of smart tech projects that are on the verge of transforming personal transportation projects. To integrate IT into a traditionally mechanical field, project teams must lean on a wider range of suppliers and partners.

"Collaboration is mission-critical for all of these projects," says Russell Hensley, principal of the automotive and assembly practice at McKinsey, Detroit, Michigan, USA. "To understand the specific opportunities around digitization and material science, the auto industry has to collaborate with companies that are familiar with these technologies."

For instance, some automakers eager to develop self-driving systems are lining up for the chance to work with Google X laboratory, which already has tested autonomous vehicles on roads in the U.S. states of California and Texas. And to improve the connectivity between cars, roads and other locations, automakers must find a way to tap into existing communications infrastructure, such as cellphone towers, Mr. Daxbacher says.

The hardware needed to implement such R&D efforts already exists, so a strong partnership between the automotive industry and the telecom industry could help accelerate collaborations. Strong project management practices can help establish efficient communications and a common language across industries.

Manufacturers, including Renault, already are creating separate departments to perform outreach with project teams at energy companies, service delivery providers and government agencies to build buy-in across industries, Mr. Midler says.

"It's a new level of program management created to incent the development of infrastructure needed to make these innovations work," he says.

"Managing projects in such a collaborative, cross-functional space isn't easy, but it is necessary for automakers to make these innovations a reality."

—Christophe Midler, École Polytechnique, Paris, France

TEAM OF RIVALS

Thrusting the next automotive revolution into high gear also will require collaboration within the auto industry. One of the biggest challenges for the entire field is to develop a single standard that telecom companies can use to connect cars to the road—and to each other, Mr. Daxbacher says.

To facilitate such a requirement—and to reduce the costs and share risks along the way—some companies have pooled resources to help create team-of-rivals joint ventures. For instance, Ford Motor Co., Nissan Motor Co. and Toyota are among 15 companies that contributed US$1 million toward the US$6.5 million Mcity autonomous vehicle testing facility project at Mobility Transfor-

mation Center (MTC), a public-private partnership program at University of Michigan, Ann Arbor, Michigan, USA.

Built to replicate an urban driving environment, Mcity opened in July 2015 and allows automakers and researchers to test self-driving technologies in real-life conditions. As a result, each automaker can see how its vehicles interact with other manufacturers' vehicles and respond to common hazards, such as pedestrians and potholes. It also allows other related industries to understand how connected technology and self-driving vehicles will affect their business models.

Mcity has a data system, traffic control center and traffic lights, and its roads have sensors, cameras and communication devices that gather and transmit data to and from vehicles. Vehicles tested on the streets transmit 10 signals per second, allowing users to test myriad scenarios and gather data about vehicle performance.

Getting rival automakers to share the same facility required project managers to determine which road scenarios each automaker sought for creating the most challenging testing ground for self-driving vehicles. The project team helped to foster collaboration—regardless of whether the issues that needed solving were unique to one organization or all of them, says John Maddox, assistant director, MTC, Ann Arbor, Michigan, USA.

"There are so many questions that need to be answered, many of which cross industrial sectors and require collaboration. If any one company tried to do it on their own it would take 20 years, and they would have to rely on significant assumptions," he says. "MTC brings all of these companies together to solve the problems together so that we can move these innovations forward rapidly."

ROAD HAZARDS

Launching a first-of-its-kind vehicle project requires facing a field of unknowns—from navigating a hodgepodge of to-be-determined regulations to overcoming

Sneak Peeks

Three innovations will reshape the next generation of automotive projects.

SELF-DRIVING CARS

Summary: A sophisticated network of sensors is at the core of autonomous driving system projects that have been launched by Google, Apple and many traditional automakers.

Status: The first self-driving cars are expected to hit the road by 2020.

LONG-RANGE ELECTRIC VEHICLES

Summary: Dramatic improvements in rechargeable battery technology are expected to at least double the driving range of second-generation electric vehicles to 200 miles (322 kilometers). But Tesla CEO Elon Musk claims the company could deliver an electric vehicle that has a 500-mile (805-kilometer) range "quite soon."

Status: Models from Tesla and General Motors that have a 200-mile range will roll off the assembly line in 2017.

QUICK-CHARGE BATTERIES

Summary: Soon it could be faster to recharge a vehicle than to refill it with fuel. A project by Israeli startup StoreDot hopes to deliver an electric vehicle battery that can be recharged in as little as five minutes.

Status: StoreDot plans to unveil a prototype by the end of 2016.

PHOTO BY CLAUS LEHMANN

Training Wheels

FCA Group's new R&D center is focused on developing local talent in a tech hot spot.

When FCA Group, known for its Chrysler, Dodge and Fiat brands, opened a US$1 billion Jeep plant in the Brazilian state of Pernambuco in 2015, it saw an opportunity to tap into an innovative talent market.

The tech park in the city of Recife, often referred to as Porto Digital, has become a software development mecca, attracting techies from around the region. With the Jeep plant in place, Recife seemed like the perfect place for a new enterprise R&D (ER&D) center, which houses FCA Group's first software center in Latin America dedicated to power train. Launched in April 2014 with first-phase construction scheduled to be completed in May 2016, the center also will include proving grounds and a test and reliability center. More than 200 team members, ranging from engineers and technicians to support personnel, already have been hired at the center.

But while Recife had plenty of software developers, the city lacks talent with experience in the automotive industry, says Egon Daxbacher, PMP, Pernambuco ER&D Center implementation project manager, FCA Group, Recife, Brazil. So the center focused on hiring young people and training them on the skills they would need to succeed.

"We prefer to invest in local people instead of bringing the most experienced people from other regions," he says. "Particularly in Brazilian culture, the people who move from one city to another city tend to move back two to three years later. And then we would lose all the investment made in those people."

FCA Group brought in a handful of experienced leaders and built an internal culture to help accelerate the learning curve. For example, before a leader can move to a new assignment, he or she must develop the skills of a new local leader to fill the role.

"This mixes the melting pot and builds our people here," Mr. Daxbacher says.

risks posed by inadequate infrastructure. For instance, in October Volvo warned that a lack of federal standards in the U.S. could put driverless vehicle projects at risk, as it's difficult to build and test systems to account for different rules in each state.

Plus, the project budget and timeline must account for training third-party mechanics to service new technologies and for bringing in external experts to mitigate telecommunications risks. Connected vehicles pose risks in the form of security threats—such as hackers who could shut down the vehicle—that project managers are still attempting to mitigate. Teams also must build contingencies for surprises, such as when climate impacts the performance of a new electric vehicle battery.

Creating a strong scope statement that captures input from all key stakeholders during the initiation stage can help avoid major changes during the execution phase, Mr. Dadhe says.

"For some R&D projects, you also need inputs from the supplier who will develop the components or provide subassembly services," he says.

However, some potential changes are influenced by unexpected shifts in the market. If consumer demands change rapidly, it can impact the future of an R&D project. Deciding whether or not to take a new tack requires careful adherence to change management best practices.

"We have to do a sensitivity analysis to see if the scope change will impact the time to market, the cost developments or the final price," Mr. Daxbacher says. "As project managers, we can lead with this kind of change management."

FAST TRACK

With such a rush to deliver innovation, project managers can—and often do—take a page from performance automakers' niche divisions, such as Formula One racing. Some of the most recent fuel-efficiency and analytics innovations have trickled down from Formula One, says motor sports industry specialist Paolo Aversa, a lecturer in strategy at the University of London, London, England. Formula One technical project teams follow an agile approach, rolling out fast prototypes, testing the technology and tweaking it for the next performance review—aware that the deadline for each project is the start of each racing season.

"Formula One is a fast-paced project environment that delivers visible results in just 12 months, whereas a traditional project team might take three years to do the same thing," Mr. Aversa says. The racing teams deploy a different car for each race, because each course has a different design that requires a car that emphasizes specific capabilities. Because automakers dig deep in their pockets for Formula One budgets, technical project teams focus on innovations without worrying about ROI, which allows them to dramatically accelerate the project life cycle. "That adds real value to the innovation process."

Over the years, Formula One has been the first to test-drive now fundamental vehicle features such as rearview mirrors, safety belts, anti-lock brakes and turbocharged engines. More recently, Formula One gave birth to carbon-fiber-reinforced plastic chassis—now featured on the BMW i3 electric vehicle and the Alfa Romeo C4—which make the cars lighter and safer. These days, most Formula One project teams are working on big-data analytics tools that provide real-time updates about road conditions and reaction scenarios, which could inform self-driving vehicle programs by Google and Tesla.

Once these innovations are proven on the race circuit, the auto companies' conventional vehicle project teams will try to make them feasible and affordable for mainstream customers. That typi-

"Formula One is a fast-paced project environment that delivers visible results in just 12 months, whereas a traditional project team might take three years to do the same thing."

