BCG

Executive Perspectives

Artificial Intelligence: Ready to Ride the Wave?

December 2021

BCG Executive Perspectives

IN THIS DOCUMENT

AI HAS STRONG POTENTIAL TO REDEFINE INDUSTRIES

At BCG, we believe **AI is one of the main forces that will transform industries** in the next decades—and we have made it one of our largest investment areas.

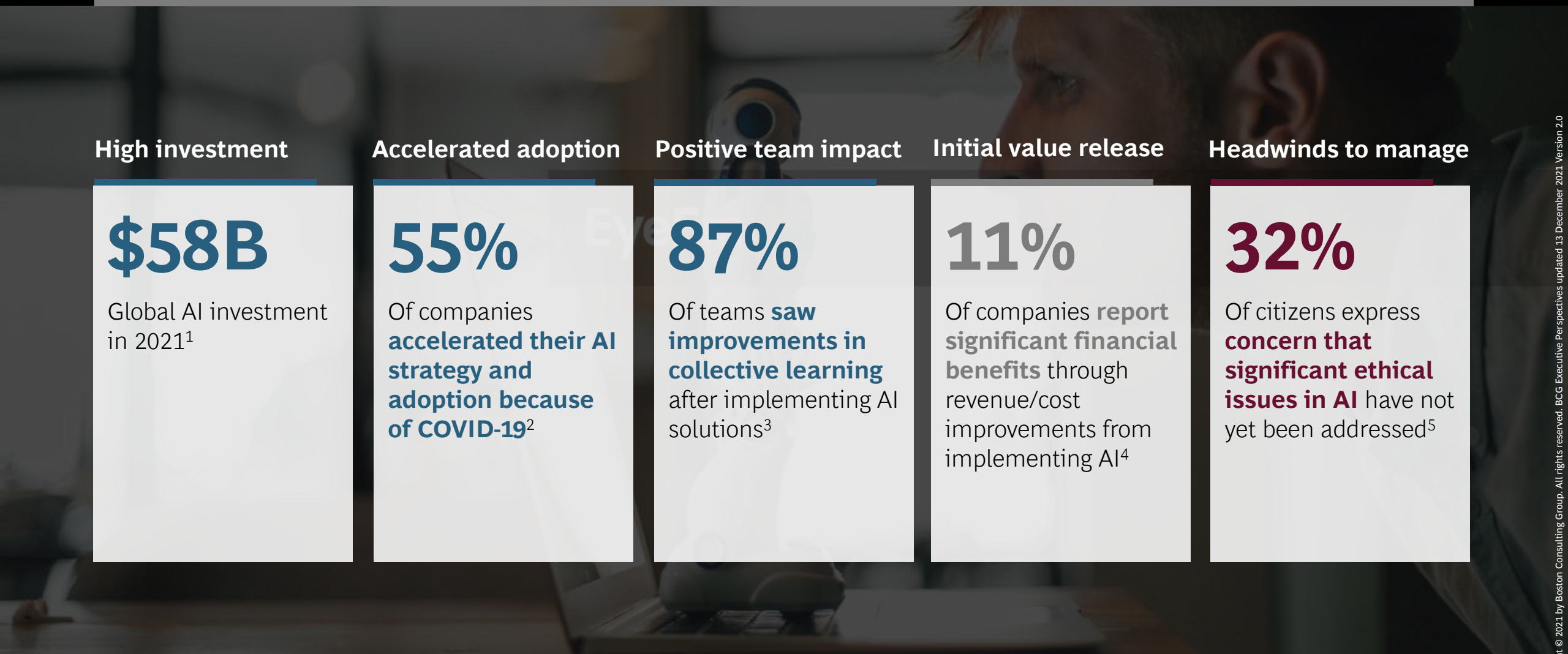
Many companies have invested in AI to unlock its potential. However, **only 11% have released significant value—**as the majority have failed to scale beyond pilots, reimagine the way they work with data, and redefine human-AI interaction.

This document **gives insight into the main success factors that corporates** should consider when deploying AI solutions.

ACT HOLISTICALLY TO HARNESS THE POWER OF AI

Sources: BCG analysis and case experience

AI is gaining momentum given potential, yet headwinds must be addressed



High investment

$58B

Global AI investment in 2021[1]

Accelerated adoption

55%

Of companies **accelerated their AI strategy and adoption because of COVID-19**[2]

Positive team impact

87%

Of teams **saw improvements in collective learning** after implementing AI solutions[3]

Initial value release

11%

Of companies **report significant financial benefits** through revenue/cost improvements from implementing AI[4]

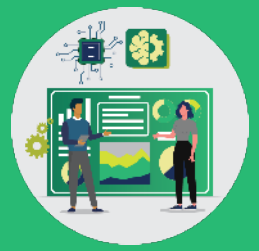
Headwinds to manage

32%

Of citizens express **concern that significant ethical issues in AI** have not yet been addressed[5]

1. MIT-BCG 2020 Artificial Intelligence Global Executive Study and Research Project; 2. AI adoption skyrocketed over the last 18 months, *Harvard Business Review*, Harris Poll 3. Out of those teams that saw improvements in both efficiency and decision quality after implementing AI (~58% of teams); *The Cultural Benefits of AI in the Enterprise*, BCG-MIT, November 2021; 4. Based on a global survey in spring 2020, attracting over 3,000 total respondents representing 29 industries and 112 countries; our assessment of "significant financial benefits" uses a threshold that varies according to organization size. For the largest organizations in our sample, with revenues of more than $10 billion, passing this threshold requires more than $100 million in revenue and/or cost improvements annually from the use of AI. For smaller organizations, the thresholds were lower: $20 million in improvements for organizations with revenues between $500 million and $10 billion, $10 million in improvements for organizations with revenues between $100 million and $500 million (or nonprofits), and $5 million for organizations with less than $100 million in revenues; 5. *The Citizen's Perspective on the Use of AI in Government*, BCG

