Future-proof 2025

Technology Trends Report

From hyperautomation to extended reality:
How 5 cutting-edge technologies are changing
the business landscape.

Pegasystems, 2021

Table of contents

Executive Summary

A nexus of technologies, commercial pressures, and business and consumer dynamics is changing the way we work, execute transactions, and manage our daily lives. These changes are ubiquitous and sometimes overwhelming: How can we know if our company is keeping pace, or better yet, setting it?

To help answer that essential question, Pega has undertaken a survey of five distinct technology trends and their impacts on multiple industry sectors. This report interprets quantitative survey data and respondent feedback to create a picture of how leading enterprises in key sectors are utilizing digital technologies and preparing for their future today. It is a snapshot of progress and contains essential insights that can help you determine how technological change and disruption can help position your company as a leader and deliver future success.

The five technology trends we examine are:

Hyperautomation

Distributed cloud
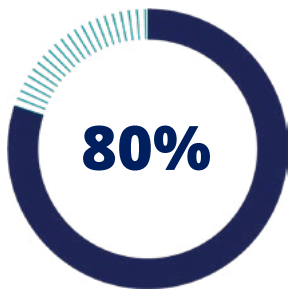
AI governance

Extended edge

Extended reality

Hyperautomation

Hyperautomation will enable virtuous disruption for industry leaders

Hyperautomation: The use of artificial intelligence (AI), machine learning (ML), robotic process automation (RPA), and other advanced technologies to automate and simplify business processes.

The difference between leaders and laggards in hyperautomation comes down to the number of easy wins an enterprise has achieved so far. Forrester predicts the market for robotic process automation (RPA) – just one part of the hyperautomation equation — will reach $12 billion by 2023. Whereas leaders are automating 80% of simple processes, such as routine IT desk tickets or data processing tasks, laggards have automated just 20% of these basics.[1]

80%

20%
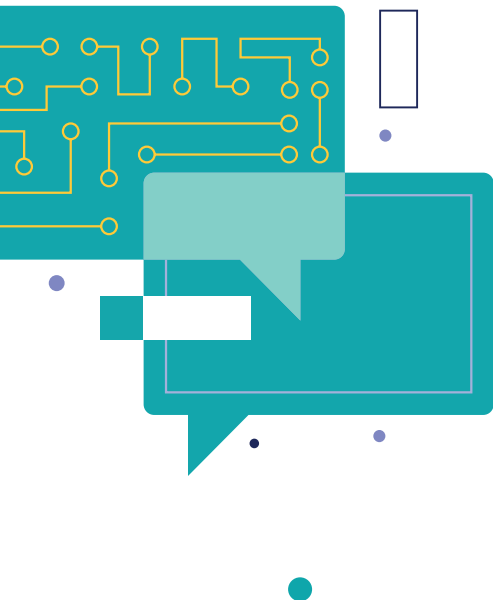
Leaders are automating

80% of simple processes.

Laggards are automating

20% of simple processes.

"Hyperautomation is an aid to increase exception management, efficiency, and customer experience."

Operations officer in a U.K.-based Financial Services enterprise

Our survey findings show that leaders across the board have new concerns about how automation impacts cybersecurity in vendor ecosystems and compliance protocols for the use and storage of data. Many respondents demonstrate concern that the technology could disrupt how enterprises interact with their employees, customers, and vendors.

The disruptive potential of this trend can be seen as an advantage or disadvantage. It's a disadvantage in areas where enterprise networks link and overlap with partner ecosystems. But leaders have a strong head start: Less than one in five respondents see the impacts of hyperautomation in their partner ecosystems, yet **55% expect these impacts within the next five years.**

Hyperautomation is also affecting production, data management, finance, and workflows. The success of deployments depends on keeping operations and processes consistent, even when upheavals such as the coronavirus pandemic require enterprises to develop new automated solutions quickly. "We must continuously build our solutions, especially during this crisis when there is no investment in building more workforce," said one respondent from a Brazilian Financial Services company. "We need to be vigilant about testing, so updates do not impact automated processes or change the format of data."

A question at top of mind for many respondents: How can automation help them support customers through transitions? Many are seeking automated solutions that help them isolate exceptions and make their customer and vendor engagements more personalized and dynamic.

Automation that streamlines workflows, such as invoicing and payments, may reduce costs and redundancies. But respondents saw differentiation in a strategy that links automation with business outcomes – which may provide insights into the ongoing effect of automation on company headcounts. Jobs that manage exceptions through AI will remain important in functions where automation is already prevalent, such as financing. Architects and AI governance experts who manage the flow, access, and storage of data can deliver value in all industries in which automation has helped build new networks or decentralized cloud deployments.