—Paolo Aversa, University of London, London, England

DRIVING GROWTH

Connected vehicle technology will allow drivers to control more than their car in the years ahead. Here's a projection of consumer spending (in billions) for ways that connected car technology will be used:

TECHNOLOGY	2016	2021
Home integration	€0.0	€0.1
Well-being*	€2.0	€7.6
Vehicle management	€3.6	€7.1
Mobility management*	€4.4	€5.6
Entertainment	€6.0	€13.4
Autonomous driving	€9.5	€39.6
Safety	€15.5	€49.3
All areas	**€40.3**	**€122.6**

*Well-being refers to a driver's health and competence. Mobility management refers to real-time guidance for traffic and vehicle service information.

Source: *Connected Car Study*, 2015, Strategy&

cally means project managers are tasked with finding ways to cut the cost of the technology, often through redesign and/or mass production.

"These teams are focused on more traditional budget and schedule issues," Mr. Aversa says. "They might remap an engine to make it more cost-effective to produce, or achieve efficiencies through scale."

"The most innovative companies have made it okay for project teams to fail, as long as they learn from the failure."

—Russell Hensley

CRASH COURSE

To achieve the biggest breakthroughs, automakers must shake their fear of project failure and embrace the potential value of mistakes, Mr. Midler says. Giving project teams time and a wide financial berth will create more opportunities to gamble on wild ideas. Although it can increase the likelihood that mistakes will be made, it also helps teams develop lessons learned that eventually lead to innovations, he says. "Bringing breakthrough innovations to market isn't easy, and it doesn't always work the first time."

For instance, several of Toyota's early Prius hybrid prototypes had issues. Some versions wouldn't start, and others sputtered after covering only a short distance, he says. Rather than scrapping the project, Toyota encouraged its teams to press on and apply lessons learned before they finally developed the vehicle that has become the auto industry's signature hybrid model.

Mcity in Ann Arbor, Michigan, USA allows automakers to test autonomous vehicles in real-life environments.

"If they had quit after the first project failure they would have lost all of that," Mr. Midler says. "Now the Prius is their [hybrid] cash cow."

To deliver the next generation of vehicles, companies need to take a more open approach to the innovation process, Mr. Hensley says. That means supporting an R&D culture where project teams pursue "a series of controlled experiments" and deliver fast prototypes with multiple review stages—knowing that many won't succeed, he says. By spreading the risk across many initial concepts, project teams can pursue multiple innovation paths and get a better handle on what's possible, Mr. Hensley says.

"The most innovative companies have made it okay for project teams to fail, as long as they learn from the failure." **PM**

CASE STUDY

Proving Grounds

Proterra is transforming Seattle's mass transit system—one bus at a time.

One of the most environmentally conscious cities in the United States wanted to raise the bar for public transit. The King County Metro Transit in Seattle, Washington planned to add as many as 200 rechargeable electric mass-transit buses, in hopes of someday replacing its existing fleet of diesels—but it needed a manufacturing partner. The agency chose the U.S. electric-bus startup Proterra in 2014 to get things started, but there was a catch. To win the contract to supply all the buses, Proterra had to prove itself by building three test buses to the agency's strict preferences.

For Proterra, which has built 63 vehicles for 10 transit agencies since 2010, it was a US$3.6 million project it couldn't refuse. The offer had the potential to establish the company as a go-to player for next-gen mass transit. But to meet King County Metro Transit's expectations, Proterra project managers had to do more than leverage the company's electric vehicle expertise. They also had to showcase their stakeholder and change management skills, says Ethan Carbaugh, bid and proposal manager, Proterra, Greenville, South Carolina, USA.

OUT OF THE GATE

The project team was up for the challenge. Since he was hired in 2014, Mr. Carbaugh has implemented a more formal project planning process that engages stakeholders right from the start. "You have to overcommunicate what the customer wants to everyone on the team," he says. "You can't assume that just because something is in the contract it will get done."

Mr. Carbaugh first invited the entire King County team to Proterra headquarters in May 2014 for a three-day technical review, at which the team compared Proterra's standard bus design and features to King County Metro Transit's desired specs. It led to a dialogue on how Proterra's standard electric bus designs could be customized to fit King County's demands, such as adding a rear towing option. "It was an exercise in change management and negotiation," Mr. Carbaugh says.

Ultimately, Proterra was able to incorporate all

Proterra has built 63 vehicles for 10 transit agencies since 2010.

of King County's roughly 80 change requests into the final design. Having the specifics nailed down from the start saved time and helped Proterra's team meet the November delivery deadline for the first bus. Two other buses were delivered on time in December. "You have to find the right balance between accommodating the customer and managing your own time and resources," Mr. Carbaugh says.

CROWD-PLEASERS

Ongoing meetings with the King County team allowed Proterra to share progress reports and educate the entire King County Metro Transit staff on how the buses would benefit the agency and the community. After the first bus was delivered, Proterra provided King County Metro Transit a Proterra service technician to address any maintenance questions and give the company another source of feedback on driver reaction, Mr. Carbaugh says.

"Getting more people involved helps secure buy-in and makes them excited about the technology," he says.

The lessons learned from the first three buses will help accelerate delivery in the future if King County Metro decides to purchase additional vehicles, Mr. Carbaugh says. While the first buses took over 12 months to deliver, including confirming and incorporating all design changes, the next buses could take no more than seven months to deliver, in part because of abbreviated stakeholder meetings, he says. Proterra is on pace to quickly scale up production for whatever number of buses the agency decides to order.

"This process helps us avoid costly rework," he says. "It improves our cash flow because we deliver projects on time, and it improves customer satisfaction."

BACK TO THE BEGINNING

Pressing the reset button can revive a stalled project.

BY NOVID PARSI

ILLUSTRATION BY CARLOS ARROJO

STALLED PROJECTS CARRY A STIGMA. AND THAT BLEMISH OFTEN REMAINS EVEN IF THEY'RE GIVEN A NEW LEASE ON LIFE.

"There's always this nagging concern among stakeholders that needs to be addressed—the concern that what caused the project to be delayed or killed will happen again."

—Phil Doty, PMI-RMP, PMP, PgMP, Serco, Reston, Virginia, USA

No matter why an initiative was put on hold, a project manager must show skeptical stakeholders that he or she has cleared former obstacles and defined a path to success.

"There's always this nagging concern among stakeholders that needs to be addressed—the concern that what caused the project to be delayed or killed will happen again," says Phil Doty, PMI-RMP, PMP, PgMP, program manager, Serco, Reston, Virginia, USA.

But past failures also provide a treasure trove of lessons learned. Whether it's a power project in Mumbai, a commuter rail initiative in Kuwait or a port city construction in Sri Lanka, a stalled project's risks are often front and center.

"With restarted projects, you know the project's problems and the team's concerns, and you can work to minimize them," Mr. Doty says. "If you know what the negative factors were the first time, you can bring them forward to the current

The Hoekse Lijn rail project in the Netherlands

time and overcome them. Now you've jump-started your risk management."

START FROM SCRATCH

Yet, even when the biggest issues are obvious, projects that get a second lease on life require a rigorous review of their first incarnation, Mr. Doty says.

For example, the Hoekse Lijn metro rail project near Rotterdam, the Netherlands was restarted after a two-and-a-half-year delay. The €315 million project, which is scheduled to be completed in 2017, is transforming a 25-kilometer (15.5-mile) stretch of heavy rail passenger and freight line into light rail. As part of the relaunch, the project team needed six months to develop a new project management plan, says Johan Dolman, general project manager, City of Rotterdam, Rotterdam, the Netherlands. Mr. Dolman says the team reviewed all the project's original specifications, requirements and designs to find any gaps in the documentation before it submitted new documentation.

"Restarting is very much like starting, but you can take advantage of the time-out to check your project on earlier mistakes or missing demands."

—Johan Dolman, City of Rotterdam, Rotterdam, the Netherlands

By reaching out to stakeholders and external technical engineers, his team discovered new risks and requirements, such as revised climate change forecasts that spurred the project team to design and build taller water barriers to mitigate flood risks.

SECOND LIFE

Location: Jakarta, Indonesia
Project Details: A two-line elevated monorail project restarted in October 2015 after a five-year shutdown due to a lack of funding. The US$1.5 billion project resumed after state-run China Communication Construction Co. agreed to finance and construct the entire system.

Location: St. Petersburg, Florida, USA
Project Details: In July 2015, the St. Petersburg City Council approved funding for the US$5.2 million Pier Park project that had been stalled for two years. Public opposition initially halted the project, but ongoing maintenance costs for the shuttered pier buildings convinced the council to move forward.

"Restarting is very much like starting, but you can take advantage of the time-out to check your project on earlier mistakes or missing demands," he says. "There is momentum to redefine the project with more acceptance for improvements or changes."

REGROUP AND REFOCUS

When a project is put on hold, uncertainty abounds. While many team members may want to jump ship, the project manager must assess the situation pragmatically.

