BACHELOR'S IN DATA SCIENCE

AI ADVANCES MAN VS. MACHINE

Advances in artificial intelligence (AI) are bringing big hopes to businesses and big fears to their employees. Business owners hope for increased profits, while workers fear losing their jobs. As this industry continues to expand, we are still witnessing the pros and cons of AI technology. The Man vs. Machine debate rages on with opponents questioning the benefit of AI to society and demanding answers to how this technology will be regulated. Proponents see a future in which AI will be overseen and managed by skilled professionals and ultimately bring overwhelming benefits to society.

CHAPTER 1

GROWTH IN THE AI INDUSTRY

Artificial intelligence is a topic widely discussed among business leaders. But how many companies and which industries are actually implementing AI technologies that are creating value?

What obstacles are they facing when considering investing in AI technologies?

STATISTICS

A FORBES SURVEY FOUND THAT:

44% of individuals employed by companies in the automotive and manufacturing sectors considered AI to be "highly important" to the manufacturing function in the next five years

49% consider AI to be absolutely critical for success

However, 56% of respondents plan to increase spending on AI by less than 10% *Forbes2*

THE "2018 DIGITAL TRENDS REPORT" BY ADOBE REVEALED

Only **15%** of businesses are using AI

31% plan to consider AI in the next 12 months

72% of business leaders consider AI a business advantage

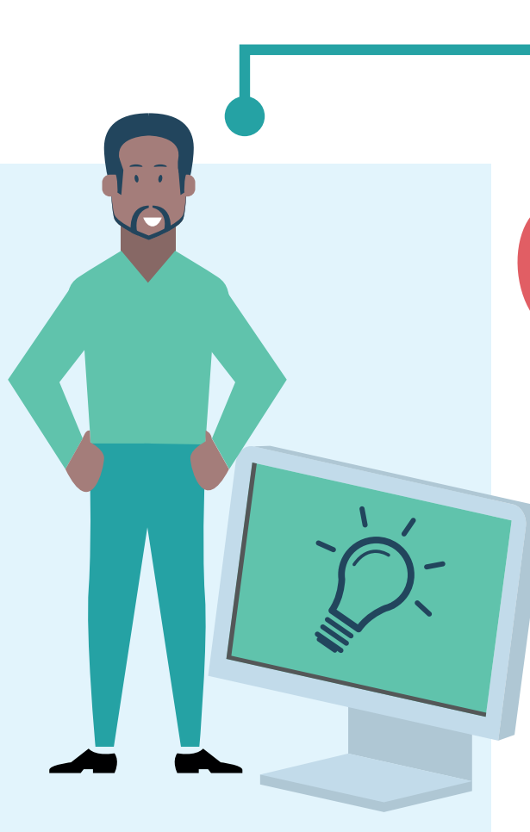
61% of businesses with an innovation strategy plan to use AI to identify opportunities in data

38% of consumers predict AI will benefit customer service

61% of marketing professionals say their company's most significant data initiative involves AI and machine learning

46% of American adults use voice assistant applications to interact with smartphones and other digital devices Adobe

INDUSTRIES USING AI

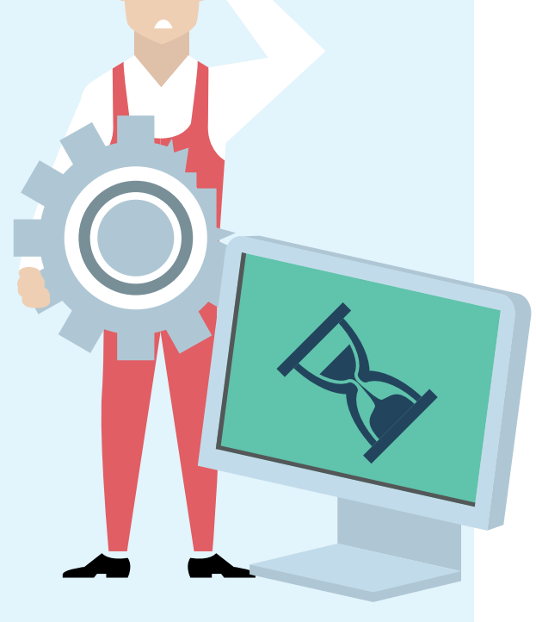


OIL & ENERGY

AI is being used to predict energy loads and reduce energy costs for the transportation, storage and refining of petroleum *McKinsey*

