

Digital Trends Radar

At september 2025

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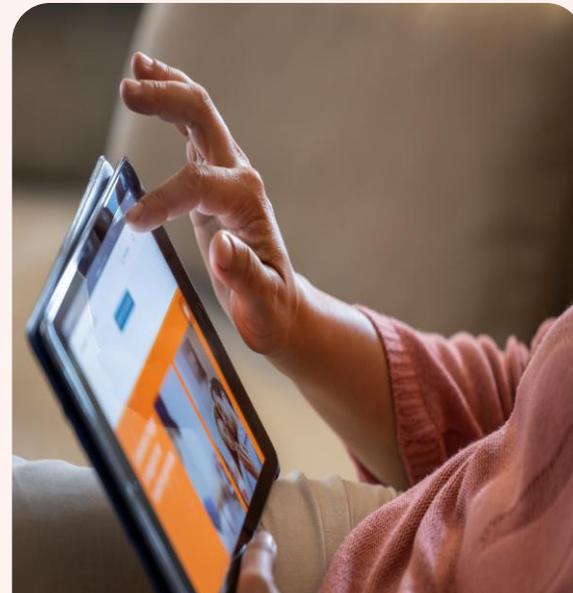
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Driving the change with conscious digital technologies

DIGITAL TRENDS RADAR

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Digital Trends Observatory at Repsol



We understand that **digital trends is already a fundamental and inseparable part of the strategy and evolution of businesses**, characterized by its rapid advancement and, at times, by its disruptive nature.

For us, it is imperative to track and understand each digital trend and identify its potential at each stage. This process is carried out mainly through the **Digital Trends Observatory**, whose tool, the **Repsol Digital Trends Radar**, helps us to visually classify digital trends, reflecting our understanding of their state of adoption, transformative potential, and applicability by business.

We reflect the degree of adoption in 4 stages

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Wait

Premature.
Extremely risky.
Better to wait.



Watch

Emergent.
It requires
observation to
identify the
potential and time
to start testing.



Prepare

Stabilizing, but with
a lot of uncertainty.
Ready to start being
tested and
understood.



Adopt

Mature, stable and
ready to be
implemented digital
trend.



Digital Trend Areas

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The **areas of digital trends** are divided into two main orientations:

- **Business:** Drive and modernize business strategies and operations very directly.
- **Technology:** Enhances and optimizes digital fundamentals and enablers.

These trends affect the different **business areas** of our company: Exploration and Production (**E&P**), Industrial Transformation and Circular Economy (**ITyEC**), Low Carbon Generation (**LCG**), **Client, Corporation** and IT and Digital (**IT&D**).

Categories

Industry Platform & Enablers

Trends that enhance industrial operations efficiency and enable other trends.

Data & AI

We leverage data and artificial intelligence to optimize processes and make smarter decisions.

Open Connectivity

Trends that facilitate the interoperability and connectivity of our businesses and with third parties.

Productivity & Automation

Trends aimed at increasing our operational efficiency.

New Channels & Interfaces

Trends applied to interaction with users and customers.

Sustainability Enabled by Digital

Digital trends that enhance our sustainability and energy efficiency aspects.

Data Fabric

Moment: **Adopt**

State: **Old**

Areas: **E&P** **ITyEC** **LCG** **Client** **IT & Digital** **Corporation** **Cybersecurity**

Description

Data Fabric is a design concept that acts as an integrated layer of data and connection processes. It enables data management across diverse environments, providing a unified architecture.

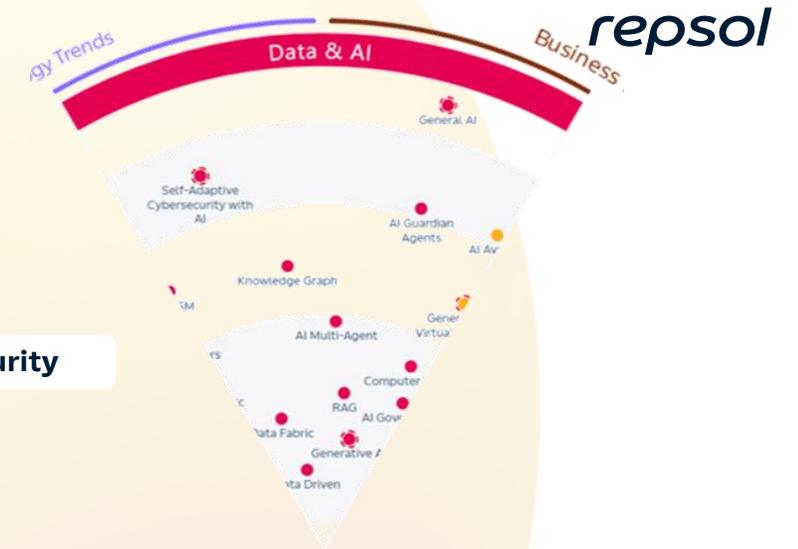
It is not just a single technology or method, but an end-to-end architecture that enables dynamic and intelligent data orchestration. Ensure data is available where and when it's needed, no matter the platform or location.

Data Fabric integrates diverse data sources and types, including structured, unstructured, and semi-structured data. This approach improves the accessibility and usability of data.

By leveraging AI and machine learning, Data Fabric can automate data discovery, cataloguing, and governance, reducing manual effort and improving data quality and compliance.

Capabilities

- Unified data management across diverse environments and platforms.
- Greater accessibility and usability of data for better decision-making.
- Automating data discovery, cataloguing, and governance using AI and machine learning.
- Support for structured, unstructured, and semi-structured data.



Data Fabric

Adoption at Repsol

Data Fabric is a concept that decouples data from its source systems, unifying it into a single analytical system to provide aggregated data to end users.

Repsol is integrating and adopting Data Fabric as a fundamental part of the ARIA platform and its evolution. This integration seeks to enhance data management, advanced analytics, and AI modeling capabilities, optimizing Data Driven decision-making, operational efficiency, and self-service capabilities.

ARIA (Advanced Repsol AI Platform) is Repsol's platform to democratize access to data in a secure way for all businesses and user profiles. It industrializes the development of Data, Analytics and AI use cases, allowing their large-scale implementation with greater speed and security.

This technology provides a unified and automated approach to data integration, ensuring its availability with high quality throughout the organization, which enables:

Data-driven decision-making.

- Generation of synthetic data.
- Self-service analytics.
- Running AI models.

Repsol's Future Plans

Repsol will continue to evolve Data Fabric capabilities by incorporating more advanced AI technologies and expanding the scope of data integration. The focus will be on creating holistic data management, ensuring that all data processes are fully integrated and automated.

In addition, it plans to extend Data Fabric to support multi-cloud environments, improving flexibility and scalability.

The adoption and future plans of Data Fabric at Repsol reflect the company's commitment to using advanced technologies to drive efficiency and innovation in data management.

Related Trends

- Data Driven
- AI Fabric

Data Driven

Moment: **Adopt**

State: **Old**

Areas: **E&P** **ITyEC** **LCG** **Client** **IT & Digital** **Corporation**

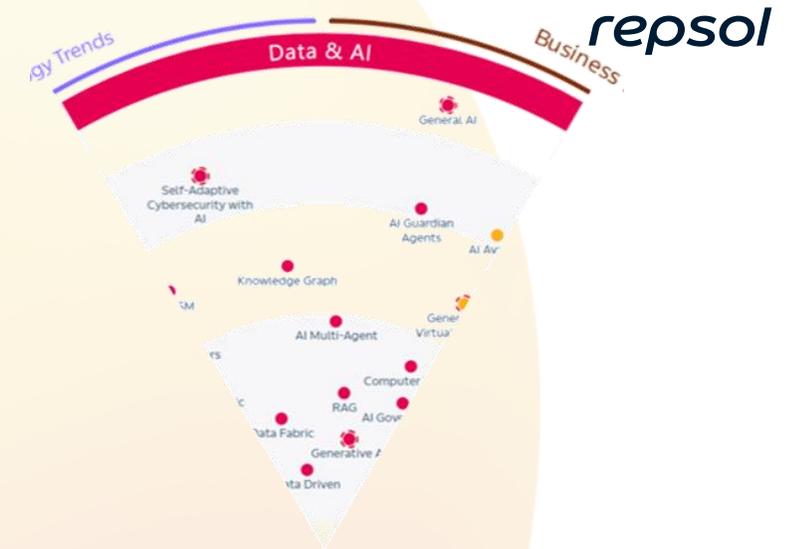
Description

Data Driven decision-making involves grounding decisions on data analysis and interpretation, with the goal of improving the accuracy and reliability of business strategies and operations.

Data Driven decision-making isn't just about gathering and analyzing information. It involves creating a data-centric culture within an organization, where data is consistently used to inform and guide strategic and operational decisions.

This approach requires investing in data infrastructure, ensuring information quality, and empowering employees with tools and skills to analyze and interpret data effectively.

Data Driven organizations are better equipped to identify trends, predict outcomes, and optimize processes, driving efficiency, innovation, and competitive advantage.



Capabilities

- Greater accuracy and reliability in decision-making.
- Investment in data infrastructure and quality assurance.
- Empowering employees with data analytics tools and skills.
- Ability to identify trends, predict results and optimize processes.

Data Driven

Adoption at Repsol

Repsol has adopted a Data Driven approach as a key component of its digital transformation strategy. This initiative has been instrumental in improving decision-making processes, optimizing operations, and driving innovation across various business units.

The company has implemented advanced data analytics and artificial intelligence (AI) technologies to harness the potential of data.

A key enabler of this transformation is ARIA (Advanced Repsol AI Platform), Repsol's data platform. ARIA democratizes access to data across business units, enabling the industrialization of large-scale data and analytics use cases, with greater speed and lower costs.

Key initiatives:

- Repsol Data Portal
- Data-driven decision-making spaces in business: Environments where data drives decision-making, optimizes operations, and improves overall efficiency.
- GLP: Implementation of data analytics to optimize supply chain management and improve customer service in the LPG business.

- Customer TI, and ECE & PC Corporation
- AI Use Cases: Generative AI Competence Center

Repsol's Future Plans

Repsol plans to continue expanding its Data Driven initiatives by integrating real-time data processing and strengthening its AI capabilities.

The company seeks to further leverage data analytics to drive innovation and improve operational efficiency.

Future plans:

- Development of new AI models.
- Implementation of advanced data management strategies.
- Continuous improvement of data quality and accessibility.

