DIGITAL DISRUPTION MATRIX

2025 Edition

ESSEC
BUSINESS SCHOOL

The Digital Disruption Matrix is published yearly by ESSEC Digital Disruption Chair

The Chair prepares a select cohort to become future digital leaders who bridge technological innovation and business strategy, equipping them with analytical frameworks and industry insights to navigate transformation across sectors.

This printed version contains a selection of our insights and results. For the complete, updated dataset with expert insights and interactive tools, visit digitaldisruptionmatrix.com

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FOREWORD

As the Dean & President of ESSEC Business School, I am personally confronted with digital disruption—a force that spares no industry, no institution, and no leader. In today's fast-changing world, making informed decisions is more crucial than ever. The Digital Disruption Matrix, developed by our school's Digital Disruption Chair, is designed to be a valuable tool in this process.

By offering a clear and scientific analysis of emerging technologies and their impact across industries, this barometer highlights the "hot spots" of transformation, thus providing business leaders with the insights they need to anticipate change, seize opportunities, and mitigate risks.

At ESSEC Business School, our mission is threefold: to create relevant knowledge, to train the next generation of leaders, and to support businesses and organizations in their transformation to make them more performing, meaningful, and sustainable. The barometer is a perfect reflection of this commitment. It is a synthesis of our expertise in data and technology, leveraged for real-world business applications.

While already comprehensive, this tool will continue to evolve, integrating new dimensions of digital transformation. Our goal is to provide decision-makers with ever-more precise and actionable insights. In a world shaped by disruption, knowledge is power—and with this barometer, we aim to empower businesses to navigate the digital age with confidence and impact.

Vincenzo Vinzi Dean & President, ESSEC

Enlighten.
Lead.
Change.

WELCOME
TO THE MATRIX

To me, the Matrix is a photo of technology potential based on expertise and data. Expertise from academics with ESSEC professors in the lead, but also from industries with 1000+ industry professionals surveyed, including several from BNP Paribas: BNP Paribas Wealth Management, BNP Paribas Cardif, BNP Paribas Asset Management, L'Atelier BNP Paribas, IT department, etc. Data was crunched from social listening but also from global patents screening.

The Matrix is an innovative tool for anyone who seeks clarity in digital disruption. First results showed that some technologies are viewed more positively by the Financial Sector than the Technology sector itself: this is the case for Descriptive AI and Generative AI.

Are we over-optimistic? The best way to answer this question is to innovate, submit prototypes to our clients, and learn from them. Build, Measure, Learn.

At BNP Paribas, we are very happy to be part of this first Matrix creation alongside ESSEC Business School and Sia Partners. We put it in your hands and hope to update it every year in the future and improve it based on your feedback.

Nathalie Doré Chief Impact & Innovation Officer, BNP Paribas Cardif

FOREWORD

At a time of accelerating technological change, the need for clear, data-driven insights into digital disruption has never been more pressing. The ESSEC Digital Disruption Matrix launches this year as an annual barometer designed to provide current and future global leaders with actionable insights on technological transformation.

This inaugural edition analyzes six transformative technologies selected by a college of 40 experts- Artificial Intelligence split into Descriptive and Generative AI, Quantum Computing, Robotics, Blockchain, and Renewable Energy Storage.

Our research synthesizes multiple perspectives: trends in peer-reviewed publications and patent filings, analysis of 340 global industry reports, a quantitative survey of 1,000 professionals across sectors, and in-depth interviews with technology experts and industry leaders.
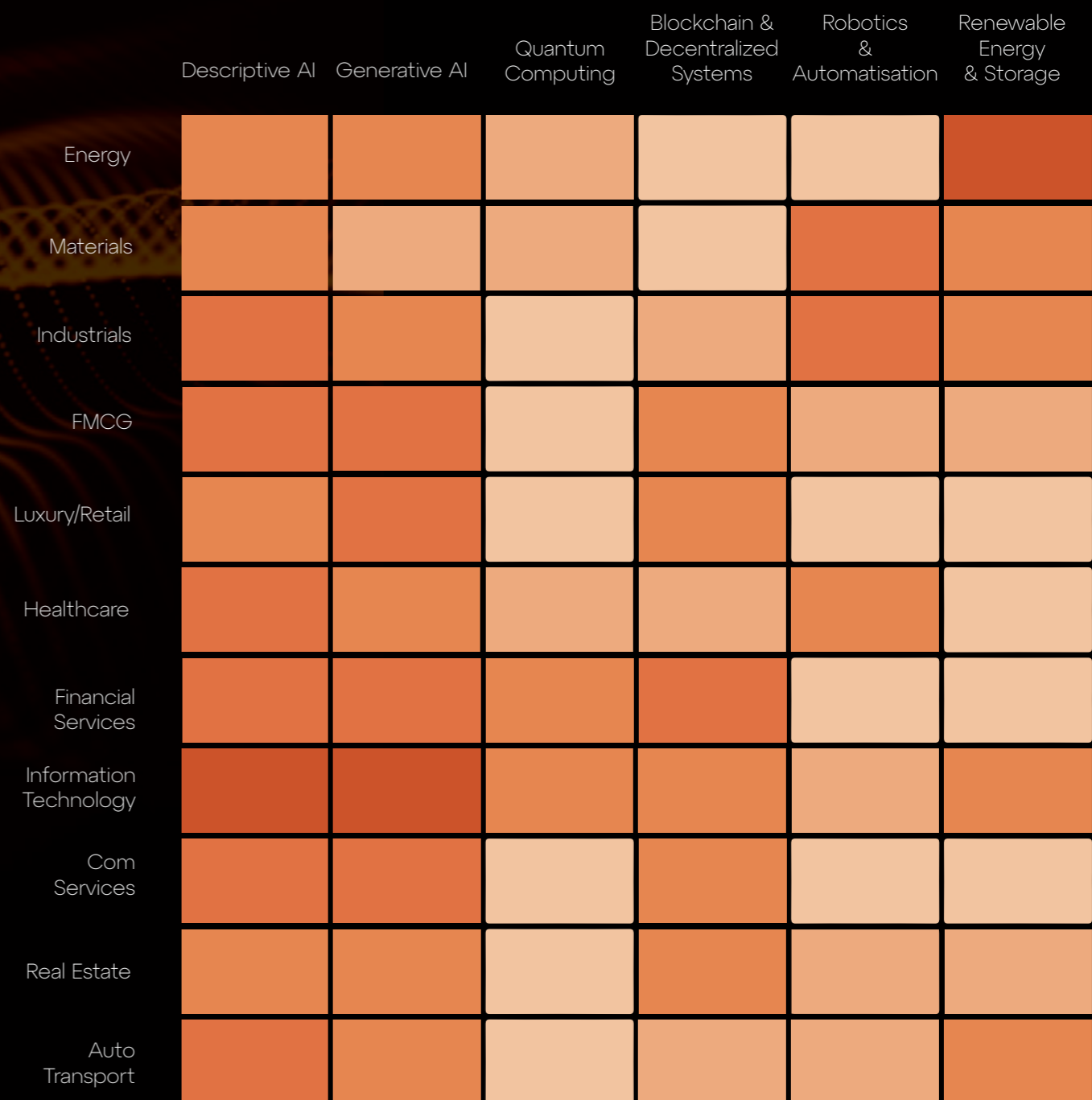
Our findings reveal a technological landscape where innovations are increasingly interconnected. Generative AI emerges with unprecedented momentum, while Energy Storage appears as the «hidden elephant in the room» – the potential bottleneck determining which innovations can scale sustainably. Quantum Computing shows promising specialized growth with significant implications for encryption, while Robotics evolves as AI simulations reduce development barriers. Despite reputational challenges, Blockchain continues developing toward an «invisible» infrastructure layer.

The resulting heatmap visualizes disruption's intensity across industries, revealing both expected patterns and surprising hotspots. Rather than claiming definitive authority, we position the Digital Disruption Matrix as a catalyst for strategic discussions about technological change. We invite readers to engage with these insights as starting points for deeper exploration in navigating an increasingly complex digital future.