In aggregate, survey respondents demonstrated that the trend-within-the-trend is hyperautomation's impact on the edges of their operations, in which:
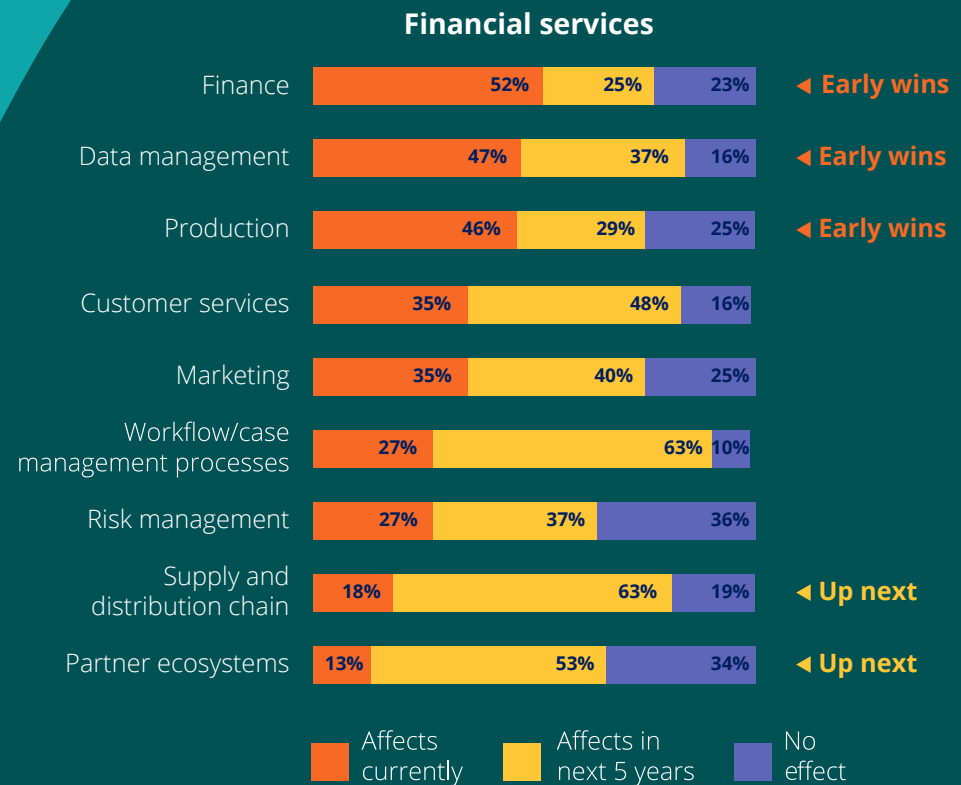
- Vendors, customers, and partners share the benefits of disruption with the fewest upsets or compromised standards.

- Technology adoption enhances the enterprises' shared ecosystems, even when the market demands a technology acceleration.

- Leaders apply automation to help identify and focus on the exceptions and refinements within operations and customer experience.

Data management, finance, and production are areas where leaders in Financial Services have scored early wins. Up next? Look to partner ecosystems and supply chains.

In which of the following areas do you think that hyperautomation will affect your organization both currently and in the next 5 years?

Financial services

Area	Affects currently	Affects in next 5 years	No effect	
Finance	52%	25%	23%	◄ **Early wins**
Data management	47%	37%	16%	◄ **Early wins**
Production	46%	29%	25%	◄ **Early wins**
Customer services	35%	48%	16%	
Marketing	35%	40%	25%	
Workflow/case management processes	27%	63%	10%	
Risk management	27%	37%	36%	
Supply and distribution chain	18%	63%	19%	◄ **Up next**
Partner ecosystems	13%	53%	34%	◄ **Up next**

Legend:
- Affects currently
- Affects in next 5 years
- No effect

TREND 2

Distributed cloud

Distributed cloud will adeptly (and safely) unite a widening network of applications

Distributed cloud: Cloud computing that allows business operations, services, and management applications to move beyond centralized data centers and be utilized wherever they are needed, including the networks of edge devices or third-party data centers.

Cloud deployments are exploding. By Gartner's calculations, even as the **global IT spend decreased by 8%** in 2020, **spending on cloud services actually increased by 19%**[2]. Our survey reflected this acceleration: 73% of respondents stated that remote and mobile work trends are making these deployments business-critical or high priority.