Related Trends

- Data Fabric

Computer Vision

Moment: **Adopt**

State: **Old**

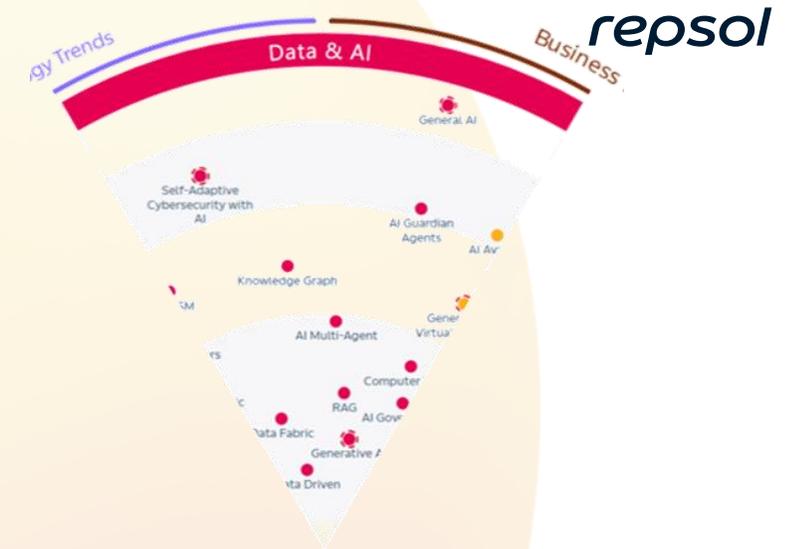
Areas: **ITyEC** **LCG** **Client**

Description

Computer Vision is a field of artificial intelligence that allows computers to interpret and process visual information about the world. It is not limited to just the recognition of objects in images. It encompasses a wide range of capabilities, such as image segmentation, pattern recognition, and motion analysis.

This technology enables applications such as facial recognition, autonomous driving, medical image analysis, and augmented reality. By interpreting visual data, computer vision systems can automate complex tasks, improve decision-making, and offer new insights across various industries.

Advances in deep learning and neural networks have significantly improved the accuracy and efficiency of Computer Vision, making it a key component of modern AI systems.



Capabilities

- Recognition of objects and patterns in images and videos.
- Image segmentation and analysis for medical and industrial applications.
- Facial recognition and security surveillance.
- Support for autonomous vehicles and augmented reality.

Computer Vision

Adoption at Repsol

Computer Vision has been adopted at Repsol, especially during the First and Second Waves of the Digital Program. Repsol has used this technology for tasks such as image classification, object detection, and optical character recognition, which has significantly improved the accuracy and speed of data processing.

Its implementation has contributed to Repsol's digital transformation, allowing for more accurate and timely decision-making.

Some examples include:

- Bird detection.
- Corrosion detection.
- Pellet Detection.
- Control of vehicles at service station pumps.
- SMA control in LPG plants.
- Control of cages and cylinders in LPG factories.
- Leakage control in fuel unloading vessels.
- Other proofs of concept and tests carried out.

Repsol's Future Plans

Repsol plans to continue promoting the use of Computer Vision in more operational areas, including advanced predictive maintenance and real-time monitoring of industrial processes.

The aim is to strengthen the safety of its assets by detecting leaks and other risks in industrial sites and solar fields. In addition, the company seeks to integrate AI-powered analytics with Computer Vision to further improve decision-making and operational efficiency.

Repsol will also focus on developing customized Computer Vision solutions tailored to specific use cases, ensuring maximum impact and value.

Related Trends

- Intelligent Assets and Operations

AI TRiSM

Moment:

Try

State:

Updated

Areas:

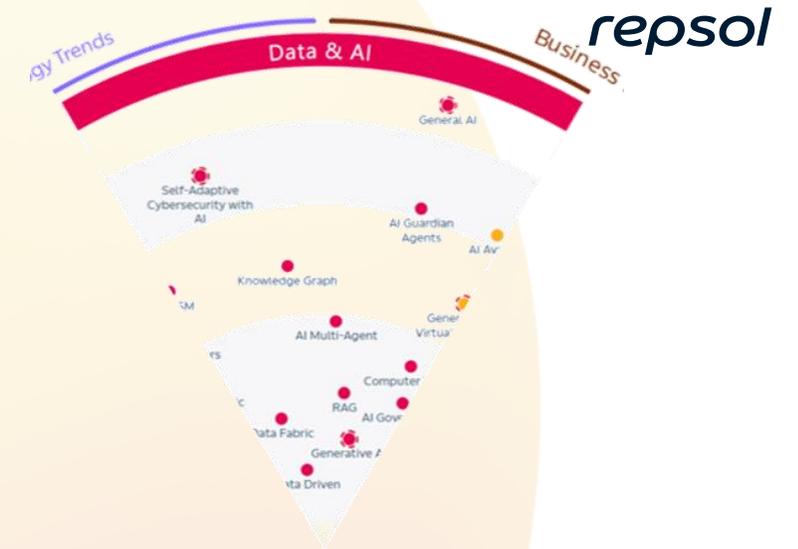
IT & Digital

Corporation

Description

AI TRiSM (Trust, Risk, and Security Management in AI) is a framework designed to ensure the trusted, secure, and responsible use of artificial intelligence. It encompasses various practices and technologies to manage risks in AI and improve transparency.

AI TRiSM is not just a specific technology or method, but a comprehensive framework that supports the ethical and secure deployment of AI systems. It ensures that AI models are transparent, explainable, and free of bias, fostering trust between users and stakeholders. AI TRiSM integrates practices such as risk assessment, compliance monitoring, and incident response to effectively manage AI-related risks. This approach improves the reliability and accountability of AI systems, promoting better governance and operational efficiency. By leveraging advanced technologies, AI TRiSM enables automation in risk detection, mitigation, and reporting, reducing manual effort and improving overall AI governance.



Capabilities

- Comprehensive risk management for AI systems.
- Increased transparency and explainability of AI models.
- Automated risk detection, mitigation, and reporting.
- Support for the ethical and responsible deployment of AI.



AI TRISM

Adoption at Repsol

AI TRiSM is currently being tested at Repsol. It involves the continuous monitoring and evaluation of AI systems with the aim of mitigating risks and ensuring ethical use. Repsol is integrating AI TRiSM in several pilot projects:

- Predictive maintenance in refineries
- Automated infrastructure monitoring
- Improved customer Service

Related Trends

- Quantum Key Distribution (QKD)
- Self-Adaptive Cybersecurity with AI
- AI Governance

Knowledge Graph

Moment: **Try**

State: **Updated**

Areas: **ITyEC** **LCG** **Client** **IT & Digital** **Corporation**

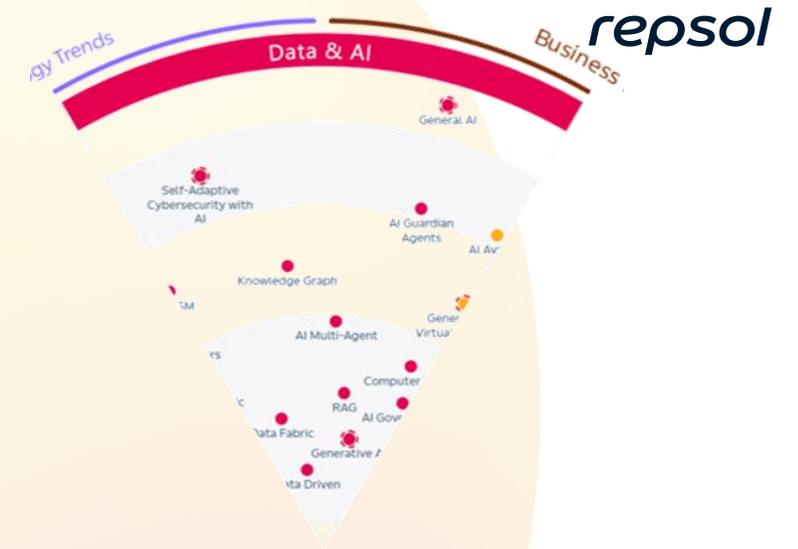
Description

A Knowledge Graph is a structured representation of information that captures the relationships between different entities. It is used to integrate, manage, and retrieve complex data in a meaningful way, enabling better decision-making and insights generation. It's not just a simple database, but a sophisticated system that connects data points across relationships, providing context and meaning. It integrates diverse sources and types of data, both structured and unstructured, to create a complete view of information. Knowledge graphs are used in multiple applications, from search engines and recommendation systems to data integration and analytics.

By using advanced algorithms and machine learning, knowledge graphs improve data discovery, search accuracy, and enable complex queries.

Capabilities

- Integration of various data sources and types.
- Improved data discovery and recovery.
- Increased search accuracy and relevance.
- Support for complex queries and analyses.
- Contextualization of information.
- Model training and coherent text generation.
- Applications in search engines, recommendation systems, and data integration.



Knowledge Graph

Adoption at Repsol

Repsol has integrated knowledge graphs into its operations to improve data analysis and decision-making. This technology has been key in structuring and connecting large volumes of data, allowing for more efficient and in-depth analysis.

Its implementation has improved incident analysis, environmental monitoring, and overall operational efficiency.

KATIA Digital Project

Related Trends

-  Generative AI
-  AI Multi-Agents

RAG

Moment:

Adopt

State:

New

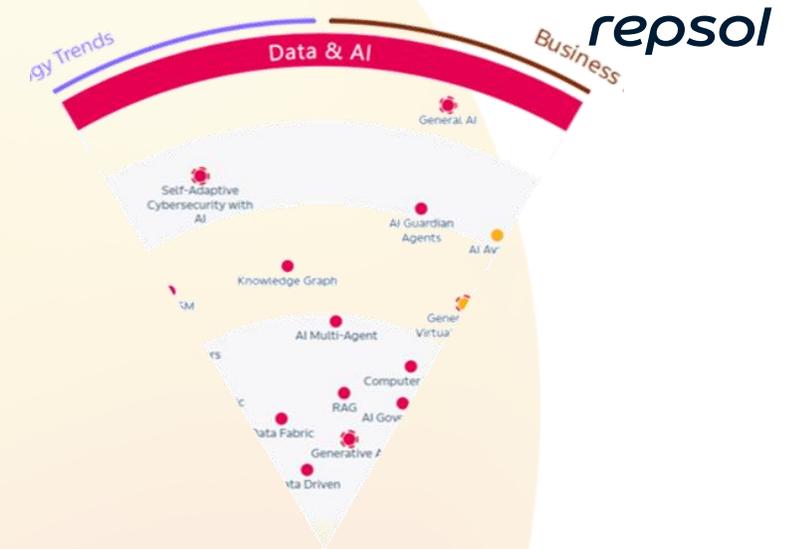
Areas:

IT & Digital

Description

Augmented Retrieval Generation (RAG) is an advanced technique used in natural language processing (NLP) to optimize the performance of large language models. The Recovery-Augmented Generation (RAG) approach focuses on refining the output of the model by incorporating insights from an external database, extending beyond the boundaries of its original training data. By leveraging this method, the model can generate responses that are not only linguistically accurate, but also enriched with information obtained from authoritative sources.

Augmented Retrieval Generation (RAG) allows a language model to access and incorporate knowledge from external sources beyond its training dataset, resulting in more informed and accurate responses. This approach involves a multi-stage process, starting with the identification of relevant information sources, followed by the extraction and integration of relevant data into the model's knowledge base.