Jérémy Beaufils
Executive Director
ESSEC Digital Disruption Chair

Prof. Jan Ondrus
Professor of Information Systems
ESSEC Digital Disruption Chair

HEATMATRIX

	Descriptive AI	Generative AI	Quantum Computing	Blockchain & Decentralized Systems	Robotics & Automatisation	Renewable Energy & Storage
Energy						
Materials						
Industrials						
FMCG						
Luxury/Retail						
Healthcare						
Financial Services						
Information Technology						
Com Services						
Real Estate						
Auto Transport						

Low — Medium — High

This heatmatrix combines analysis from peer-reviewed publications, patent filings, industry reports, and expert interviews to visualize disruption intensity across sectors. Darker orange indicates higher disruption potential.
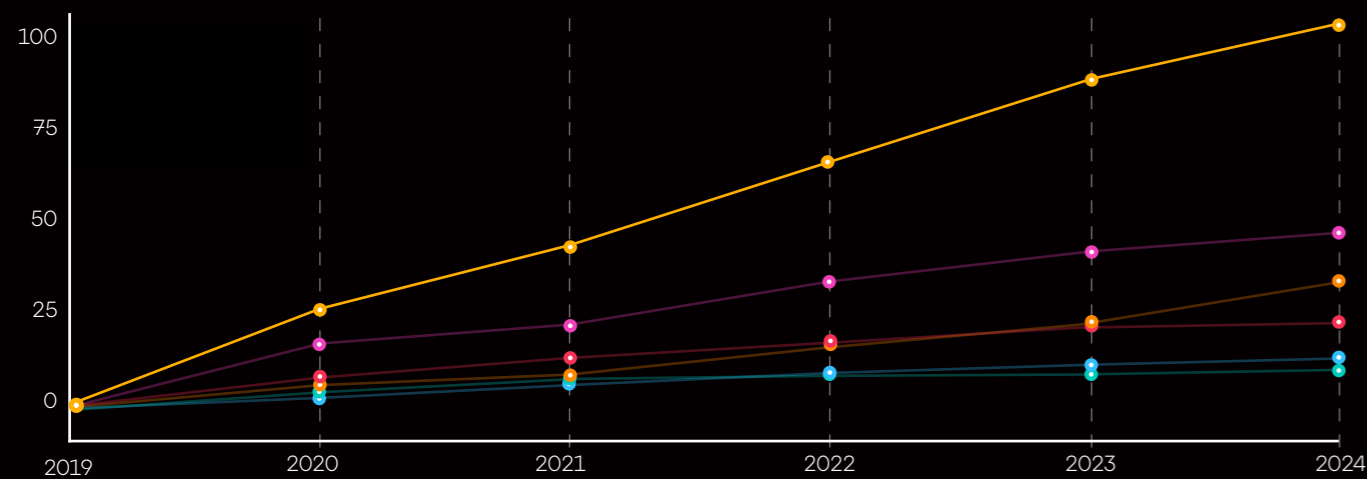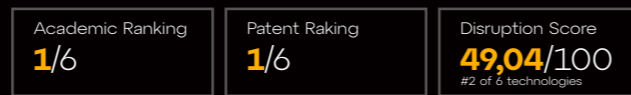
Technology Deep Dive

DESCRIPTIVE AI

WHAT IS DESCRIPTIVE AI?

Descriptive AI encompasses traditional AI approaches that analyze and interpret existing data to identify patterns, make predictions, and derive insights. This technology forms the foundation of practical AI applications in industry through machine learning, statistical analysis, and pattern recognition.

ACADEMIC & INDUSTRY DATA

Academic Ranking	Patent Raking	Disruption Score
1/6	**1**/6	**49,04**/100 #2 of 6 technologies

Cumulative Technology Publications

Legend:
- AI (Descriptive AI)
- Energy storage
- AI (Generative AI)
- Quantum Computing
- Robotic & automation
- Decentralisation & blockchain

Source: L'Atelier BNPP, Patents and Academic Publications. Disruptiveness score is based on the citations/publication ratio.
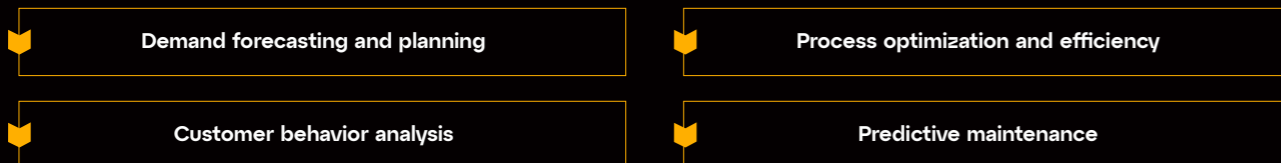
Industries Most Impacted

#1
Information Technology

#2
Healthcare

#3
Industrials

Cross-Industry Applications

- Demand forecasting and planning
- Process optimization and efficiency
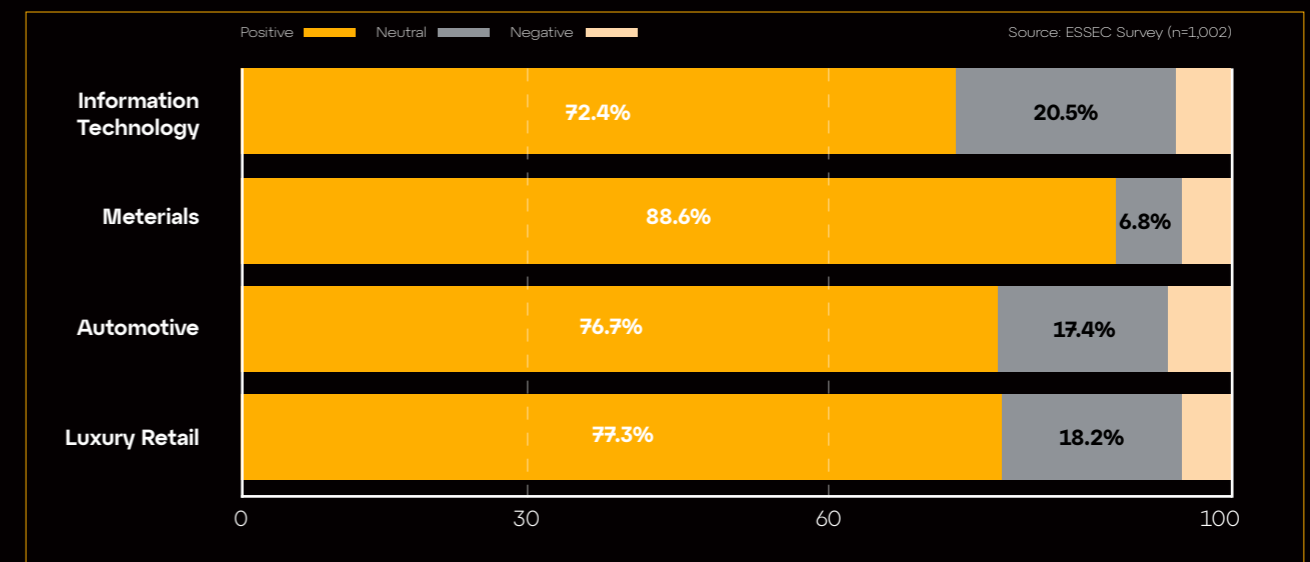- Customer behavior analysis
- Predictive maintenance

DIGITAL DISRUPTION CHAIR'S COMMENT:

Despite flashier technologies grabbing headlines, Descriptive AI remains the essential foundation powering digital transformation across industries. Its maturity and longevity have yielded unprecedented volumes of research across neural networks and deep learning systems. Though less visible to consumers, this AI backbone enables applications, automation, and powers Generative AI itself.

Its steady growth trajectory signals that all industries must reconsider their operational models and workforce skills as this foundational technology continues to evolve.

HUMAN PERSPECTIVE

Sentiment Toward Descriptive AI in Top Disruption-Anticipating Sectors

Source: ESSEC Survey (n=1,002)

Sector	Positive	Negative
Information Technology	72.4%	20.5%
Meterials	88.6%	6.8%
Automotive	76.7%	17.4%
Luxury Retail	77.3%	18.2%

« Many companies are so focused on GenAI that they might overlook the real value descriptive AI can unlock. Ideally, GenAI will help bridge the user interface gap, making it easier for organizations to integrate Descriptive AI effectively. »

Prof. Maciej Workiewicz
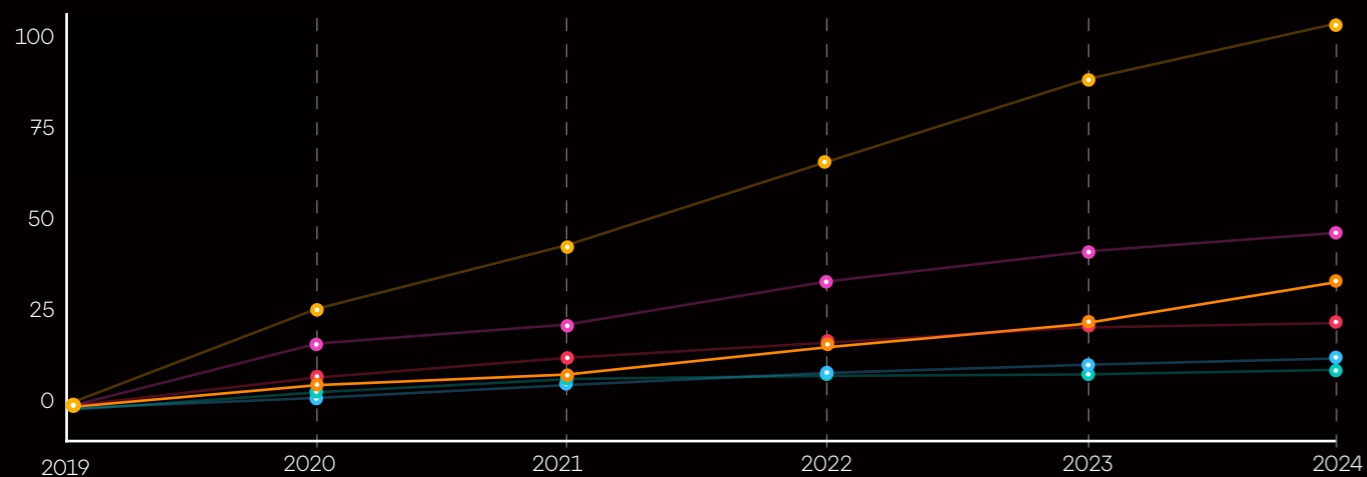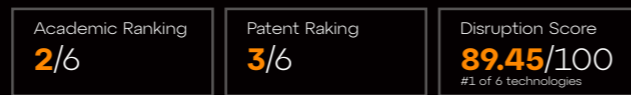Associate Professor of Management at ESSEC Business School

GENERATIVE AI

WHAT IS GENERATIVE AI?