For example, London, England-based telecommunications company Colt Technology Services halted a €1 million software-upgrade project in Bengaluru, India for two months in late 2015 after a vendor-designed patch that was supposed to improve the program's operational efficiency instead caused the system to shut down.

"That's when a crisis began," says Vinit Gupta, PMP, a Bengaluru, India-based manager of project practice at Colt. "At first, the team didn't know if things would return to normal, what the new timeline would be, how the project would be delivered—it was a critical and tense situation for us."

Colt stopped the project as Mr. Gupta and his team created a new risk register, a new project plan outlining the completed and outstanding activities, and a new schedule accounting for the two months the vendor would need to repair its patch. Mr. Gupta knew that being proactive was the best way to make sure the project would eventually be restarted, so he communicated progress regularly.

He kept in touch with his team members' functional managers, especially those who had

"I had to explain to them what happened, what we were doing to fix the issue and why we wanted to restart the project—emphasizing the benefits the project would deliver to the business."

—Vinit Gupta, PMP, Colt, Bengaluru, India

Location: Rochdale, England
Project Details: Originally proposed in 2006, the £100 million revitalization of Rochdale's town center is now slated for completion in 2018. Legal issues had kept the project at bay, but developers are now confident the team will break ground in 2016.

Location: Dubai, United Arab Emirates
Project Details: The AED600 million Dubai Maritime City was first announced in 2003—and was scheduled to open in 2012. In December 2014, the project finally broke ground on a 48-story tower, with the full development slated for completion in 2017.

been assigned to other projects temporarily. This helped ensure those resources would be available when the project was ready to restart. He also held weekly stand-up meetings with project stakeholders and sponsors to keep them on board—and remind them of the project's long-term strategic value.

"I had to explain to them what happened, what we were doing to fix the issue and why we wanted to restart the project—emphasizing the benefits the project would deliver to the business," he says. "It's all about proactive communication."

A NEW VISION

Restarting a project also means ensuring effective engagement and buy-in from executives and stakeholders. Project managers can show sponsors and key stakeholders how the project will avoid repeating past problems by increasing the frequency of updates with executives and outlining how previously damaging risks will be mitigated.

On the Hoekse Lijn metro rail project, the delay was caused in part by a legal dispute over which organization controlled the line—ProRail, the government agency that oversees heavy rail infrastructure, or RET, Rotterdam's regional metro rail service. Although the Ministry of Infrastructure settled the dispute by handing control to RET, ProRail remains a critical stakeholder. The metro line will handle some freight traffic, so ProRail still is responsible for the authorization and construction of parts of the line, Mr. Dolman says.

Before the initiative restarted, the project team drafted an agreement to define mutual scope and conditions that all parties could agree to, he says. The team also brought both sides together for decision-making meetings and continues to hold individual meetings as necessary to resolve any potential conflicts.

"Mitigation of risks mainly consisted of increased communications, where the project team sometimes was like a mediator between RET and ProRail," Mr. Dolman says. "Several issues were effectively addressed in multidisciplinary teams."

When starting over, all eyes are on the finish line—and anything that could prevent the project team from reaching it. When a project gets a second life, project managers must treat it as another chance. **PM**

A Strong Start

Strategic thinking, leadership skills and business acumen can help a project team hit the ground running.

BY KATE ROCKWOOD PORTRAITS BY JONATHAN TIMMES

Charisse Brossard, PMP, ADP,
Washington, D.C., USA

Effective projects start by deciding where they will end.

Clearly marking the finish line helps team members keep their eyes on the prize—and make sure they're moving in the right direction.

Project initiation processes help unify the team by defining the path, purpose and parameters of the project. They clarify the end goal from the beginning and get buy-in from everyone involved.

"Initiating a project means converting ideas into reality," says Mohammed Khedir Sultan, PMP, senior projects planner, DAL Engineering Co., Khartoum, Sudan. "Considerable effort is required to collect information and prepare a proper plan in order to convert that idea to reality."

Project initiation transforms the whirlwind of agreements, goals and assumptions surrounding a project into a concrete project charter. It develops a project's feasibility, defines its constraints and brings together a cohesive team that can move the project forward.

But not all teams take the time to start their projects right. Some project managers think skipping the initiation phase will help them get a jump start on the schedule and deliver their project faster, says Jee Peng Lim, PMP, project and compliance manager, Abbott Manufacturing, Singapore.

"However, this could also lead to a lot of conflicts or confusion later," he says. "What's worse, the cost of changes exponentially increases toward the end of the project. Thus, skipping project initiation makes project control more challenging and puts scope, cost and timeline at risk."

Getting all the pieces in place requires a sharp strategic focus. Honing strategic thinking, business acumen and leadership skills helps project managers make sure their projects start—and finish—strong.

"Initiating a project means converting ideas into reality."

—Mohammed Khedir Sultan, PMP, DAL Engineering Co., Khartoum, Sudan

Firm Footing

Avoid these common initiation pitfalls to start a project on solid ground.

Anxious ambition: Don't let antsy team members or impatient sponsors rush the initiation process. Hurrying ahead will only put the project behind from the beginning.

Crippling indecision: Sponsors must be confident enough to clearly define the project scope and requirements. Confronting a lack of commitment early on can help clear up any underlying leadership concerns.

Lack of consensus: Glossing over disagreement about the project's purpose can sign its death warrant. Get everyone on board with the strategic vision from the start.

Unavailable resources: Getting the right people on board can be the difference between success and failure. Avoid the temptation to get started without key stakeholders—even if it seems impossible to get on their schedules.

SETTING THE SIGHTS

Defining a project's final destination requires outlining the benefits it intends to deliver—and understanding how they'll help the organization achieve its strategic goals.

"A project that's not aligned to the organization's goals may waste millions of dollars," Mr. Sultan says.

Yet less than half (44 percent) of organizations report high alignment of projects to strategy, according to PMI's 2016 *Pulse of the Profession®: The High Cost of Low Performance* report.

This difficulty stems from the elusive nature of organizational strategies. They shift with changes in the business climate, technology trends and the competitive landscape—and people on the low end of the ladder can't always keep up.

Organizations rarely update their written strategy and distribute it to all employees, so this is where it pays to ask proactive questions. Check in periodically with the project management office (PMO) manager or portfolio manager who can clarify the organization's strategic vision—and specify how the project will help deliver on its big picture goals.

"If you're assigned a project that doesn't seem to align with the organizational strategy, speak up," says Mr. Sultan. "Write a clear report detailing your concerns and submit it to the responsible entity." Such a report could clarify a project's strategic purpose—or even spark a shift in the scope.

"Skipping project initiation makes project control more challenging and puts scope, cost and timeline at risk."

—Jee Peng Lim, PMP, Abbott Manufacturing, Singapore

> **Putting in a phone call [to your stakeholders and project team] early on to introduce yourself and form a connection can help you build up some credibility."**
>
> —Charisse Brossard, PMP

LAYING THE FOUNDATION

While a risk register, phased schedule and detailed budget will get hammered out in the planning phase, initiation is all about building the business case. As the foundation of the project charter, the business case outlines the project's overall time frame, cost, major risks and financial assumptions.

This process is as much about enlisting expertise as crunching numbers. This is the time for project managers to make sure they're asking the right questions to the right people, says Mr. Lim. "Always ask around and never assume things."

While a risk register, phased schedule and detailed budget will get hammered out in the planning phase, initiation is all about building the business case.

He recommends finding out if anyone has executed a similar project before and asking the team to clearly outline the project's constraints and underlying assumptions.

"The project manager should have a session with the project sponsor to understand the scope more in depth," Mr. Lim suggests. "Which of the requirements are must-haves and which are good-to-haves? That lets you prioritize the critical requirements and let the lesser requirements get completed later or dropped with the support of the sponsor."

RALLYING THE TROOPS

The initiation phase should go beyond completing paperwork to connecting

with the people who ultimately will drive the project forward, says Charisse Brossard, PMP, engagement leader, ADP, Washington, D.C., USA.

"I've worked here for 24 years, and I used to jump into all of the documents and technical aspects. But what I've learned is that you really have to set the tone of the project," she says.

Ms. Brossard often works with stakeholders and project teams that span geographies and generations. So she makes it a priority to develop professional relationships early on to keep everyone focused on the same vision.

"You're going to be working with these people for a couple of months, if not a year or more. Putting in a phone call early on to introduce yourself and form a connection can help you build up some credibility," she says. "That's what you need with project initiation—instant credibility."

Icebreakers are an effective go-to for team building, Ms. Brossard says. The trick is to pick an activity that will create unity, not just introductions. At a recent initiation gathering, for instance, she asked team members to share their very first phone numbers.

"It brought back such nostalgia in the room, whether it was older people discussing landlines or younger people talking cellphones. Instead of everybody feeling tense and focused on the new project, we were focused for a minute on getting to know one another and share this common connection," she says. "So much of project management is about relationships, and if you can use the project initiation phase to build connections you'll be in a better position to be effective for the rest of the project."

