

PREDICTIVE AI

MARKET APPLICATIONS

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PREDICTIVE AI

Introduction

In the current discourse on artificial intelligence, much of the spotlight is focused on generative AI and its remarkable ability to create what is new. Yet, working quietly behind the scenes is its more established counterpart: **predictive AI**. This foundational technology delivers its profound value not by generating novel content, but by accurately forecasting **what is next**. Its core function is to transform data from a passive, historical record into an active, strategic asset that illuminates the path forward. This report provides a market-focused analysis of predictive AI, moving beyond the technical complexities to explore its real-world applications and strategic implications for businesses in Luxembourg and beyond.

The fundamental shift enabled by predictive AI is the transition from **reactive problem-solving to proactive, data-driven decision-making**. It represents a move away from managing crises as they occur towards anticipating and mitigating them before they arise. This means shifting from fixing a machine after it breaks down to scheduling maintenance based on a forecast of its failure; from reacting to customer complaints to predicting and preventing churn with targeted interventions; and from navigating market shifts as they happen to simulating their impact and adjusting strategy in advance.

In today's data-rich environment, the ability to turn foresight into a tangible operational advantage is no longer a niche capability but a baseline requirement for operational excellence and long-term competitiveness.



PREDICTIVE AI – USE CASES

Banking & finance

The financial services industry was an early adopter of predictive analytics and remains one of its most advanced users. The technology is critical for managing risk, detecting fraud and complying with regulations.

KEY APPLICATIONS

- **Algorithmic trading and market forecasting:** Predictive models analyse vast quantities of market data, news sentiment and economic indicators to forecast stock price movements, currency fluctuations and market volatility. High-frequency trading (HFT) firms use these predictions to execute millions of trades in fractions of a second, capitalising on fleeting market inefficiencies.
- **Advanced fraud detection:** Modern fraud detection systems use predictive AI to establish a baseline of normal behaviour for each customer. Every transaction is scored in real-time against this baseline. The models can detect subtle, coordinated fraud patterns that would be invisible to human analysts, such as "card testing" where fraudsters make tiny purchases to validate stolen card numbers before making large ones.
- **Complex scenario simulation for strategic planning:** Financial institutions operate in a volatile environment where economic conditions can shift rapidly. Predictive AI allows them to move beyond simple forecasting to run complex "what-if" simulations, modelling how their portfolios and balance sheets would perform under a wide range of potential

scenarios. This is a cornerstone of modern risk management and strategic planning.

WHAT IS HAPPENING WORLDWIDE?

[Mastercard](#) uses predictive AI in its Decision Intelligence solution, which analyses over 100 billion transactions annually. The system learns a cardholder's typical spending habits to approve legitimate transactions seamlessly while flagging and blocking suspicious ones, helping banks reduce false declines and fraud losses.

[Revolut](#) engineered a dynamic solution powered by advanced machine learning. At its core, the system uses a proprietary deep learning model to predict the probability of a transaction being fraudulent in real-time. For every single card payment, the model analyses hundreds of data points, including the user's spending history, device information, and merchant details, to generate an immediate risk score. This predictive score allows the system to make intelligent, nuanced decisions instead of simply following static rules. Based on the predicted risk, it can instantly approve a legitimate transaction, block a clearly fraudulent one, or issue a real-time challenge for verification. This use of predictive AI has enabled Revolut to dramatically reduce the number of "false positives" (legitimate transactions being incorrectly declined), significantly improving customer experience while simultaneously increasing the accuracy of real fraud detection.

Global banking group [BBVA](#), through its dedicated AI Factory, uses predictive AI to make its early debt recovery process more efficient. They have developed a machine learning model that predicts the probability of a customer paying back a recent debt without any intervention.

PREDICTIVE AI – USE CASES

Telecom & IT

In a sector defined by massive data flows and intense competition, predictive AI is essential for managing network infrastructure, defending against cyber threats and reducing customer churn.