Generative AI refers to artificial intelligence systems capable of creating new content, from text and images to code and synthetic data. This technology leverages large language models and neural networks to generate novel outputs based on patterns learned from training data.

ACADEMIC & INDUSTRY DATA

Academic Ranking	Patent Raking	Disruption Score
2/6	**3**/6	**89.45**/100
		#1 of 6 technologies

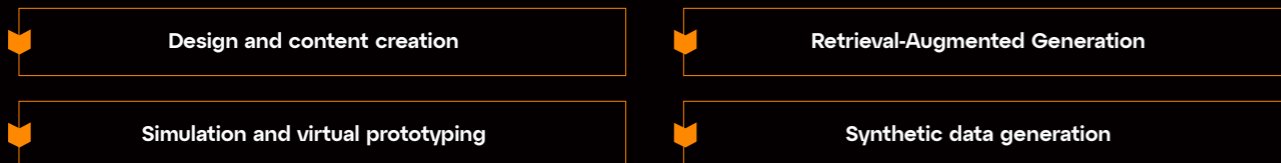### Cumulative Technology Publications

Legend:
- AI (Descriptive AI)
- Energy storage
- AI (Generative AI)
- Quantum Computing
- Robotic & automation
- Decentralisation & blockchain

Source: L'Atelier BNPP, Patents and Academic Publications. Disruptiveness score is based on the citations/publication ratio.

Industries Most Impacted

#1	#2	#3
Information Technology	**Communication Services**	**Luxury/Retail**

Cross-Industry Applications

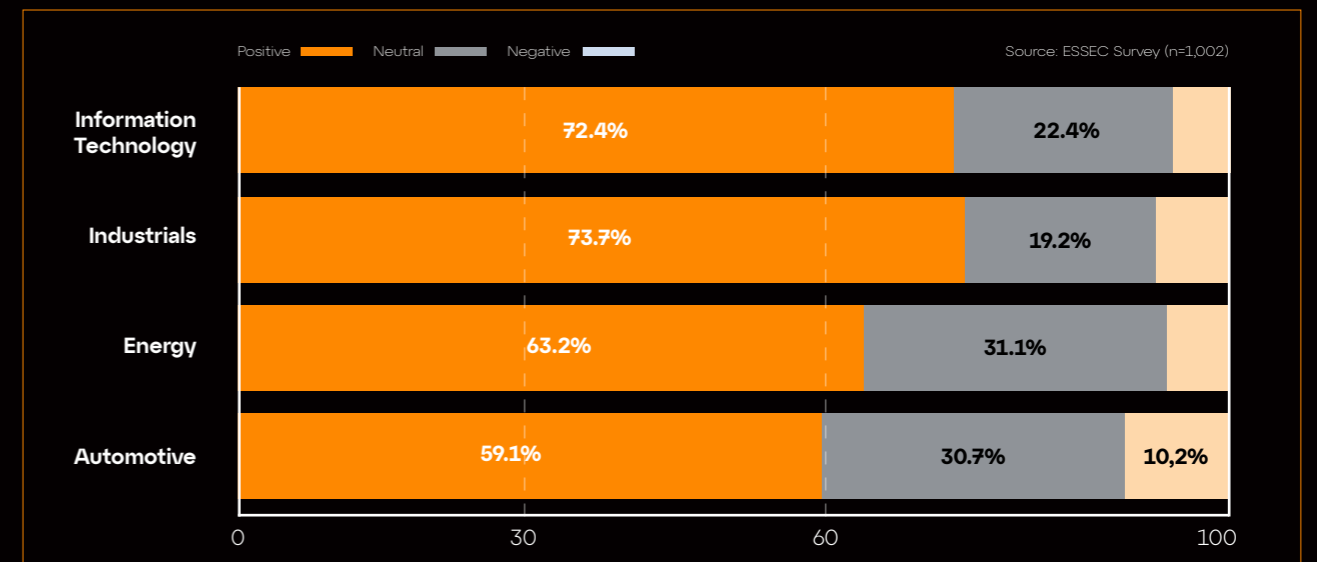| Design and content creation	Retrieval-Augmented Generation
Simulation and virtual prototyping	**Synthetic data generation**

DIGITAL DISRUPTION CHAIR'S COMMENT:

Generative AI has exploded with unprecedented momentum, surpassing even the blockchain fever of 2021 in intensity and adoption rate.

Its disruption score stems not from sheer volume but from extraordinary trend acceleration and citation impact. Its natural human-machine interface and widespread accessibility are driving mainstream adoption by employees across sectors. We're witnessing Generative AI use cases increasingly converging with Descriptive AI and automation capabilities, pointing toward the emerging horizon of Agentic AI systems.

HUMAN PERSPECTIVE

Sentiment Toward Generative AI in Top Disruption-Anticipating Sectors

Source: ESSEC Survey (n=1,002)

Legend: Positive, Neutral, Negative

Sector	Positive	Neutral	Negative
Information Technology	72.4%	22.4%	
Industrials	73.7%	19.2%	
Energy	63.2%	31.1%	
Automotive	59.1%	30.7%	10,2%

« An interesting shift due to the wide availability of GenAI in our daily lives is that it changes the implementation from top-down to bottom-up. As we are using GenAI beyond our work contexts, we bring it into our organizations. This triggers new managerial questions around which types of use are acceptable and which are not, which will also determine how GenAI manifests itself inside organizations. »

Prof. Lauren Waardenburg
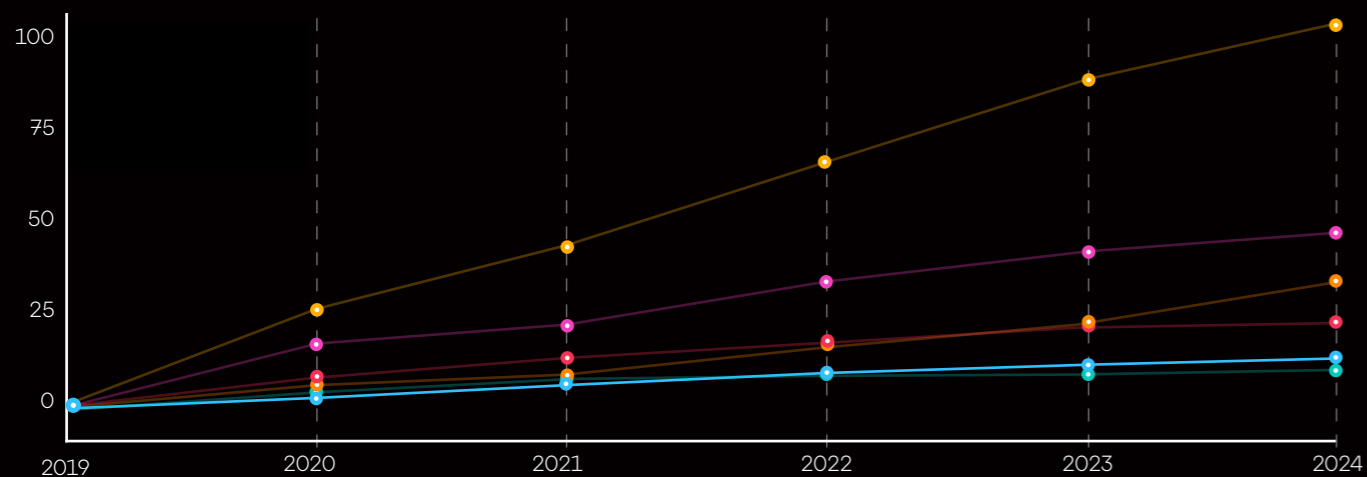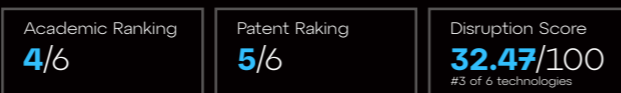Assistant Professor, Information Systems at ESSEC Business School

QUANTUM COMPUTING

WHAT IS QUANTUM COMPUTING?

Quantum Computing harnesses quantum mechanical phenomena like superposition and entanglement to perform computations. This technology enables exponentially faster calculations for specific problems, particularly in cryptography, material science, and complex system optimization.