Through continuous improvement and updating, RAG enables the model to dynamically adapt to new information and evolving contexts, thereby enhancing its ability to generate contextually relevant and grounded responses.

Importance

- It allows the model to provide answers based on updated and authoritative information, improving its relevance and reliability.
- It facilitates the integration of real-world knowledge into the generated text, improving the model's ability to understand and address complex queries.
- Supports applications that require custom responses by allowing the model to reference specific domains or topics outside of its original training set.

RAG

Adoption at Repsol

RAG is currently being deployed at Repsol. It is being integrated into several pilot projects to empower Data Driven decision-making and improve operational efficiency.

Our focus is oriented towards:

- Specialization and Modularization (instead of a generic construction).
- Division into components (data ingestion, retrieval, and generation) for easy evaluation and optimization (rather than a monolithic system).
- Ensure data quality before it is ingested into the RAG system, with particular attention to unstructured data.
- Use of multiple search approaches to ensure that the system can handle different types of queries effectively (including hybrid search and metadata-based filtering).
- Application of optimization techniques before and after data retrieval, such as query transformation and result reordering, to improve the relevance and accuracy of the generated responses.

Repsol's Future Plans

Repsol plans to further improve its RAG systems by integrating AI agents that can execute actions for data retrieval and response generation. In addition, the creation of customized Large-Scale Language Models (LLMs) optimized for specific use cases is envisaged.

The focus will also be on continuous improvement of data quality and optimization techniques to maintain high standards in the retrieval and generation of information.

Generative AI

Moment: **Adopt**

State: **New**

Areas: **E&P** **ITyEC** **LCG** **Client** **IT & Digital** **Corporation**

Description

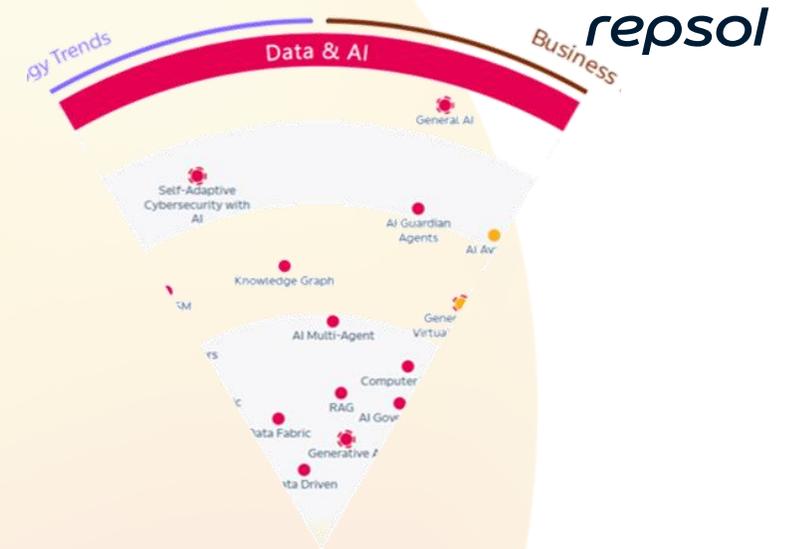
Generative Artificial Intelligence refers to artificial intelligence systems capable of producing new content, such as images, text, or music, based on patterns learned from existing data. These systems use techniques such as deep learning and neural networks to generate realistic and novel results.

Generative AI systems employ a variety of architectures, including generative adversarial networks (GANs) and recurrent neural networks (RNNs), to create content that features similar characteristics to training data. These technologies have applications in creative fields, content generation and data augmentation, among others.

Capabilities

Applications:

- Art generation
- Text generation
- Video Generation
- Musical composition
- Speech recognition and synthesis
- Machine translation
- Sentiment Analysis
- Code generation
- Medical diagnosis
- Industrial Process Optimization



Generative AI

Adoption at Repsol

Generative AI has been a key focus in Repsol's digital transformation process, due to the potential of this technology to change the way we work and communicate. For this reason, we are involved in its adoption from multiple perspectives and integrating it into different projects. Repsol has used generative AI for content creation, data analysis, and predictive modeling.

- Generative AI Competence Center:
- Identification, implementation, production and scaling of initiatives.
- Definition and evolution of the generative AI technology platform.
- Application of generative AI to our employees, including training and support for rapid adoption.
- Use of generative AI in development and UX teams.
- Guarantee of an ethical and responsible adoption of generative AI, aligned with Repsol's values.
- Copilot M365 and launch of HackIA as a space for innovation.

Repsol's Future Plans

Generative AI has already had an impact on Repsol's operations. Planned progress:

- Expand the Generative AI Competence Center to support more complex projects.
- Conduct hackathons focused on generative AI to foster innovation and identify new use cases.

Related Trends

- AI Guardians Agents
- General AI
- AI Multi-Agents
- Knowledge Graph
- Generative AI Virtual Assistants
- AI Avatars

Self-Adaptive Cybersecurity with AI

Moment: **Watch**

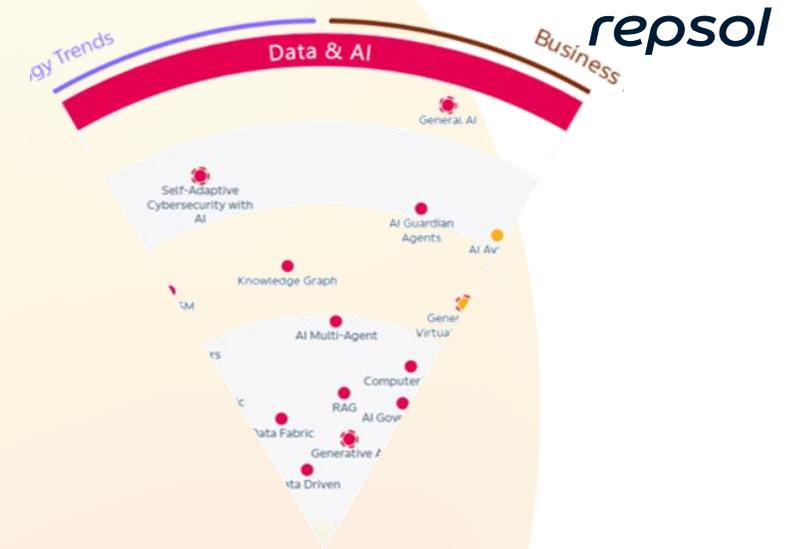
State: **New**

Areas: **IT & Digital** **Corporation**

Description

AI Self-Adaptive Cybersecurity refers to the use of artificial intelligence to create dynamic and responsive security systems that can adapt to new threats in real-time, improving the ability to protect data and systems against evolving cyber threats. AI Self-Adaptive Cybersecurity is not just a single technology or method, but a comprehensive system that combines diverse data sources and advanced analytics to create a dynamic and adaptable security framework. It ensures that security measures are continuously updated and optimized to counter emerging threats.

This approach integrates threat intelligence, behavioral analytics, and machine learning. It allows you to detect, respond to, and mitigate cyber threats in real time. By leveraging AI, these systems can predict potential attacks, recommend countermeasures, and improve the overall security posture.



Advantages:

- Proactive Defense
- Continuous learning
- Less human intervention
- Scalability
- Cost efficiency
- Greater accuracy
- Better regulatory compliance



Self-Adaptive Cybersecurity with AI

Capabilities

- Real-time monitoring and analysis of security threats.
- Enhanced detection and response using AI and machine learning.
- Predictive analytics to identify potential cyberattacks.
- Integration of threat intelligence and behavioral analytics.

Related Trends

- AI TRISM
- Quantum Key Distribution (QKD)

AI Guardian Agents

Moment: **Watch**

State: **New**

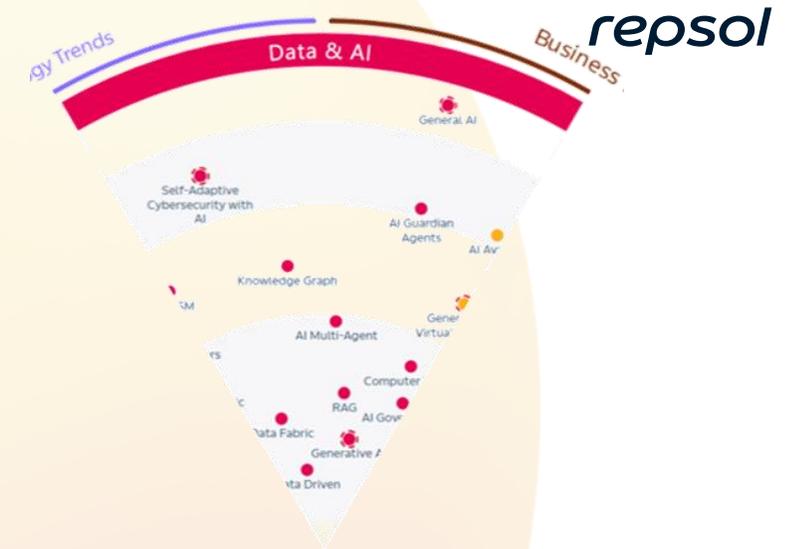
Areas: **E&P** **ITyEC** **LCG** **Client** **IT & Digital** **Corporation**

Description

AI Guardian Agents are specialized AI agents designed to monitor and manage other AI agents. They act as automatic safeguards, ensuring that AI systems operate within defined ethical, legal, and operational boundaries.

AI Guardian Agents are not just monitoring tools, but sophisticated entities capable of ensuring compliance and governance in AI systems. They use advanced algorithms and machine learning to detect and prevent non-compliant behavior, ensuring that AI development and operations comply with established regulations and principles.

One of the future use cases of AI Guardian Agents is the elimination of the need for human intervention in the creation of traditional or Generative AI models. Currently, human supervision is necessary to ensure that these models comply with all required regulations and Repsol's internal policies.



AI Guardian Agents have a close relationship with multi-agent AI systems, acting as supervisors to ensure that they operate within defined boundaries.

Capabilities

- Automatic enforcement of compliance with ethical and legal standards.
- Real-time monitoring and management of AI agent activities.
- Detection and prevention of non-compliant behaviors.
- Integration with existing AI systems to provide oversight and governance.
- Increased security and reliability in AI operations.

AI Guardian Agents

Adoption at Repsol

Repsol is exploring the use of AI Guardian Agents to improve the governance and compliance of its AI systems. These agents act as an additional layer of oversight, ensuring that all AI operations are aligned with Repsol's ethical standards, regulatory requirements, and internal rules.

Repsol's Future Plans

Repsol plans to integrate AI Guardian Agents more widely into its AI initiatives. Future efforts will focus on improving the capacities of these actors to provide more comprehensive oversight and governance.