KEY APPLICATIONS

- **Network performance and QoS prediction:** Telecom operators use predictive analytics to manage network traffic and ensure Quality of Service (QoS). By forecasting demand in specific cells, especially during large public events, they can dynamically allocate bandwidth to prevent congestion and dropped calls.
- **Predictive cybersecurity:** Modern cybersecurity has shifted from reaction to prediction. AI-powered platforms analyse billions of data points from network traffic and endpoints to predict emerging threats. They can identify the subtle reconnaissance activities that often precede a major ransomware attack, allowing security teams to neutralise the threat proactively.
- **Proactive customer care:** Predictive models can identify customers who are experiencing service degradation (e.g., slow internet speeds) even before they complain. A telecom provider can then proactively contact the customer and offer a solution, such as sending a technician or offering a service upgrade, turning a potential negative experience into a positive one.

WHAT IS HAPPENING WORLDWIDE?

[Cisco](#) uses predictive analytics in its networking hardware to forecast potential network issues. Its "AI Network Analytics" can identify patterns that indicate a likely device or connection failure, providing administrators with root cause analysis and recommended actions to resolve the issue before it impacts users.

WHAT IS HAPPENING IN LUXEMBOURG?

[SecurityScorecard](#) predict the likelihood of a future data breach for any given organisation worldwide. It continuously collects billions of data points, ranging from unpatched software to leaked credentials, and feeds them into a sophisticated AI model, that been trained on historical data to understand the complex correlations between specific security weaknesses and actual breach events.

[Cybrlab.ai](#) is a cybersecurity company developing pre-emptive, AI-driven protection against online scams and fraud, with its flagship solution known as the ZeroScam ecosystem. Unlike traditional fraud detection systems that react after financial damage has already occurred, Cybrlab uses predictive AI to identify and disrupt scams at the very beginning of their lifecycle. Its models analyse large volumes of behavioural, linguistic, network, and URL-level signals across messaging platforms, telecom channels and financial systems to predict whether a digital interaction is likely to escalate into a scam within minutes rather than days.

PREDICTIVE AI – USE CASES

Healthtech

Predictive AI is ushering in a new era of proactive and personalised healthcare, with the potential to improve patient outcomes and make healthcare systems more efficient.

KEY APPLICATIONS

- **Early disease detection:** Researchers are training AI models to detect diseases like cancer earlier than ever before. For example, models can analyse mammograms and predict the likelihood of breast cancer developing in the next five years with greater accuracy than traditional risk models. This allows for earlier screening and intervention.
- **Hospital readmission prediction:** Preventing hospital readmissions is a major priority for healthcare providers. Predictive models analyse a patient's electronic health record upon discharge to calculate their risk of being readmitted. High-risk patients can then be enrolled in follow-up programmes, such as receiving home visits from a nurse, to ensure they are recovering properly.
- **Drug discovery and clinical trial optimisation:** Pharmaceutical companies use predictive models to accelerate drug discovery by forecasting which chemical compounds are most likely to be effective against a specific disease. AI can also optimise clinical trials by predicting which patients are most likely to respond to a trial drug, making the trials faster and more likely to succeed.

WHAT IS HAPPENING IN LUXEMBOURG?

[Helical](#) is a biotech and healthtech startup focused on accelerating drug discovery using advanced bio foundation models. Its platform enables pharmaceutical and biotech companies to run large-scale in-silico experiments. Predictive AI is core to Helical's value proposition: its models learn patterns from massive biological datasets to predict how genes, molecules, or therapies will behave, helping researchers forecast therapeutic response, toxicity and disease mechanisms.

[Hale-X](#) is developing AI-powered digital twins for precision healthcare, with a strong emphasis on predictive analytics and prevention. The platform aggregates and continuously updates multimodal health data, including blood tests, electronic health records, vital signs, and wearable data, into a single, dynamic model of each patient. Using machine learning and predictive analytics, Hale-X can anticipate health risks, predict clinical deterioration or complications, and simulate future health trajectories, enabling earlier and more personalised interventions.

[MDsim](#) is a medtech company specialising in AI-driven biomechanical digital twins, currently focused on spine care. Predictive AI is used to simulate disease progression, forecast spinal degeneration, and predict the outcomes of different surgical or preventive strategies before any intervention takes place. Surgeons can virtually test and optimise surgical plans, reducing uncertainty, complications, and revision surgeries.

