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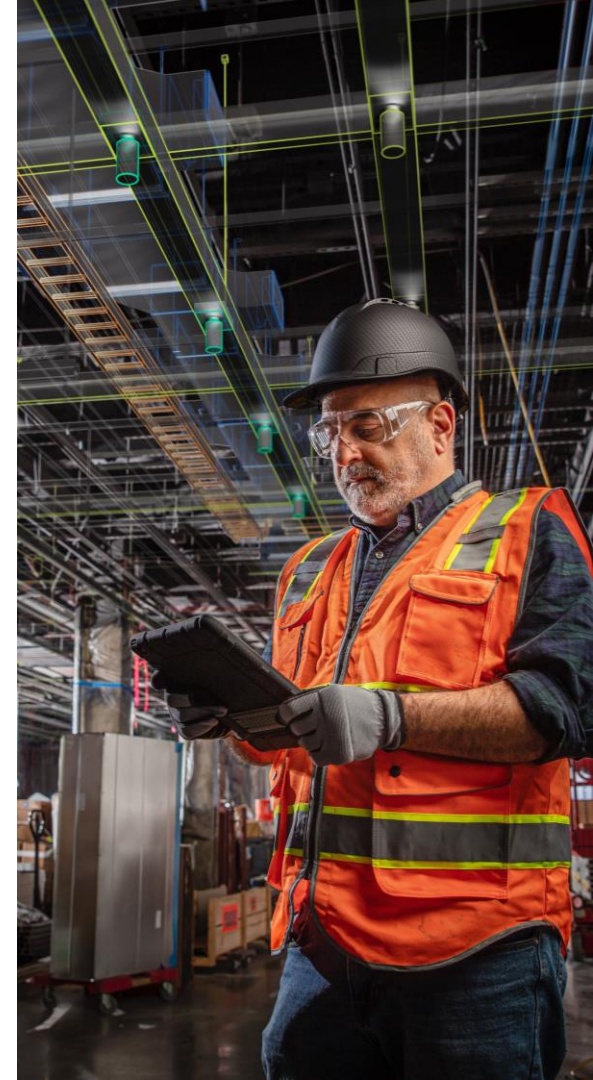
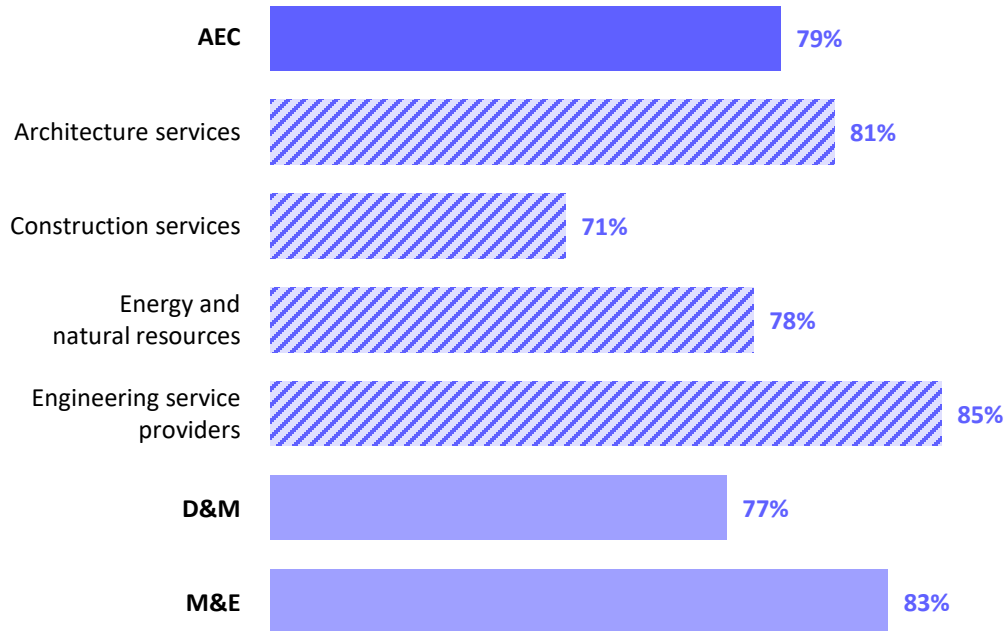