Related Trends

- General AI
- Generative AI
- AI Multi-Agents

AI Multi-Agent

Moment: **Adopt**

State: **New**

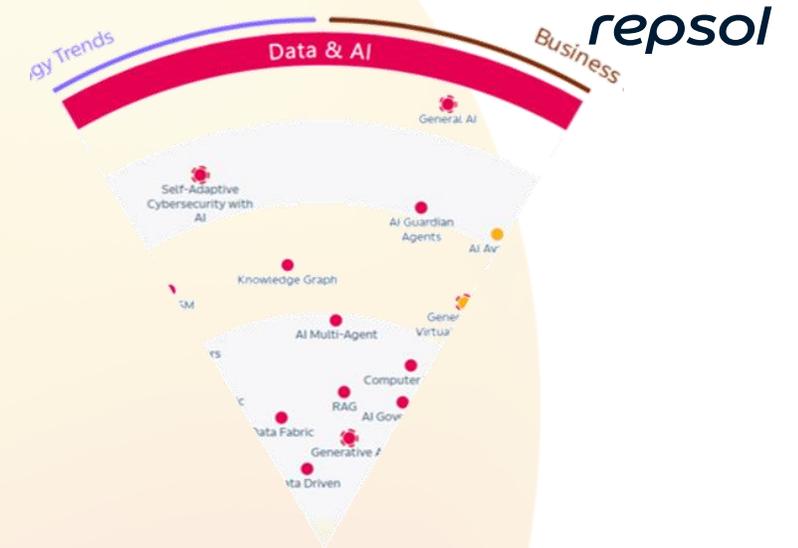
Areas: **Client** **IT & Digital** **Corporation**

Description

AI Multi-Agent refer to systems in which multiple intelligent agents interact or work together to solve problems or achieve goals. These agents can be autonomous or semi-autonomous and collaborate, negotiate and coordinate their actions to optimize results in complex environments.

AI Multi-Agent systems are not just a single technology or method, but a comprehensive architecture that enables dynamic and intelligent interaction between multiple agents. They ensure that tasks are executed efficiently through collaboration and coordination.

These systems integrate various types of agents, including autonomous, semi-autonomous, and human-in-the-loop agents, improving problem-solving capabilities, flexibility, and scalability, enabling more complex and adaptive applications. Thanks to advanced algorithms and machine learning, they can optimize decision-making, improve performance, and adapt to changing environments.



In addition, these systems are evolving towards more advanced forms of intelligence, culminating in agentic AI: agents capable of acting with full autonomy, setting their own goals, reasoning about the environment and executing actions on their own initiative. This evolution represents a paradigm shift, where agents not only collaborate, but also plan, learn and make strategic decisions independently, opening the door to a new generation of intelligent digital solutions.

Capabilities

- Seamless integration of multiple intelligent agents for collaborative problem solving.
- Optimization in decision-making through coordination and negotiation between agents.
- Support for various applications and environments.
- Increased scalability and flexibility for complex, adaptive systems.

AI Multi-Agent

Use cases:

- Content generation
- Virtual assistants
- Multifunctional intelligent chatbots
- Recommendation systems
- Language/vision/aid agents
- Coordination between agents
- Agent Technology Integration
- Quality Control of Content Generated by Multiple Agents- Governance and Control

Adoption at Repsol

Repsol is testing AI Multi-Agent to improve various business processes. Currently, it is integrating them into pilot projects to explore their benefits.

As a natural step in the adoption of Generative AI for enterprise and corporate use cases, the trial involves the use of the following technologies:

- Agent Identification and Outreach
- Orchestration and management technology between agents- Implementation of loop breaking systems in autonomous communication
- Guardrails Implementation
- Implementación de RAG (Retrieval-Augmented Generation)

Repsol's Future Plans

Repsol plans to continue testing and implementing AI Multi-Agent as the technology evolves and offers new capabilities. Integration with closely related technologies, such as Guardrails Agents, Guardian Agents and Agentic AI, which can prevent man-in-the-middle attacks and provide the necessary security, will be prioritized.

Related Trends

- Machine Customers
- Knowledge Graph
- Generative AI
- AI Guardian Agents
- Modern Workplace

AI Governance

Moment: **Adopt**

State: **New**

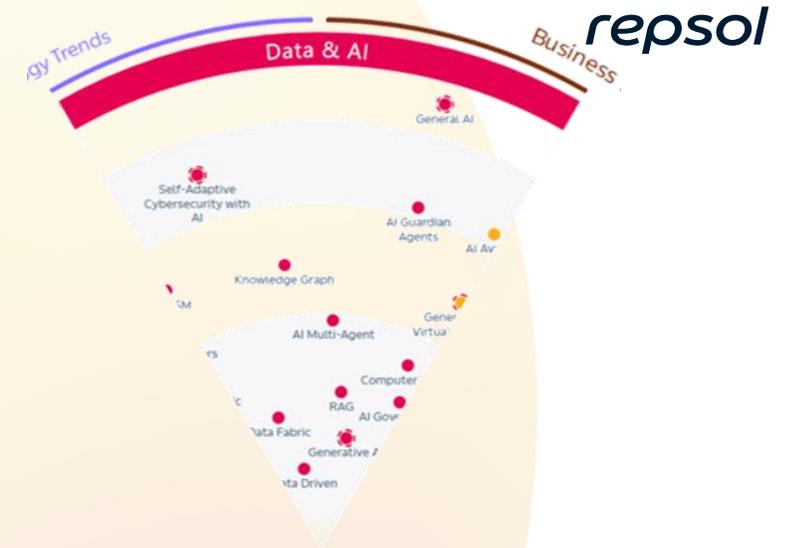
Areas: **Corporation**

Description

AI Governance is about creating and using artificial intelligence in ways that prioritize ethical considerations and social welfare. It ensures that AI technologies are used fairly, responsibly, and in a manner that respects user privacy and in compliance with laws such as the EU AI Act. This approach seeks to mitigate the risks associated with AI, such as bias, lack of transparency, and potential harm to individuals and communities.

Capabilities

- Ensure equity by developing AI systems that do not discriminate against people based on race, gender, or other protected attributes. Techniques such as bias detection and correction are essential to achieve this goal.
- Promote transparency by making AI decision-making processes understandable to users. This includes providing explanations for AI decisions and making sure users know how their information is being used.
- Improve accountability by establishing clear guidelines and regulations for the use of AI, ensuring that developers and organizations are held accountable for the impact of their AI systems.
- Respect user privacy by implementing robust data protection measures and ensuring that AI systems handle personal data responsibly and securely.





AI Governance

- Ensure regulatory compliance by adhering to laws and regulations such as the EU AI Act and the US Executive Order on AI, which emphasize safety, transparency, and accountability.

Adoption at Repsol

Repsol is committed to establishing a responsible framework for the use, development, and implementation of AI technologies. A key component of this framework is the creation of the Generative AI Competence Center (IAGen Competence Center), which drives the adoption and governance of generative AI technologies across the organization.

Repsol's approach to AI Governance is guided by principles that emphasize privacy, data governance, security, transparency, fairness, and human oversight. These principles are applied globally across the organization, ensuring that AI technologies are used ethically and responsibly.

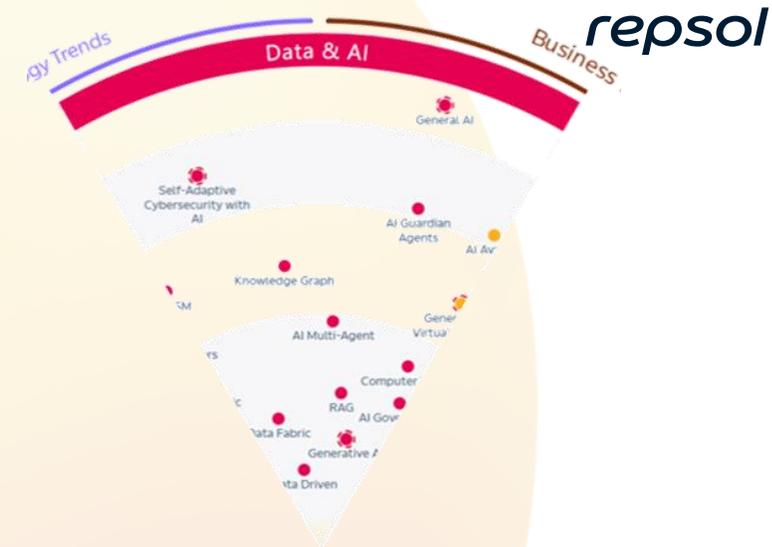
Repsol's Future Plans

Repsol plans to continue refining its AI Governance framework by integrating advanced AI ethics and compliance measures. The company aims to improve its structure, ensuring continuous monitoring and evaluation of AI systems.

In addition, Repsol will focus on expanding its inclusion initiatives, making AI technologies more accessible and fair for all users. The company also plans to collaborate with international organizations to stay updated on the latest developments in AI ethics and regulations.

Related Trends

- AI TRiSM



General AI

Moment: **WAIT**

State: **New**

Areas: **E&P** **ITyEC** **LCG** **Client** **IT & Digital** **Corporation**

Description

General AI, also known as Artificial General Intelligence (AGI), refers to a form of AI that possesses the ability to understand, learn, and apply knowledge across a wide range of tasks, similar to human intelligence.

General AI aims to create machines that can perform any intellectual task that a human being can. Unlike narrow AI, which is designed for specific tasks, General AI would have the cognitive capabilities to solve novel problems, learn from experience, and adapt to new situations.

Capabilities

- Understand natural language and engage in meaningful conversations with humans on a variety of topics. This includes the ability to understand context, emotions, and subtleties in human communication.

- Learn from experience by continuously improving your performance based on feedback and new data. General AI systems can acquire new skills and knowledge autonomously without requiring explicit programming for each task.
- Solve complex problems by applying general reasoning and problem-solving skills. General AI can address a wide range of challenges, from scientific research to day-to-day decision-making, by leveraging its broad knowledge base.
- Adapt to new environments and tasks with minimal human intervention. General AI systems are flexible and can be quickly adjusted to changing conditions, making them highly versatile in various applications.

Related Trends

- AI Guardian Agents
- RAG
- Generative AI

New Channels & Interfaces

Web3

Moment:

Watch

State:

Updated

Areas:

ITyEC

Client

Description

Web3 represents the next phase of the internet, focusing on decentralization, user control, and increased security through blockchain technology. Despite that, Web3 isn't just about decentralized applications and blockchain, it represents a transformative approach to how we interact with the digital world.

By leveraging decentralized networks, Web3 offers greater security and privacy for users, reducing the risks associated with centralized data storage. It empowers users by giving them control over their own data, enabling peer-to-peer interactions without intermediaries. In addition, Web3 introduces new economic models through decentralized finance (DeFi), enabling innovative, more accessible, and inclusive financial services. Token-based economies facilitate the empowerment of users and creators, providing new opportunities for monetization and interaction.