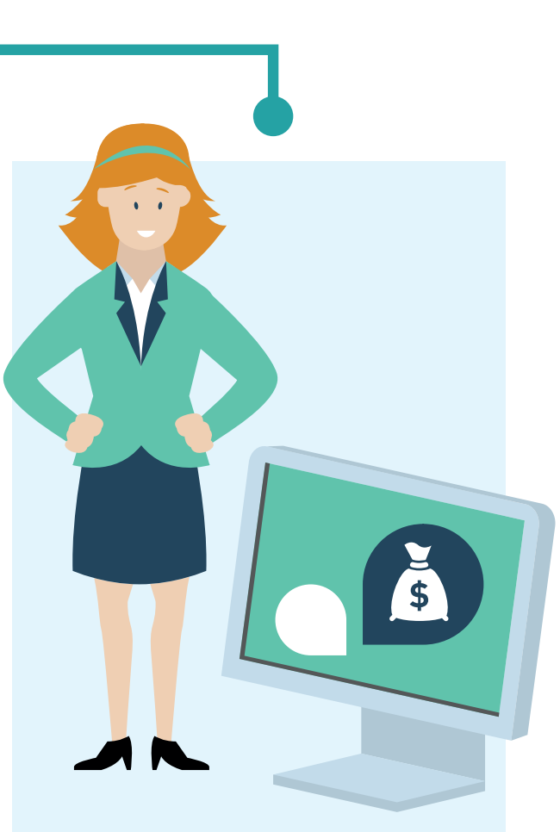
MARKETING

AI is being used to map customer journeys and identify how each individual reaches a customer segment *CIO*