AEC



Digital Tools

Respondents who said that **the future growth of their company will depend on digital tools:**



Performance

Percentage of AEC respondents who identified their company as **top performers**, rating their company's performance in 2021 as "exceptional" or "above average":

52% in AEC

48% in D&M

53% in M&E

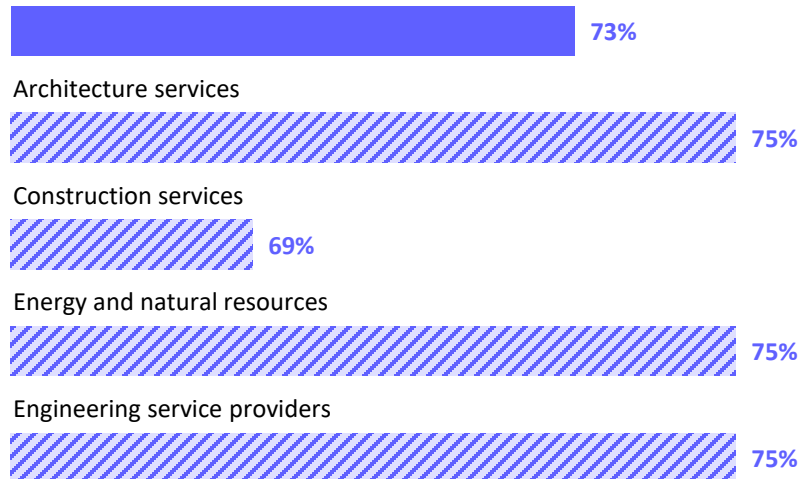


Investments

Respondents in **AEC industries** plan to make the following investments over the next three years:

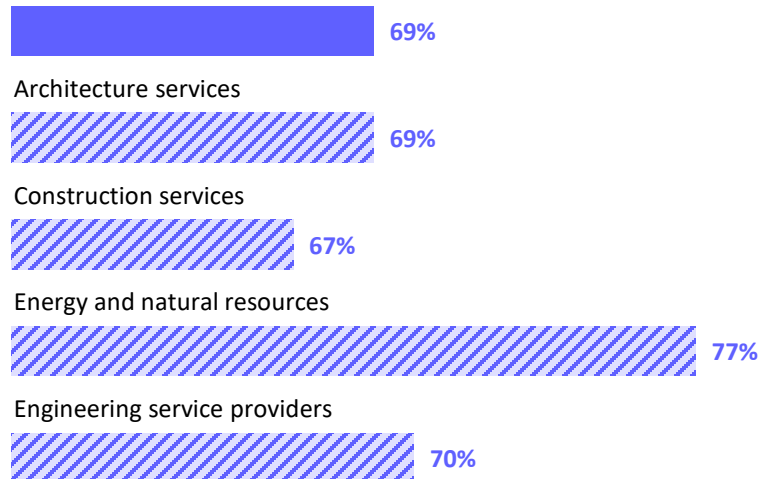
Technology to deliver improved project outcomes:

All AEC



Data management and analytics:

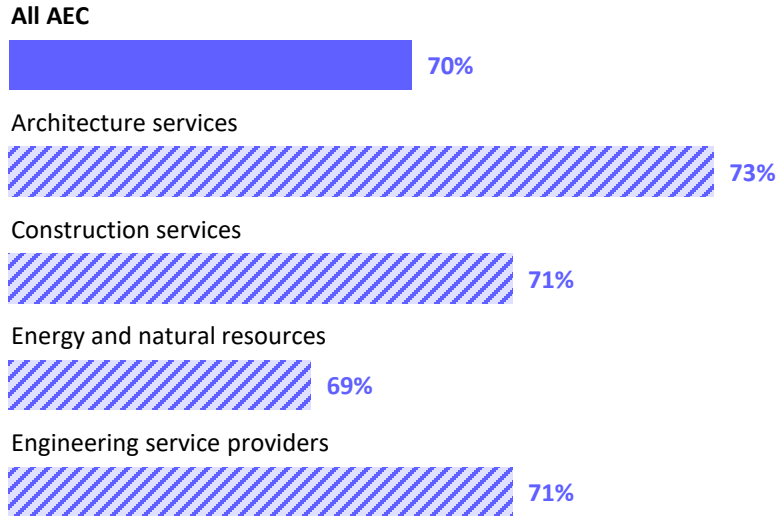
All AEC



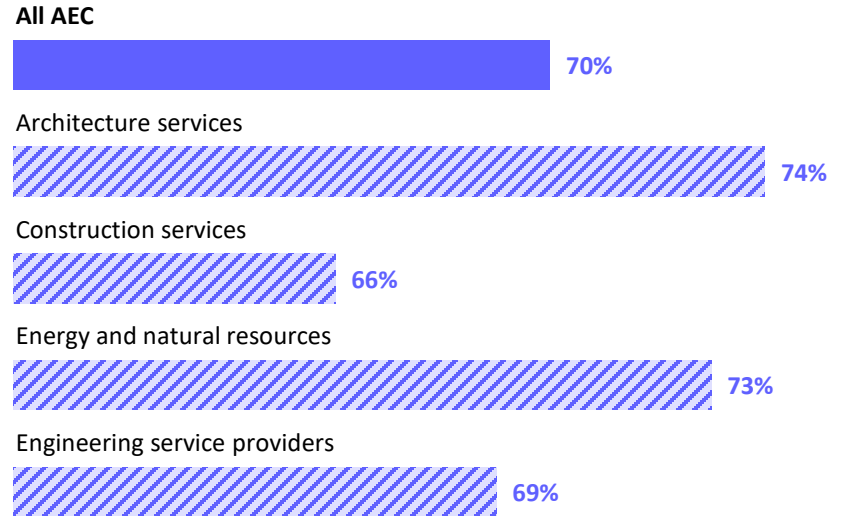
Investments

Respondents in **AEC industries** plan to make the following investments over the next three years:

Improved processes and operations:



Product and/or service innovation:



Digital maturity

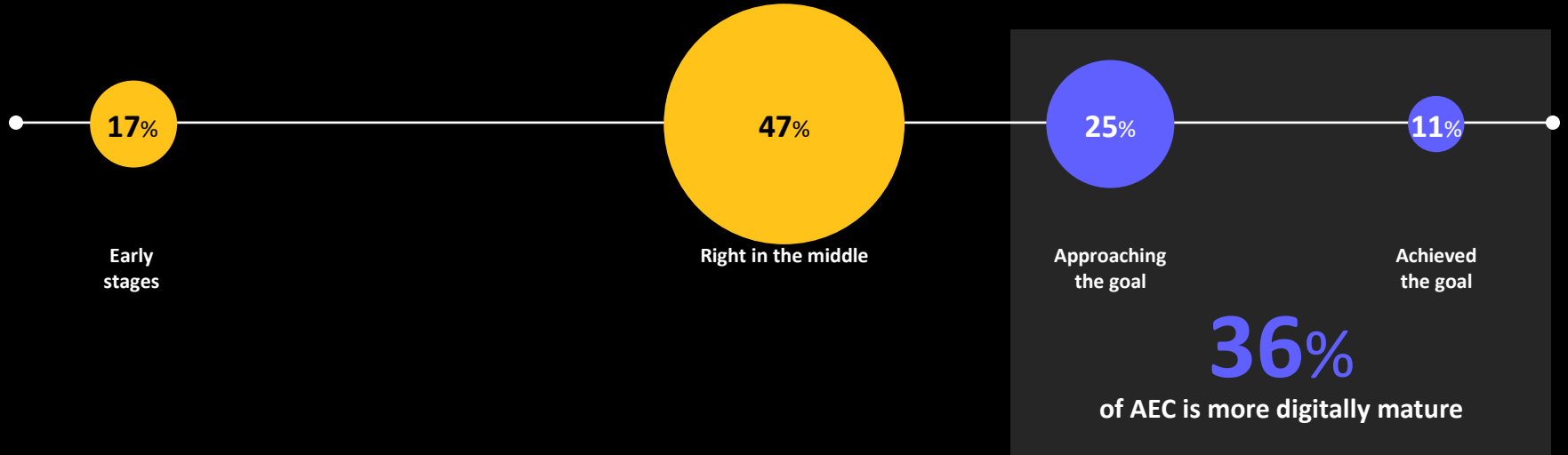
Where AEC respondents report their company is in its digital transformation journey:

Less digitally mature

Companies in the early or middle stages of the journey are defined as “less digitally mature”

More digitally mature

Companies approaching or that have already achieved their transformation are defined as “more digitally mature”*



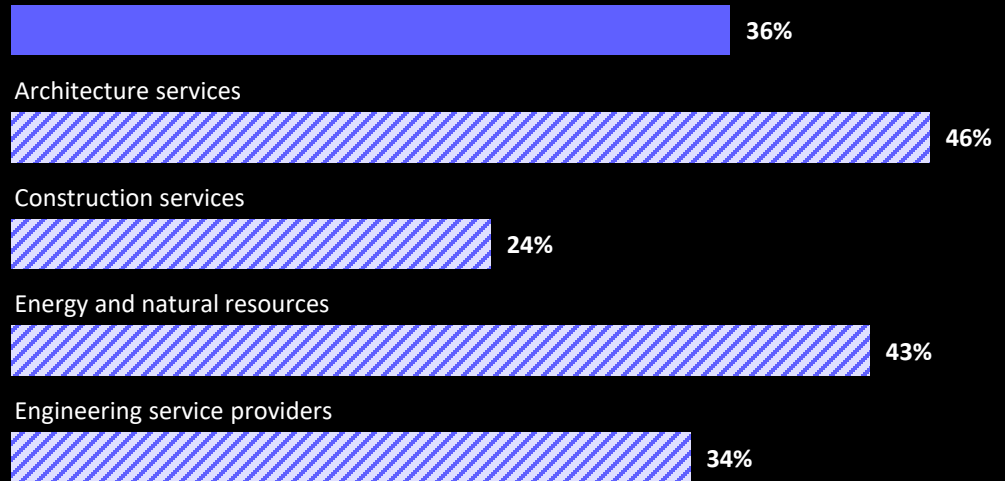
Digital maturity

36%

of respondents from companies in AEC reported that their company is “more digitally mature,” compared to 38% across all respondents.

This trailed M&E but was on par with D&M.

All AEC



Benefits of digital transformation

Respondents from AEC said the top benefits of digital transformation are:



Increased innovation



Reduced costs



More satisfied customers

Among all industries, the top benefits cited were:

- 1 Reduced costs
- 2 Increased innovation
- 3 Ability to launch products more quickly