Summary (i/ii) | AI: current state and trends



CURRENT STATE AND TRENDS

1. **Strong potential of AI has driven high growth**, underpinned by focused investments in optimization, predictive maintenance, personalization, and automation

2. **Yet, only 11% of firms report significant financial value from AI.** Those that do, deliberately reimagine the way they work with data and successfully move from pilots and proof of concept to scaling

3. **A critical element is people,** with high value unlocked in effective organizational learning and change management

4. Apart from driving financial outcomes, AI can also **reignite team effectiveness, morale, & culture in the long term**

5. Despite positive outlook and growth, there are several dynamics to manage: **labor market shifts and talent shortages, data capability gaps, ethicality and transparency concerns,** and expected increase in regulations

Sources: BCG analyses, experience, and publications

Summary (ii/ii) | AI: implications for leaders

Embed AI in your business

1 **Clearly articulate the ambition for value creation** from AI, linked to your company's strategy and purpose—develop a clear perspective of where AI will drive business outcomes

2 **Treat AI development as a business transformation:** redesign collaboratively with business owners, iterate, and improve based on human-AI learning

Prepare your operating model for AI

3 **Learn from digital natives:** Change your ways of working and operating model to enable enterprise agility, continuously reimagine business processes, and effectively orchestrate ecosystems

4 **Involve HR early on:** Anticipate AI impact on jobs and skill sets, embed in **strategic workforce planning** and **internal upskilling programs**, rethink **employee value proposition** to retain talent

5 **Decouple data capability building from core IT systems,** embed flexibility via reshoring, and modernize iteratively

6 **Invest early in responsible AI** governance, policies and standards, structural assessment, expert staff, and issues response plan; provide transparency to stakeholders

Deep dives per implication—on pages 14-20

Sources: BCG analyses, experience, and publications

1 Context | AI comprises technologies complementing human capabilities to interpret data, make decisions, and take actions

Artificial intelligence is enabled by tech-human interaction across three core buildings blocks

DATA	PROCESSING	ACTION
• Machine vision[1]	• Info processing	• Image generation
• Speech recognition	• Pattern recognition	• Handling & control
• Natural language processing[2]	• Learning from data	• Navigation & movement

AI has the power to support and enhance human capabilities, beyond what is currently possible

1. **Process big data in real time,** without need for humans to input updated data
2. **Achieve ultra-granularity,** even while processing massive amounts of data
3. **Improve continuously and autonomously** through learning loops
4. **Scale massively at a low cost,** with computing power exponentially improving
5. **Provide humans with actionable data** difficult to comprehend otherwise

Strong growth: AI market expected to grow at 28%[3] CAGR through 2023

1. Machine vision: methods to provide imaging-based automatic inspection and analysis, 2. Natural language processing: subfield of AI and linguistics, concerned with interactions between computers and human language;
3. IDC, Worldwide Artificial Intelligence Forecast, 2019–2023. Sources: BCG analysis, CB insights, IDC

1.1 AI growth underpinned by focused investments in four key areas that are redefining industries and necessitating action

Four investment areas

AI has revolutionized industries across variety of use cases

	Example use cases	*Example impact*
Optimization	**Travel** | Optimized network planning and service quality with minimal operational disruptions using passenger flows to adjust route structures and scheduling	**27%** opex reduction
Personalization	**Consumer** | Personalized marketing using anticipated customer behavior, contextual and churn probability data, leveraging database of 20M+ customers	**3x** incremental revenue per customer
Automation	**Insurance** | Same-day claims payment enabled by medical imaging, face and voice prints, ML,[1] data from many ecosystems (e.g., finance, health care, auto, real estate)	**60%+** claims self-service
Predictive operations/ maintenance	**Industrial goods** | Risk-based system using manufacturing and inventory data to simulate, predict, evaluate, and optimize logistical and supply bottlenecks	**15%** operations and maintenance savings

Spotlight: AI & CO_2 emissions

Monitoring emissions

- Collect data from every part of the value chain
- Approximate missing data
- Estimate the level of certainty of the results

Predicting emissions

- Forecast emissions
- Simulate reduction efforts, new tech, and demand

Reducing emissions

- Use prescriptive AI to improve efficiency

Critical to invest to avoid disruption: 84% of firms believe AI helps them gain a competitive advantage[2]

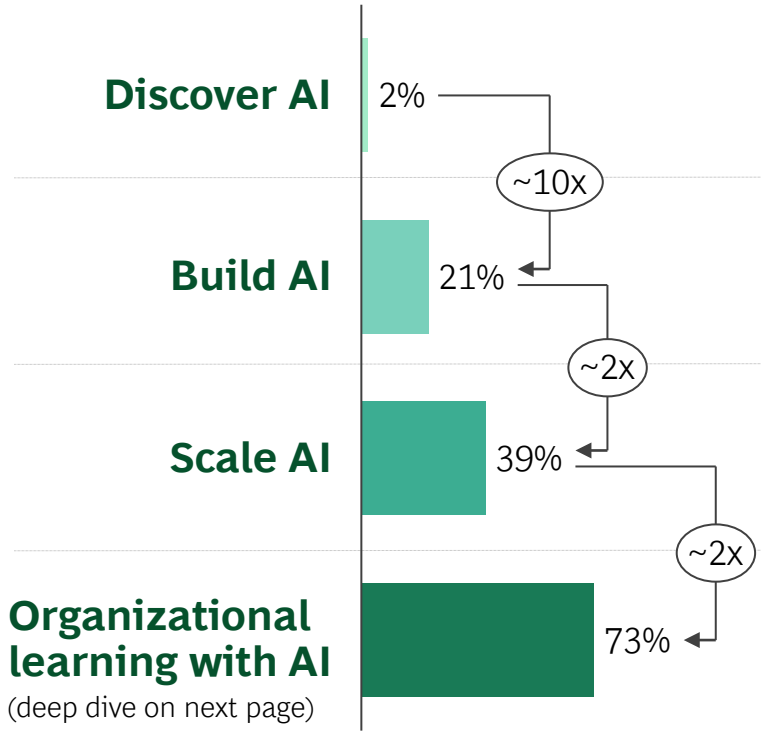
1.Machine learning, 2. BCG-MIT Sloan Management Review 2019 AI Survey, n=2,555. Sources: BCG-Wired database, Fortune, BCG Henderson Institute, BCG cases and experience