ACADEMIC & INDUSTRY DATA

Academic Ranking	Patent Raking	Disruption Score
4/6	**5**/6	**32.47**/100 #3 of 6 technologies

Cumulative Technology Publications

Legend:
- AI (Descriptive AI)
- Energy storage
- AI (Generative AI)
- Quantum Computing
- Robotic & automation
- Decentralisation & blockchain

Source: L'Atelier BNPP, Patents and Academic Publications. Disruptiveness score is based on the citations/publication ratio.
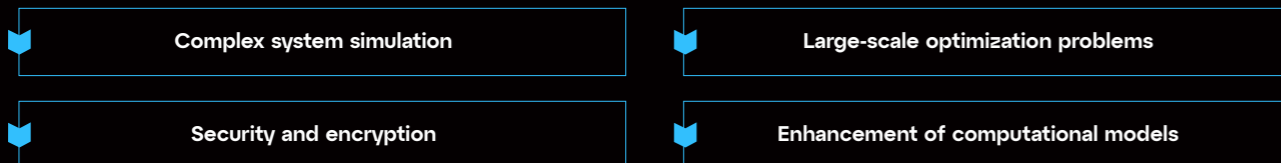
Industries Most Impacted

#1
Financials Services

#2
Healthcare & Materials

#3
Energy

Cross-Industry Applications

- Complex system simulation
- Large-scale optimization problems
- Security and encryption
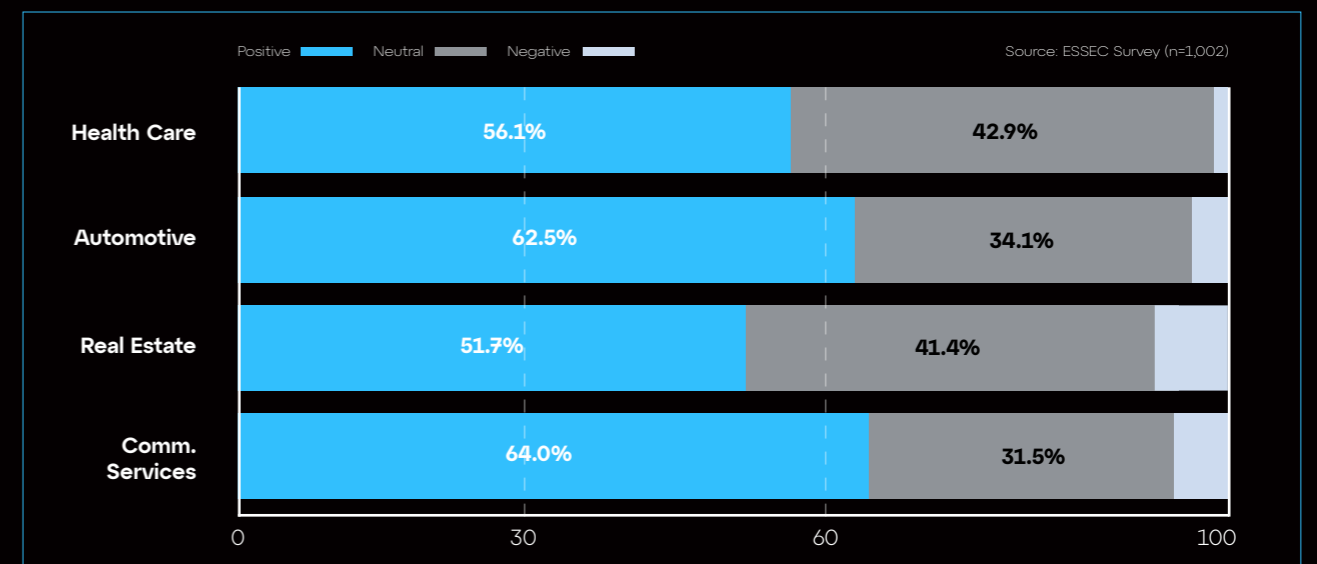- Enhancement of computational models

DIGITAL DISRUPTION CHAIR'S COMMENT:

Quantum Computing carries significant momentum yet remains specialized and ranks lower than its perceived buzz might suggest.

Its potential to undermine current encryption standards creates urgency around the question: «Do today's secrets need protection against tomorrow's quantum capabilities?» While key use cases are identified, they remain largely theoretical. The professional community's neutral stance suggests a «wait and see» approach, with uncertainty about who will ultimately access this technology versus the ubiquity of AI.

HUMAN PERSPECTIVE

Sentiment Toward Quantum Computing in Top Disruption-Anticipating Sectors

Positive / Neutral / Negative   Source: ESSEC Survey (n=1,002)

Sector	Positive	Negative
Health Care	56.1%	42.9%
Automotive	62.5%	34.1%
Real Estate	51.7%	41.4%
Comm. Services	64.0%	31.5%

« So far, the technology has been plagued by the difficulty of reducing errors, hampering its deployment in conventional deterministic computing. Yet, its potential for massive parallel computation remains outstanding. This combination fits remarkably well with the requirements of modern AI, where parallelism coexists with errors managed through statistical processes. »

Prof. Fabrice Cavaretta
Associate Professor of Management, ESSEC Business School
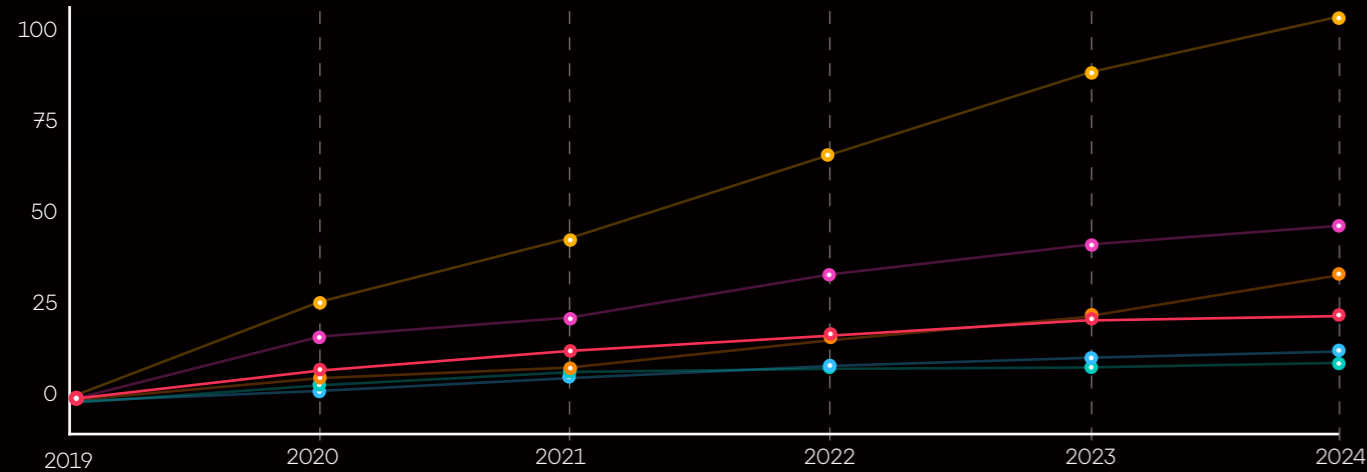
BLOCKCHAIN & DECENTRALIZED SYSTEMS

◗ WHAT IS BLOCKCHAIN AND DECENTRALIZED SYSTEMS?

Blockchain technology enables secure, decentralized record-keeping and transactions without requiring central authority. It creates transparent, immutable records across distributed networks, supporting applications from cryptocurrency to supply chain tracking.

◗ ACADEMIC & INDUSTRY DATA

Academic Ranking	Patent Raking	Disruption Score
5/6	**4**/6	**12.04**/100
		#6 of 6 technologies

Cumulative Technology Publications

Legend:
- AI (Descriptive AI)
- Energy storage
- AI (Generative AI)
- Quantum Computing
- Robotic & automation
- Decentralisation & blockchain

Source: L'Atelier BNPP, Patents and Academic Publications. Disruptiveness score is based on the citations/publication ratio.

Industries Most Impacted

#1	**#2**	**#3**
Financials Services	**Healthcare**	**Information Technology**

Cross-Industry Applications

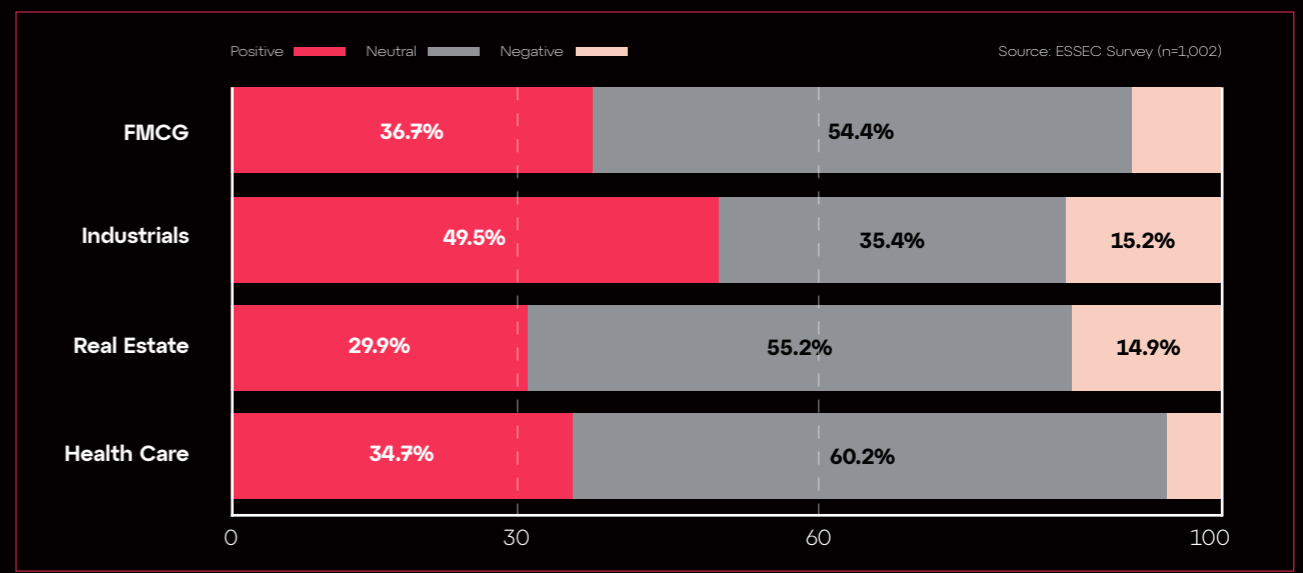| ◗ Asset tracking and verification	◗ Sourcing, Authenticity and Reparability Informations
◗ Smart contract automation	◗ Product Passports

◗ DIGITAL DISRUPTION CHAIR'S COMMENT:

Blockchain technology faces reputational challenges stemming from cryptocurrency market volatility and the NFT boom-bust cycle.