PREDICTIVE AI – USE CASES

Energy & materials

For the energy sector, predictive AI is crucial for balancing the grid, integrating renewables and maintaining the reliability of critical infrastructure.

KEY APPLICATIONS

- **Grid load forecasting:** Grid operators use sophisticated AI models to predict electricity demand down to the minute. These models analyse weather forecasts (temperature, cloud cover, wind speed), historical demand and economic data to ensure that supply perfectly matches demand, which is essential for preventing blackouts.
- **Renewable energy generation forecasting:** The output of wind and solar farms is variable. Predictive models are essential for forecasting their generation, allowing grid operators to reliably integrate this clean energy into the grid by balancing it with other power sources.
- **Asset performance management:** Energy companies use predictive maintenance to monitor the health of critical assets like gas turbines, wind turbines and transformers. For a wind farm, models can predict the failure of a gearbox months in advance by analysing vibration and temperature data, preventing costly failures and maximising energy production.

WHAT IS HAPPENING WORLDWIDE?

[Schneider Electric](#) actively enables predictive AI in practice by embedding advanced machine-learning models into its EcoStruxure Industrial Advisor – Predictive Energy solutions, which help industrial and commercial customers anticipate energy demand, detect anomalies early and optimise consumption across complex

systems. By combining connected devices, real-time data and domain expertise in energy management, Schneider empowers organisations to move from reactive monitoring to proactive decision-making, reducing energy costs and carbon emissions while improving operational resilience, positioning predictive AI as a concrete lever for efficiency, sustainability and industrial performance.

WHAT IS HAPPENING IN LUXEMBOURG?

[Creos](#), the country's primary electricity and gas grid operator, has implemented an AI-powered platform named "Alva". This system functions as a sophisticated digital twin of Luxembourg's entire smart grid. The core of Alva's functionality lies in its powerful predictive capabilities. By continuously analysing real-time data from across the network, the AI can accurately forecast future grid behaviour. Specifically, it predicts energy flows, anticipates potential grid congestion or bottlenecks and models the impact of variable factors like weather changes on renewable energy production.

[E.E.M.M.](#) (European Energy Market Makers) is an energy trading and analytics company that uses advanced predictive AI to forecast renewable energy production and energy market price fluctuations. Its predictive AI systems process millions of data points, including historical production data, weather forecasts, market price trends and balancing market signals, to predict short-term and medium-term price movements. A distinctive feature of E.E.M.M.'s approach is the integration of large-scale text and news analysis: its proprietary AI model continuously analyses news articles in more than 100 languages to detect geopolitical events or market-moving signals within seconds and immediately adjust price forecasts and trading strategies.

PREDICTIVE AI – USE CASES

Transport & logistics

In an industry where margins are tight and timing is everything, predictive AI is the key to unlocking new levels of efficiency and reliability.

KEY APPLICATIONS

- **Dynamic route and fleet optimisation:** Logistics companies use predictive AI to plan the most efficient routes for their delivery fleets. These systems go beyond simple GPS, incorporating real-time traffic, weather forecasts and even the probability of finding parking at a specific time of day to continuously optimise routes and delivery schedules.
- **Predictive asset maintenance:** For airlines, trucking companies and shipping lines, asset uptime is critical. Predictive maintenance models forecast failures in engines, tyres and other critical components. An airline, for example, can use predictive analytics to schedule the replacement of a jet engine component during planned overnight maintenance.
- **Accurate ETA prediction:** Providing accurate Estimated Times of Arrival (ETAs) is a key customer service differentiator. Modern logistics platforms use predictive models that learn from historical trip data to provide ETAs with a high degree of accuracy, updating them in real-time as conditions change.

WHAT IS HAPPENING WORLDWIDE?

[DHL](#), one of the world's largest logistics companies, uses predictive analytics to anticipate transit delays in its global network. Its "MySupplyChain" platform provides visibility into potential disruptions, allowing the company and its customers to proactively adjust and re-route shipments to avoid costly delays.