Overall, Web3 seeks to create a more open, transparent, and user-centric internet.

Capabilities

- Increased user privacy and control over their personal data through decentralized networks.
- Enhanced security and transparency with blockchain technology.
- New economic models and opportunities through decentralized finance (DeFi).
- Empowering users and creators through token-based economies.
- It facilitates and depends on the digital identity, owned by the users."

Related Trends

 Omnichannel  XR  Metaverse

 Spatial Computing  Optichannel

New Channels & Interfaces

Generative AI Virtual Assistants

Moment:

Try

State:

New

Areas:

ITyEC

Client

Corporation

Description

Generative AI Virtual Assistants use advanced AI techniques to interact with users in a natural and intuitive way, providing assistance and generating human-like responses.

Generative AI Virtual Assistants don't just answer user queries. They leverage natural language processing and machine learning to understand context, generate relevant responses, and perform tasks. These assistants can handle complex interactions, provide personalized recommendations, and learn from user interactions to improve over time. They are used in a variety of applications, from customer service and technical support to personal productivity and entertainment. By providing a more interactive and human-like experience, generative AI virtual assistants improve user engagement and satisfaction.

Capabilities

- Understanding and generating natural language for human-like interactions.
- Context-aware responses and task performance.
- Personalized recommendations and learning from user interactions.
- Applications in Customer Service, Technical Support and Personal Productivity.



Generative AI Virtual Assistants

Adoption at Repsol

Generative AI Virtual Assistants are currently being tested at Repsol to improve various business processes and improve interactions with customers. This technology aims to provide intelligent, context-aware responses and automate routine tasks. Repsol is testing the integration of Generative AI Virtual Assistants in several pilot projects to explore their potential benefits. Our starting point is also internal, encompassing both our customer/supplier services and our customers.

- Customer Service Automation
- Document Processing
- Internal Support

Repsol's Future Plans

Examples of Gen AI assistants that Repsol is working on to facilitate the consumption of information from applications:

- Marco Polo Assistant: assistant designed to make predictive routes dynamic, adapting them to the condition and health of the equipment, adjusting the frequency of inspections according to the condition of the assets.
- Rosalind Assistant: assistant designed for extracting information from various sources to understand the condition of the equipment, consulting the health of the equipment, spare parts and similar assets in the plant.

This commitment to this technology reflects Repsol's commitment to innovation and operational excellence.

Related Trends

- AI Avatars
- Generative AI

New Channels & Interfaces

Omnichannel

Moment: **Adopt**

State: **Old**

Areas: **Client**

Description

Omnichannel refers to a comprehensive approach to customer experience management, in which interactions across multiple channels—such as online, offline, mobile, and in-store—are integrated to deliver a unified and consistent experience. This strategy focuses on satisfying the needs and preferences of the customer, regardless of the channel they choose. Omnichannel strategies seek to provide a seamless and integrated customer journey, eliminating silos between different channels and touchpoints. This approach requires a robust technology infrastructure and data integration capabilities to ensure a consistent experience across all channels.

Some of its key elements are:

- Unified Customer Data
- Consistent branding
- Channel Integration

Adoption at Repsol

Repsol has implemented an omnichannel strategy to improve the customer experience and communication on various platforms.

Salesforce has been a key player in this strategy, facilitating the unification of the sales force and significantly improving the user experience. User experience (UX) also plays a fundamental role in the design of Repsol's services, and the company has leveraged Adobe's technology to improve the delivery of personalized and customer-centric content.



Omnichannel

Repsol's Future Plans

Repsol plans to further enhance its omnichannel strategy by integrating advanced analytics and AI-based features to deliver hyper-personalized experiences tailored to specific needs. The company is looking to expand the use of omnichannel platforms in more business units.

In addition, Repsol will focus on improving the interface and user experience, making its portals more intuitive and accessible. It also plans to collaborate with external partners to incorporate technological advancements into its omnichannel platforms.

It will also continue to optimize internal communication and the employee experience through the adoption of the same technology.

Repsol's commitment to omnichannel technology reinforces its focus on the user and customer experience.

Related Trends

- Web3
- XR
- Metaverse
- Hyper-personalization
- Human Digital Twin
- Optichannel

New Channels & Interfaces

Portals

Moment: **Adopt**

State: **Old**

Areas: **Client**

Description

Portals, in the context of customer channels, refer to web-based platforms or interfaces that provide customers with access to a wide variety of services, information, and interactions with a business or organization. They function as a centralized hub where users can interact with the company, access services, support, account information, and more. They are critical to improving the customer experience and fostering long-term relationships.

Capabilities

Some of its key features are:

- Self-service capabilities for tasks such as account management, bill pay, and product customization.
- Access to real-time information, order status, and transaction history, providing transparency to customers.
- Personalization based on preferences, behavior, and previous interactions, creating tailored experiences.
- Secure authentication and data protection measures to ensure the security of customers' sensitive information.
- Integration with other systems such as CRM (Customer Relationship Management) and ERP (Enterprise Resource Planning) for a seamless experience.
- Multi-channel support, allowing customers to interact across the web, mobile devices, and other touchpoints.



Portals

Adoption at Repsol

Repsol has used portals to optimize different business processes and improve the user experience (employees and customers). These portals function as centralized platforms to access information, manage resources, and facilitate communication.

The implementation of portals has contributed to the company's digital transformation. To this end, Repsol has leveraged Adobe's technology to optimize the delivery of personalized and customer-oriented content.

Repsol's Future Plans

Repsol plans to further enhance its portals by integrating advanced analytics and artificial intelligence to deliver hyper-personalized experiences based on customers specific needs. In addition, it will focus on improving the interface and user experience.

Related Trends

-  Biometrics
-  Intelligent Applications

New Channels & Interfaces

XR

Moment:

Try

State:

Old

Areas:

E&P

ITyEC

LCG

Client

Corporation

Description

XR, or Extended Reality, is an umbrella term that encompasses virtual reality (VR), augmented reality (AR), and mixed reality (MR). These technologies combine the physical and virtual worlds to create immersive and interactive experiences that go beyond traditional boundaries.

Extended Reality technologies have applications in various industries, such as entertainment, education, health, and business. They allow users to visualize and interact with digital content in the real world, opening up new possibilities for training, simulation, and collaboration.

Types of Extended Reality (XR):

- Virtual Reality (VR)
- Augmented Reality (AR)
- Mixed Reality (MR)



Adoption at Repsol

Although Extended Reality (XR) is not new to Repsol and we have been exploring it for years, technological advances are constantly expanding its possibilities. Therefore, we continue to research its use to improve different business processes and employee training.

Some examples of application at Repsol are:

- Service Station Training
- LPG Tank Display
- Remote and guided support

XR

Repsol's Future Plans

Repsol seeks to expand the use of XR to improve remote expert assistance through augmented reality, with initiatives such as:

- Implementation of AR for remote assistance, allowing problems to be detected and resolved in real time.
- Expansion of XR in training programs, covering more complex scenarios and operations.
- Integrating XR with other digital technologies to deliver richer, immersive employee experiences.

Related Trends

- Web3
- Omnichannel
- Metaverse
- Optichannel

New Channels & Interfaces

Metaverse

Moment: **WAIT**

State: **Old**

Areas: **ITyEC** **Client** **Corporation**

Description

The Metaverse is a collective shared virtual space, created by the convergence of virtually enhanced physical reality and persistent virtual reality, which includes the sum of all virtual worlds, augmented reality, and the internet. The concept of the Metaverse encompasses virtual spaces where users can interact with a computer-generated environment and with other users through avatars. It represents a fusion between the physical and virtual worlds, offering immersive experiences, social interactions, and economic activities.

Characteristics:

- Virtual environments
- Avatar customization
- Social interactions



Related Trends

- Web3
- Omnichannel
- XR
- Spatial Computing
- Optichannel

New Channels & Interfaces

AI Avatars

Moment:

Watch

State:

New

Areas:

Client

Corporation

Description

AI Avatars are digital representations of individuals created using artificial intelligence algorithms. These avatars can mimic human behavior, interact with users in real-time, and perform tasks ranging from customer service to entertainment. AI avatars use natural language processing (NLP) and machine learning (ML) techniques to simulate human-like interactions and responses. These virtual assistants can improve customer service, offer personalized recommendations, and facilitate interaction on various online platforms.

Capabilities

Applications:

- Customer Service
- Personal assistants
- Entertainment

Related Trends

- Generative AI Virtual Assistants
- Generative AI



New Channels & Interfaces

Hyper-Personalization

Moment:

Try

State:

Updated

Areas:

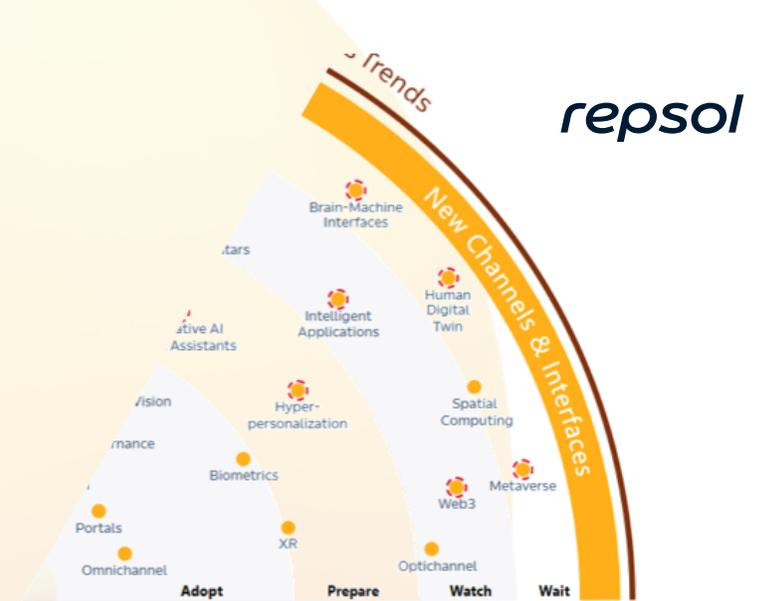
Client

Corporation

Description

Hyper-Personalization refers to the practice of tailoring products, services, and experiences to individual preferences and behaviors with a high degree of accuracy. This approach goes beyond simply personalizing content, using advanced data analytics, artificial intelligence, and machine learning algorithms to deliver real-time recommendations and experiences, dynamically tailored to each user.

However, true hyper-personalization has not yet been achieved either socially or technologically. There are barriers both in the ability to process data in real time and in the social and regulatory acceptance of such a profound level of personalization. Aspects such as privacy, ethics in the use of data and interoperability between systems limit the total implementation of this concept.



Hyper-Personalization allows companies to provide individualized experiences across multiple touchpoints, fostering customer engagement and loyalty. By analyzing user data and behavior patterns, organizations can anticipate needs, offer relevant recommendations, and create seamless interactions that resonate with each user.