This getting-to-know-you phase is also a good time to demarcate roles, especially across departmental lines, says Gustavo Pastrana, PMP, chief operation officer and deputy managing director, Grupo Protg, Mexico City, Mexico.

"Sometimes the borders between team roles can be blurry and cause confusion," he says.

To nip later miscommunication in the bud, he suggests using project initiation meetings to make sure everyone understands both the big-picture vision of the project and the responsibilities tied to their specific post.

"The project manager should also understand the level of authority he or she has and the governance model of the project, whether that includes leading steering committees, change control committees or internal meetings," Mr. Pastrana says.

Project managers also should use these early meetings to set a clear definition of project success. Outlining specifically what the sponsor is looking for makes it easier for the team to achieve the desired results, he says.

"Interview all key stakeholders to validate each expectation of the project outcome and which key performance indicators will be needed to assure the business benefits will be delivered," Mr. Pastrana says. **PM**

"The project manager should also understand the level of authority he or she has and the governance model of the project, whether that includes leading steering committees, change control committees or internal meetings."

—Gustavo Pastrana, PMP, Grupo Protg, Mexico City, Mexico

Starting a project out right requires a strong professional foundation. The ideal project management skill set—outlined in PMI's **Talent Triangle**—is a combination of technical, leadership, and strategic and business management expertise.

Channel Changer

The Panama Canal expansion project has required consolidated control and a phased approach.

BY NOVID PARSI

Expansion of the canal in Panama

Container ships enter a lock on the Panama Canal in 2012. The expansion will allow larger ships to pass through the canal.

PHOTO BY THOMAS KOEHLER/PHOTOTHEK VIA GETTY IMAGES

Global trade volumes have expanded exponentially over the last century. And to accommodate that growth, shipping freighters have expanded in kind. Today's container ships have more than five times the capacity of their early predecessors—and require a significantly wider berth.

For the Panama Canal, this was bad for business. Opened in 1914, the canal handles 5 percent of the world's shipping traffic and 70 percent of all cargo to and from the United States. But over the years, this valuable shortcut became desperately outdated. The Panama Canal Authority knew it was time for an upgrade and launched an expansion megaproject in 2007.

"We weren't capturing all the business we could. We were losing business," says Jorge de la Guardia, executive manager, locks project management division, Panama Canal Authority, Panama City, Panama.

The organization charges shippers based on the capacity of their vessels—and the organization was starting to see its most valuable customers head in another direction. In 2013, 16 percent of the world's container fleet was post-Panamax, meaning they were too large to fit through the Panama Canal. However, these ships carried 45 percent of the world's cargo—and are expected to represent 62 percent of total container ship capacity by 2030. To keep up with the evolving needs of its customer base, the 50-mile (80-kilometer) waterway needed a complete overhaul.

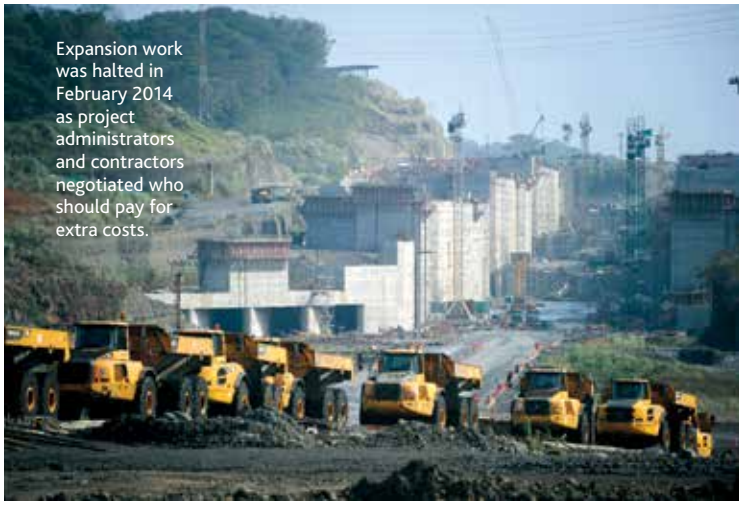
For the first major renovation since the canal was built, the Panama Canal Authority divided a US$5.6 billion, eight-year canal expansion program into four major project areas and established a project management office (PMO) to oversee them.

"This program was so big and it had to move fast. Decisions had to be made quickly for efficiency and cost-effectiveness, to finish within the targeted time frame," says Ilya Marotta, executive vice president, Panama Canal Authority, Panama City, Panama. "So we created a project manage-

"This program was so big and it had to move fast. Decisions had to be made quickly for efficiency and cost-effectiveness."

—Ilya Marotta, Panama Canal Authority, Panama City, Panama

New Panama Canal locks under construction in Cocoli, near Panama City, in August 2014



Expansion work was halted in February 2014 as project administrators and contractors negotiated who should pay for extra costs.

PHOTOS BY RODRIGO ARANGUA/AFP/GETTY IMAGES

Shipshape

1997: Studies begin for a program to expand the Panama Canal.

2002: The Panama Canal Authority starts to draft the program proposal.

2006: Voters approve expansion proposal via a national referendum.

2007: Program construction begins.

2009: The project to construct the third set of locks begins.

2011: The locks' contractor faces a six-month construction delay on concrete placement startup.

2013: Work completed on wider Atlantic and Pacific entrances to accommodate larger ships.

June 2015: Atlantic and Pacific locks are filled and gate-testing begins.

June 2016: Scheduled completion for expansion program

ment office within the Panama Canal Authority for fast reaction."

CONTROL ROOM

With a staff of 350, the PMO helped the organization consolidate its talent and resources—and ensured that the expansion program was the organization's highest priority. Consolidating talent led to faster decisions, which accelerated project execution, while other organization staff could focus on making daily canal operations run smoothly during construction, Ms. Marotta says.

The PMO also was tasked with controlling the massive program's cost and scope. "One of megaprojects' largest risks is scope creep," Ms. Marotta says. The PMO mitigated that risk by implementing a program management information system and creating a manual detailing its project management processes. This helped the organization implement stringent change management practices, including a rigorous change-order procedure for any request that could affect the budget or schedule.

A project manager had to submit a change order if a requested change affected any part of the project, such as cost or timeline. A matrix with thresholds was established within the program management plan—the maximum scheduling and budget changes that project leaders at different levels could approve. For instance, Ms. Marotta was authorized to approve a change of up to US$5 million, but higher amounts required authorization from the administrator. And change requests higher than 5 percent of the project budget had to be green-lighted by the Panama Canal Authority board.

"If there was something worth changing, then it would be approved, but it had to be very needed," Ms. Marotta says.

LOCKED IN

At US$3.2 billion, the new locks were the most expensive project in the expansion program. It

"It may take more time for the contractor to get things done properly. But we can live with a delay. We cannot live with a bad project."

—Jorge de la Guardia, Panama Canal Authority, Panama City, Panama

The team made some advance payments or paid some claims in as few as 15 days rather than the contractual obligation of 56 days—all to keep the project moving.

Four of the 16 new gates installed for the project are transported through port of Colon, Panama in June 2014.

PHOTO BY ED GRIMALDO/AFP/GETTY IMAGES

Talent Spotlight

Itzel Ulloa, PMP, project control manager, third set of locks project

Organization: Panama Canal Authority

Location: Panama City, Panama

Experience: 30 years

Other notable projects:
1. Fortuna Hydroelectric Project, a US$532 million, 300-megawatt reservoir-based hydroelectric facility completed in 1994. Ms. Ulloa served as quality control engineer for concrete mix design and installation for parts of the project.

2. Gaillard Cut Widening Project, a US$166 million expansion of the narrowest navigation channel in the Panama Canal that was completed in 2001. Ms. Ulloa oversaw contracts for excavation work.

Career lessons learned: "Being involved in the preparation of the owner's project cost estimate and the selection of the contractor has been extremely valuable. It gave me the experience, knowledge and skills required for such a huge undertaking."

expanded the existing locks by 16 meters (52 feet)—to allow post-Panamax ships to pass through the canal—while reducing water usage by 7 percent.

These improvements involved more than 10,000 activities and relied on a baseline document to track the timeline, budget and payment schedule for each activity. "It's the document that we used for seven years to review the payment and progress of the project," says Itzel Ulloa, PMP, project control manager, Panama Canal Authority, Panama City, Panama.

The project control team met each week to review completed and outstanding tasks, then met with the representative for the consortium of international contractors each month to discuss any issues and how the contractor would address them. To stay on top of the budget, the organization required a contract that settled all payment disputes with contractors through an adjudication board. The team made some advance payments or paid some claims in as few as 15 days rather than the contractual obligation of 56 days—all to keep the project moving.

"From a project management perspective, our team's success really depended on helping the contractors continue the project by being creative from a financial point of view," Ms. Ulloa says.