8% decrease
in global IT spend

19% increase
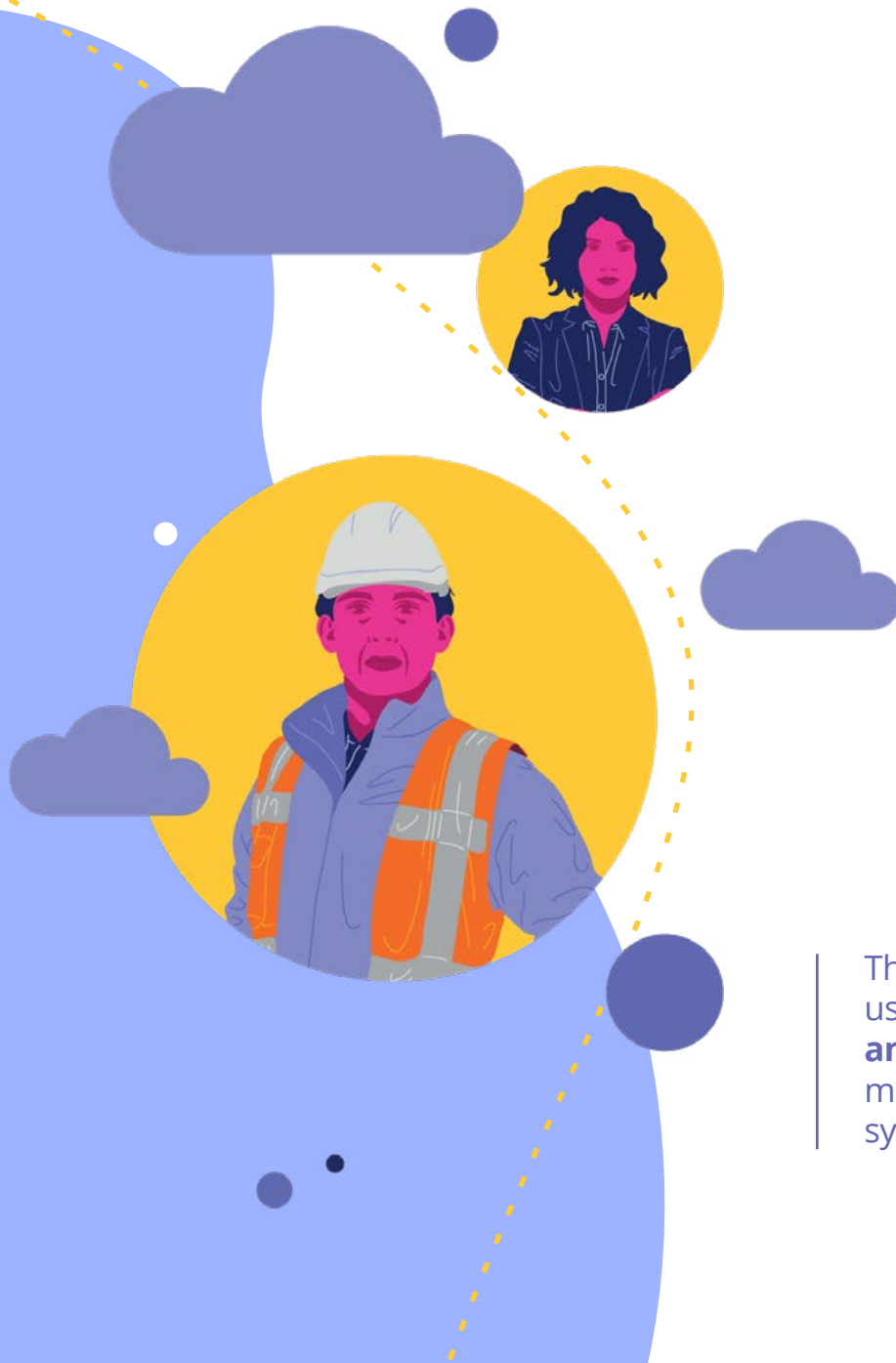in cloud services spend

But can enterprises maintain data integrity, maximize value from these deployments, and keep them from spiraling out of control? This question will separate industry leaders from laggards.

"There is a lot of proprietary data that needs to be secure and certain data that we are not permitted to or comfortable with storing outside our organization."

Operations officer in a U.K.-based Financial Services enterprise

In many industries, the acceleration identified and addressed issues in data security, data integrity, and endpoints. Even for enterprises with mature cloud deployments, questions arose about where data is stored, how its privacy can be assured and segmented, how to maintain access management privileges, and how cloud deployments can scale. "There have been a lot of positives that came with COVID," said a respondent who works in IT for a European university. "It has brought forward the importance of data security and data transmission."

Yet despite wide deployment, only **22% of respondents rated their distributed cloud technology as intelligent or mature**. As lockdowns required enterprises to rely more on still-evolving clouds, more attention was paid to the back ends of these deployments, APIs, and IT engineering to enhance connectivity and security.

Industry leaders are ensuring they meet their business priorities by making sure these solutions remain robust and data integrity remains high. Security will come more easily to companies that anticipate the potential challenges that accompany more distributed operations.

There is also an important subset of enterprises that will use cloud deployments to **interconnect silos in assets and work sites.** A respondent in operations for a European manufacturer highlighted the opportunity to use cloud to synchronize data within his highly decentralized company.

While large cloud service providers are expected to dominate most markets and regions, some enterprises may continue to seek out smaller cloud providers to meet specific needs. An IT professional in financial services in India noted that the government is supporting in-country data centers as an economic incentive. Depending on the market, enterprises may find governance protocols on data propriety and storage may be easier to follow with a wider range of cloud options.
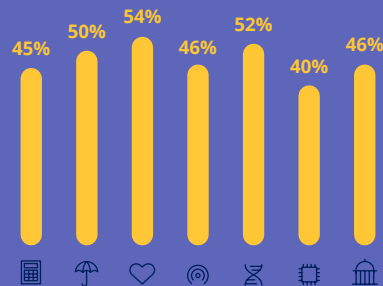
Overall, enterprise leaders in cloud deployment appear to prioritize these issues:

- Staying ahead on data security and prioritization with developed governance strategies.

- Building value by linking disparate operations through robust deployments and APIs.

- Working with providers that can segment cloud solutions to serve the unique needs of the enterprise and its requirements regarding data storage, access, and security.
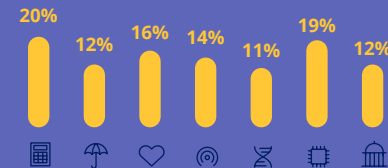
Access management and security top the list of concerns related to distributed cloud deployments.
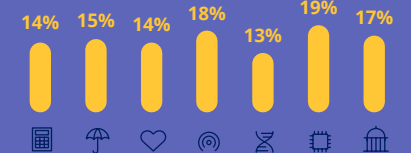
More companies are deploying multiple cloud solutions to become nimbler, but struggling to balance these deployments within centralized architecture that may still be faster and more efficient.

Which best describes your company's challenge?

- 🖩 **Financial services**
- ⛱ **Retail insurance**
- ♡ **Healthcare**
- ◎ **Telecoms**
- ⚱ **Life sciences**
- ▣ **Manufacturing**
- 🏛 **Public sector administration**

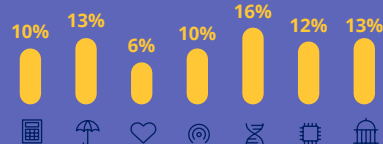**Cloud deployments are presenting new challenges related to access security.**

45% 50% 54% 46% 52% 40% 46%

Company operations remain overly reliant on legacy architecture, even though it sees the benefit of moving to cloud solutions.

20% 12% 16% 14% 11% 19% 12%
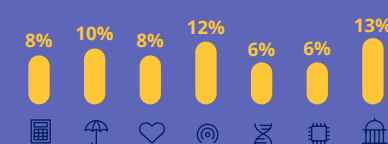
Cloud deployments have made data management more challenging than it was with centralized architecture.

14% 15% 14% 18% 13% 19% 17%

Cloud deployments have made the company nimbler but have introduced complications related to compliance and regulations.

10% 13% 6% 10% 16% 12% 13%

The company does not have sufficient metrics to justify a multiple cloud solution deployment.

8% 10% 8% 12% 6% 6% 13%

The company lacks resources and expertise needed to manage a migration to cloud solutions.