Reaction to the Pandemic

AEC respondents were less likely to say the COVID-19 pandemic

Caused changes in product or service demand

25% in AEC

30% in D&M

36% in M&E

Forced their company to rethink priorities

29% in AEC

36% in D&M

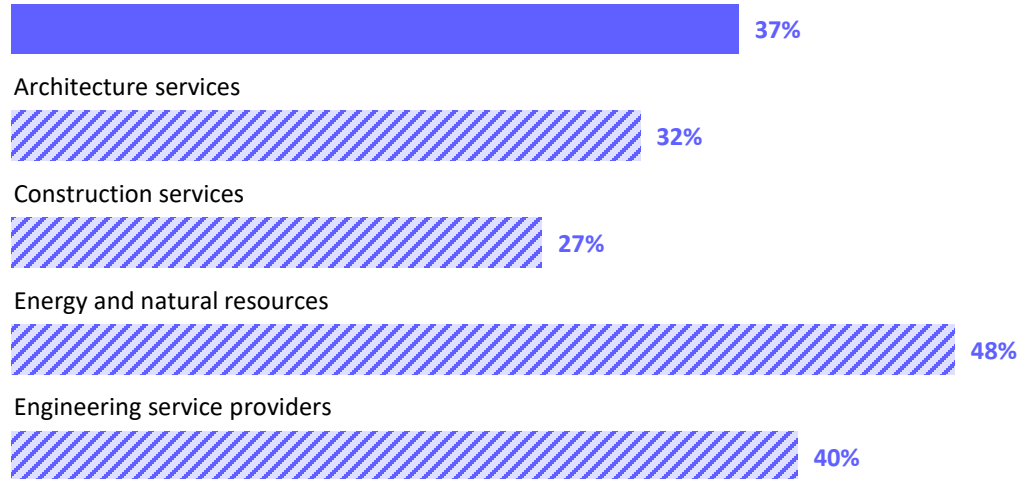
35% in M&E



Leveraging data

There are some differences in how companies are leveraging internal data for collaboration with AI. Respondents in **AEC** were more likely than those in **M&E** to say they leverage data for internal collaboration among teams

All AEC



Skills of the future

More than the average across industries, **AEC respondents say the most important technical skills for their company's workforce over the next three years are:**

Technology use, monitoring, and control



3D Modeling



Automation



Cloud computing



Data science, including the ability to present, understand, and leverage insights from data



Cybersecurity and privacy

Technology design and programming



Artificial intelligence and machine learning



Analytics programming and data management



Software engineering



Ability to design and program technology to meet business needs

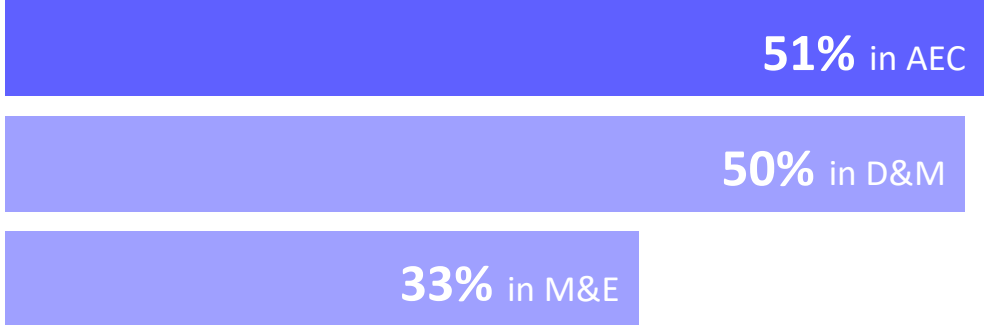


Ability to develop sustainability tracking tools

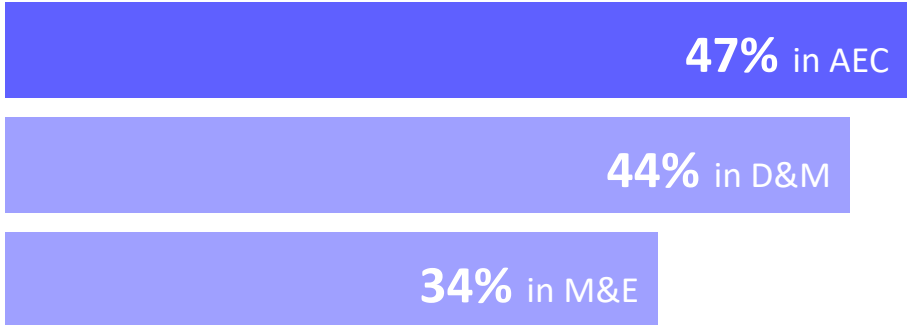
Talent challenges

AEC respondents were more likely to say:

The workforce is rapidly aging:

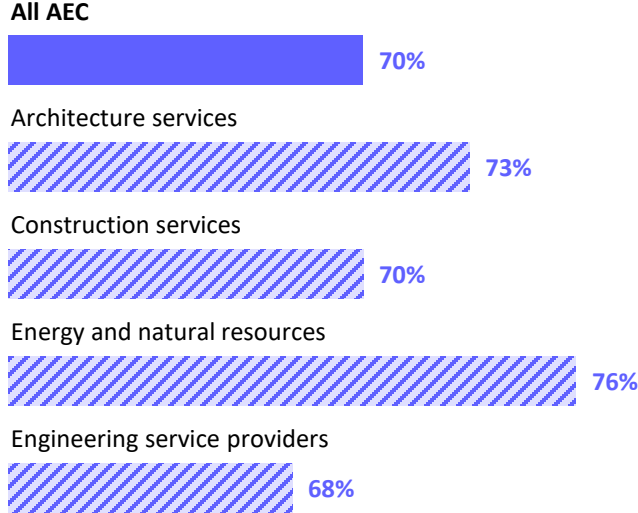


Company culture is too slow to adapt to the younger generation's needs:

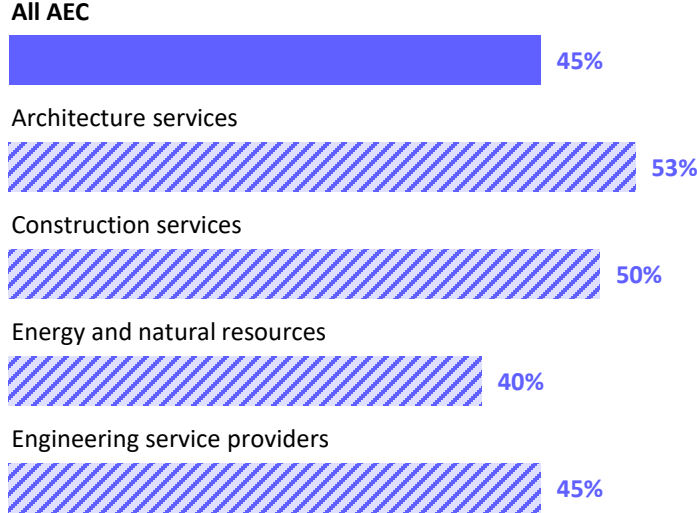


Talent solutions

Respondents who agree that in the next three years, their company is **planning to invest more in technology focused training:**



Respondents who agree their company **doesn't have the skills nor the resources to design internal training programs:**



Sustainability in action

AEC led the way in specific sustainability actions:

Increasing the share of renewable energy sources used:

33% in AEC

31% in D&M

22% in M&E

Helping customers decrease their carbon emissions:

29% in AEC

25% in D&M

18% in M&E

Participating in carbon project financing:

19% in AEC

12% in D&M

13% in M&E

Sustainability pressure

When asking how influential different groups are in pressuring their organization to create and meet sustainability goals, respondents said these groups were “very” or “moderately” influential:



	CUSTOMERS	EMPLOYEES	INVESTORS	GOVERNMENT
All AEC	82%	73%	76%	78%
Architecture services	89%	77%	78%	80%
Construction services	82%	73%	70%	69%
Energy and natural resources	82%	78%	86%	89%
Engineering service providers	80%	70%	73%	71%



Hiroshi Kono

Senior Executive Officer,
Daiwa House Industry Co.,
Ltd.



We hold various events, such as digital transformation contests and meetups, to motivate people to work on digital technology—and to spur the company as a whole to increase digital motivation. We received about 1,000 applications for the contests, and the board of directors and others served as judges. We encourage the younger generation to think about more efficient collaboration among teams by trying out new technologies into their workflow. It harnesses their creativity and **becomes a power to transform the construction industry itself.**





Megan Stanley

Manager – Technical
Applications, GHD



We realized the potential value of data some time ago, but today our sources of data are nearly endless. This has created, for many of us, a data explosion. With the volume of information we generate through sources like project information, communications, sensors, and technology, **we have access to a lot of potentially high-value data**. The challenge for organizations and the industry will be how we collectively create standards and a consistent approach to realizing that value.





Fiona Short

Principal | Architect,
Warren and Mahoney



Sustainability attracts talent. You want the right people to come and want to work for you, and you want to be a company that people are proud to work for. A focus on sustainability helps you to get the best out of people because they're passionate and their work aligns with their values. It attracts those like-minded people, and it is just the right thing to do.





MingLei Ma

Chief of Engineering
Research Institute,
China Construction Eighth
Engineering Division
Corporation



Sometimes, new graduates' knowledge appears to be outdated in comparison to our industrial practices. In some cases, our internal R&D is more advanced than the R&D at universities. We've developed tutorials based on our own patent pool to **help new employees acquire knowledge about our internal development and patents.**





MingLei Ma

Chief of Engineering
Research Institute,
China Construction Eighth
Engineering Division
Corporation



Customized, company-specific training [is important]. At the organization, employees participate in a points-based lifelong learning system and receive tailored training about the company’s patents and research findings.