SCHEDULED PROGRAMMING

Delays were a constant threat on this long-term project. For instance, a lock leak in 2015 caused a weeks-long delay while the team worked to find a solution. When a video of the leak went viral and riled the public, the team knew it needed to mitigate the damage—and fast. The contractor quickly identified and remedied the problem—a lack of reinforcement in a lock joint.

The Panama Canal Authority held weekly meetings with the contractor and brought in third-party experts to ensure repairs were completed effectively. Once the problem was solved, the organization reached out to media to explain how future risks were mitigated.

"This project has 4 million owners," Mr. de la Guardia says, referring to Panama's population. "This is a very emotional topic in this country. It wasn't an unsolvable problem, but it was a very visual one."

Although the entire expansion program was

Construction of the new Gatun Locks next to the Atlantic Ocean in June 2015

scheduled to finish 18 months behind schedule, taking shortcuts to reduce delays would have impacted the quality of work, Mr. de la Guardia says. Relaxing specifications on, for instance, concrete work, might have accelerated the project but would have increased the risk of noncompliance, he says. "It may take more time for the contractor to get things done properly. But we can live with a bad project."

MADE IN PANAMA

When work is completed, shipping traffic capacity will double. New locks on the Atlantic and Pacific sides of the canal already allow vessels more than twice the previous size to pass through; a new 6.3-kilometer (3.9-mile) access channel links the new Pacific locks to the canal; the original channels are wider and deeper; and the entire canal system has increased water supply. This success has been a point of national pride for Panama, Ms. Marotta says.

"The canal's original construction [in 1914] was built mainly by foreigners under the U.S. Corps of Engineers," Ms. Marotta says. "This time it's different: 90 percent of the workforce is Panamanian."

As a result, the project management and engineering expertise gained during the expansion will remain in Panama, while the canal's expansion will have a global reach, she says.

"It's a project that will touch the world." **PM**

Route Revisions

Other canal projects in progress or on the horizon:

1 NICARAGUA CANAL

Location: Southern Nicaragua

Description: The 278-kilometer (173-mile) channel to connect the Atlantic and Pacific oceans would be among the world's largest.

Budget: US$50 billion

Status: Start of construction delayed until late 2016 because of environmental concerns and China-based sponsor Hong Kong Nicaragua Canal Development Group's financial woes.

2 SUEZ CANAL EXPANSION

Location: Egypt

Description: A 72-kilometer (45-mile) stretch in the middle of the canal was widened and deepened to increase traffic and revenue.

Budget: US$8 billion

Status: The one-year project was completed in August.

3 DUBAI WATER CANAL

Location: Dubai, United Arab Emirates

Description: A 3-kilometer (1.9-mile) canal that connects Business Bay Canal with the Arabian Gulf

Budget: US$545 million

Status: Scheduled to be completed by end of 2016

PMI'S 2016
PULSE OF THE PROFESSION®

Ahead of the Pack

To gain a competitive edge, organizations must build a culture that recognizes the value of project and program management.

BY DONOVAN BURBA

Every organization wants to deliver better results. But some consistently outpace the competition, while others remain stuck in the middle of the pack.

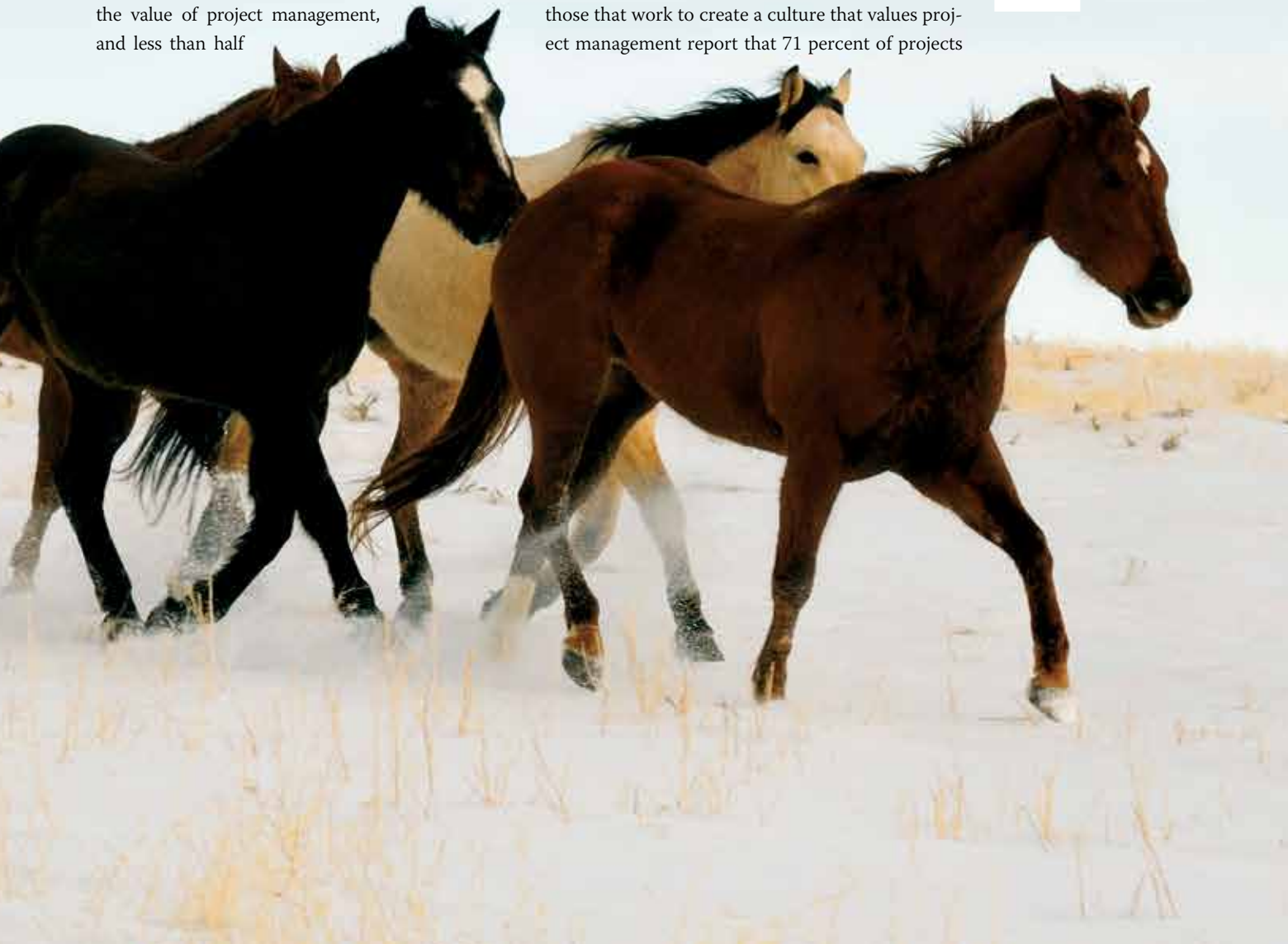
Over the years, PMI's *Pulse of the Profession®* research has found that high-performing organizations—those that deliver 80 percent of projects on time, on budget and meeting original goals—are more likely to use proven project, program and portfolio management practices. Yet, PMI's 2016 *Pulse of the Profession* report found that most organizations aren't committed to increasing their project management capabilities, with only 1 in 4 using standardized practices across the entire organization.

This is partly due to a lack of clarity around how project management helps organizations meet their strategic goals. Only slightly more than half of organizations say they fully understand the value of project management, and less than half report high alignment of projects to organizational strategy, according to the 2016 *Pulse* report.

The use of PMOs and other proven success factors, including a focus on training and development and executive sponsor engagement, remained level or declined year-over-year. And the consequences have hurt the bottom line. The 2016 *Pulse* report found that organizations wasted US$122 million for every US$1 billion they invested due to poor project performance—a 12 percent increase over the previous year.

The good news? Widespread gaps in understanding the power of project management create an opportunity for organizations to gain a competitive edge. For instance, organizations that understand project management as a role, a profession and an organizational competency waste 13 times less money than less-accomplished counterparts. And those that work to create a culture that values project management report that 71 percent of projects

Over the years, PMI's *Pulse of the Profession®* research has found that high-performing organizations are more likely to use proven project, program and portfolio management practices.



meet original goals and business intent, compared to only 52 percent at organizations that make building this culture a low priority.

By nurturing the right skills and priorities, organizations can foster a culture that positions project management as a driver of high performance. The 2016 *Pulse* report found that organizations with high project management maturity earn strong marks three ways: They look beyond technical skills, engage executive sponsors and understand the strategic role of the enterprise-wide project management office (EPMO).

When organizations develop the ideal skill set—a combination of technical, leadership, and strategic and business management expertise—40 percent more of their projects meet goals and original business intent. Organizations with more than 80 percent of projects with actively engaged executive sponsors have an average of 65 percent more projects meeting goals. Organizations with less than 50 percent of projects with actively engaged executive sponsors have an average of 46 percent of projects meeting goals. And organizations that align their EPMO to strategy report 27 percent more projects completed successfully and 42 percent fewer projects with scope creep.