2% 0% 2% 0% 2% 4% 0%

TREND 3

AI governance

Industry leaders will set the standard for AI governance

AI governance: A framework of legal, procedural, and operational guidelines and standards for the use of data, AI, and ML capabilities. This may pertain to external governance, such as governmental regulations or governance that evolves through the establishment of industry standards and agreements.

There's no avoiding AI – or the need for governing controls. In another recent survey, Pega canvased 6,000 people in six countries. 70% of respondents expressed fear about AI. Enterprise leaders are getting that message – particularly in sectors that handle large amounts of personal data, such as Healthcare and Financial Services.

But laggards still haven't set higher standards in AI governance. 65% of respondents felt external governance was insufficient to manage AI adoption. Respondents from all industry sectors described the challenges of conforming to GDPR, central bank directives, HIPAA, and other regulatory frameworks.
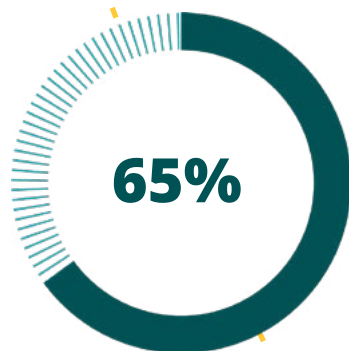
70%

When Pega canvased 6,000 people in six countries for a recent survey, **70% expressed fear about AI.**

"With proper management, companies can become leaders of AI mitigation in their sectors. Public authorities will get on track, but for now, it's the companies that are responsible."

Operations executive in a European Manufacturing enterprise

65%

65% of respondents stated they **felt external governance is insufficient to manage AI adoption.**

However, only so much blame can be put on regulations. **27% of respondents have no designated leader in AI governance, with Manufacturing, Healthcare, and Financial Services all reporting significant gaps in internal leadership and formal strategies**. This frustration with external governing frameworks actually reveals their natural limitations – and the urgent need and responsibility for enterprises to step up and create more comprehensive governance frameworks.

"To become a leader in AI governance, the enterprise must check that the software for its AI algorithms is correct, and that the algorithms are ethical," said an IT executive from the Public Sector. This may incentivize enterprises to construct governance strategies that exceed regulators' standards.

An operations executive with a European Financial Services company addressed the overlap between governance and good public standing. "We apply an extra layer on top of what is required of us, especially because we deal with so much client data and there is a reputational risk associated with any issues that occur."

The expansion of partner ecosystems and their technical challenges is creating opportunities for enterprises with high standards for AI governance. "Many firms are putting data security and validation processes in place to monitor us and their other trading partners," said another Financial Services respondent.

As companies seek to burnish their credentials as good stewards of data and technology, governance strategies that are mature and above industry standards can be mutually beneficial in many partnerships. Good governance protocols, the financial services respondent confirms, are already a key element: "We look for companies who share our views and look to meet the same standards."

But who assumes leadership on governance? A strategy based on technical expertise and outcomes may help enterprises keep their governance fresh and responsive to new challenges. "AI is nothing but unsupervised learning," says an IT respondent with an India-based Financial Services company. "Mistakes will happen, so both business and IT teams need to pull governance around the process."

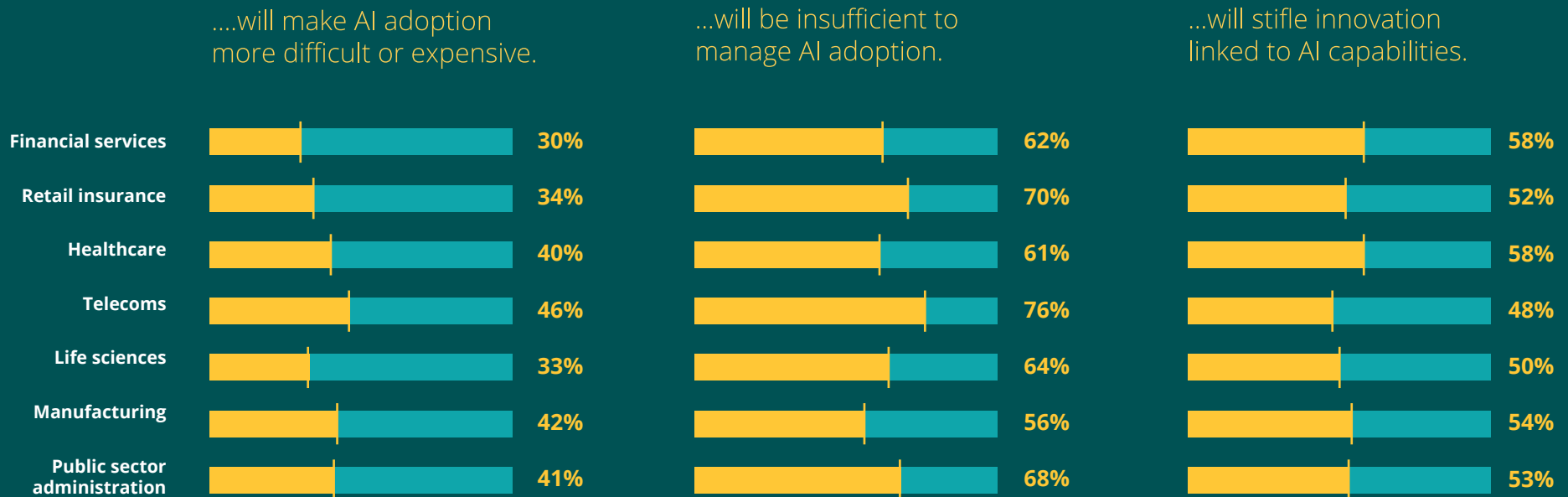**Our survey suggests leaders in AI governance will organize their strategies around these principles:**

- Industry-specific governance is the value-add and a key source of differentiation.

- External AI regulation is a baseline that will establish the enterprise's reputation for transparency.