1.2 Significant value release from AI is rooted in reimagining the way companies work with data and an ability to move from pilots to scaling

Only 11% of companies report **significant financial benefits** through revenue/cost improvements from implementing AI[1]

Four key steps to unlock financial benefit

Likelihood of achieving significant financial benefits with AI (%)



Each step comprises critical activities for value release

Launch pilots: Implement AI in targeted areas, e.g., models that reduce customer churn

Advance to organizational use: Embed in overall strategy; reimagine use of data; invest in data capability building, technology, and algorithms and in developing technical AI skills

Scale to broader use cases and solutions, e.g., embed AI into processes and solutions on both production and consumption sides[2]

Create opportunities for mutual learning between humans and AI, e.g., learning how to adapt and use human-machine roles and interactions in different processes and situations

1. Based on a global MIT-BCG survey in spring 2020, attracting over 3,000 total respondents representing 29 industries and 112 countries. Our assessment of "significant financial benefits" uses a threshold that varies according to organization size. For the largest organizations in our sample, with revenues of more than $10 billion, passing this threshold requires more than $100 million in revenue and/or cost improvements annually from the use of AI. For smaller organizations, the thresholds were lower: $20 million in improvements for organizations with revenues between $500 million and $10 billion, $10 million in improvements for organizations with revenues between $100 million and $500 million (or nonprofits), and $5 million for organizations with less than $100 million in revenues; 2. Tech and business sides; Sources: MIT-BCG: findings from the 2020 AI global executive study and research project, Expanding AI's Impact with Organizational Learning

1.3 A critical element is people's interaction with AI - high value is unlocked from zero-based design and effective organizational learning

To capture value, reimagine processes…

5x more likely to realize significant value when **processes redefined to embed AI**[1]

Start with a **zero-based mindset** (reimagine input data, collaboration between systems and processes continuously—and not only incremental changes)

5x more likely to realize significant value **when facilitating continuous human-AI learning**

Using all three ways:
- Built-in AI learning from human feedback
- Humans learning from AI to apply insights
- Humans designing AI to learn autonomously

… and rethink human-AI interactions

6x more likely to release significant value if **effectively rethink how humans and AI work together** and deploy **all appropriate human-AI interaction modes**

AI-dominant → Human-dominant

Mode	AI decides and implements	AI decides, human implements	AI recommends, human decides	AI generates insights, human uses in decisions	Human generates, AI evaluates
Used when:	Humans slow down process	AI can capture the context well	AI cannot factor all context fully	Creative work	Hypothetical situations
Example	Personalized offers	Predictive maintenance	Trading	Hiring plans	Simulations

Agility and oversight are critical: Switch between modes as context changes (e.g., COVID)

1. Versus those making no or small changes
Sources: MIT-BCG: findings from the 2020 AI global executive study and research project, Expanding AI's Impact with Organizational Learning

1.4 Apart from driving financial impact, AI can also improve team effectiveness and bolster team culture

87%
Of teams[1] indicated that they improved their **collective learning**

65%
Of teams[1] reported **improved clarity of roles**

79%
Of teams[1] highlighted an **increase in morale**

78%
Of teams[1] reported better **collaboration**

Examples

FRENCH ENERGY COMPANY

- Next-best-offer **AI recommendation tool for vendors,** now also used for training
- Adoption varied by vendor's tenure (more heavily used by newcomers)
- Veterans made tool more useful by "teaching" it (to enable newcomers and minimize manual training), promoting a **culture of AI use**

US HEALTH CARE COMPANY

- **Emotional AI "listens"** to the conversation of pharmacists, picks up emotional signals, and suggests what the pharmacist could do to provide a better experience
- Those who used AI tool ended up with **more satisfied customers** (higher NPS[2])
- Pharmacists **understood how they can better execute their role** (e.g., how to handle customer calls, portray empathy, respond to situations)

US EXCHANGE OPERATOR

- AI tool scanning prospectuses for useful information that can benefit clients
- From 1 person scanning 1-2 docs for hour to AI scanning 120,000 docs per hour
- Resulted in significant improvement in **employee satisfaction and morale** by **improving the type and caliber of job** that team members do

EUROPEAN AIRLINE

- AI **predicting passengers likely to miss their flight** and sequencing luggage loading, to limit disruption and ensure on-time departure
- AI-driven process **helps align teams, inform relevant members** of what bags to be loaded and offloaded when, and enable better coordination

1. Of the teams that implemented AI and saw improvements in both efficiency and decision quality (58% of teams); 2. Net Promoter Score; Source: The Cultural Benefits of AI in the Enterprise, BCG-MIT, November 2021

1.5 Despite positive outlook, companies must manage labor, data, ethical, and regulatory dynamics

Labor market shifts and gaps in talent capabilities

59% Face challenges in **acquiring and developing AI talent**[1]

56% **Increase in demand** for data scientists and data engineers in the US in 2021

40% Of world's jobs at risk of being **automated in next 15-25 years**[2]

Limited data capability, quality, and consistency

23% of **firms view gaps in data capabilities** as biggest challenge[1]

60% struggle with the large number and inconsistency of **data sources**[3]

71% report **at least three large data quality issues**[3]

Unethical application and lack of transparency

55% **Overestimate their organization's responsible AI maturity** and progress[4]

31% Of citizens concerned with **lack of transparency** in AI decision making[5]

50% Believe **insufficient understanding** is the greatest obstacle to AI[6]

Expected increased regulatory burden for companies

Initial steps in place:

- European Union Draft AI Act - released in April 2021
- US Fair Trade Commission guidance on truth, fairness, and equity of AI use