To realize the benefits of project management practices, project leaders must also make executives aware of the gaps within their organizations. The *Pulse* report found that executives and PMO directors often have different perspectives on the organization's ability to successfully formulate strategy, prioritize and fund projects, execute strategic projects and identify lessons learned. For instance, 83 percent of executive leaders believe their organizations successfully formulate strategy appropriate for changing market conditions, compared to 59 percent of PMO directors. Similarly, nearly three-quarters of executives said their organization fully understands the value of project management, while less than half of PMO directors said the same.

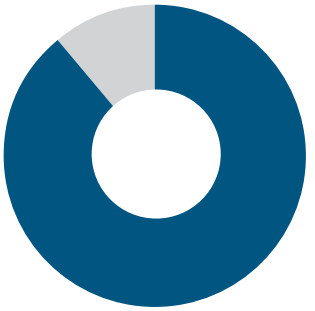
To bridge these gaps—and create a culture that understands and values project and program management—change must start at the top. But the end results will boost project success rates and the bottom line. **PM**

Fast Track to Success

High performance and project management maturity go hand in hand—but many organizations are still in the slow lane.

ON TARGET

Having proven project, program and portfolio management practices in place makes a dramatic difference in project performance.



89%

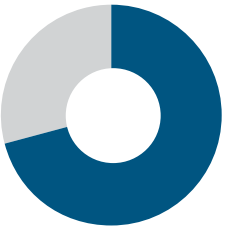
of projects at high-performing organizations meet original goals and business intent. (High performers complete 80 percent or more of projects on time, on budget and meeting original goals.)

34%

of projects at low-performing organizations meet original goals and business intent. (Low performers complete 60% or fewer of projects on time, on budget and meeting original goals.)

BUILDING BLOCKS

At organizations that place a high priority on creating a culture that recognizes the importance of project management:



71%

of projects meet original goals and business intent, compared with **52%** at organizations that make it a low priority.

But most organizations aren't making the connection:

38%

of organizations place a high priority on creating a culture that recognizes the importance of project management.

DOWN THE DRAIN

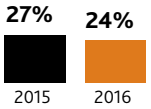
US$122 million

Amount organizations waste on projects for every **US$1 billion** invested, due to poor project performance.

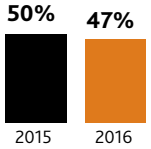
That's a **12% increase** from 2015.

MISSED OPPORTUNITIES

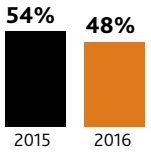
Fewer organizations are leveraging key success factors compared to last year:



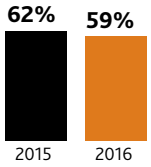
Apply **standardized project management** practices organization-wide



Have a **formal knowledge transfer process**

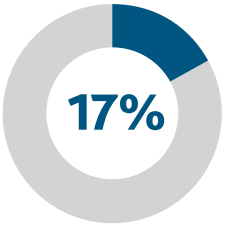


Projects that are **strategic initiatives**

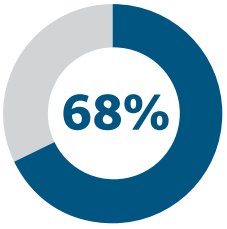


Projects that have **actively engaged executive sponsors**

FIGHTING INERTIA



of organizations report high benefits realization maturity (no change since 2013).



of organizations have a PMO (no change since 2012).

THE TALENT TRIANGLE

25%

of organizations consider leadership, business and strategic management skills, and technical skills a priority. (Of those organizations, **40%** more of their projects meet the original goals and business intent.)

32%

more projects are successful in organizations that invest in ongoing project management training, offer a defined project management career path and establish formal knowledge transfer processes.

GET IN SYNC

49% of organizations have an enterprise-wide project management office (EPMO).

Among organizations that have an EPMO:

44% are highly aligned with organizational strategy.

Among organizations that align their EPMO with strategy:

27%
more projects are completed successfully.

42%
fewer projects have scope creep.

SUPPORT FROM ABOVE

An actively engaged executive sponsor is the top driver of project and program success:

3 in 5
projects have engaged executive sponsors.

65%
Organizations with more than **80%** of projects that have executive sponsor support have **65%** more projects that are successful.

Source: *Pulse of the Profession®*, PMI, 2016 (Methodology: 2,428 project management practitioners, 192 senior executives and 282 PMO directors around the world were surveyed in October 2015.)

WEATHER THE STORM

Infrastructure projects can cushion the blow of extreme weather events—if project managers can navigate the uncertainty of a changing climate.

BY MICHAEL APPLEBAUM

PORTRAITS BY JONATHAN BIELASKI

Whether it's caused by drought-induced fire, rising floodwaters or the crushing weight of massive snowfall, extreme weather events are putting stress on countries around the globe. Governments are working urgently to mitigate the economic risks associated with global climate change—and with good reason. By 2050, the World Bank estimates that adapting to an average global temperature increase of 2 degrees Celsius will cost between US$70 billion and US$100 billion per year.

Countries are responding by increasing their support for climate resiliency projects that aim to bolster infrastructure and protect communities from natural disasters. In developing countries in particular, institutions such as the World Bank often finance these initiatives. Over the past five years, the World Bank has spent US$30.3 billion on 330 transportation projects, with more than one-quarter of those projects—such as mass-transit initiatives—intended to deliver climate change benefits.

One of the fundamental challenges for any climate resiliency project involves managing the uncertainty around how climate change will impact

Kenneth M. Dion, Toronto and Region Conservation Authority, Toronto, Ontario, Canada

Rendering of a major flood protection and revitalization project for southern Ontario's lower Don River

a specific locale, says Andrew Losos, transport specialist at the World Bank in Washington, D.C., USA.

"The question is: How do you plan for the future, when we know there will be an overall increase in global temperature and intense storms, but it is hard to predict precisely what will happen to any individual country?"

"Most projects are designed to meet objectives based on the most likely climate scenario, but that doesn't work when you're dealing with climate change—too much risk involved."

—Andrew Losos, World Bank, Washington, D.C., USA

WINDS OF CHANGE

Under these conditions, project managers must plan for a wider range of possible outcomes, says Mr. Losos. For instance, where a project to construct a highway might typically design its structures to withstand a 100-year statistical flood, project managers might now need to prepare for even greater variability.

"Most projects are designed to meet objectives based on the most likely climate scenario, but that does not work when you're dealing with climate change—there's too much risk involved," says Mr. Losos. "You may end up building expensive infrastructure that may not be economical to operate over its capital life span because of climate impacts."

To mitigate these risks, project managers should vigilantly validate their model's assumptions—and build in some leeway to absorb unexpected change, says Kenneth M. Dion, senior manager of special projects at the Toronto and Region Conservation Authority (TRCA) in Toronto, Ontario, Canada.

Those tactics have worked for Mr. Dion on a major flood protection and revitalization project for southern Ontario's lower Don River. Construction on the estimated CA$1 billion project is expected to commence in 2017, with a target completion date of 2023. The engineering design features a new multi-outlet valley system—including new channels and modification to existing infrastructure—built to protect the region from a flood event equivalent to the size of Hurricane Hazel, a 1954 storm that caused over US$1 billion in damage in Canada.

"In our hydraulic model, we applied the intensity of rainfall from the 1954 storm as the maximum expected rainfall event. But it's not going to rain with that intensity everywhere during a hurricane," says Mr. Dion. "We included some uncertainty to account for the effects of climate change by adding another half meter of elevation in building up the [constructed valley walls] of our flood protection system. That ensures capacity in the event we have more frequent and larger hurricanes in the future."

Project managers also must be ready to course-correct when the assumptions that informed their requirements are proven wrong, says Darren Suen, PMP, chief of FloodSafe information and advocacy branch, division of flood management, California Department of Water Resources in Sacramento, California, USA.

"In a typical project you're managing from a relatively static environment. But with climate change, it's an evolving science," he says. "The outcome isn't finite; it's based on the best available data."

In this type of fluid environment, Mr. Dion leans on adaptive management techniques. He builds mechanisms into the various phases of a project that allow for modifications under changing circumstances, thereby increasing the overall project's flexibility.

As part of the flood protection design for the Don Mouth Naturalization and Port Lands Flood

THE COSTS OF CLIMATE CHANGE

Climate-related losses and damage are driving the need for climate-resiliency projects around the globe.

GLOBAL

- Over the past 10 years, climate-related disasters, including storms, floods and drought, caused **US$1.4 trillion** in damage, according to the United Nations Office for Disaster Risk Reduction (UNISDR).
- In 2014, 900 weather-related events caused **US$100 billion** in loss and damage, according to UNISDR. Of that damage, **60 percent** occurred in developing nations.