Despite high patent activity, widespread adoption remains incremental, as seen in Digital Product Passport regulations. Years of high expectations have yielded disappointing real-world implementation results. However, blockchain still shows potential to become an «invisible» technological layer underpinning everyday transactions, operating effectively in specialized niches rather than transforming entire industries.

◗ HUMAN PERSPECTIVE

Sentiment Toward Blockchain and Decentralized Systems in Top Disruption-Anticipating Sectors

Source: ESSEC Survey (n=1,002)

Sector	Positive	Neutral	Negative
FMCG	36.7%	54.4%	
Industrials	49.5%	35.4%	15.2%
Real Estate	29.9%	55.2%	14.9%
Health Care	34.7%	60.2%	

« Blockchain adoption is at a turning point. We see increasingly that financial applications dominate the market while other applications fall behind. With many users and investors prioritizing scalability over decentralization, centralization remains a significant systemic risk for blockchain applications. »

Prof. Christoph Mueller-Bloch
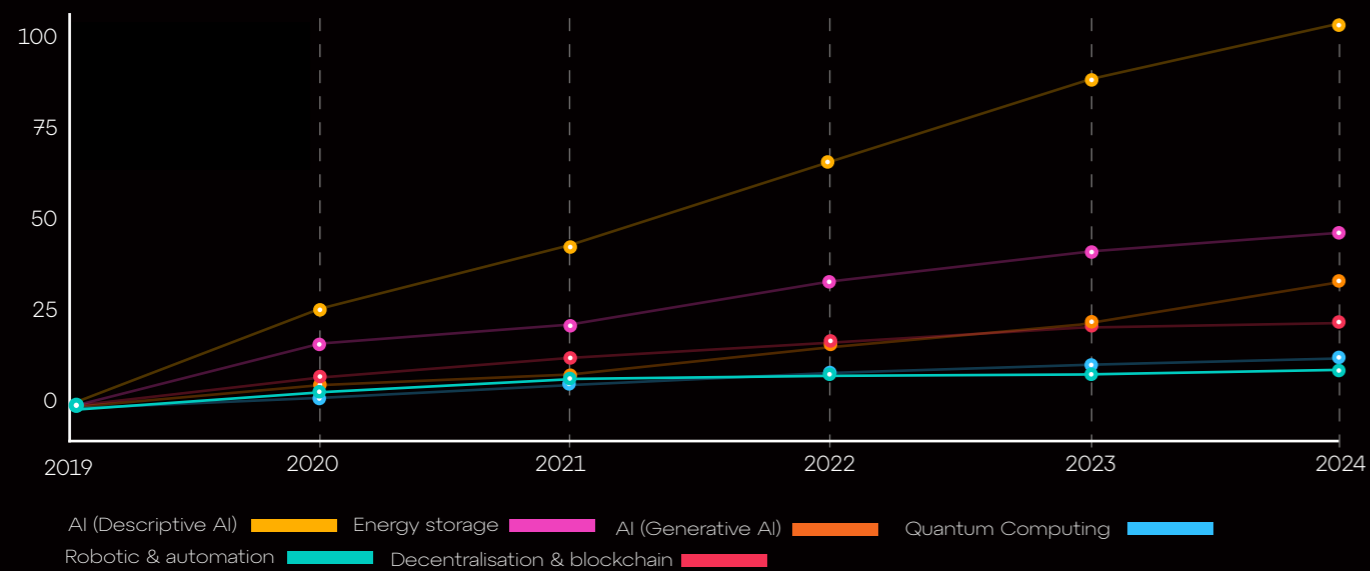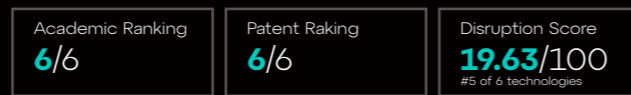Assistant Professor, Information Systems at ESSEC Business School

ROBOTICS
& AUTOMATION

◤ WHAT IS ROBOTICS AND AUTOMATION?

Robotics and Automation encompasses the design and deployment of physical and virtual systems that can perform tasks automatically with minimal human intervention. This includes industrial robots, autonomous systems, and process automation technologies.

◤ ACADEMIC & INDUSTRY DATA

Academic Ranking	Patent Raking	Disruption Score
6/6	**6**/6	**19.63**/100
		#5 of 6 technologies

Cumulative Technology Publications

Legend:
- AI (Descriptive AI)
- Energy storage
- AI (Generative AI)
- Quantum Computing
- Robotic & automation
- Decentralisation & blockchain

Source: L'Atelier BNPP, Patents and Academic Publications. Disruptiveness score is based on the citations/publication ratio.
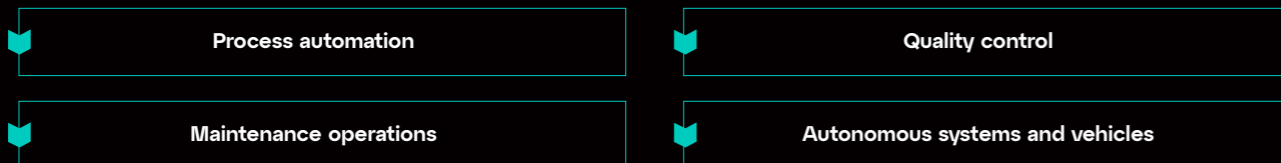
Industries Most Impacted

#1	#2	#3
Industrials	**Healthcare**	**Materials**

Cross-Industry Applications

Process automation	Quality control
Maintenance operations	**Autonomous systems and vehicles**

◤ DIGITAL DISRUPTION CHAIR'S COMMENT:

While Robotics represents industry modernization, AI simulations obliterate historical barriers to entry. Digital economies now rely on robotics as AI's essential hardware complement. Advanced simulations from graphics pioneers cut prototyping costs, democratizing robotics.

This AI-robotics convergence lowers barriers in physical industries, turning costly tests into zero-cost simulations and enabling new innovators. Meanwhile, professionals in traditional sectors see Robotics and Automation as disruptive, expecting AI-driven efficiency gains and the streamlining of tedious tasks.

◤ HUMAN PERSPECTIVE

Sentiment Toward Robotics and Automation in Top Disruption-Anticipating Sectors

Source: ESSEC Survey (n=1,002)

Sector	Positive	Negative
Comm. Services	71.9%	25.8%
FMCG	78.9%	20.0%
Energy	75.9%	24.1%
Financials	77.8%	20.0%

« The next generation of robotics and automation is already underway, driven by AI agents. These intelligent systems are transforming task execution, information processing, and decision-making across industries. Their deployment is rapidly expanding, with the potential to impact the entire spectrum of sectors. AI agents operate with a high degree of specialization and are designed for continuous learning. They are defined by key attributes such as autonomy, adaptability, proactiveness, and rapid responsiveness.. »