Proceeds:

- Increased customer satisfaction
- Increased conversion rates
- Improved brand loyalty

Hyper-Personalization

Adoption at Repsol

Hyper-Personalization is the evolution of personalization of the user experience, the latter being a pre-built application in what we do.

There is still a long way to go in the development of hyper-personalization, and it continues to offer greater possibilities as technology advances, as evidenced by the recent contributions of Generative AI to this field.

At Repsol, we have begun experimenting in:

- Collection of Customer Data
- Targeted products and services
- Improving the Customer Experience

Related Trends

- Omnichannel
- Human Digital Twin

New Channels & Interfaces

Human Digital Twin

Moment: **WAIT**

State: **New**

Areas: **Client** **Corporation**

Description

The Human Digital Twin refers to a virtual representation of an individual, created using real-time data and advanced analytics. It is used to simulate, predict, and optimize human health and performance. The Human Digital Twin is not just a single technology or method, but a comprehensive system that integrates diverse data sources and advanced analytics to create a dynamic and accurate virtual model of a person. It ensures that data is continuously updated and analyzed to provide insights into health, performance, and behavior.

The Human Digital Twin combines physiological, behavioral, and environmental data, enabling improved personalized care, performance optimization, and preventative measures. By leveraging artificial intelligence and machine learning, this technology can predict health issues, recommend interventions, and improve overall well-being.



Capabilities

- Real-time monitoring and analysis of health and performance data.
- Improved personalized care and preventive measures.
- Predictive analytics for health issues and performance optimization.
- Integration of physiological, behavioral and environmental data.

Human Digital Twin

Applications:

- Health
- Sport
- Personal Use

Potential use cases in the energy industry:

- Work environment
- Field Workers
- Control Room Operators
- Maintenance Teams
- Emergency Response

Related Trends

- Hyper-Personalization
- Omnichannel

New Channels & Interfaces

Biometrics

Moment: **Adopt**

State: **Updated**

Areas: **E&P** **ITyEC** **LCG** **Client** **Corporation**

Description

Biometrics refers to the measurement and statistical analysis of people's unique physical and behavioral characteristics. It is mainly used for authentication and access control, improving security and convenience.

Biometrics is not just a single technology or method, but a comprehensive system that supports various authentication techniques, such as fingerprint recognition, facial recognition, and iris scanning. It ensures that data and access are secure, accurate, and efficient, no matter the platform or location. Biometrics integrates various data sources and methods, including physiological and behavioral traits. This approach improves user security and convenience, promoting better identity management and fraud prevention. Using advanced algorithms and machine learning, biometrics can automate authentication processes, reduce errors, and strengthen overall security.

Capabilities

- Secure and accurate authentication across diverse environments and platforms.
- Increased security and convenience for better identity management.
- Automation of authentication processes using advanced algorithms and machine learning.
- Support for multiple biometric traits, including:
 - Speech recognition
 - Facial recognition
 - Fingerprint recognition
 - Palm recognition
 - Iris Scan
 - Heartbeat recognition
 - Vein Pattern Recognition
 - Blood tests



Biometrics

Adoption at Repsol

At Repsol, we have begun to adopt biometric technology to improve security and user experience. Some real cases include:

- Customer authentication in our call centers.
- Secure access control for visitors to our facilities.
- Biometric verification for transactions on our mobile apps.

Repsol's Future Plans

Looking ahead, Repsol plans to expand the use of biometrics to further improve security and operational efficiency. Some future initiatives include:

- Implement biometric authentication for employee access to sensitive data and systems.
- Expand biometric verification to more customer service channels, including online platforms.
- Integrate biometrics with IoT devices for secure and seamless interactions.
- Explore advanced biometric technologies.

Related Trends

- Portals
- Intelligent Applications

New Channels & Interfaces

Spatial Computing

Moment: **WAIT**

State: **Updated**

Areas: **E&P** **ITyEC** **LCG** **Client** **Corporation**

Description

Spatial Computing is the new term used to refer to all 3D web experiences, including the metaverse and immersive experiences. It involves the use of digital technology to interact with and manipulate real-world objects and environments through augmented reality (AR), virtual reality (VR), and mixed reality (MR).

Spatial computing isn't just about creating immersive experiences. It encompasses a wide range of technologies that enable interaction with 3D environments, including AR, VR, and MR. These technologies allow users to visualize and manipulate digital content in real space, providing applications in gaming, education, healthcare, architecture, and more. Spatial computing enables improved user experiences, better training and simulation, and innovative solutions for remote collaboration. By merging the physical and digital worlds, it opens up new possibilities for how we interact with technology and our environment.



Capabilities

- Immersive experiences through AR, VR and MR. Interaction with 3D environments.
- Applications in gaming, education, health, and architecture.
- Enhanced user experiences and solutions for remote collaboration.
- Development of the metaverse and other immersive 3D web experiences.
- Improved training and simulation for various industries.
- Innovative solutions for remote work and collaboration.

Related Trends

-  Web3
-  Metaverse

New Channels & Interfaces

Brain-Machine Interfaces

Moment: **WAIT**

State: **New**

Areas: **ITyEC** **Corporation**

Description

Brain-Machine Interfaces are systems that allow direct communication between the brain and external devices, which are designed to assist, augment, or repair human cognitive or sensorimotor functions.

They are not just a single technology, but a multidisciplinary field that combines neuroscience, engineering, and computer science. They can interpret brain signals and translate them into commands for external devices, such as prosthetics, computers, or even other brains. This technology has the potential to revolutionize medical treatments for neurological disorders, improve human capabilities, and create new forms of human-computer interaction.

Brain-Machine Interfaces can be invasive, involving implants, or non-invasive, using external sensors. Advances in AI and machine learning are crucial to improving accuracy and functionality, making them more accessible and effective.



Capabilities

- Enhanced human capabilities.
- Creation of new markets.
- Improved accessibility Human-computer interaction.

Overall, the disruptive potential of Brain-Machine Interfaces lies in their ability to fundamentally change how we interact with technology and enhance human capabilities, creating new opportunities and challenges for businesses.

New Channels & Interfaces

Intelligent Applications

Moment:

Watch

State:

New

Areas:

E&P

ITyEC

LCG

Client

Corporation

Description

Intelligent Applications are software solutions that incorporate artificial intelligence, advanced data analytics, and automation to make decisions, adapt to context, and deliver optimized experiences. These applications not only execute predefined tasks, but also learn from the environment, the user, and the data to improve their performance in real time.

Their ability to self-improve, contextualize, and proactively respond makes them a key element in the evolution of enterprise software, from static to dynamic, intelligent, and customized systems.

Capabilities

- Automated and contextualized decision-making.
- Continuous learning through AI and data analytics.
- Real-time personalization based on usage patterns.
- Dynamic adaptation to new conditions or inputs.
- Integration with business systems and operational flows.

Related Trends

 Portals

 Biometrics

 Modern Workplace



New Channels & Interfaces

Optichannel

Moment: **Watch**

State: **New**

Areas: **Client**

Description

Optichannel represents the natural evolution of multichannel and omnichannel approaches toward a more intelligent, contextual, and customer experience centered strategy. It's not simply about being present across all channels but about selecting the optimal channel at the right moment, for each customer and each interaction, maximizing relevance, efficiency, and fluidity.

This strategy is powered by technologies such as artificial intelligence, advanced analytics, process automation, and adaptive interfaces, enabling real-time dynamic personalization and intelligent orchestration of touchpoints. The goal is to deliver integrated, coherent, and frictionless experiences across both physical and digital channels, anticipating user needs and minimizing the effort required in each interaction.

Capabilities

- Seamless integration of physical and digital channels into the user experience.
- Real-time personalization based on behavior and preferences.
- customer journey analytics and intelligent channel orchestration.
- Consistency and continuity between interactions at different touchpoints.
- Dynamic adaptation of the optimal channel depending on the user's context.
- Optimization of campaigns and business processes using AI.

Related Trends

- Web3
- Omnichannel
- XR
- Metaverse



Sustainability Enabled by Digital

Energy Management and Optimization

Moment: **Watch**

State: **Updated**

Areas: **E&P** **ITyEC** **LCG** **Client** **Corporation**

Description

Energy Management and Optimization (EMS) systems are software platforms that monitor, analyze, and control energy consumption in buildings, industrial facilities, and power grids. They use data analytics, machine learning, and IoT sensors to optimize energy use, reduce costs, and minimize environmental impact.

Unlike purely deterministic approaches, EMSs incorporate stochastic variables, allowing uncertainty and variability in energy demand, generation, and prices to be modeled. This improves predictability and optimization in dynamic environments. In addition, the current trend is to integrate stochastic variables with the value chain, allowing for more holistic and adaptive energy management to changing market and operating conditions.

Energy Management and Optimization systems help organizations optimize energy use, reduce costs, and achieve sustainability goals. They provide insights into energy consumption patterns, identify areas for improvement, and automate energy-saving measures such as load reduction and demand response.

Some key features are:

- Data monitoring and analysis
- Optimization algorithms
- Integration with IoT devices

Related Trends

-  ESG Management and Reporting Systems



Sustainability Enabled by Digital

EV Charging Infrastructure

Moment: **Adopt**

State: **Old**

Areas: **Client** **IT & Digital**

Description

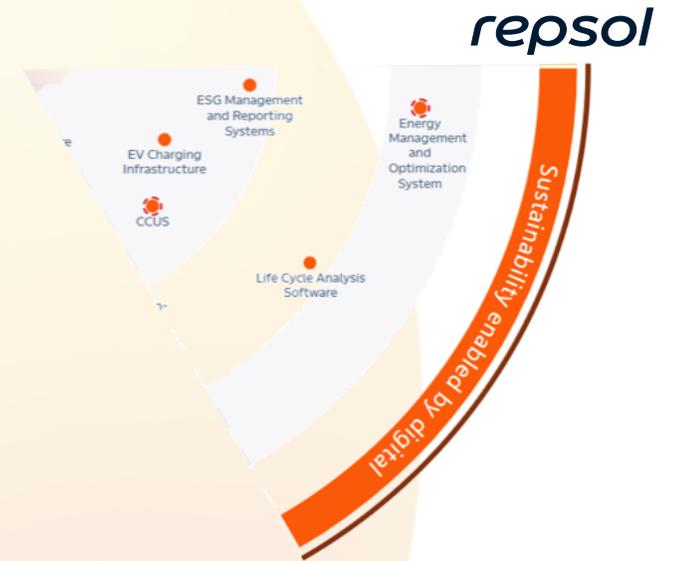
Electric Vehicle (EV) Charging Infrastructure refers to the network of charging stations and support infrastructure for electric vehicles. It includes a variety of charging station types, from standard Level 1 chargers to DC fast chargers, as well as associated hardware and software for monitoring and billing.

EV Charging Infrastructure is critical to the adoption and proliferation of electric vehicles. It comprises public charging stations installed in parking lots, streets and highways, as well as private solutions for homes, workplaces and fleet operators.