EUROPE

- Extreme river floods that now occur every 100 years will become **twice as likely** over the next 30 years, according to scientists from the European Commission's Joint Research Center. Climate-related damage to land, property and people across the continent are expected to increase by an average of **200 percent** by the end of the century.

UNITED STATES

- Drought conditions persisted through all of 2015 across several Western U.S. states. The lack of rainfall devastated farmland and encouraged wildfire conditions—and cost **US$1 billion in 2015**, according to The National Oceanic and Atmospheric Administration.

LATIN AMERICA AND THE CARIBBEAN

- The economic costs of climate change are projected to sap between **1.5 percent and 5 percent** of the region's GDP by 2050.

SOUTHEAST ASIA

- The potential economic impact of annual floods in the region is on the rise, according to the World Resources Institute. By 2030, **US$215 billion in GDP** could be exposed annually, an increase of more than **US$193 billion**.

Protection project, for example, TRCA is proposing to install an inflatable weir (a barrier that alters the river's natural flow) near the mouth of the river to control the direction of flow of water into the various river outlets before it enters Lake Ontario.

"If we turn off the power pumps, the weir drops in and we can divert more of the water into the hardened areas such as the channel with hardened dockwalls. It's a strong tool to control a flood event so that the water is not concentrated in any of the three valley outlets," says Mr. Dion.

PATTERNS IN CHAOS

Analyzing risks and studying the right data can help governments identify which projects to prioritize—and help project managers prepare for the challenges they could encounter. In subtropical regions, for instance, climate change is causing dramatic variability in the water cycle. Both monsoons and drought seasons are becoming more intense, which creates a significant infrastructure challenge in the region, says Ghulam Murtaza, drainage engineer, Mouchel Middle East, Riyadh, Saudi Arabia.

Mr. Murtaza recently worked on a project to study the impact of climate change on the water resources of Bhutan. The study found that between 2015 and 2030, the variability of the water cycle would increase, on average, by 15 percent to 20 percent—and by 2090 that variability will rise as high as 35 percent. That's bad news for the country's aging infrastructure.

"Bhutan is flooding," he says. "Roads, railways, bridges, dams and other infrastructure did not account for this factor in their existing design structures."

Between 2010 and 2015, flooding in Pakistan also has become more severe. Yet, because there are no mechanisms in place to store water, drought periods also are causing greater devastation, especially given the population's heavy economic reliance on

"In a typical project you're managing from a relatively static environment. But with climate change, it's an evolving science."

—Darren Suen, PMP, California Department of Water Resources, Sacramento, California, USA

UNCHARTED WATERS

On 29 October 2012, Hurricane Sandy flooded the underground tunnels of one of the busiest subway lines in New York, New York, USA with over 27 million gallons (102 million liters) of saltwater. Restoration of the badly damaged Montague Tunnel, which connects Lower Manhattan and Brooklyn via the R train, was completed one month ahead of schedule in September 2014. It was a complex project that included extensive demolition and the installation of miles of new concrete duct banks, new track work, electrical and communication systems, signaling devices and mechanical pumps.

Like other major U.S. cities, New York's transit system was ill-equipped to handle Sandy's deadly 14-foot (4.3-meter) storm surges. Many of its tunnels were built in the early 20th century and included duct banks made from terra cotta, which easily erodes during a flood. When local officials looked across the globe for comparative solutions, they found themselves in unknown territory.

"We did a worldwide search to see how other major cities manage their flood mitigation issues and concluded there were no existing solutions that could be implemented in our system without a major redesign," says John O'Grady, who has overseen more than US$4 billion in post-Sandy resiliency projects as head of capital program management for the Metropolitan Transportation Authority (MTA) in New York.

As part of its contract with the MTA, Delaware-based manufacturer ILC Dover introduced a Flex-Gate system—a large sheet of waterproof fabric that can be deployed and retracted in minutes—and is testing a new inflatable "plug" to protect 23 subway entrances from floodwaters of varying heights.

"We worked with many vendors, innovators and engineering firms to develop flood mitigation devices and solutions to fit our transit infrastructure environment," Mr. O'Grady says.

"We did a worldwide search to see how other major cities manage their flood mitigation issues and concluded there were no existing solutions that could be implemented."

—John O'Grady, Metropolitan Transportation Authority, New York, New York, USA

agriculture. To help communities cope with these environmental changes, Pakistan is investigating infrastructure initiatives that will allow storm water to be harnessed and used year-round.

"Projects are needed to store water and also to control floodwaters," Mr. Murtaza says. "But these projects are very long and take time, more than 10 or 15 years. They are in the initial stages."

A HUMAN SOLUTION

Typically, climate change projects need to build consensus among several disparate and powerful constituencies. In California, for example, a program is underway to expand the Yolo Bypass in the Sacramento River Basin. The flood-control system is comprised of levees, weirs and a natural bypass near densely populated areas, leading to significant challenges in obtaining alignment among a large number of influential stakeholders, says Mr. Suen.

"There are perceived impacts to the ecosystem and recreation and farmland," says Mr. Suen. "You have residents, farmers and people in charge of land reclamation districts responsible for maintaining the weir and levee system. On the government side, local agencies all have specific projects they'd like to get done, while at the state level, we're trying to implement a systemwide resiliency program for climate change and resulting extreme weather events."

To achieve objectives, Mr. Suen has adopted a policy of "early and often" communication with his stakeholders. Getting a head start on a basis of understanding helps build trust with stakeholders, he says. It's best to start with working-level stakeholders, then proceed up the chain of command, building momentum for consensus along the way.

"When you're proposing to change an environment that people live in every day, you have to be transparent in your decision-making," he says. "Clear and consistent communication establishes trust in the expertise of the organization."

Some infrastructure projects need to go beyond getting buy-in to inspiring community participation. For instance, a water management project in Pakistan requires communities to harvest rainwater

they can use to water gardens, wash cars and clean their homes, Mr. Murtaza says.

"To restore the water source at the basin level, I think the most important thing is getting the community involved," he says. "Most communities are not educated, so the loss of water is very high."

To inspire people to change their behavior, the Pakistani government has launched educational programs that outline easy ways families and communities can install water-harvesting tanks on rooftops and in parking lots, where large amounts of runoff are wasted. Municipal governments also are requiring new homes to include rainwater tanks in their master plans.

"The size of the tank varies according to the size of the plots," Mr. Murtaza says. "But if the tank is missing, the final plan is not approved."

Getting this level of participation requires speaking to people in ways they can understand. Several times during the recently completed environmental assessment portion of the Don Mouth project, Mr. Dion's team was challenged ahead of public meetings to "tone down" the technical language in their presentations. That resulted in a net positive for the project, he says.

"We were continuously changing the wording of our documentation in our newsletters, web content, handouts, display boards and presentation slides," recalls Mr. Dion. "We responded to public input, incorporated that input into the study and provided detailed consideration for those items. The fact that we gave a detailed look at the implications of these options aided us in gaining our very high level of public support for the project." **PM**

"When you're proposing to change an environment that people live in every day, you have to be transparent in your decision-making."

—Darren Suen, PMP

FEATURED BOOK

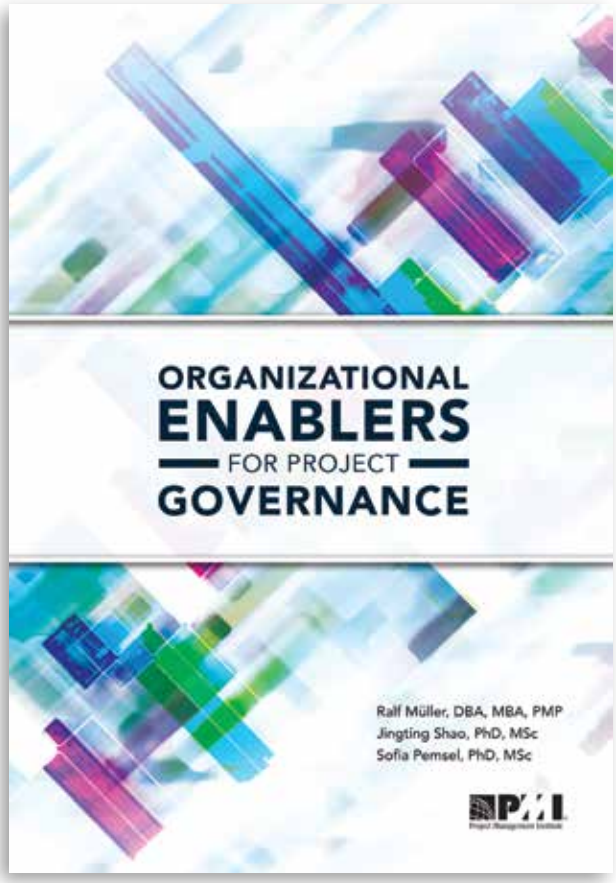
Ralf Müller, DBA, MBA, PMP; Jingting Shao, PhD, MSc; Sofia Pemsel, PhD, MSc

Organizational Enablers for Project Governance

While corporate culture plays a significant role in the success of any corporation, governance and "governmentality" not only determine how business should be conducted, but also define the policies and procedures organizations follow to achieve business functions and goals. In their book, *Organizational Enablers for Project Governance*, Ralf Müller, Jingting Shao and Sofia Pemsel examine the interaction of governance and governmentality in various types of companies and demonstrate how these factors drive business success and influence project work, efficiency and profitability.