[Shippeo](#) provides a leading real-time transportation visibility platform. Its core predictive AI function is to calculate a highly accurate and reliable Estimated Time of Arrival (ETA) for any shipment. Instead of relying on simple distance and speed calculations, Shippeo's machine learning models analyse thousands of data points in real-time, including traffic, weather and historical delivery performance, to predict the precise moment a shipment will arrive.

WHAT IS HAPPENING IN LUXEMBOURG?

[G-Transport](#), developed by Gulliver Luxembourg, is an AI-powered logistics and transport management platform designed to make freight and last-mile delivery operations smarter, more efficient and more sustainable. The platform integrates predictive analytics and machine learning to optimise route planning, load distribution and delivery execution in real time. At the core of its predictive AI are models that analyse historical and live operational data, such as traffic conditions, delivery success rates, vehicle characteristics, customer availability and regulatory constraints, to predict delivery failures before they happen and proactively reschedule routes.

PREDICTIVE AI – USE CASES

Manufacturing

For Industry 4.0, predictive AI is the cornerstone of the "smart factory" and the resilient supply chain. It optimises complex processes, minimises downtime and improves visibility from end to end.

KEY APPLICATIONS

- **Predictive maintenance:** This remains the killer app for AI in manufacturing. For example, a manufacturer of machines might use sensors to monitor the vibration and temperature of a machine's spindle. The predictive model, trained on historical failure data, can forecast a bearing failure weeks in advance, allowing maintenance to be scheduled during planned downtime.
- **Production quality control:** Predictive models can analyse data from sensors and cameras on the production line to predict quality issues in real-time. In semiconductor manufacturing, for instance, models can predict the final yield of a silicon wafer based on measurements taken during the fabrication process, allowing engineers to make adjustments to improve output and reduce waste.
- **Supply chain risk management:** Modern AI platforms can predict supply chain disruptions by monitoring hundreds of real-time data sources, including shipping vessel locations, weather patterns, labour strikes and geopolitical news. If a model predicts a significant delay at a key port, it can automatically alert logistics managers and recommend alternative routes or suppliers to mitigate the impact.

WHAT IS HAPPENING WORLDWIDE?

[Siemens](#), a leader in industrial automation, uses predictive analytics in its MindSphere platform. At one automotive plant, Siemens implemented a predictive maintenance solution for the motors on its assembly line, reducing unplanned downtime by over 30% and lowering maintenance costs.

WHAT IS HAPPENING IN LUXEMBOURG?

A prime example of applied predictive AI in Luxembourg's industrial sector is the technology project [Predictive](#). The result of [Cebi International S.A.](#) & [DataThings S.A.](#), this project has developed an Industrial DataOps platform specifically designed to help manufacturers transition from reactive to proactive operations. At the core of their solution is the creation of a "Production Digital Twin", a dynamic, virtual replica of a factory's entire production environment. This digital twin is powered by predictive AI models that continuously analyse real-time data streamed from machinery and sensors on the factory floor. By forecasting future operational states, the platform can anticipate events before they happen. For instance, it can predict an imminent equipment failure and automatically trigger a maintenance alert or forecast a drop in production quality and recommend specific adjustments.

PREDICTIVE AI – USE CASES

Retail & E-commerce

Predictive AI is the engine behind modern retail, powering the personalisation and efficiency that customers now expect as standard.

KEY APPLICATIONS

- **Demand forecasting:** Accurate demand forecasting is crucial for optimising inventory. Leading retailers use predictive models that incorporate not only historical sales data but also external factors like local events, weather forecasts and social media trends. For example, a supermarket chain's model might predict a surge in demand for barbecue supplies in a specific city after seeing a sunny weather forecast combined with a local football match.
- **Customer Lifetime Value (CLV) prediction:** Instead of just focusing on a single transaction, retailers use predictive models to forecast the total revenue a customer will generate over their entire relationship with the brand. This allows them to segment customers more effectively and invest more in retaining high-value individuals.
- **Personalised promotions:** Predictive AI enables dynamic and personalised pricing. An e-commerce platform can predict a specific user's willingness to pay for an item based on their browsing history and past purchase behaviour and then offer a tailored discount to convert the sale without eroding margins unnecessarily.

WHAT IS HAPPENING WORLDWIDE?