- Strong AI governance that enhances partnerships will further establish an enterprise as a leader and trendsetter.

All surveyed industries see trouble ahead for AI governance and regulation that do not go far enough.

What concerns you the most about the impact of industry regulation on your company's automated or AI capabilities?

Concerned that regulations...

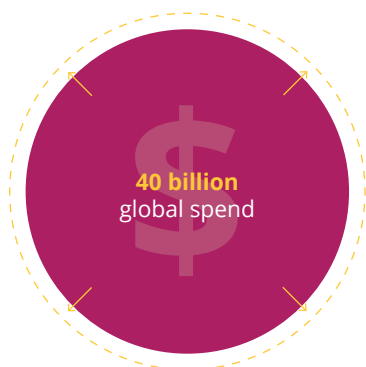|	....will make AI adoption more difficult or expensive.	...will be insufficient to manage AI adoption.	...will stifle innovation linked to AI capabilities.
Financial services	30%	62%	58%
Retail insurance	34%	70%	52%
Healthcare	40%	61%	58%
Telecoms	46%	76%	48%
Life sciences	33%	64%	50%
Manufacturing	42%	56%	54%
Public sector administration	41%	68%	53%

TREND 4

Extended edge

Extended edge will reward the enterprises that implement it today

Extended edge: Computing and storage capability that enables higher functionality and processing power of devices and users at the edge of enterprise networks. The proliferation of Internet of Things (IoT) devices is an important driver of this trend, and many experts believe widespread adoption of 5G connectivity will be a force multiplier.

The worldwide market for edge computing was a healthy $3.5 billion in 2019. With the rapid acceleration of Internet of Things (IoT) automation and cloud computing, Grand View Research estimates the 2027 global spend will top $40 billion[4]. Leaders in this tech space are left wondering how it will be deployed rather than when.

40 billion global spend

The 2027 global spend for edge computing **will top $40 billion.**

"Necessity is the mother of invention. Companies will be bending over backward to provide the latest secure tech solutions in order to stay relevant and competitive in this current fast-paced, changing economy."

U.K.-based Telecoms operations expert

In our survey, **just 18% of respondents described their extended edge technology as "mature,"** although 96% expected it to be at least "emergent" within five years.

So what does this mean for those still early in their journey? Some industries are just waiting for the green light, which may come through changes to internal standards or the propulsion of other technologies like 5G.

Other respondents noted that the deployments aren't feasible with their current connectivity between cloud and edge. **Between 34% and 50% of respondents in all sectors stated that their deployment will depend on greater maturation of automation, AI, and machine learning (ML).** Between 21% and 30% cited distributed cloud as an integral step in their extended edge journey.

But for many respondents, the pandemic brought on positive disruption – so the wait-and-see approach isn't an option. "COVID, lockdown, and the new constraints have been a game-changer that led us to use more extended edge," says an executive in operations with a European Manufacturing enterprise.

As business cases in Healthcare, Manufacturing, and Retail introduce more IoT technology, extended edge deployments will be needed to process data closer to its source. It may also require increased communication between cloud and edge capabilities, which could require 5G connectivity. The lack of 5G may push deployments back a few years for some enterprises. However, a marketing executive with a manufacturer in the APAC region sees the connection points as the key: "While connecting to your cloud, you need to work that connection, make it fast, make it smoother, so you don't use too much bandwidth."
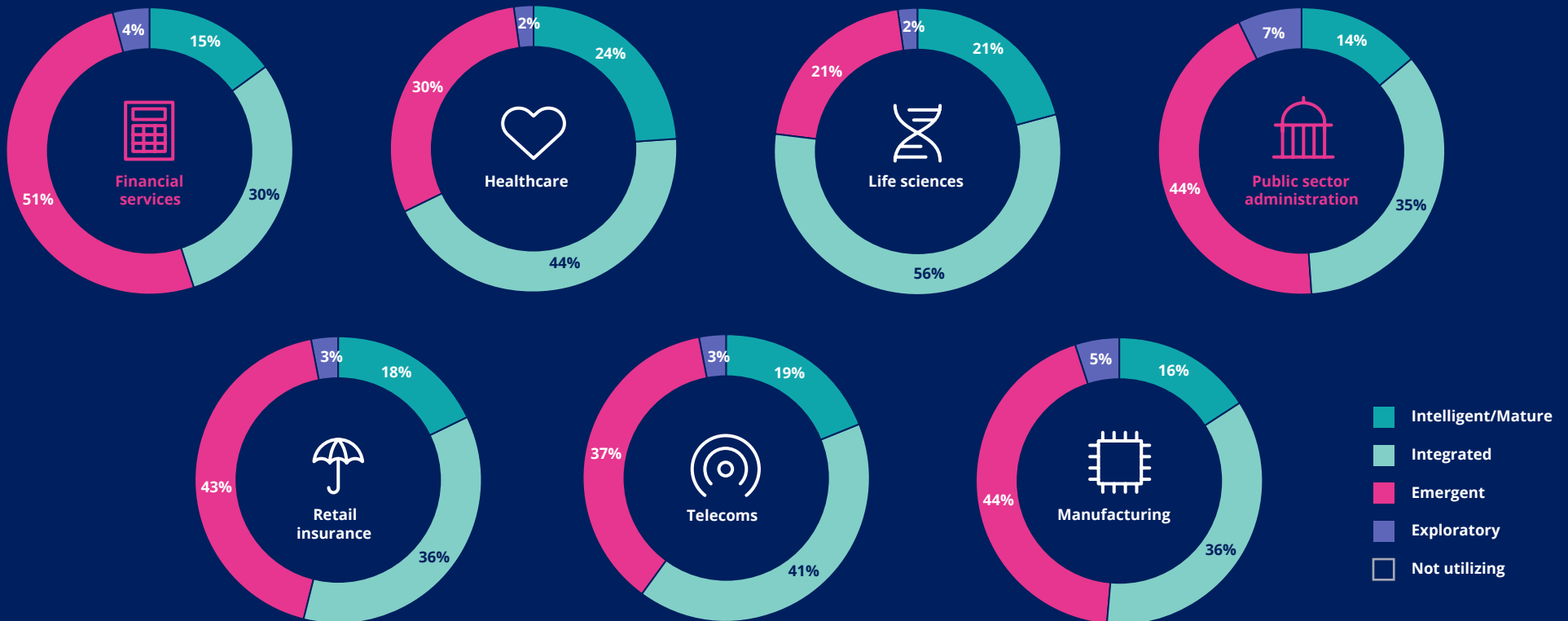
5G and progress in other technology trends may be enough to push some enterprises forward on extended edge. **Leaders in the space will establish their position and realize value earlier than most by adhering to these objectives:**