MANUFACTURING

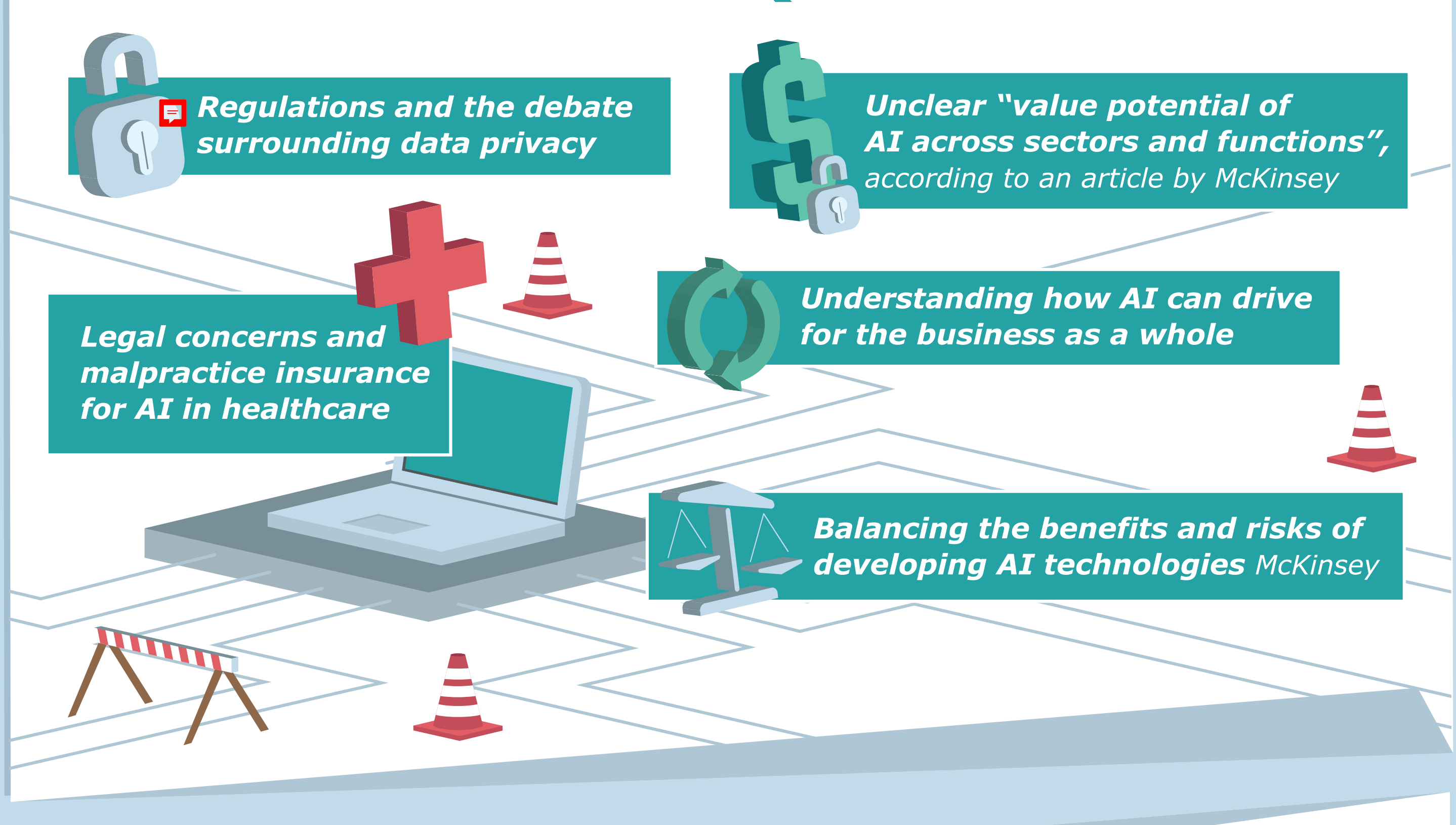
AI is being used to predict and avoid unplanned downtimes resulting from malfunctioning machinery *CIO2*



BANKING & FINANCE

AI is being used to assist customers 24/7 through conversational assistants *TechTarget2*