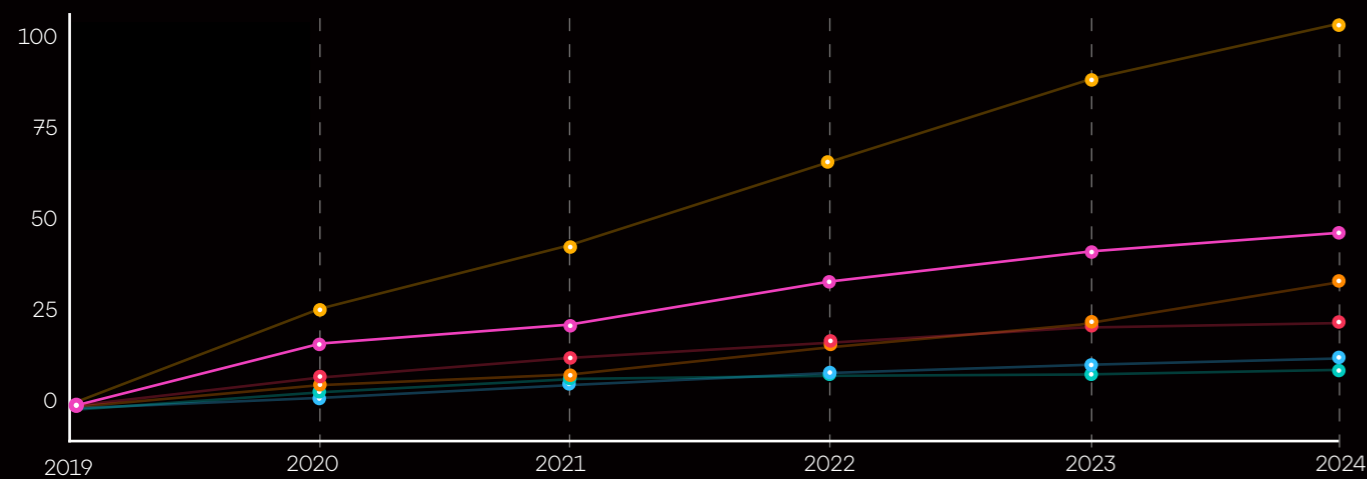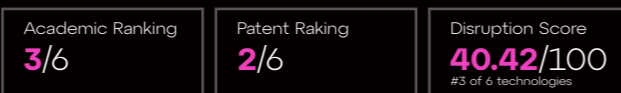**Cesar Moukarzel**
Associate Partner, Sia

RENEWABLE ENERGY & ENERGY STORAGE

WHAT IS RENEWABLE ENERGY AND ENERGY STORAGE?

Renewable Energy and Storage technologies encompass systems for generating, storing, and distributing sustainable energy. This includes solar, wind, and other renewable sources, along with advanced energy storage solutions like batteries and grid management systems.

ACADEMIC & INDUSTRY DATA

Cumulative Technology Publications

Academic Ranking	Patent Raking	Disruption Score
3/6	**2**/6	**40.42**/100 #3 of 6 technologies

AI (Descriptive AI) — Energy storage — AI (Generative AI) — Quantum Computing — Robotic & automation — Decentralisation & blockchain

Source: L'Atelier BNPP, Patents and Academic Publications. Disruptiveness score is based on the citations/publication ratio.

Industries Most Impacted
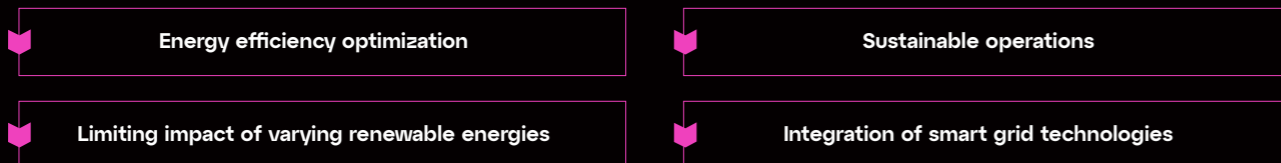
#1	**#2**	**#3**
Energy	**Automotive/Transport**	**Materials & Industrials**

Cross-Industry Applications

| Energy efficiency optimization	Sustainable operations
Limiting impact of varying renewable energies	Integration of smart grid technologies

DIGITAL DISRUPTION CHAIR'S COMMENT:

While Robotics modernizes traditional industries, AI simulations are obliterating entry barriers. Today's digital economies rely on robotics as AI's essential hardware counterpart. Advanced simulations cut prototyping costs, democratizing robotics.

This AI-robotics convergence lowers barriers, transforming costly tests into zero-cost simulations, enabling unprecedented innovation. Meanwhile, professionals in traditional sectors view Robotics and Automation as disruptive, anticipating efficiency gains from AI-driven automation and streamlined tasks.

HUMAN PERSPECTIVE

Sentiment Toward Renewable Energy and Storage in Top Disruption-Anticipating Sectors
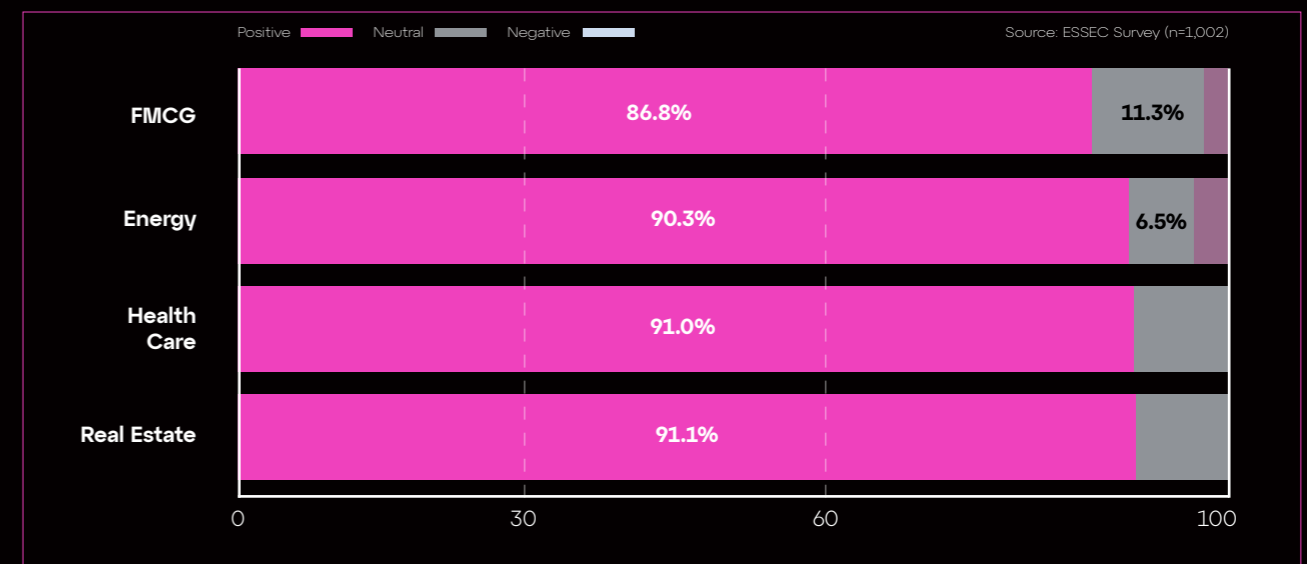
« AI's uncertain energy demands plus electric vehicles adding two megawatt-hours per household create significant grid challenges. For countries where gigawatts of industrial flexibility are now gone, there is a choice to be made: California-style battery deployment or smarter demand management. »

Pierre Leplatois
Partner Energy & Utilities, Sia

Industries overview

INDUSTRIES OVERVIEW

This section highlights key technological hotspots identified through data analysis, alongside the most positively and negatively perceived technologies based on insights from 1,000 professionals across 17 countries.

Selected verbatim responses from industry professionals provide firsthand perspectives on the impact, potential, and challenges of these technologies in their respective sectors.

ENERGY

Companies involved in the exploration, production, or refining of energy products.

⚓ MATRIX HOTSPOTS

Renewable Energy	Generative AI	Descriptive AI

⚓ TECHNOLOGIES SEEN MOST POSITIVELY BY THIS SECTOR

Renewable Energy
Positive

« A must do to enable sustainable development of activities in the future. »
27 years of experience in the Energy sector

« Offers great possibilities; innovations are particularly needed in energy storage. »
15 years of experience in the Energy sector

Robotics
Positive

« That's fine, as long as the aim is to lighten tasks, not to replace 100% of humans. »
20 years of experience in the Energy sector

« Mature and useful, but not easy to adopt. »
8 years of experience in the Energy sector

⚓ TECHNOLOGIES SEEN MOST NEGATIVELY BY THIS SECTOR

Blockchain
Negative

« Little visibility on concrete. »
8 years of experience in the Energy sector

« So many opportunities but level of complexity impeding progress. »
35 years of experience in the Energy sector

Generative AI
Negative

« This technology is the future. Those who don't know how to use it are doomed. »
10 years of experience in the Energy sector

« A powerful technology whose long-term negative effects are little known or underestimated. »
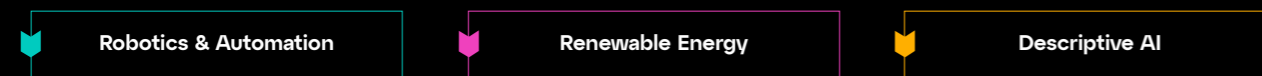15 years of experience in the Energy sector

MATERIALS

Businesses in chemicals, construction materials, metals, paper, and forestry products.

INDUSTRIALS

Aerospace, defense, machinery, construction, fabrication, and manufacturing.