- Find opportunities to push extended edge through strategic automation and distributed cloud deployments.

- Seize current opportunities presented by IoT platforms and deployments.

- Strategize regarding the multiplicative value of 5G connectivity and its impact on potential to realize value from disconnected assets.

Financial services and public sector administration report a need to accelerate extended edge deployments.

At least 91% of all respondents in every sector expect deployments to be emergent, integrated, or mature within 5 years. **How mature do you expect extended edge technology will be within your company within five years?**

Financial services
- 4%
- 15%
- 30%
- 51%

Healthcare
- 2%
- 24%
- 44%
- 30%

Life sciences
- 2%
- 21%
- 56%
- 21%

Public sector administration
- 7%
- 14%
- 35%
- 44%

Retail insurance
- 3%
- 18%
- 36%
- 43%

Telecoms
- 3%
- 19%
- 41%
- 37%

Manufacturing
- 5%
- 16%
- 36%
- 44%

Legend:
- Intelligent/Mature
- Integrated
- Emergent
- Exploratory
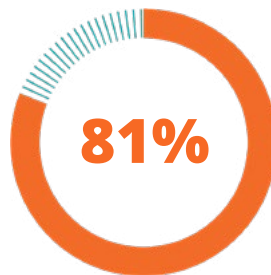- Not utilizing

TREND 5

Extended reality

Extended reality will help leaders deliver dynamic customer experiences

Extended reality (XR): A combination of, and advancement on, augmented reality, virtual reality, and mixed reality technologies. XR enables the creation of deeply immersive "real world" experiences that simulate reality and physical states of being.

Extended reality (XR) has plenty of futuristic use cases – today. Gartner predicts one-third of all enterprises will have launched multi-dimensional experiences that include XR functionality by 2021[5]. Full-blown simulated reality may have to wait, but laggards will miss the impact of this technology at their peril.

52%

52% of all respondents expect **XR pilots or full implementation** within the next 12 months.

81%

81% of respondents **expect XR to be essential or an important differentiator** within 5 years.

"More work could be done on the market analysis and getting information from the use cases. Sometimes, technology people focus too much on the technology rather than the market."

IT executive with a European Public Sector organization

XR is still developing: **35% of respondents believe it is changing the way their industry provides customer experience, and 41% think it has changed marketing techniques. But only 12% reported active discussions about how to budget for deployments.** All sectors anticipate XR to have a significant impact on customer engagement in five years, and to a lesser extent, industry marketing. But how will we get there?

The maturation of other technology trends explored in this survey will help establish XR's relevance. Some respondents described taking a cautious approach due to the high cost of XR adoption. Others described how hyperautomation and extended edge will soon push customer journeys into new territory. The applications will require a joint focus on several technologies, but many leaders are finding XR's potential impact to be a reason for optimism *and* action.

A respondent who works in IT in the public sector noted that the pandemic forced his industry to look at simulated experience to conduct engagement and customer outreach. Retail, Manufacturing, and Healthcare can also benefit from this by delivering a competitive advantage with customers or better enabling operations such as predictive maintenance or employee training. "It requires equipment that will increase costs, but there is a lot of advantage in using that equipment," said the Public Sector respondent. "Relative to the cost, the benefits are greater."

Industry leaders, in turn, need to identify the best use cases and determine which likely won't deliver full value. "In our industry, technicians' touch and feel is important," said a respondent who works in marketing for an APAC manufacturer. "Virtual reality is nice, but you don't touch or feel anything."

An IT executive for an EMEA manufacturer said it was important to watch technology trends for potential customer gains. Just as 5G allows consumers to access larger downloads, XR coupled with AI could generate far more dynamic connections: "It could make very personalized marketing solutions, so there is huge, outstanding potential."

As XR takes shape, industry leaders may score early wins through a market-focused strategy that:
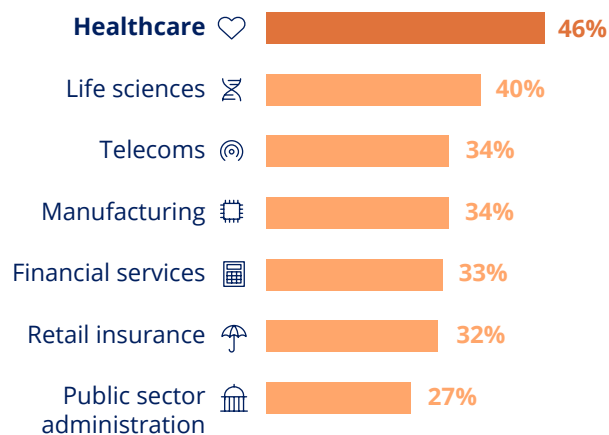
- Relies on steady, targeted investments in hyperautomation, distributed cloud, and extended edge capabilities.

- Watches for business cases that deliver a completely new experience.