[Amazon's Demand-Side Platform \(DSP\)](#) now uses a predictive AI model at the

heart of its Performance+ and Brand+ campaign solutions, enabling advertisers to go beyond traditional static targeting by continuously analysing real-time behavioural and first-party signals to forecast which customers are most likely to convert now or in the future. This predictive intelligence allows campaigns to automatically optimise audience selection and delivery toward advertiser goals like better return on ad spend or lower cost per acquisition, with early advertisers reporting significant performance uplifts thanks to this forward-looking approach. The company has also been holding for 10 years patents for "[anticipatory shipping](#)," a model that predicts what customers in a certain area will order and begins moving those products to a nearby warehouse *before* the orders are even placed, enabling faster delivery.

WHAT IS HAPPENING IN LUXEMBOURG?

[Fischer S.A.](#) was awarded at the Luxembourg AI Excellence Awards 2025 for its advanced use of predictive AI in order management, deploying machine-learning models to forecast daily demand with high precision and automatically recommend optimal production and ordering volumes across its 70 bakery outlets; developed in partnership with Resultance, the solution enables Fischer to anticipate customer demand rather than react to it, leading to a measurable increase in sales (+4 %) and a reduction in food waste (-1.5 %) during the pilot phase and positioning predictive AI as a core operational tool rather than a purely experimental technology.

PREDICTIVE AI – USE CASES

Space

In the high-stakes environment of space, where assets are worth billions of euros and physical intervention is often impossible, predictive AI has become an essential technology for managing risk and ensuring mission success. From predicting dangerous collisions to forecasting the health of distant spacecraft, predictive AI provides the foresight needed to operate safely and efficiently in the final frontier.

KEY APPLICATIONS

- **Predictive collision avoidance:** This is the most critical application for Space Situational Awareness (SSA). AI models analyse orbital data to forecast the trajectories of satellites and space debris, predicting potential collisions days in advance.
- **Satellite health monitoring and predictive maintenance:** Satellites are complex systems that operate in a harsh environment. Predictive models analyse telemetry data (e.g., temperature, battery voltage, component performance) to forecast the degradation or potential failure of on-board systems.
- **Launch trajectory and weather optimisation:** During a rocket launch, predictive models are used to forecast the optimal trajectory based on real-time atmospheric conditions. They can also predict the likelihood of weather-related launch scrubs (e.g., due to high winds or lightning).
- **Earth observation data analysis:** Satellites generate enormous volumes of data for Earth observation. Predictive AI is used to analyse this data to forecast a wide range of phenomena, such as crop yields for agriculture, deforestation rates, or the path of wildfires.

WHAT IS HAPPENING IN LUXEMBOURG?

[Neuraspace](#) offers an advanced, AI-powered Space Traffic Management (STM) platform designed to automate collision avoidance for satellite operators. The platform's core function is to provide highly accurate and automated collision risk assessments. It ingests data from multiple sources and uses sophisticated machine learning models to predict the probability of a collision between a satellite and other objects, such as space debris or another satellite. Crucially, Neuraspace moves beyond simple warnings by providing actionable intelligence. Its AI not only forecasts a potential collision but also recommends optimal avoidance manoeuvres, helping satellite operators to protect their high-value assets efficiently and sustainably.

[Mission Space's](#) entire focus is on providing "space weather" forecasts, a critical service for ensuring the safety and functionality of orbital assets. Space weather, which includes phenomena like solar flares and geomagnetic storms, can disrupt satellite operations and permanently damage sensitive electronic components. Mission Space uses a network of on-orbit and ground-based detectors to collect real-time data, which is then fed into their proprietary AI and machine learning models. These models are designed to predict the timing, intensity and trajectory of dangerous space weather events. By forecasting these occurrences, Mission Space provides satellite operators with the advance warning needed to take protective measures, such as temporarily placing a satellite into a safe mode or postponing critical manoeuvres.