Deep dives on each area are in appendix (pages 23-26)

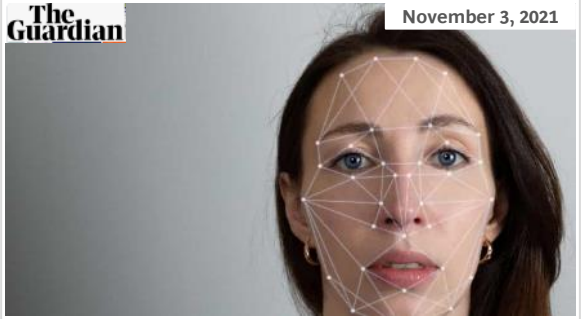
1. "Artificial intelligence in business gets real," MIT Sloan Management Review and BCG, BCG Center for Sensing and Mining the Future; 2. "AI expert says automation could replace 40% of jobs in 15 years, Fortune. 3. "O'Reilly State of Data Quality in 2020" report. 4. Responsible AI constitutes a company's governance framework that documents how a specific organization is addressing the challenges around AI from both an ethical and a legal point of view; From BCG's Responsible AI Survey 2021. Note: n = 1,034. Based on organizations' responses to 21 questions about their implementation across generally accepted RAI dimensions. 5. The Citizen's Perspective on the Use of AI in Government, BCG; 6. The Cultural Benefits of AI in the Enterprise, BCG-MIT; Additional sources: BCG analyses

In the news | Significant advancements in AI, but a need to manage headwinds

17 AI innovative development pilot zones built in China

'Yeah, we're spooked': AI starting to have big real-world impact, says expert

The founder of Google Brain has raised $57 million for his A.I. start-up



Facial recognition firm Clearview AI to appeal order to stop collecting images of Australians

Alphabet has set up a new lab that will use AI to try to discover new drugs

AI is not ready to make profound decisions

White House AI director says US should model Europe's approach to regulation

Meta: Facebook and Instagram parent company hails new AI system to detect harmful content

Source: Press releases

2 To take advantage of AI, leaders must embed it into their business strategy and transformation, and prepare their operational models

Embed AI in your business

1 **Clearly articulate the ambition for value creation** from AI, linked to your company's strategy and purpose—develop a clear perspective of where AI will drive business outcomes

2 **Treat AI development as a business transformation:** redesign collaboratively with business owners, iterate and improve based on human-AI learning

Prepare your operating model for AI

3 **Learn from digital natives:** Change your ways of working and operating model to enable enterprise agility, continuously reimagine business processes, and effectively orchestrate ecosystems

4 **Involve HR early on:** Anticipate AI impact on jobs and skill sets, embed in **strategic workforce planning** and **internal upskilling programs**, rethink **employee value proposition** to retain talent

5 **Decouple data capability building from core IT systems,** embed flexibility via reshoring and modernize iteratively

6 **Invest early in responsible AI** governance, policies and standards, structural assessment, expert staff, and issues response plan; provide transparency to stakeholders

Sources: BCG analyses, experience, and publications

2.1 Clearly articulate the ambition for value creation from AI and develop a perspective of where AI will drive outcomes

Identify AI value creation linked to your business strategy and purpose

2x more likely to report value generation if AI is on the CEO agenda (vs. if only managed at IT function level)

Critical to decide what to do and what not to do—**focused investment is key**

Prioritize revenue growth to unlock higher value

2x More likely to **obtain value** from AI if **focus on revenue** (vs. cost savings alone)

72% Of those that have seen **revenue growth** expect it to continue in the next 5 years (vs. only **44%** of those focused on **cost cutting**)

Place calculated "bets" on larger projects

50% Of firms investing in **higher-risk** AI projects see value add (vs. 23% for lower-risk, smaller ones)

Selectively deploy small, cost-cutting ones

- **Quick wins**–build buy-in and fund the AI journey
- Of these, focus on **productivity improvements** with low incremental complexity or resource intensity

Identify desired AI outcomes at department level to support corporate strategy[1]

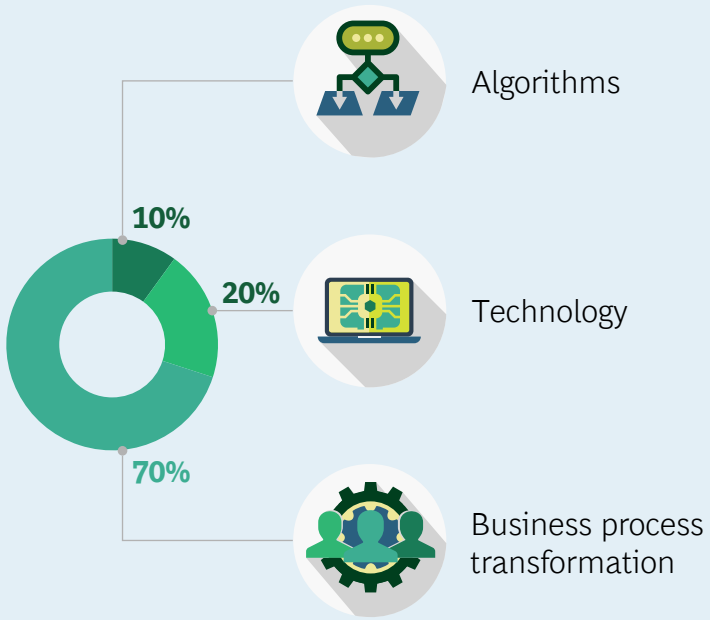
Marketing	Product	Manufacturing	Supply chain	Risk	Climate & sustainability
• Personalization • Cross-sell & upsell • Churn & retention • Next best product and action	• Promo & pricing • Assortment • Salesforce effectiveness • Zone-based pricing	• Predictive maintenance • Quality analytics • Advanced asset management • Digital twins	• Advanced forecasting • Inventory, network, & route optimization • Simulations	• Automated risk monitoring • Claims management • Fraud detection	• Carbon emission optimization • Predictive carbon storage • Yield prediction