- Does not wait for technology to mature before identifying early, valuable applications.
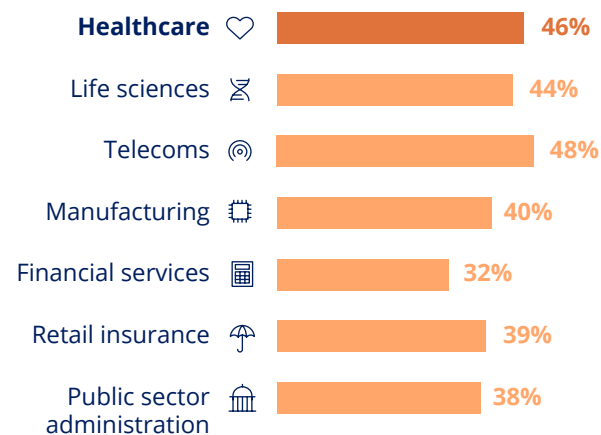
The healthcare industry reports the most dramatic effects of XR in marketing and customer experience among those surveyed.

Which statement best describes the importance of extended reality technology in your industry in 2020?

Extended reality is changing the way the industry is providing customer experience

Industry	%
Healthcare ♡	46%
Life sciences	40%
Telecoms	34%
Manufacturing	34%
Financial services	33%
Retail insurance	32%
Public sector administration	27%

Extended reality is changing the industry's marketing techniques

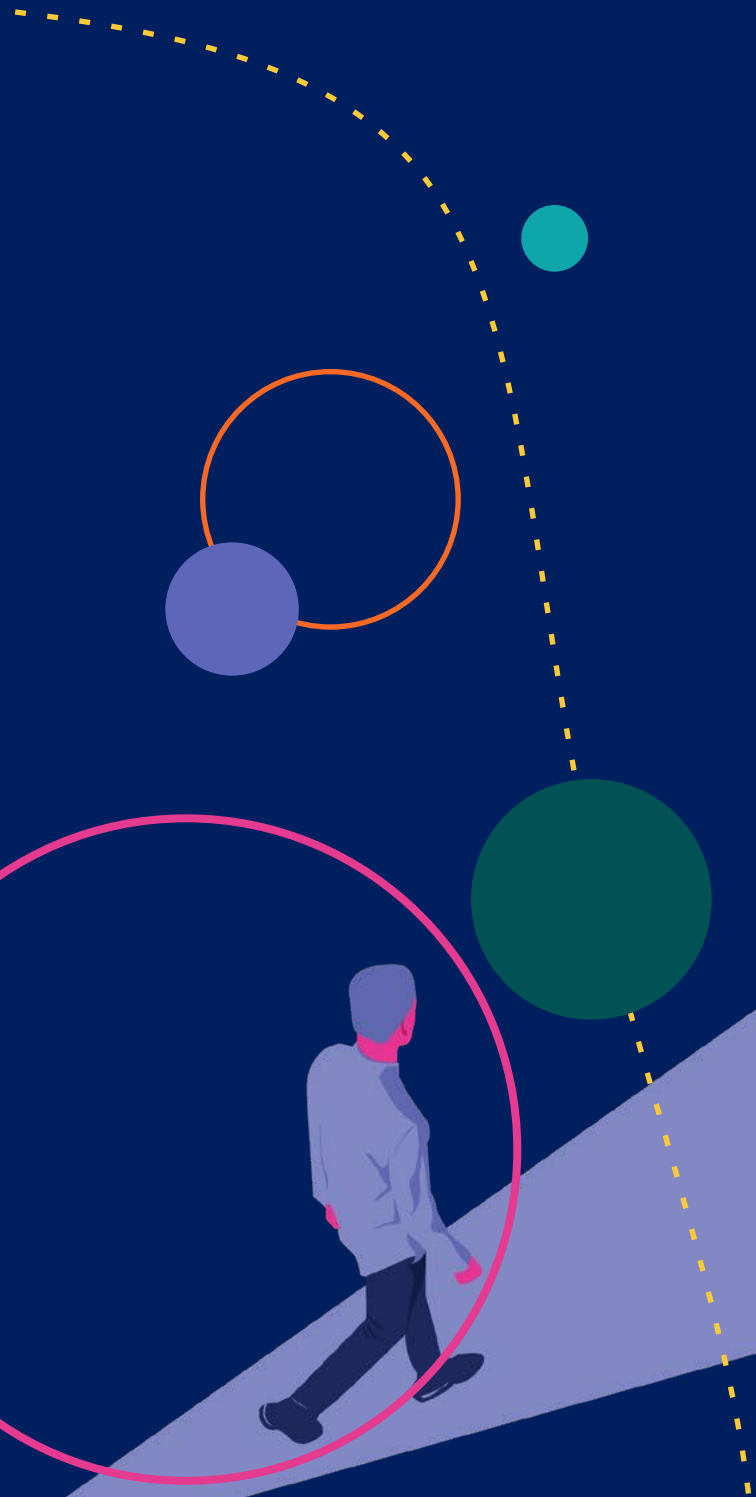| Industry	%
Healthcare ♡	46%
Life sciences	44%
Telecoms	48%
Manufacturing	40%
Financial services	32%
Retail insurance	39%
Public sector administration	38%

Be a leader.
Act like it's 2025.