The data for the studies was collected through interviews with six companies in Sweden and China and a global web-based questionnaire that garnered 208 responses. Using this data, the authors conducted four studies, employing various research methodologies, to investigate the different systems of governance and their relationships to organizational success. Based on these results, the authors discovered that organizational enablers (including key factors such as leadership, governance and influence of project managers) have a critical impact on how organizations operate, adapt to market fluctuations and forces, and make essential changes over time.

This must-read book is a practical guide for executives and project managers alike. The insights and industry examples provided can be applied to any project-based organization.



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Project Management Institute, 2016,
ISBN: 9781628250848, paperback, 240 pages,
$27.95 Member, $34.95 List Price

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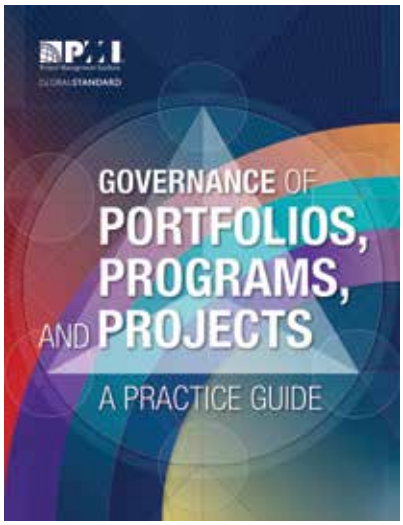


Project Management Institute

Governance of Portfolios, Programs, and Projects: A Practice Guide

Developed by leading experts in the field, this text provides guidance to organizations and practitioners on how to implement or enhance governance on portfolios, programs and projects. It provides definitions for governance in an effort to distinguish the different levels of governance and to identify their common elements and shares leading practices for creating a governance framework. It can be used by senior executives, functional managers and senior leadership as a reference for portfolio, program and project governance. Overall, the guide offers a consistent approach to portfolio, program and project governance, something that many organizations currently lack.

Project Management Institute, 2016, ISBN: 9781628250886, paperback, 122 pages, $27.95 Member, $34.95 List Price

Project Management Institute

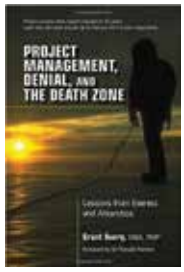
Translations of the PMBOK® Guide—Fifth Edition

A Guide to the Project Management Body of Knowledge (PMBOK® Guide)—Fifth Edition reflects the collaboration and knowledge of working project managers and provides the fundamentals of project management as they apply to a wide range of projects. This internationally recognized standard gives project managers the essential tools to practice project management and deliver organizational results. Translations are available in 10 languages besides English: Arabic, Simplified Chinese, French, German, Italian, Japanese, Korean, Brazilian Portuguese, Russian and Spanish.

Project Management Institute, 2014, ISBN: 9781935589679 (English), 589 pages, digital version is free for members, printed version: $49.50 Member, $65.95 List Price

Grant Avery

Project Management, Denial, and the Death Zone: Lessons from Everest and Antarctica

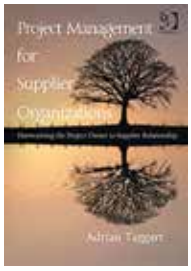


Using examples and lessons learned from high-risk environments where the price of project failure is death, this innovative and captivating guide provides powerful insights into the root causes of project failure and how to manage them. Written from a base of in-depth project management knowledge and experience, this essential reference for business leaders, portfolio owners, project and program managers, business analysts and risk managers explores the drivers of risk in projects as well as the relationship between our ambitions and our abilities. It provides pragmatic real-world solutions to the constant threat of project failure that readers can apply directly to their organization.

J. Ross Publishing, 2015, ISBN: 9781604271195, hardcover, 288 pages, $42.70 Member, $44.95 List Price

Adrian Taggart

Project Management for Supplier Organizations



Counter to convention, this book explores project management from the perspective of the vendors providing the necessary goods and services to a project. It explains the likely impact on the structure, culture and procedures of suppliers and identifies the additional competencies they may require. It offers new insights, frameworks and models that integrate the role of the supplier as a member of the owner's project team with their own necessary commercial activities such as marketing and selling. The text explores the shared and divergent interests of suppliers and owners and shows how a well-thought-out and carefully executed procurement process maximizes the former and diminishes the latter.

Ashgate Publishing Company, 2015, ISBN: 9781472411099, hardcover, 302 pages, $113.95 Member, $119.95 List Price

Perfectly Positioned

How to start on the path toward organizational agility.

By Sergio Luis Conte, PMI-ACP, PMI-PBA, PMP

When top tennis stars like Novak Djokovic or Roger Federer play, they always seem to be in the right place at the right time. It's as if the ball is hit directly to them. Part of this is obviously due to the players' quickness and fitness level. But what is not always obvious is that the players are applying their knowledge to create their future. By anticipating where the opponent will hit the ball, they can be perfectly positioned to respond.

Organizational agility has the same goal: using knowledge and organizational structures to get in position to respond quickly to the changing environment and even to create changes in the environment. But working toward organizational agility takes effort. Here are some tips to help organizations beginning to explore the process.

Understand what agility is. There's a lot of misunderstanding in the market; agility is not only related to software or IT. Agility is not a method or methodology. In reality, agility is an enterprise-wide concept useful in any sector.

Evaluate the impact to implement it. Agility will transform your whole organizational structure or enterprise architecture. All organizational components and their relations will be affected. Before starting, conduct a gap analysis of the current enterprise architecture and the desired future enterprise architecture. This is necessary to define the problem that will be solved by the transformation to organizational agility. (The tool I use to integrate all this is Tom Peters' 7S Model described in the book *In Search of Excellence*.)

Make the transformation by evolution, not by revolution. Don't transform everything in one shot. There is a lot in the organization—especially organizational knowledge—that can be reused or can be leveraged to a new state. Remember that organizational agility is a matter of reconfiguring organizational structures and ability to find appropriate ways to apply organizational knowledge.

Agility does not come in a can. Author and agile expert Rick Dove stresses this point. Becoming agile doesn't involve an easy-to-follow recipe. You need to adjust your implementation using the tools, methods and techniques that best fit your situation.

Organizational culture enables change. You need to create an adaptable structure that can be changed when needed as easily as a child changes a Lego creation. The organizational culture will enable the right change at the right time. In my last initiative, we helped create an environment that contributes to organizational agility with Franklin Covey's Speed of Trust method, which aims to make trust between co-workers a strategic advantage for an organization.

Consider the business analyst. The role of business analyst could help to create the transformation you're seeking. Business analysts identify business needs and recommend relevant solutions—and the implementation of agility is certainly a business need. **PM**

Sergio Luis Conte, PMI-ACP, PMI-PBA, PMP, is a senior program supervisor at PepsiCo., Buenos Aires, Argentina.

CLOSING THOUGHTS

Noman Zafar Chaudry, PMP

Location: Sydney, Australia
Title: Senior scheduling/planning specialist
Organization: KBR Inc.
Sector: Construction and engineering

You're working on Sydney Metro, Australia's largest public transport project. How do you keep it on schedule?
I developed a custom tool to keep design development of Metro stations, railway lines and associated infrastructure on track. The tool feeds off the main contractor's schedule and includes line items for each package and stage, the latest monthly update from the contractor and forecasts from our team. This allows me to provide accurate status updates and forecasts to management.

Project managers keep people focused on the bigger picture so they know what needs to be done to get to the finish line, not just the next bend in the road.

What's the best project you've worked on?
It's difficult to choose between Khalifa Port in Abu Dhabi, United Arab Emirates; the Abu Dhabi Airport Expansion Project; and Sydney Metro.

What three adjectives best describe you?
Meticulous, straightforward and cool-headed.

If you could recruit a celebrity for your project team, who would it be?
Tom Cruise. He has the uncanny ability to turn around and deliver impossible missions (read: most projects).

What's the most rewarding part of your job?
The satisfaction of seeing things happen as planned is incomparable.

What advice do you have for new project managers?
You need to know where you want to go (goal) and where you are (current progress status) to know how to reach the finish line (plan).

If you could give someone an honorary PMI credential, whom would it be?
The project sponsor who envisioned the first pyramid in Egypt more than 4,500 years ago, and had it designed and constructed.

Why does the world need project managers?
We keep people focused on the bigger picture so they know what needs to be done to get to the finish line, not just the next bend in the road.

What's your project management mantra?
Plan, do, track, adjust your plan and start all over again. **PM**

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