CHALLENGES & OBSTACLES



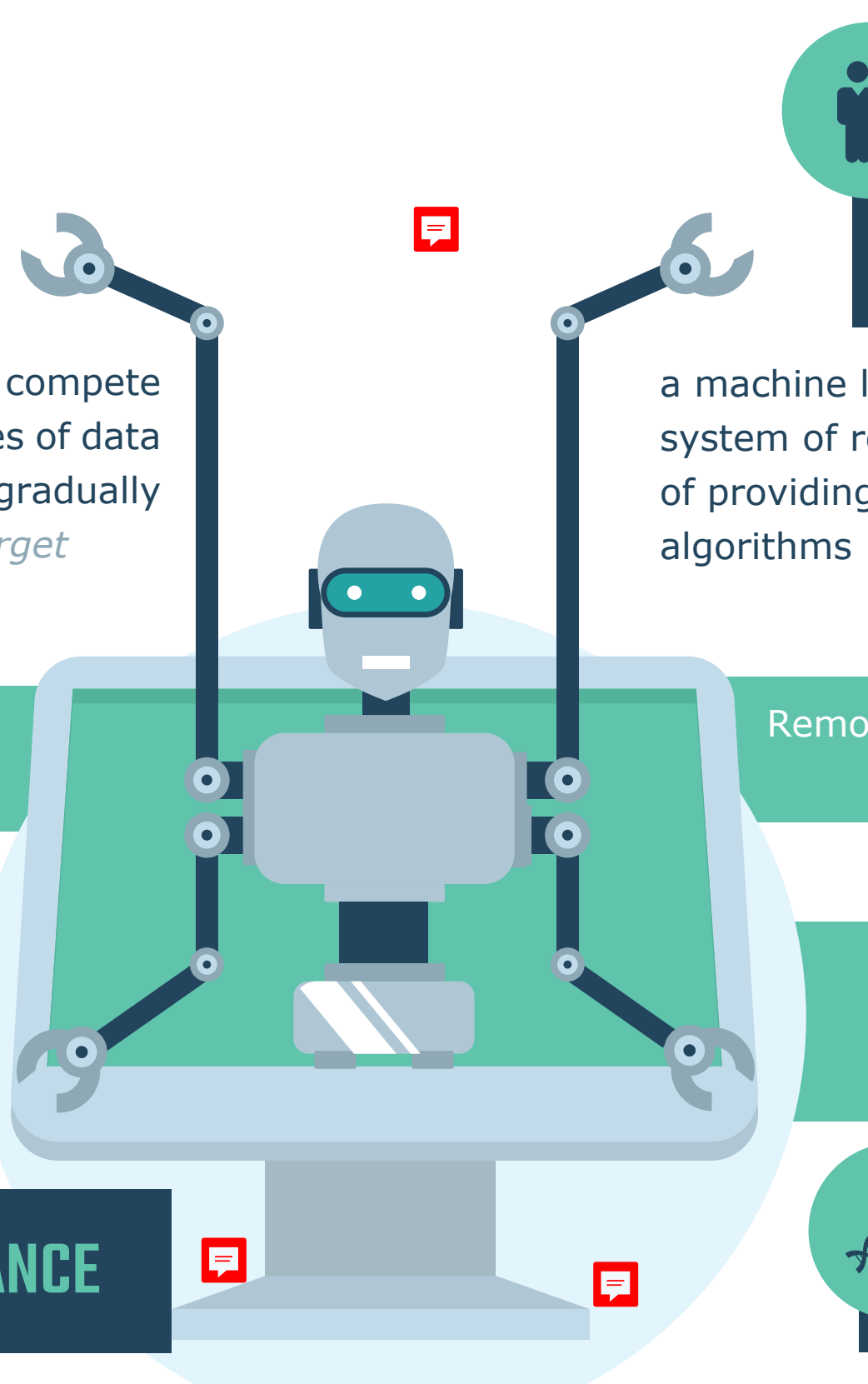
- ***Regulations and the debate surrounding data privacy***
- ***Unclear "value potential of AI across sectors and functions",*** *according to an article by McKinsey*
- ***Legal concerns and malpractice insurance for AI in healthcare***
- ***Understanding how AI can drive for the business as a whole***
- ***Balancing the benefits and risks of developing AI technologies*** *McKinsey*

CHAPTER 2

HOW AI TECHNOLOGY IS HELPING BUSINESSES

Though numerous applications have been developed using AI, there are four main types of AI technologies.

4 TYPES OF AI TECHNOLOGIES



GENERATIVE ADVERSARIAL NETWORK (GAN)

composed of two neural networks that compete with each other to mimic different types of data distribution, generate data sets, and gradually improve behaviors and output *TechTarget*

Benefits:

Useful for generating test datasets from scratch *McKinsey*

Example:

Training an AI to create a blog based on previous content *TechTarget*

REINFORCEMENT LEARNING

a machine learning program that uses a system of reward and punishment, instead of providing explicit directions, to train algorithms

Benefits:

Removes the need for a programmer to teach the agent *Techopedia*

Example:

Develop systems to play board gamessuch as chess and beat human champions *McKinsey*

PREDICTIVE MAINTENANCE

a strategy to predict when a device will fail and monitor its maintenance to detect anomalies before an issue occurs *McKinsey*

Benefits:

Cost savings in lost productivity and service expenses; reduced overstock; minimize issues related to quality and reliability *Techopedia2*

Example:

Extend the life of expensive machinery, such as cargo planes

DIGITAL TWINS

defined by an IBM article as "the virtual representation of a physical object or system across its life-cycle. It uses real-time data and other sources to enable learning, reasoning, and dynamically recalibrating for improved decision making."