PREDICTIVE AI

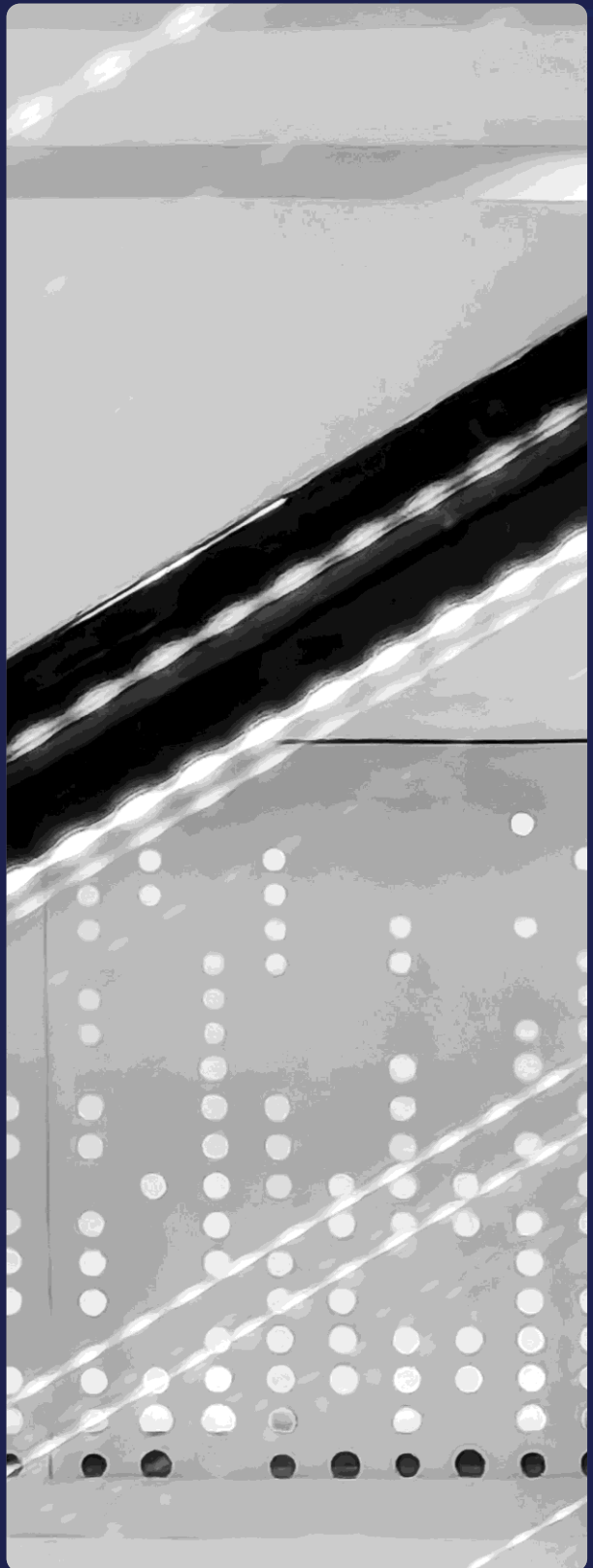
Conclusion

Predictive AI is not a futuristic concept; it is a mature, foundational technology that is already delivering substantial, measurable value across nearly every industry. While newer forms of AI like generative and agentic systems capture headlines with their novel capabilities, predictive AI remains the bedrock of data-driven decision-making. Its enduring power lies in its ability to transform data from a historical record into a forward-looking strategic asset, enabling organisations to answer the critical question: "What is likely to happen next?"

The primary impact of predictive AI is its role as the engine of a fundamental strategic shift: **from reactive to proactive**. As we have seen through examples in finance, manufacturing, logistics and even the space sector, market leaders are no longer just responding to events as they occur. They are forecasting them. They predict machine failures to prevent downtime, anticipate customer needs to enhance loyalty, forecast market shifts to manage risk and foresee grid congestion to ensure energy stability. This ability to act in anticipation is the very definition of a modern competitive advantage.

For organisations in Luxembourg and beyond, mastering predictive analytics is no longer an option but a baseline requirement for operational excellence.

Ultimately, predictive AI is the cornerstone of strategic foresight in a data-centric world. For any organisation seeking to build resilience, drive efficiency and navigate future uncertainty with confidence, the path forward begins with harnessing the power of prediction.



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