⚓ MATRIX HOTSPOTS

| Robotics & Automation | Renewable Energy | Descriptive AI |

⚓ MATRIX HOTSPOTS

| Robotics & Automation | Blockchain | Renewable Energy |

⚓ TECHNOLOGIES SEEN MOST POSITIVELY BY THIS SECTOR

Descriptive AI — Positive

« This technology is a necessary tool to assist employees in faster and more optimized product production. »
21 years of experience in the Materials sector

« Concentrates essential information and helps us learn faster. »
2 years of experience in the Materials sector

Renewable Energy — Positive

« Our lifeline. As such it will not be much of a game changer, though. »
26 years of experience in the Materials sector

« The future of humanity depends on their success. »
13 years experience in the Materials sector

⚓ TECHNOLOGIES SEEN MOST POSITIVELY BY THIS SECTOR

Robotics — Positive

« Clearly a big opportunity considering HR and labor challenges these post-COVID years. »
12 years of experience in the Industrials sector

« Hugely impactful already, but still only scratching the surface of what may be possible. »
30 years of experience in the Industrials sector

Descriptive AI — Positive

« Industrially applied but costly. »
15 years of experience in the Industrials sector

« Nothing will stop it - just use it ! »
30 years of experience in the Industrials sector

⚓ TECHNOLOGIES SEEN MOST NEGATIVELY BY THIS SECTOR

Blockchain — Negative

« To clunky, but once the wrinkles are ironed out will be game changing. »
25 years of experience in the Materials sector

« Severely over hyped. A hammer still looking for a nail. »
35 years of experience in the Materials sector

Generative AI — Negative 6.8%

« Very useful for generating documentation. »
12 years of experience in the Materials sector

« Over-hyped but to some extend justifiably we'll see where the diminishing returns are very soon. »
20 years of experience in the Materials sector

⚓ TECHNOLOGIES SEEN MOST NEGATIVELY BY THIS SECTOR

Blockchain — Negative

« This technology is struggling to be democratized and is the most obscure to understand. »
15 years of experience in the Industrials sector

« Limited but emerging impact, particularly on supply chain traceability and transparency. »
10 years of experience in the Industrials sector

Generative AI — Negative

« Considering our tendencies to use General AI without proper due diligence, Generative AI makes me nervous! »
9 years of experience in the Industrials sector

« Needs training and governance around tools to avoid disillusionment and risk. »
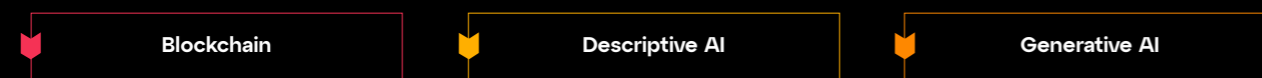20 years of experience in the Industrials sector

FMCG

Food, beverages, tobacco, household products, mass-market retail, and personal care products.

LUXURY AND SPECIALTY RETAIL

High-end retail, luxury automotive brands, and upscale leisure industries.

⚑ MATRIX HOTSPOTS

Blockchain	Descriptive AI	Generative AI

⚑ TECHNOLOGIES SEEN MOST POSITIVELY BY THIS SECTOR

Renewable Energy   Positive

« Carbon reduction should be a priority for every industries. »
20 years of experience in the FMCG sector

« Highly important but politically charged. »
15 years experience in the FMCG sector

Robotics   Positive

« Opens up the field of possibilities for tasks/missions that are hard on the human body. »
28 years of experience in the FMCG sector

« Future for our warehouses. »
2 years of experience in the FMCG sector

⚑ TECHNOLOGIES SEEN MOST NEGATIVELY BY THIS SECTOR

Blockchain   Negative

« Can be complex and time-consuming - Not adaptable to all product types. »
6 years of experience in the FMCG sector

« Guaranteed traceability, very useful if applied to agricultural products. »
5 years of experience in the FMCG sector

Generative AI   Negative

« Behavioral Change, New Markets, Enhance Productivity at Scale. »
30 years of experience in the FMCG sector

« Help us better at communication and reduce repetitive mundane work. »
17 years of experience in the FMCG sector

⚑ MATRIX HOTSPOTS

Generative AI	Blockchain	Descriptive AI

⚑ TECHNOLOGIES SEEN MOST POSITIVELY BY THIS SECTOR

Descriptive AI   Positive

« Accelerator technologies that can greatly enhance existing organizational capabilities. »
15 years of experience in the Luxury and Specialty Retail sector

« A road to automation. »
25 years of experience in the Luxury and Specialty Retail sector

Generative AI   Positive

« An aid to creation, but still no substitute for human creative talent. »
20 years of experience in the Luxury and Specialty Retail sector

« The rise of ia solutions based on natural language is driving operational and service gains in all business sectors! »
8 years of experience in the Luxury and Specialty Retail sector

⚑ TECHNOLOGIES SEEN MOST NEGATIVELY BY THIS SECTOR

Generative AI   Negative

« The hype and associated bubble will show that this sustainable revolution is not yet mature, and the associated issues have barely been addressed. »

« Environmental disaster (a subject never mentioned by its trainers and lecturers), and therefore unsustainable. Dangerous because unregulated, and a source of stress and job losses. A clear historical misinterpretation. »

Blockchain   Negative

« Maturity has narrowed the field of applications, which is good news. The example of the bubble associated with these technologies is interesting. »

« Interesting in principle, but very few real applications implemented. »
25 years of experience in the Luxury and Specialty Retail sector

HEALTH CARE

Health care equipment and services, pharmaceuticals, and biotechnology companies.

FINANCIALS

Banks, investment funds, insurance companies, and real estate firms.

❦ MATRIX HOTSPOTS

Descriptive AI	Robotics	Generative AI

❦ TECHNOLOGIES SEEN MOST POSITIVELY BY THIS SECTOR

Renewable Energy
Positive

« At a macro level, a healthier environment will help behavioral health by allowing people to spend more time outside. »
15 years of experience in the Health Care sector

« Renewable energy sources will perhaps be less impactful in heatlhcare, but will help safeguard our electrical/power supply. »
1 year of experience in the Health Care sector

Robotics
Positive

« Improve patient care, hospital and clinic operations. »
30 years of experience in the Health Care sector

« Predictive maintenance and cost reduction. »
20 years of experience in the Health Care

❦ TECHNOLOGIES SEEN MOST NEGATIVELY BY THIS SECTOR

Blockchain
Negative

« Industrial applications finally seem to be rising. »
10 years of experience in the Health Care sector

« Blockchain will allow for encrypted patient data and secure data exchanges, it also will remove paperwork, leading to increased system effectiveness. »

Descriptive AI
Negative

« AI has already changed how health systems operate and work, and this is only the beginning of widespread changes it will usher in. »

« Good step but wary of bad/ biased data in training. »
20 years of experience in the Health Care sector

❦ MATRIX HOTSPOTS

Gen AI and Descriptive AI	Blockchain	Quantum Computing

❦ TECHNOLOGIES SEEN MOST POSITIVELY BY THIS SECTOR

Descriptive AI
Positive

« Gaining insights that may have been otherwise dismissed as mundane statistics. »
39 years of experience in the Financials sector

« This is were all the focus should go, it is a game changer and needs gov policies to be adapted, social thinking has to adapt. »
18 years of experience in the Financials

Generative AI
Positive

« A time-saving task facilitator. »
13 years of experience in the Financials sector

« Gen AI has great transformative potential. »
25 years of experience in the Financials sector

❦ TECHNOLOGIES SEEN MOST NEGATIVELY BY THIS SECTOR

Blockchain
Negative

« Apart from cryptocurrencies, the possibilities opened up by this technology still suffer from a great deal of misunderstanding and low availability of talent. »

« Potential to optimize production, reduce costs. »
17 years of experience in the Financials sector

Generative AI
Negative

« Potentially useful, but there needs to be intentionality to avoid unwanted consequences; even more so than with other types of AI. »

« Lots of upside. But also may/will need regulation. could potentially be 'bad'/manipulative content/marketing such that consumers don't understand why they are doing something or wanting something. »

INFORMATION TECHNOLOGY

Software, hardware, electronics, and IT services.

COMMUNICATION SERVICES

Telecommunications, media, entertainment, and creative industries.

⬡ MATRIX HOTSPOTS

| Renewable Energy | Gen AI and Descriptive AI | Quantum Computing |

⬡ TECHNOLOGIES SEEN MOST POSITIVELY BY THIS SECTOR

Renewable Energy
Positive

« Disruptive potential is large here, changing mind-set to low power devices untethered from any grid. »
35 years of experience in the IT sector

« Living in the US, nobody really cares here. »
20 years of experience in the IT sector

Descriptive AI
Positive

« Convenient but needs to be mastered (both technically and ecologically) »
9 years of experience in the IT sector

« Will spread to many fields through agents. »
30 years of experience in the IT sector

⬡ TECHNOLOGIES SEEN MOST NEGATIVELY BY THIS SECTOR

Blockchain
Negative

« Few really useful, value-creating use cases. »
7 years of experience in the IT sector

« This technology will enable traceability and security of operations. »
18 years of experience in the IT sector

Generative AI
Negative

« It boosts the use of time and resources. »
20 years of experience in the IT sector

« Promising but still far from allowing something that a user can rely on. »
19 years of experience in the IT sector

⬡ MATRIX HOTSPOTS

| Quantum Computing | Blockchain | Gen AI and Descriptive AI |

⬡ TECHNOLOGIES SEEN MOST POSITIVELY BY THIS SECTOR

Renewable Energy
Positive

« Is not of major concern to how people do our work, except that we need to figure this out to fuel our insatiable appetite for computing. »

« An absolute priority for all other techs previously mentioned. »
7 years of experience in the Communication Services sector

Generative AI
Positive

« Is going to redefine human creativity, expression, art and what it means to «create» and what is «ownable.» »

« It has the potential to significantly alter our relationship with technology and information. »
30 years of experience in the Communication Services sector

⬡ TECHNOLOGIES SEEN MOST NEGATIVELY BY THIS SECTOR

Blockchain
Negative

« Needs a lot of brand love, but also could be huge in helping us bridge the concepts of ownership and provenance in the near future because of generative AI. »

« Niche industries without clear alignment to general business day to day needs. »
21 years of experience in the Communication Services sector

Generative AI
Negative

« Incredible potential to streamline monotonous tasks, but application is currently overblown. »
10 years of experience in the Communication Services sector

« Largely misunderstood and minimal understanding of its longitudinal impact on my sector. »
16 years of expertise in the Communication Services sector

REAL ESTATE

Companies that own commercial, industrial, and residential real estate.