This infrastructure plays a key role in reducing range anxiety, increasing convenience, and supporting the transition to sustainable transportation.

Components:

- Charging stations
- Network connectivity
- Payment and billing systems





EV Charging Infrastructure

Adoption at Repsol

Repsol has made progress in the development and implementation of EV Charging Infrastructure to respond to the growing demand for electric vehicles.

From a technical perspective, this represents a significant challenge in which the company has worked on the IT adaptations necessary for the management of the EV charging network.

These accommodations include:

- Advanced communication systems
- Demand Forecasting
- Integration with renewable energies

Repsol's Future Plans

Repsol plans to continue improving its EV charging network by increasing the number of stations and improving their capacities. The company seeks to integrate advanced technologies, such as smart charging and energy management systems, to optimize the charging process and improve the user experience.

In addition, Repsol will focus on developing ultra-fast charging stations to reduce charging times and facilitate EV adoption.



Sustainability Enabled by Digital

repsol

ESG Management and Reporting Systems

Moment: **Adopt**

State: **Old**

Areas: **Corporation**

Description

ESG (Environmental, Social, and Governance) Management and Reporting Systems are software platforms that help organizations measure, monitor, and report their sustainability and social responsibility initiatives. They allow companies to track ESG performance, set goals, and communicate their progress to stakeholders.

These systems make it easy to integrate sustainability considerations into operations and business decision-making. They automate the collection, analysis, and reporting of ESG metrics, such as carbon emissions, diversity, employee engagement, and corporate governance.

Some of its key features are:

- ESG Data Management
- Performance Tracking
- Stakeholder engagement
- Compliance



ESG Management and Reporting Systems

Adoption at Repsol

Repsol has been actively working on the implementation of an ESG Management and Reporting System. This system is designed to optimize the collection, analysis, and reporting of ESG data, providing a more complete view of Repsol's performance.

Main Focuses:

- Data Source Integration
- Transparent reporting
- Identification of areas for improvement

Repsol's Future Plans

Repsol seeks to expand the capabilities of this system to cover more areas of its operations, ensuring comprehensive monitoring and reporting of ESG performance. It also plans to incorporate the latest technological advancements into its ESG Management & Reporting System as they become available.

Related Trends

- Energy Management and Optimization Systems



Sustainability Enabled by Digital

repsol

Life Cycle Analysis Software

Moment:

Try

State:

Updated

Areas:

E&P

ITyEC

LCG

Client

IT & Digital

Corporation

Description

Life Cycle Analysis Software provides comprehensive tools to assess the environmental impacts of products throughout their entire life cycle, from raw material extraction to material processing, manufacturing, distribution, use, repair and maintenance, and disposal or recycling.

Capabilities

- Comprehensive impact assessment by assessing environmental effects such as carbon footprint, water use and energy consumption at each stage of the product life cycle, facilitating the identification of key areas for improvement.
- Integrating data from various sources to provide a holistic view of a product's environmental impact, including data from the supply chain, manufacturing processes, and end-of-life disposal methods.
- Scenario analysis to assess the potential environmental benefits of different product designs, materials, and manufacturing processes.

- Supporting regulatory compliance by ensuring products meet environmental standards and regulations.

Adoption at Repsol

Repsol is integrating Life Cycle Analysis Software into several pilot projects to explore its potential benefits:

- Yme Lifecycle Information Management
- Supply Chain Optimization
- Project Planning & Cost Management
- Regulatory Compliance and Net Zero Emissions Tracking.

Life Cycle Analysis software is proving to be a valuable tool at Repsol, providing comprehensive information on the environmental impact of products and processes throughout their entire life cycle.



Sustainability Enabled by Digital

CCUS

Moment:

Adopt

State:

Old

Areas:

E&P

ITyEC

Description

Carbon Capture, Usage and Storage (CCUS) is a set of technologies that allow carbon dioxide (CO₂) emitted by industrial or energy processes to be captured, reused in productive applications or safely stored in deep geological formations. This technology is key to the decarbonization of hard-to-electrify sectors and to achieving net-zero targets.

CCUS is a technological ecosystem that combines sensors, control systems, transport infrastructure, geological storage and digital platforms. Its implementation requires integration with technologies such as artificial intelligence, edge computing, and industrial automation.

Capabilities

- CO₂ capture in industrial and energy sources.
- CO₂ reuse in chemical processes, synthetic fuels or building materials.
- Safe and traceable geological storage.
- Real-time monitoring and verification using sensors and digital platforms.
- Integration with automation, AI, and edge computing technologies.

Adoption at Repsol

Repsol is driving the development of CCUS technologies as a member of the Oil and Gas Climate Initiative (OGCI), through investments made by the OGCI Climate Investments fund.

In addition, it is participating in the TarraCO₂-Storage project, which aims to store 54 million tonnes of CO₂ from hard-to-abate industries in northeastern Spain.





CCUS

This initiative represents a unique opportunity for industrial decarbonization in Southern Europe through a safe, efficient, and scalable method of permanent CO₂ storage.

Repsol is also leading a large-scale geological CO₂ storage project in the United States: the "Aves" storage hub in Texas, in partnership with Carbonvert Inc. and Mitsui & Co. This consortium has formed the joint venture "Aves" to develop storage permits in offshore geological formations in the Gulf of Mexico (Texas coast). In 2023, Aves (led by Repsol) was awarded concessions for two state areas - Port Aransas North and Mustang Island, totaling ~350 km² - granted by the Texas General Land Office for use in CO₂ sequestration projects from industries in the Corpus Christi region.

Furthermore, in 2024, Repsol - through its affiliate Petronor - began construction of a pilot plant for synthetic fuels at the Port of Bilbao. This pioneering project will produce liquid synthetic fuels (such as kerosene or diesel) from renewable hydrogen and captured CO₂, instead of petroleum. The facility includes a 10 MW electrolyzer to generate green hydrogen and will be supplied with CO₂ captured from industrial sources (e.g., refining processes at Petronor or other plants).

Through chemical reactions (Fischer-Tropsch synthesis or others), it will combine H₂ and CO₂ to obtain synthetic hydrocarbons which, being carbon-neutral fuels, can be used in transportation (aviation, trucking), thereby reducing net emissions.

Repsol's Future Plans

Repsol aims to continue driving the development of carbon capture, utilization, and storage (CCUS) technologies, reinforcing its role in industrial decarbonization and exploring new applications for captured CO₂. Key strategic lines include:

- Development of carbon capture and storage hubs: Repsol seeks to position itself as a key player in the creation of shared infrastructure capable of managing CO₂ from multiple sources efficiently and securely.
- International expansion of storage hubs: The company plans to advance the development of geological CO₂ storage infrastructure in strategic markets, with the goal of strengthening its global presence and enabling the decarbonization of major industrial clusters through scalable, high-impact technological solutions.
- Synthetic fuels and carbon removals: Repsol is exploring the use of captured CO₂ to produce zero-emission synthetic fuels and to progress toward negative-carbon technologies.

Productivity & Automation

Robotics & Hardware Automation

Moment:

State:

Areas:

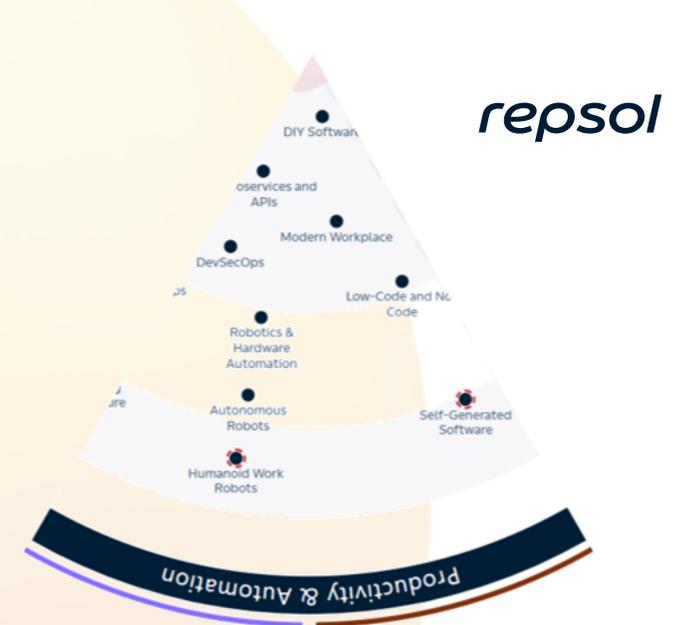
Description

Robotics & Hardware Automation involve the use of robotic systems and automated hardware to improve operational efficiency and safety. These technologies are fundamental in modern industrial processes, providing precision and reliability. Robotics & Hardware Automation encompass a wide range of technologies designed to automate physical tasks.

These systems can operate in hazardous environments, perform repetitive tasks with high precision, and integrate seamlessly with other digital systems. By leveraging advanced sensors, AI, and machine learning, these technologies can adapt to changing conditions and optimize performance. This integration improves productivity, reduces human error, and increases safety in various industrial applications.

Capabilities

- Automated operation in hazardous and challenging environments.
- High accuracy and reliability in repetitive tasks.
- Integration with AI and machine learning for adaptive performance.
- Greater safety and efficiency in industrial processes.



Robotics & Hardware Automation

Adoption at Repsol

Repsol has adopted robotics and hardware automation to improve operational efficiency and safety.

Some prominent use cases include:

- Robotic arms in LPG plants for handling hazardous materials.
- Firefighting and emergency response robots in refineries and chemical plants.
- Drones for the inspection of generators and solar panels in LCG.
- Drones for analysis of the integrity of the plant's infrastructure (Bolivia) and seasonal campaigns for CO2 emissions analysis.
- Automated guided vehicles (AGVs) for the transport of materials in industrial complexes.
- Collaborative robots for laboratory automation and sample handling.

Repsol's Future Plans

Looking ahead, Repsol plans to continue investing in robotics and hardware automation. The focus will be on adopting more advanced robots, including autonomous and humanoid robots, to further improve operational capabilities and safety.

For example:

- The possibility of using drones for pipeline inspection in E&P operations is being considered.
- In the Autonomous Plant roadmap, it is proposed to include drones for asset monitoring, autonomous supervision robots with day and infrared vision, etc.

This evolution will support Repsol's commitment to innovation and efficiency in its industrial processes.