1. Non-exhaustive list; Sources: BCG-MIT Sloan Research report Winning with AI Pioneers Combine Strategy, Organizational Behavior, and Technology, Oct 2019; BCG analyses and experience

2.2 Treat AI as a business transformation: don't focus only on tech and algorithms—design collaboratively with business owners

10-20-70 rule: Realizing value from AI is rooted in business adoption

Key value drivers in enterprise AI adoption



Create an environment in which tech can co-develop and implement AI solutions with business team

Critical to design for consumption: Business teams whose work is affected must be engaged to provide feedback and test prototypes

37% Of cases where business leaders pioneer AI projects see value added (vs. only 17% where tech solely leads similar projects)

Upon new AI investments, it is **important to build in cost lines for both producing and consuming AI** (e.g., developing expertise among business users, building processes and metrics to support adoption)

88% Of companies that generate value from AI tightly link their AI initiatives to company-wide digital transformations

Example: Industrial manufacturer MNC

To facilitate **collaborative, cross-functional approach**, the company operates an AI lab that pulls people out of their daily jobs for 1-2 weeks to work with data scientists on prototype solutions

Yearly **internal conference** on AI for relevant employees

All-staff AI inductions and training to raise overall understanding

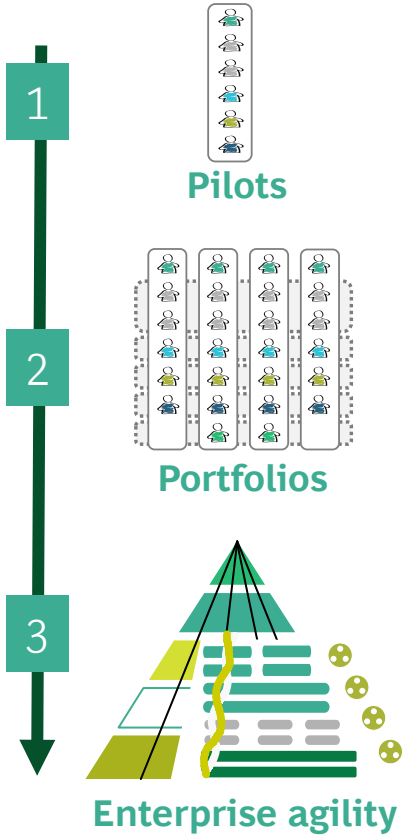
Sources: BCG-MIT Sloan Research report *Winning with AI Pioneers Combine Strategy, Organizational Behavior, and Technology*, Oct 2019; BCG, *How to Win with Artificial Intelligence*; BCG analyses and experience

2.3 Change your ways of working and operating model to enable enterprise agility by leveraging cross-functional teams, platforms, and modularity

Enterprise agility needed

Adoption of AI at scale will require **more agile structures** focused on business value and faster time to market by **breaking the compromise between scale and agility**

Start with pilots, move to portfolios, and ultimately scale to enterprise agility



- **Break silos** by bringing together **small, empowered, multidisciplinary teams** (tech and business combined) to build AI solutions

- **Ensure autonomous teams** moving in unison through strong alignment around a shared purpose, strategy, and priorities
- **Make the matrix work** by separating "what" and "how" at team level
- Ignite, articulate, activate, and embed new leadership behavior

- **Allocate resources continuously,** aligned with outcome-based goals
- **Build platforms**[1] to benefit from scale and drive long-term innovation
- Embed **modularity** to reduce interdependencies and allow teams to work autonomously end-to-end[2]
- **Remove boundaries of the organization** to seamlessly integrate external talent from the broader ecosystem

1. Platforms can be business area (for example, core process flow oriented) or technology area (for example, core IT system oriented) that require persistent funding and staffing of teams-of-teams to drive design, delivery, and operations of AI products/capabilities; 2. Removing legacy "spaghetti" structures with heavy interdependencies between teams. Source: BCG experience

2.3 Effectively orchestrate an AI ecosystem to enable fast learning, scaling, and lower technology costs

AI requires access to data and collaboration

To drive transformative impact with AI, companies need access to:

- Large diverse sector-specific and customer-wide data
- Potential for deeper experiments with vertical AI
- Faster feedback loops to enable quick development cycles
- Support in use case expansion

Sources: BCG experience and analyses

Determine ecosystem potential, rethink role of players, orchestrate effectively

1 Do not treat AI solutions as a plug-and-play

Bring about systemic change to optimally leverage other players' capabilities

Do not treat the same as investing in startups to gain a possible use of off-the-shelf tech

Engage ecosystem players: rethink mutual workflows

2 Carefully scout for and validate AI pioneers and partners

Change mindset on how to define strategic segment (e.g., from car manufacturer to mobility)

Study the emergent AI and trends, identify internal gaps

3 Collaboratively innovate on how to exchange information

Take the lead in establishing new data-sharing policies with large digital firms, AI pioneers/ startups, universities, think tanks, NGOs

2.4 Embed AI skill set shortages in your strategic workforce planning and develop internal upskilling programs, do not focus only on external hiring

Perform strategic workforce planning, regularly reassess

86% Of firms believe existing workers will need to change skill sets

At a company level, assess workforce **size, composition, and development**

Evaluate future skill set demand given strategic direction and AI projects—e.g., including skills mapping and advanced supply and demand models

Plan globally to bridge the gaps:
- Assess future talent in your markets based on **government AI policy**
- Engage with top universities early on to tap into STEM talent
- Consider recruiting from **more fluid talent pools** outside of core markets[1]

Supplement hiring with upskilling—given likely shortages soon

59% Of companies that are actively reskilling their workforce see impact from their AI efforts (vs. 19% that rely solely on hiring)

65% Of those with multiple approaches to AI talent have seen business impact from AI

Create a lifelong learning culture: Deliver content and skill upgrades in a variety of formats so that they can be integrated into the daily routine