Technology won't wait for us. Market forces and opportunities are providing rocket fuel to automated and cloud capabilities, pushing enterprise edges onto more platforms and remote networks. If we were to boil the feedback from hundreds of respondents in seven industries and many countries down to a single technological principle it might read: **Leaders don't wait.**

But leaders also act deliberately. They approach digital evolution methodically, relying on quick wins and basic deployments that engineer more complex and ambitious advances. With sound strategy, tools, and partnerships, they're turning these five trends into vectors that will propel them to new wins in 2021, 2025, and beyond.
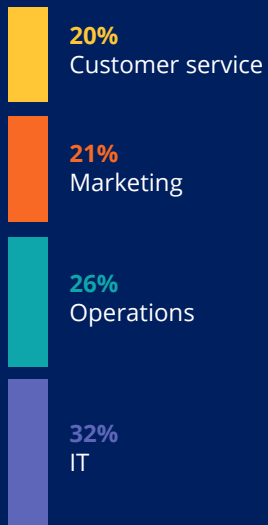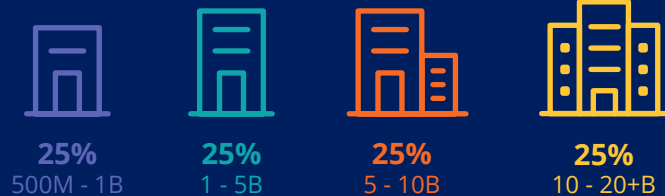
Survey Methodology

While creating the study, Pegasystems included multiple perspectives within the enterprise framework, actively seeking respondents who may view the five technology trends through different vantage points and who are informed by a variety of skill sets.
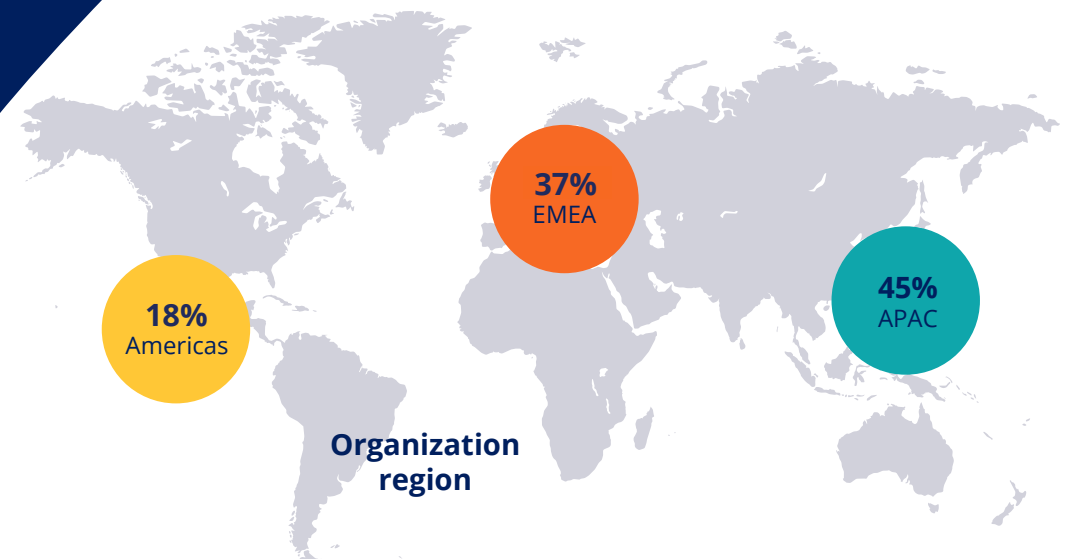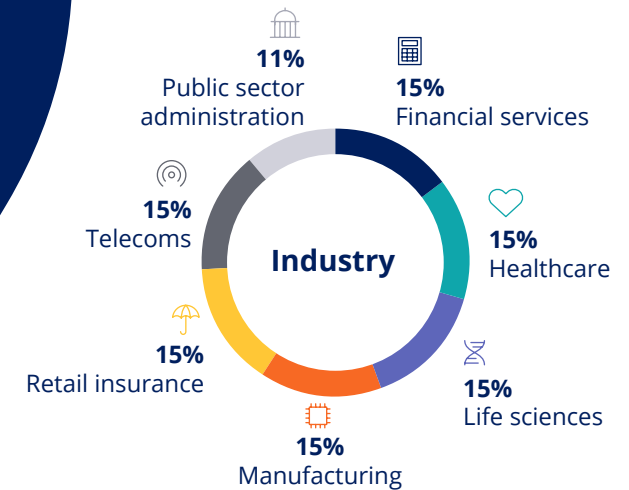
Job function

20% Customer service

21% Marketing

26% Operations

32% IT

Job Title

10% AI Head/Lead

7% Chief Digital Officer
7% Chief Operating Officer
7% Chief Analytics / Data Scientist / Data Officer
7% Chief Marketing Officer
6% Chief Information / Technology Officer
6% Chief Security Officer

12% President

13% Senior Vice President / Executive Vice President

13% Vice President / Assistant Vice President

12% Senior Director / Director

Industry

11% Public sector administration

15% Financial services

15% Healthcare

15% Life sciences

15% Manufacturing

15% Retail insurance

15% Telecoms

Company Revenue

25% 500M - 1B

25% 1 - 5B

25% 5 - 10B

25% 10 - 20+B

Organization region

18% Americas

37% EMEA

45% APAC

Sources:

1. Forrester, "Predictions 2020: On The Precipice of Far-Reaching Change."
2. "Gartner Says Global IT Spending to Decline 8% in 2020 Due to Impact of COVID-19," May 13, 2020.
3. Pega, "Artificial Intelligence in Business: Balancing Risk and Reward."
4. Grand View Research, "Edge Computing Market Size, Share & Trends Analysis Report By Component (Hardware, Software, Services, Edge-managed Platforms), By Industry Vertical (Healthcare, Agriculture), By Region, And Segment Forecasts, 2020 – 2027," March 2020.
5. Gartner, "Top 10 Strategic Technology Trends of 2020."

PEGA®

About Pegasystems

Pega delivers innovative software that crushes business complexity. From increasing customer lifetime value to streamlining service to boosting efficiency, we help the world's leading brands solve problems fast and transform for tomorrow. Pega clients make better decisions and get work done with real-time AI and intelligent automation. And, since 1983, we've built our scalable architecture and low-code platform to stay ahead of rapid change. Our solutions save people time, so our clients' employees and customers can get back to what matters most.