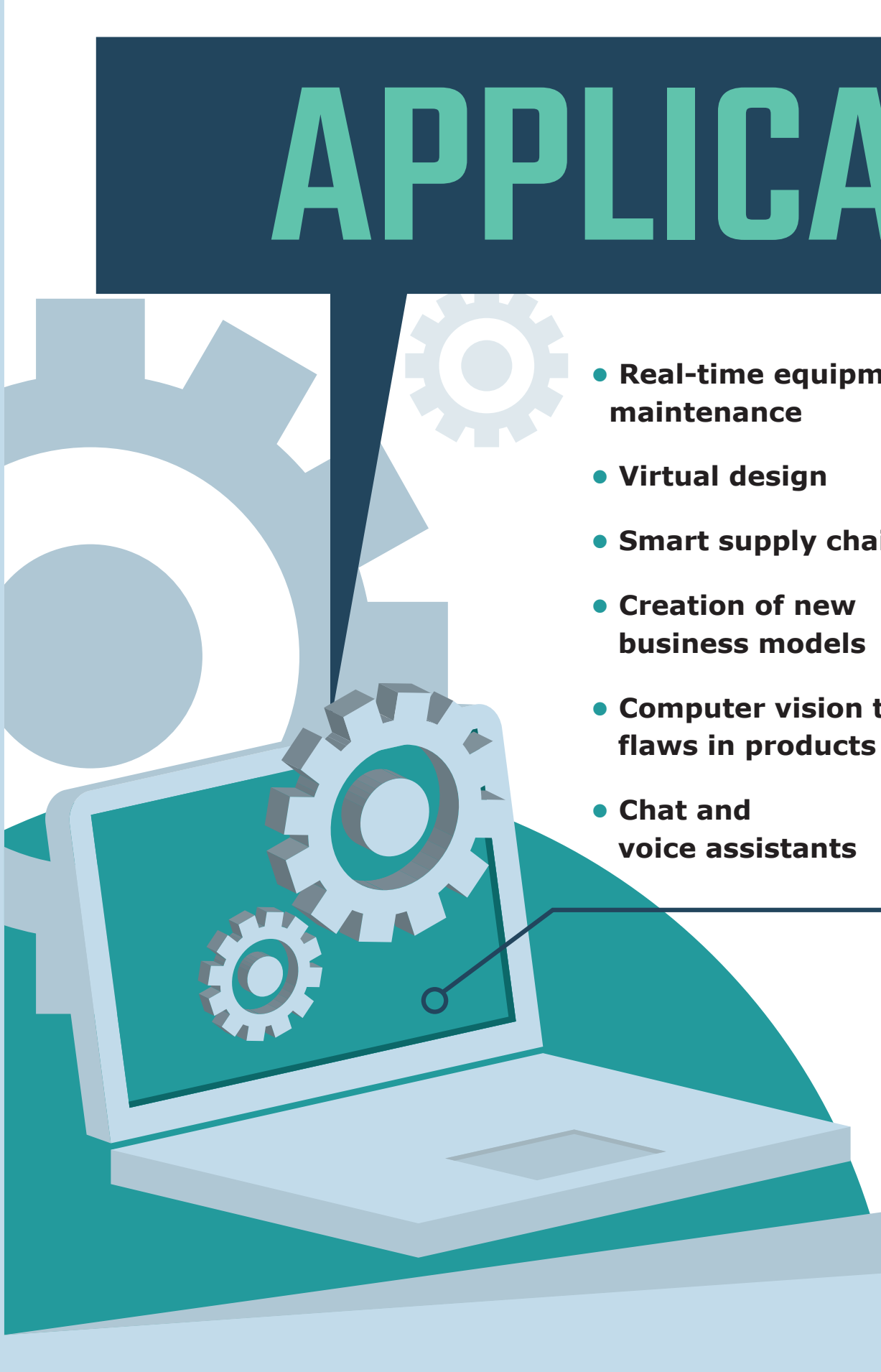
Benefits:

Useful for not only understanding how a product performs today, but also in the future

Example:

Create digital scenarios depicting a car's performance across various metrics *IBM*