Develop flexible employee pool for people with AI skills, without yet knowing which function or use case they'd be best suited for

Shift the recruitment focus from hiring for skill to **hiring for "will":** comprehensive upfront training and room for self-teaching AI skills

1. Especially given postpandemic remote-working era

Sources: BCG's *The Future of Jobs in the Era of AI*, 2021; BCG-MIT Sloan Research report *Winning with AI Pioneers Combine Strategy, Organizational Behavior, and Technology*, Oct 2019; BCG's *How to Win with Artificial Intelligence;* BCG experience

2.5 Enable data and AI via five “mental flips”: decouple data capability building from core IT, embed flexibility via reshoring, and modernize iteratively

Decouple data capability building from the core IT transformation - to introduce tremendous business agility and reduce IT risk

Liberate the data and focus on business outcomes - business (not IT) owning data to prioritize and drive use cases. Data & digital platforms approach:

- Create a data layer to liberate data from core systems across enterprise (e.g., ERP, CRM)
- Build more modular interfaces between systems
- Adopt cloud infrastructure for speed and agility

Reshore and build in-house engineering capabilities – to improve time to value

Apply a broad-based approach: Rather than overemphasizing a particular data capability, the best companies invest to build their maturity in all core capabilities of the pyramid (see page 24)

Build incrementally and iteratively modernize over time: Don’t aim for a “big bang”—build data capabilities in a deliberate, incremental manner over time. Apply test, learn, and improve mindset

Sources: BCG's DACAMA research, BCG experience

2.6 Invest early in responsible AI (RAI) governance, policies, expert staff, and structural assessment—and provide transparency to stakeholders

Need to manage AI ethical issues

82% Of the public wants responsible AI to reduce ethical risks

78% Of workers want help managing product dev ethical challenges

But...

21% Of companies have a fully mature RAI program in place

55% Overestimate their organization's RAI maturity and progress[2]

Four steps organizations should take to get started

Empower responsible-AI leadership

- Appoint a leader to design program, engage in forums, identify champions, establish principles
- Diverse committee to steer complex issues

Establish governance: trust but verify

- Establish mechanism for review and adherence, escalation paths to raise concerns, and integrate into existing risk processes
- Refine roles—accountability for RAI outcomes

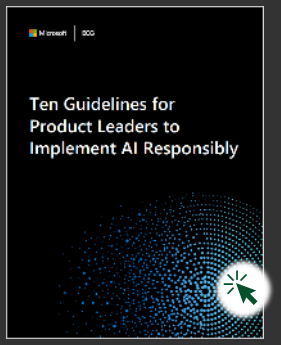
Develop principles, policies and training

- Build, refine, communicate RAI principles, policies, & training to all AI team members
- Regularly refine based on company feedback[1]

Conduct structured reviews of AI systems

- Adopt a structured assessment tool to proactively identify risks during project life cycle
- Undertake a comprehensive assessment

Read more on the topic in:
Microsoft-BCG study on implementing AI responsibly



Guidelines to support AI innovation with responsible outcomes and anticipate and mitigate risks of AI systems, with a focus on product development and delivery processes

1. Feedback around employee concerns, high risk areas, etc.; 2. From BCG's Responsible AI Survey 2021. Note: n = 1,034. RAI = responsible artificial intelligence. Based on organizations' responses to 21 questions about their implementation across generally accepted RAI dimensions; Other sources: Center for the Governance of AI, University of Oxford, Doteveryone, BCG analyses and experience

Additional perspectives on AI trends and implications

Are You Overestimating Your Responsible AI Maturity?

Is Your Company Gaining Momentum in Data?

The Future of Jobs in the Era of AI

The Hidden Cultural Benefits of AI

How Automation and AI Can Unlock Value in IT Operations

Use AI to Measure Emissions—Exhaustively, Accurately, and Frequently

Are You Making the Most of Your Relationship with AI?

How Digital Giants and Europe Can Cooperate to Win in AI

How Humans and AI Can Work Together to Create Better Businesses

Click here to read past editions of Executive Perspectives

BCG

Executive Perspectives

Appendix

Deep dives in AI dynamics which companies should manage

Labor Page 23

Labor market shifts and gaps in talent capabilities

Data Page 24

Limited data capability, quality, & consistency

Ethics Page 25

Unethical application and a lack of transparency

Regulation Page 26

Expected increase in regulatory burden

Labor | AI likely to shift labor markets—with growth in tech, creative, and managerial jobs, and a decline in routine, manual-labor jobs

AI drives shift in required skills

Likely job automation:
- Processing of big data
- Repetitive motions
- Control precision, etc.

6:1 For 6 jobs automated or augmented, 1 additional job is required

Low automation probability:
- Collaboration
- Management
- Empathy
- Creativity, etc.

41% see increased risk of automation for their job in 2020, but 68% willing to retrain[1]

Most concerned employees	1. Finance and auditing 2. Customer service 3. Human resources 4. Administration and secretarial 5. Media and information
Least concerned	1. Social work 2. Law 3. Science and research 4. Health and medicine 5. Management