GuoJin Zhu

Chief Engineer,
Kunming Engineering
Corporation Limited, Power
China Group



We're trying to develop a new platform to digitalize our archive so that every step of the engineers' thoughts can be documented. With these efforts, we can set up our library of knowledge, and the resources in this library can be used to inspire similar projects in the future. **This end-to-end documentation of the whole process of idea, development, inspiration, and iteration will be very valuable for our future development.**





GuoJin Zhu

Chief Engineer,
Kunming Engineering
Corporation Limited, Power
China Group

“

In the long run, the share of renewable energy will exceed that of fossil fuels, but I'm concerned about the acceleration of the transition to new energy. It's easier to use energy from fossil fuels, and the cost of green energy is still high. We need more technical advances to make green energy more affordable.

”



Andreas Rau

Head of Product
Management, Transport
System Bögl, Max Bögl



Digital transformation **hasn't**
reached the **broad industry yet.**





Coral Butler

Group Head of Digitally
Enabled Lean Project
Delivery (DeLPD),
PM Group

“

A number of senior-level employees decided to retire a year or two early during the COVID-19 pandemic, leading to a **loss of institutional knowledge and depriving junior employees of mentorship.**

”



Catherine Topley

Former CEO,
Scottish Canals



That was a turning point, **being able to show employees the value of the technology**, as opposed to the threat.





Frédéric Gal

Head of Business
Modernisation Project,
Bouygues Construction



Digital is going to help us really bring continuity between the studio and site parts of our company. **Digital is going to break the silos that are ingrained in company culture.**





Frédéric Gal

Head of Business
Modernisation Project,
Bouygues Construction



The pressure to change and grow sustainably is coming from everywhere—shareholders, employees, clients, governments. When you have more constraints, you are more inventive. It's a good thing for us, but **we have to implement sustainability practices without excluding ourselves from society's building and infrastructure needs.**





Frédéric Gal

Head of Business
Modernisation Project,
Bouygues Construction

“

The thing that keeps me up at night is the idea of not changing. We have stressed the model to its maximum point. We are going to break the model, and someone is going to disrupt the construction industry.

”



Stacy Smedley

Executive Director, Building
Transparency



Employees coming out of college, up to those in their mid-thirties and often beyond, really care about [sustainability]. **If you can't walk the walk at your company, you may lose top talent in your space.**





Dalton Ho

Regional Sustainable Design
Leader, Associate,
Perkins&Will



When you're talking about making progress on decarbonization, a major component comes down to cost. We have clients that are very interested in carbon reductions and are accurately valuing the cost of emissions, but we also have clients who are not at that stage yet. **At the end of the day, important carbon reductions may not get implemented if they're not also cost-effective.**





Paul Makovsky

Editor in Chief, ARCHITECT
Magazine



The skills employees need will continue to change. While executives may have wanted their employees to learn a second language decades ago, those leaders might now prefer that their workers learn a second programming language. **Upskilling is a forever journey.**





Paul Makovsky

Editor in Chief, ARCHITECT
Magazine



We're starting to measure sustainability in terms of equity. **Whatever you're going to build, you need to be thinking about how it impacts your community.** Are the things that you are doing good for your company, good for your community, and ultimately good for the world?





Steve Plumb

Senior Editor, SME Media,
Manufacturing Engineering



The industry needs a comprehensive approach to making sense of data. We need to start by outlining what data needs to be collected and then consider how data collection will work, how analysis will be conducted, and finally how we will use the data to create and implement new strategies.





Steve Plumb

Senior Editor, SME Media,
Manufacturing Engineering



Software skills are increasingly important. Problem-solving and other so-called ‘soft skills’ are becoming more important as well—being able to communicate well, being able to work with other people, being able to work autonomously.





Steve Plumb

Senior Editor, SME Media,
Manufacturing Engineering



Managing data is **easier said than done.**