APPLICATIONS OF AI



- **Real-time equipment maintenance**
- **Virtual design**
- **Smart supply chain**
- **Creation of new business models**
- **Computer vision to detect flaws in products** *Forbes2*
- **Chat and voice assistants**
- **Cybersecurity defense** *(such as predicting vulnerability exploitation)*
- **Diagnoses in healthcare**
- **Recruiting** *McKinsey*
- **Market predicting**
- **Accelerating the reading and understanding of text**
- **Predicting misconfigurations**
- **Predicting misconfigurations**
- **Data entry and reporting**
- **Credit card processing**
- **Understanding intentions behind communication to identify bad behavior**
- **Reviewing proposals** *Forbes3*

CHAPTER 3

MAN VS. MACHINE

THREATS AND REALITIES OF AI

The Man vs. Machine debate pits humans against machinery. But can these robotic creations overpower their inventors? And what could happen if AI enabled crime?

POTENTIAL THREATS POSED BY AI

Increase in cybercrime as a result of:

- **Lowered barriers to entry**
- **Automated discovery of software bugs**
- **Social engineering attacks using Facebook-style algorithmic profiling**
- **Weaponization of drone swarms to create "slaughterbots"**
- **Automated surveillance by nations to suppress opposition**
- **Automated and personalized disinformation campaigns** *Guardian*

A DEFENSE AGAINST THE DANGERS OF AI

- Governments should create regulations to govern the use of AI
- Determine the optimal level of transparency in how AI technology works and how it is being used
- Develop procedures for verifying a system's robustness Guardian

THE ARGUMENT FOR AI

For AI and automation to flourish, human insight and guidance is critical. In 2015, cybersecurity job postings increased by **74% — about 50% were unfilled.**

Similar to other industries that have experienced automation, AI technology will create "exponentially more opportunities for more people in more ways than even those most directly impacted by it can often imagine at first," says an article published on Forbes. *Forbes*

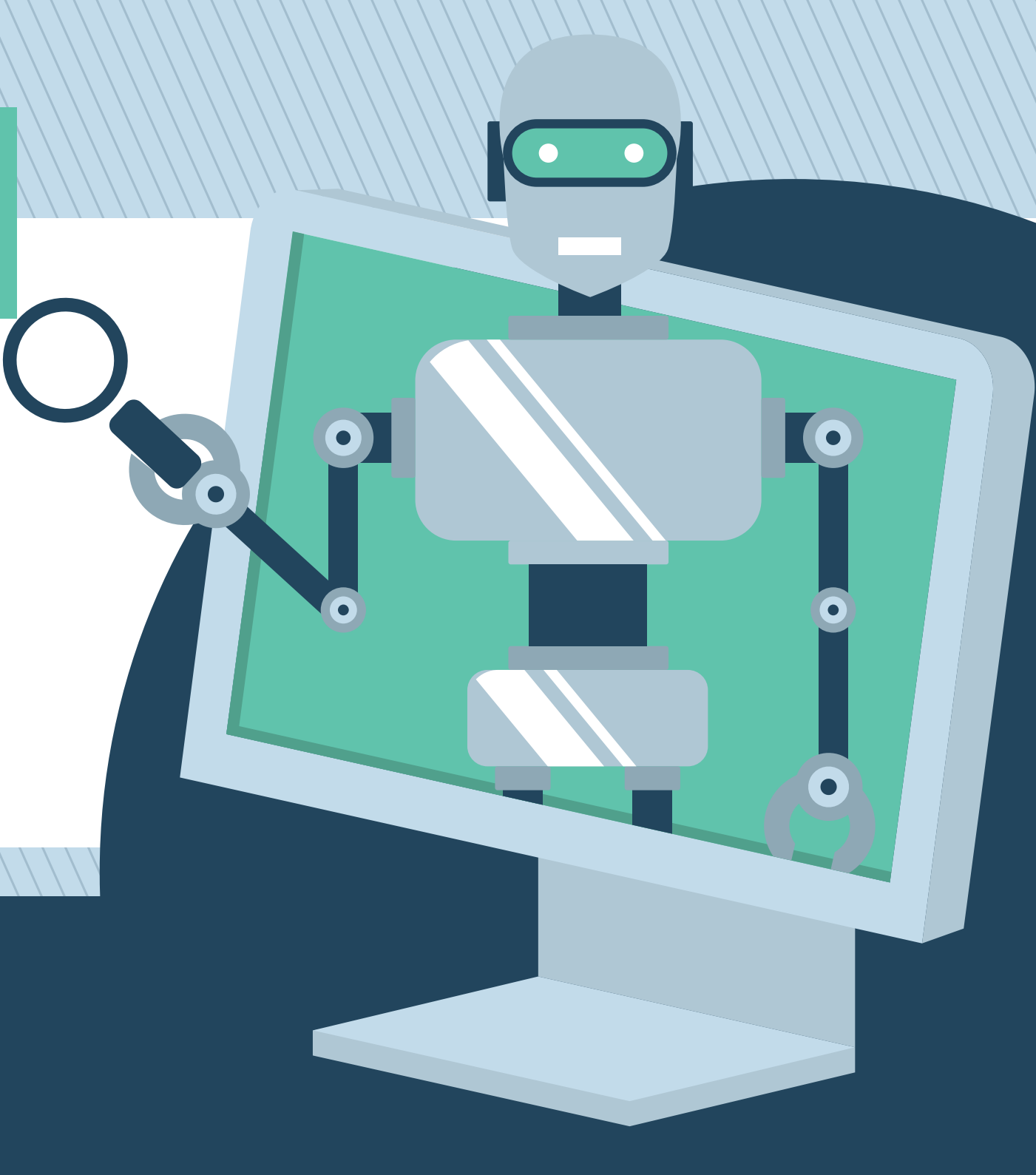
For example, email has not abolished the U.S. Post office. In 2017, the USPS shipped 5.7 billionpackages, compared to 3.1 billion in 2009. *USPS*