Expected widening labor supply-demand gaps necessitate reskilling of employees

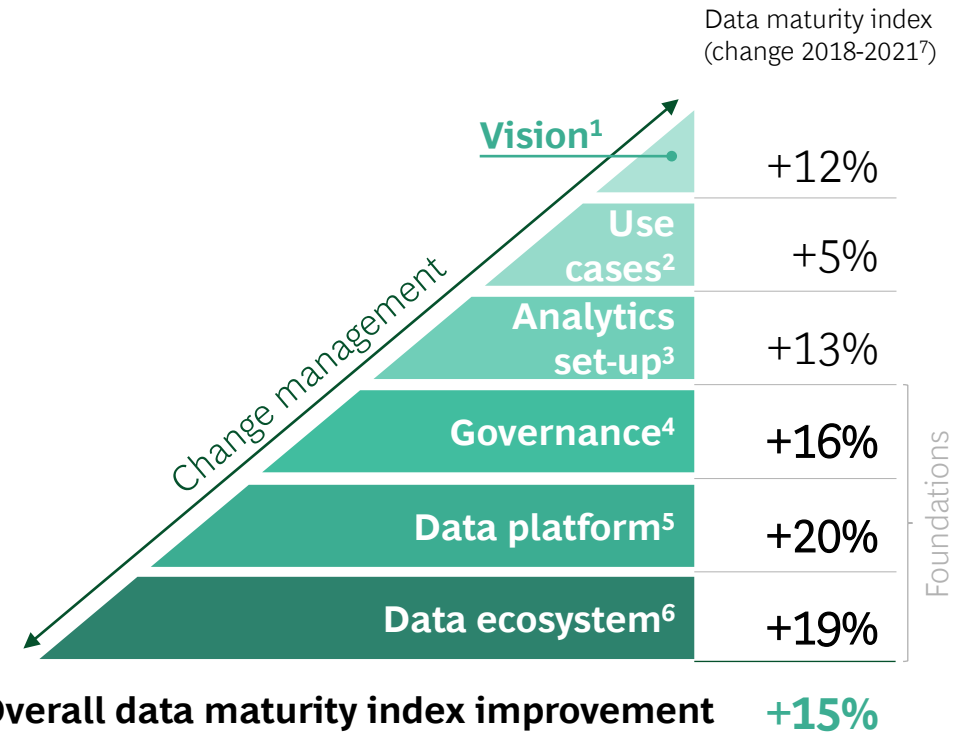
	Net **surplus** in 2030 vs. 2020		Net **shortage** in 2030 vs. 2020		
	Admin support	Production	IT and math-based jobs	Management	Architecture
	+1,650 K	**+490 K**	**-5,567 K**	**-4,150 K**	**-1,198 K**

	Expected overall labor supply shortages—resulting in low surplus numbers across jobs	Production	IT and math-based jobs	Management	Finance
		+37 K	**-1,052 K**	**-1,026 K**	**-280 K**

1. 2020 BCG/The Network proprietary web survey and analysis. Sources: Modelling workforce supply and demand for the next 10 years based on digital, demographic and COVID-19 implications, Faethm and BCG analysis; 2020 BCG/The Network proprietary web survey and analysis, Decoding Global Reskilling and Career Shifts-Apr 2021

Data | Data availability, quality, buy-in, & governance centralization critical to scaling of AI—continued gaps but progress underway

Companies have advanced the data "foundations" in the past 3 years



Overall data maturity index improvement **+15%**

Yet, actual data maturity falls short of corporate ambitions

21% Gap in achieved maturity level vs. ambition from 3 years ago[7]

Gap reducing versus previous 3-years (2015-2018), yet remains wide

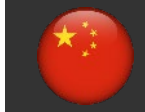
Key challenges include:

- Lack of business buy-in and management
- Limited central governance and management
- Underinvestment in data quality, variety, & standardization

23% View gaps in **data capabilities** as main challenge[8]

Strong data focus underpins China's advancement in AI

Strong investment in central data housing and governance



83% **40%** **39%**

Of pioneers[9] manage corporate data centrally

Access to large sets of data via orchestrated ecosystems

~30% of Chinese companies are declaring significant financial benefits[10] with AI, vs 10% in US

1. Objective and outcomes we aim to achieve from using data; 2. Main macro use cases for the data, value we expect from each of them, ownership and accountability for each of them; 3. Talent pool, analytics functions, process and results; 4. Data management, data hygiene actions (e.g., key quality indicators); 5. End-to-end infrastructure suitability for vision and future use cases (e.g., from modelling to industrialization); 6. Understanding, leveraging and role in the ecosystem; 7. BCG Data Capability Maturity Assessment 2021 vs expectations in 2018; 8. "Artificial intelligence in business gets real," MIT Sloan Management Review and BCG, BCG Center for Sensing and Mining the Future; 9. Defined as organizations that both understand and have adopted AI. These organizations are on the leading edge of incorporating AI into both their offerings and internal processes. They comprise 18% of the survey conducted as part of MIT-BCG 2019 Artificial Intelligence Global Executive Study and Research Project; 10. Based on a global survey in spring 2020, attracting over 3,000 total respondents representing 29 industries and 112 countries. The assessment of "significant financial benefits" uses a threshold that varies based on organization size (e.g., for companies with revenue of $10B or more, threshold is >$100M in revenue and/or cost improvements annually from the use of AI, etc.)

Ethics | Ethical and transparency concerns around AI applications can raise reputational risk and be a limiting factor—if not appropriately addressed

AI faces many ethical challenges…

What decisions should we let AI make?

Who decides how to deploy AI?

Who should be responsible **for AI's mistakes**?

How to **eliminate AI bias** in decision-making?

How to address the perceived **lack of transparency** ("black box" nature) of AI?

..and many more..