AUTOMOTIVE AND TRANSPORT

Mainstream automotive companies and transportation-related industries.

❧ MATRIX HOTSPOTS

| Gen AI and Descriptive AI | Blockchain | Renewable Energy |

❧ MATRIX HOTSPOTS

| Descriptive AI | Generative AI | Renewable Energy |

❧ TECHNOLOGIES SEEN MOST POSITIVELY BY THIS SECTOR

Renewable Energy
Positive

« Hugely important in addressing climate change, also presents opportunities to reengineer the entirety of the power distribution system. »

« Moving away from fossil fuels is critical for human survival so whatever we can do in this space is a net positive. »
4 years of experience in the Real Estate

Descriptive AI
Positive

« Been around for a long time, and will still be fundamental and important in the next 5 years. »
25 years of experience in the Real Estate sector

« Important foundational technology that could enable a range of valuable end-user use cases. »
2 years of experience in the Real Estate

❧ TECHNOLOGIES SEEN MOST POSITIVELY BY THIS SECTOR

Robotics
Positive

« Fewer people operating more interconnected operating systems. »
15 years of experience in the Automotive and Transport sector

« This technology is real, it's coming of age, and it's going to free humans from many thankless tasks. »
29 years of experience in the Automotive and Transport sector

Renewable Energy
Positive

« I am deeply committed to exploring these technologies as critical solutions for a sustainable future, with a particular interest in their integration into existing infrastructures. »

« Natural progression from carbon-intensive energy. Opportunity to innovate. »
2 years of experience in the Automotive and Transport sector

❧ TECHNOLOGIES SEEN MOST NEGATIVELY BY THIS SECTOR

Blockchain
Negative

« This technology is tomorrow's open system. »
12 years of experience in the Real Estate sector

« Data security is a key issue in our business. »
20 years of experience in the Real Estate sector
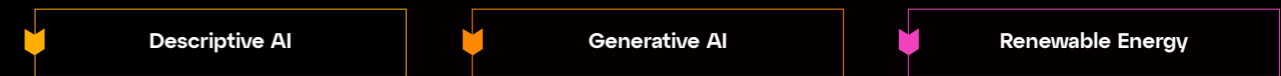
Quantum Computing
Negative

« This could be fabulous or awful as the effects of technology depend on how its used and how its powered. »
4 years of experience in the Real Estate sector

« A mysterious contender that possesses the unique ability to influence and transform what lies ahead in technology. »
44 years of experience in the Real Estate sector

❧ TECHNOLOGIES SEEN MOST NEGATIVELY BY THIS SECTOR

Blockchain
Negative

« Given a bad name by crypto currency the potential in supply chains should be exploited much more than it is currently. »

« Overhyped. »
40 years of experience in the Automotive and Transport sector

Generative AI
Negative

« As someone who works on these models, it's going to be a nightmare for the future. »
5 years of experience in the Automotive and Transport sector

« Too much hype today, still major issues. »
15 years of experience in the Automotive and Transport sector

Matrix Zoom

QUANTIC MATTERS FOR MATERIALS

Why we made Quantum our 2025 Zoom

Ranking fourth in our Digital Disruption Matrix with a score of 32.47/100, quantum computing represents what we call a «frontier technology» - one that's still emerging yet holds tremendous transformative potential. Our matrix revealed what we've dubbed the «waiting for quantum» effect, with 40% of professionals across all sectors expressing neutral sentiment toward this technology, reflecting widespread uncertainty about when and how to prepare for its impact.

This ambiguity presents a fascinating challenge for business strategists for whom making accurate predictions and business decisions based solely on existing data is particularly difficult for a field this nascent. Patents and academic publications predominantly focus on cryptographic applications, but is this where the true business value lies?

To gain a forward-looking perspective that goes beyond what the data currently shows, we turned to one of the most informed and involved entrepreneurs in the quantum space. Pierre Desjardins, CEO and co-founder of C12, offers valuable insights on what our matrix has revealed and how businesses should approach this transformative yet still-developing technology.

Quantic matters for materials, a discussion with Pierre Desjardins, CEO of C12 Quantum Electronics.

ESSEC Digital Disruption Chair: Quantum computing ranks just behind AI and renewable energy in our disruption matrix. How do you interpret quantum computing's high ranking, and could you tell us about C12's approach?

Pierre Desjardins: It's very exciting to see quantum computing ranked at this level despite its early maturity stage and the fact that we're still some years away from real-world applications. At C12, we're developing quantum computers with a focus on large-scale, error-corrected quantum computing – the kind that will have a clear differentiation from classical computers, providing genuine quantum advantage.
We have a unique approach based on research at the École Normale Supérieure of Physics in Paris.: carbon nano-tubes. We're the only company in the world building quantum computers with this approach. We've completely redesigned how quantum computers are built, eliminating roadblocks to scaling the technology. Currently, the industry has many interesting working prototypes, but nothing that works at scale. The true potential of this technology emerges when it works at scale.

ESSEC Digital Disruption Chair: When looking at quantum computing, we've observed that most existing patents and publications focus primarily on cryptographic applications. We'd like to go beyond what we see right now and get your forward-looking perspective?

Pierre Desjardins: It's interesting because cryptography was the first theoretical quantum algorithm ever designed, with proven exponential speed advantages over classical algorithms. However, paradoxically, cryptographic applications will probably be the last ones actually implemented on real quantum computers. Many other applications will come first – for the chemical industry, the finance industry, and manufacturing. For instance, we're already collaborating with a global gas provider to explore how our quantum computing solution can simulate chemical reactions that cannot be simulated on classical computers, even with access to large supercomputers. We believe the chemical industry will likely be the first to be significantly impacted by this technological advancement.

ESSEC Digital Disruption Chair: That's really interesting. Why do you think people don't see this coming? How would you explain the disconnect?

Pierre Desjardins: Quantum computing is still not well understood as a technology. When we talk to customers, they often acknowledge that quantum computing will impact their business, but when asked if they've identified key applications related to their business, most haven't actually thought that through. We're still at a stage where we're identifying applications where quantum computing will be useful.

Another reason is timing – while the industry recognizes the eventual reality of quantum computing, there's significant disagreement about when we'll have useful, utility-scale quantum computers. If you ask different hardware players, each will give you a different date. This creates the «wait and see» attitude mentioned in your results.

ESSEC Digital Disruption Chair: How would you recommend businesses approach this? Should they take action now, and if so, what kind?

Pierre Desjardins: In some sectors like the ones you identified as hotspots, companies should definitely be looking more closely at this technology to understand how it could impact their business. Our current customers are building strong competitive advantages by being early adopters. This is the kind of technology that takes time to adapt to, to understand where it can be applied, and to build the right workflows. For chemical companies, manufacturing businesses, and anyone involved in engineering design simulation, it's better to be an early adopter than a late one.
My second recommendation is to explore different modalities for building quantum computers. Since there are multiple approaches, customers sometimes hesitate, wondering if they should wait for evidence that one technology is superior to another. But that clarity will come at a late stage, when quantum computers are already useful. My best advice for customers would be to develop a portfolio of technologies – at least two, maybe three different approaches to test.

ESSEC Digital Disruption Chair: Do you expect some modalities to be more performant for specific use cases?

Pierre Desjardins: The main difference between modalities is whether you're looking for a third-generation computer – the equivalent of vacuum tubes from the 1950s – which will be quite expensive but can work for some use cases, or if you want to leapfrog directly to the next generation of quantum computers where you'll have a clear quantum advantage.

ESSEC Digital Disruption Chair: How do you see the trend evolving, in terms of volume of publications and adoption: will quantum computing match the levels we're seeing renewable energies at? Will it catch-up with the growth that Gen-AI is showing?

Pierre Desjardins: My best prediction is that we'll ride the wave of AI as much as possible. AI can be an extremely good driver for quantum computing adoption. What I also see is that some people tend to frame AI and quantum computing as competitors, but in reality, AI, quantum computing, and high-performance computing will work together to solve problems we couldn't even dream of solving before. For example, in chemical simulation, these technologies will be complementary rather than competitive.

ESSEC Digital Disruption Chair: That's very interesting. I think the matrix or heat map zones that will light up for quantum computing will also light up for AI, so that's something we'll look at in next year's edition. Thank you very much, Pierre.

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Lead.
Change.

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