AI is particularly beneficial in the field of cybersecurity, automating time-consuming tasks such as data mining and freeing up time for higher-level tasks such as identifying and removing threats.

Cybersecurity technology can resist **4.4 million** network intrusions, neutralize **91,000 malware programs, and block 150,000 websites** — per minute.

Technology is only one factor influencing changes across various industries and should not be the scapegoat for innovation. *Forbes*

CONCLUSION



As progress is made in the field of AI, the responsibility to ethically manage and lead change increases evenmore. Governments, organizations, and AI experts must come together to govern this new frontier. With clarity surrounding rules and responsibilities, the Man vs. Machine debate could be resolved once and for all.

SOURCES:

https://facts.usps.com/table-facts/
https://www.techopedia.com/definition/32055/reinforcement-learning
https://www.techopedia.com/definition/32027/predictive-maintenance
https://www.adobe.com/insights/15-stats-about-artificial-intelligence.html
https://www.ibm.com/blogs/internet-of-things/iot-cheat-sheet-digital-twin/
https://searchenterpriseai.techtarget.com/definition/generative-adversarial-network-GAN
https://www.cio.com/article/3302739/marketing-industry/how-ai-is-reshaping-marketing.html
https://searchenterpriseai.techtarget.com/feature/AI-in-banking-industry-brings-operational-improvements
https://www.forbes.com/sites/forbestechcouncil/2018/05/01/ai-doesnt-eliminate-jobs-it-creates-them/#70b301933e70
https://www.forbes.com/sites/insights-intelai/2018/07/17/how-ai-builds-a-better-manufacturing-process/#5923f1e21e84
https://www.cio.com/article/3309058/manufacturing-industry/5-ways-industrial-ai-is-revolutionizing-manufacturing.html
https://www.theguardian.com/technology/2018/feb/21/ai-security-threats-cybercrime-political-disruption-physical-attacks-report
https://www.mckinsey.com/featured-insights/artificial-intelligence/notes-from-the-ai-frontier-applications-and-value-of-deep-learning
https://www.forbes.com/sites/forbestechcouncil/2018/09/27/15-business-applications-for-artificial-intelligence-and-machine-learning/#6a296857579f