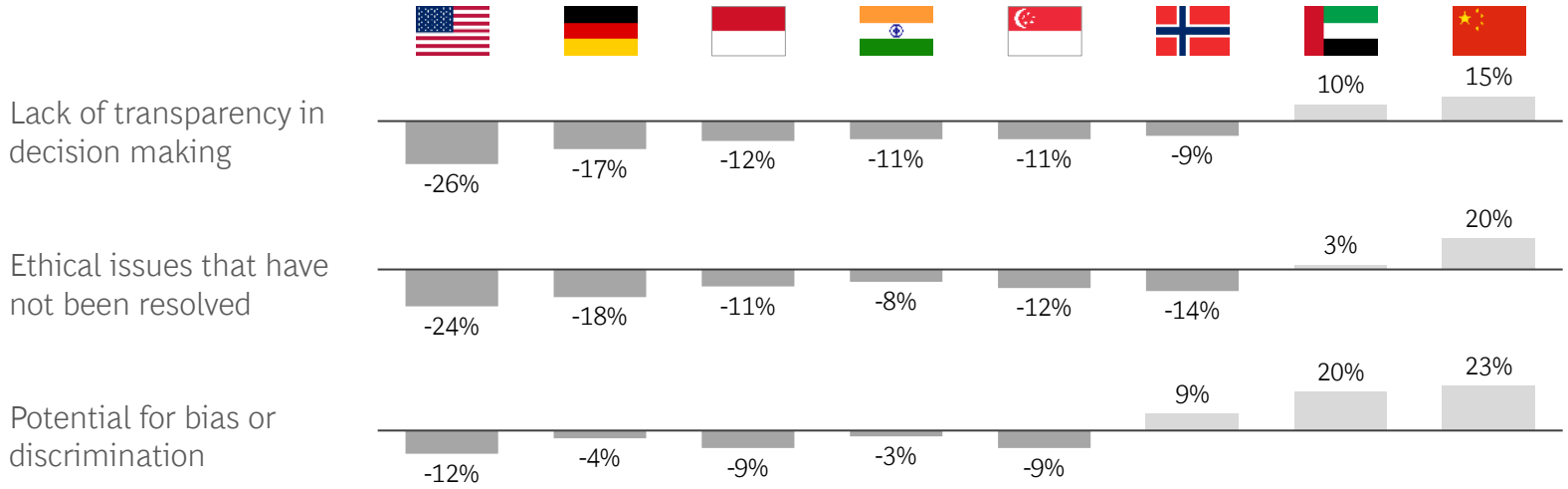
… and "black box" perception

49% Of respondents believe that mistrust of AI stems from a **lack of understanding**[1]

34% Of respondents believe that AI decisions provide **too little context**[2]

…with varied sentiment by nation[3]

Average net perception: Percent of individuals "not concerned" less "strongly concerned"
(i.e., negative % indicates that more surveyed individuals are concerned than not)



1. The cultural benefits of AI, MIT Sloan-BCG November 2021; 2. OECD Science and Technology "42 countries adopt new OECD principles on AI"; 3. Survey questions: What concerns you most about the use of AI by governments? Response options range from 1-7, where 1 = Extremely concerned, and 7 = Not at all concerned. Respondents who selected '6' or '7' have been included as not concerned, '1' or '2' have been included as strongly concerned, '3', '4' and '5' have been counted as neutral.
Source: BCG 2018 Digital Government Satisfaction Survey

Regulation | Expected increase in scrutiny, amplifying compliance burden: EU's draft risk-based proposal provides example

EU Draft AI Regulation 2021, likely to launch in 2020s

Proposal focused on:

- Protection of general interests and fundamental human rights
- Limiting bias and security risks of AI

Wide application:

- Any AI systems with impact/"output" in the EU[1]

Compliance burden:

- Significant documentation, record keeping, and disclosure required
- Fines up to 6% of global annual revenue for failure to comply

Risk-based approach (higher risk, higher requirements), with evolving list of prohibited practices to reflect new AI uses

	Low or minimal risk	High risk	Unacceptable risk
Activities	**AI systems that do not fall in other two risk categories, incl.:** • **"Obvious" interaction** with humans (e.g., chatbots) • Operations optimization • Behavior prediction • Digital solutions personalization, etc.	• **Public safety** management • **Educational assessment** & admission • **Recruitment, promotion,** and contract termination decisions • **Administration of justice** and law enforcement • **Creditworthiness** and public-benefits eligibility assessment	• AI systems likely to cause harm: **subliminally manipulate, exploit vulnerabilities,** or **distort behavior** • AI-based **social scoring** • **"Real-time" biometric identification** in public spaces for law enforcement[2]
Business implications	**Customer transparency**: AI use disclosure	**Stringent requirements:** Customer transparency, human oversight, government registration, monitoring & reporting, conformity assessment, data & risk management	**Prohibited AI practices:** monitor closely and work with EU bodies to assess "gray-zone" applications

1. Including: providers that first supply or put an AI system into service in the EU (putting into service involves making it available for use by a "user" or for use by the provider itself), regardless of whether the providers are located inside or outside the EU; users of AI located in the EU; and providers and users located outside the EU, if the output produced by the system is used in the EU). 2. Note: Biometric identification and people categorization in nonpublic spaces considered 'high risk';
Source: EU Regulation of the European Parliament, Allen Overy

Disclaimer

The services and materials provided by Boston Consulting Group (BCG) are subject to BCG's Standard Terms (a copy of which is available upon request) or such other agreement as may have been previously executed by BCG. BCG does not provide legal, accounting, or tax advice. The Client is responsible for obtaining independent advice concerning these matters. This advice may affect the guidance given by BCG. Further, BCG has made no undertaking to update these materials after the date hereof, notwithstanding that such information may become outdated or inaccurate.

The materials contained in this presentation are designed for the sole use by the board of directors or senior management of the Client and solely for the limited purposes described in the presentation. The materials shall not be copied or given to any person or entity other than the Client ("Third Party") without the prior written consent of BCG. These materials serve only as the focus for discussion; they are incomplete without the accompanying oral commentary and may not be relied on as a stand-alone document. Further, Third Parties may not, and it is unreasonable for any Third Party to, rely on these materials for any purpose whatsoever. To the fullest extent permitted by law (and except to the extent otherwise agreed in a signed writing by BCG), BCG shall have no liability whatsoever to any Third Party, and any Third Party hereby waives any rights and claims it may have at any time against BCG with regard to the services, this presentation, or other materials, including the accuracy or completeness thereof. Receipt and review of this document shall be deemed agreement with and consideration for the foregoing.

BCG does not provide fairness opinions or valuations of market transactions, and these materials should not be relied on or construed as such. Further, the financial evaluations, projected market and financial information, and conclusions contained in these materials are based upon standard valuation methodologies, are not definitive forecasts, and are not guaranteed by BCG. BCG has used public and/or confidential data and assumptions provided to BCG by the Client. BCG has not independently verified the data and assumptions used in these analyses. Changes in the underlying data or operating assumptions will clearly impact the analyses and conclusions.