Related Trends

- Humanoid Work Robots
- Autonomous Robots
- Intelligent Assets and Operations

Productivity & Automation

Humanoid Work Robots

Moment: Watch

State: New

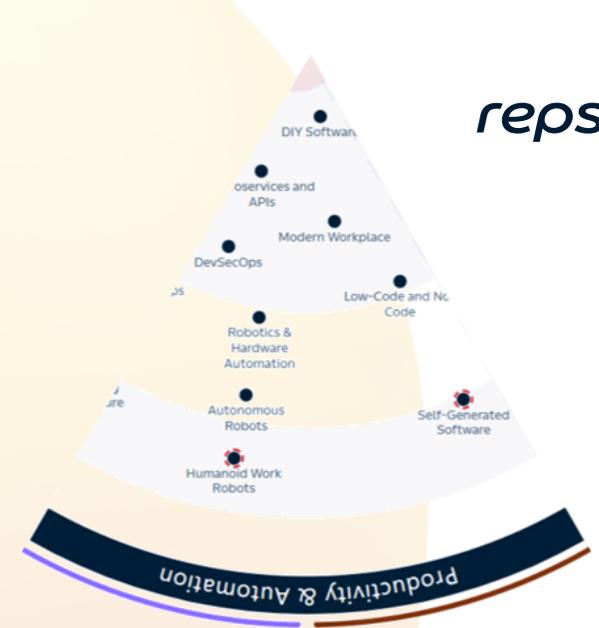
Areas: E&P ITyEC LCG Client Corporation

Description

Humanoid Robots or Humanoid Work Robots are advanced robots designed to mimic human movements and interactions. They are used in various industries to perform dangerous, repetitive, or precision-demanding tasks.

Humanoid Robots at work are not simply machines; They represent a fusion of advanced robotics, artificial intelligence, and human-like design. They are equipped with sensors and actuators that allow them to perceive their surroundings and interact in a similar way to humans. They can perform a wide variety of tasks, from assembly line work to customer service and hazardous materials handling. By integrating AI, these robots can learn from their experiences, adapt to new tasks, and improve their performance over time. This makes them invaluable in industries where flexibility and accuracy are critical.

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Capabilities

- Perform complex and repetitive tasks with high precision.
- Interact with humans in a natural and intuitive way.
- Adapt to new tasks using machine learning and AI.
- Operate in hazardous environments to ensure human safety.

Adoption at Repsol

An initiative is underway at D.Technology to test the G1 Unitree humanoid robot for possible use in an autonomous plant.

Related Trends

- Intelligent Assets and Operations
- Autonomous Robots
- Robotics & Hardware Automation

Productivity & Automation

Autonomous Robots

Moment: **Try**

State: **New**

Areas: **E&P** **ITyEC** **LCG** **Client** **Corporation**

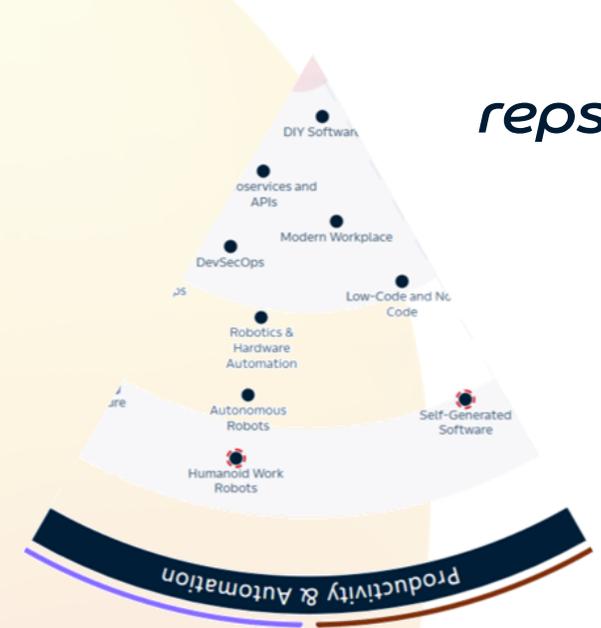
Description

Autonomous Robots are machines capable of performing tasks or actions without human intervention. They use sensors, algorithms, and artificial intelligence to perceive their environment, make decisions, and execute actions autonomously. They find applications in various industries, including manufacturing, logistics, agriculture, and healthcare. They can perform tasks such as assembly, packaging, transportation, and surveillance with precision and efficiency, leading to increased productivity and safety.

Some key technologies include:

- Sensors and perception
- Navigation and route planning
- Machine Learning and AI

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Adoption at Repsol

At D.Tecnología, tests are being carried out with different autonomous robots: general-purpose robot (Unitree's humanoid G1 robot) and inspection robot.

Related Trends

- Robotics & Hardware Automation
- Humanoid Work Robots
- Intelligent Assets and Operations

⊗ Productivity & Automation

Low-Code & No-Code

Moment: **Adopt**

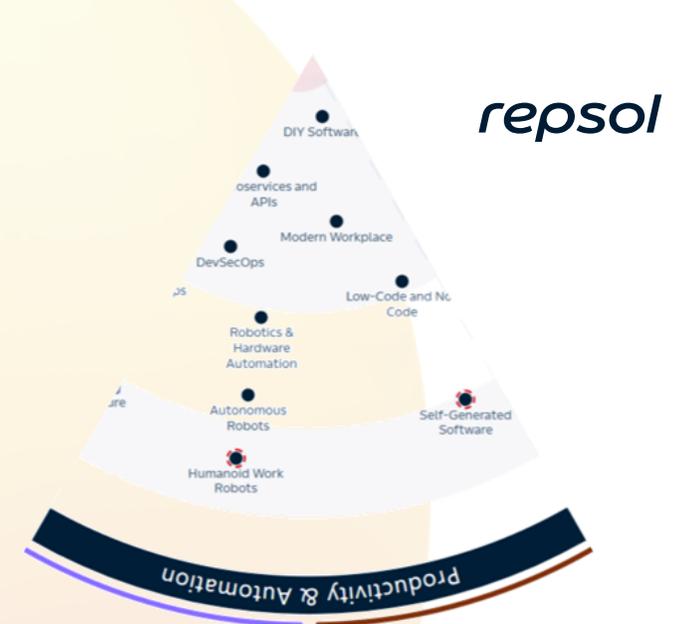
State: **Old**

Areas: **IT & Digital**

Description

Low-Code and No-Code development platforms are software tools that allow for the rapid creation of applications with minimal need for manual programming. These platforms allow users to design and configure applications visually, using drag-and-drop interfaces, pre-built components, and templates, reducing reliance on traditional coding skills.

Low-Code and No-Code platforms democratize application development by enabling citizen developers, business analysts, and IT professionals to create custom solutions quickly and efficiently. They accelerate the software development lifecycle, reduce time to market, and help organizations innovate and adapt to changing business needs.



Some of its key features are:

- Visual Development Environment
- Reusable components
- Integration capabilities

Low-Code & No-Code

Adoption at Repsol

Repsol is adopting Low-Code platforms to improve agility and innovation in application development. These tools reduce the need for manual programming, streamlining development cycles and reducing reliance on traditional processes.

Repsol has started this process with OutSystems, one of the main Low-Code platforms, to optimize several business processes:

- Application Portfolio Management (APM)
- Agility in Application Development
- Innovation in IT functions

In addition, Repsol is exploring No-Code platforms, which further simplify development by allowing the creation of applications without the need for coding. As this technology matures, Repsol plans to conduct tests to evaluate its benefits and its integration into existing workflows.

The Low-Code and No-Code platforms are already adding value to Repsol by improving agility, innovation, and efficiency in application development.

Use cases:

- Application Portfolio Management (APM)
- ITSM

- Creation, Update, and Deletion (CUD) of Applications, Technical Services, and Platforms

Repsol's Future Plans

Repsol seeks to further expand the use of Low-Code and No-Code to improve operational efficiency and innovation. Their plans include:

- Integration of Low-Code / No-Code with other digital technologies, such as AI and Generative AI, to create more automated and complete solutions.
- Expanding the scope of applications developed with Low-Code / No-Code to cover more complex business processes.
- Training and support for employees so they can leverage these platforms effectively.

In conclusion, Low-Code and No-Code are already contributing significantly to Repsol's operations, and with planned improvements, they are expected to play an even more crucial role in innovation and efficiency in the future.

Related Trends

● Self-Generated Software

● DIY Software

⊗ Productivity & Automation

DIY Software

Moment: **Adopt**

State: **Old**

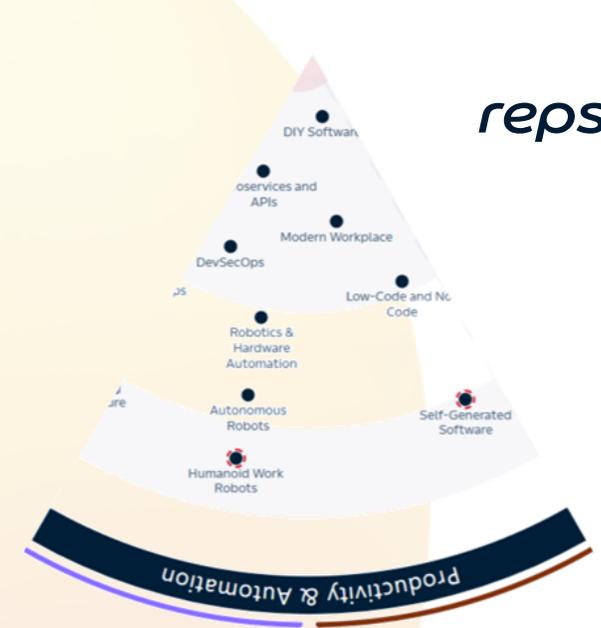
Areas: **IT & Digital** **Corporation**

Description

DIY Software (Do It Yourself Software) refers to manual development applications from scratch, using traditional programming languages, frameworks, libraries and technical tools. This approach gives the developer full control over the logic, architecture, and design of the solution, allowing for complete customization and deep integration with other systems.

Unlike automated approaches, DIY Software involves the developer designing, coding, testing, and deploying the solution without relying on visual platforms or pre-built components.

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Key features:

- Manual development
- Maximum control and flexibility
- High customization
- Requires advanced technical knowledge
- Increased effort and development time

This approach remains essential in contexts where a high degree of customization, performance, security, or integration with complex systems is required.

DIY Software

Adoption at Repsol

Repsol has several "flavors" of complexity and capacity, depending on the level of training each person wants to undertake, and each flavor is supported by different platforms to provide the right tools. Repsol has established a dedicated DIY center to support and guide employees in their projects.

As part of this momentum, an innovation space called hackathon (#HackItYourself) has been launched to promote Digital Transformation at Repsol through DIY and foster a culture of innovation. This initiative provides employees with tools to digitize and streamline their daily processes.

Thanks to the DIY development model, we have achieved the following results:

- More than 100 creator employees actively participated, many of them business users with no prior automation experience. his model is supported by tools such as PowerApps and Power BI, and has given rise to an active community of makers who develop solutions to automate tasks, improve efficiency and reduce errors.
- More than 500 robots in production, developed by our creators.
- More than €1 million in impacts generated by robots in 2024, and more than €3 million accumulated since the launch of the project in 2022.

Repsol's Future Plans

Repsol plans to expand the DIY initiative by providing more training and resources to employees, allowing them to develop innovative solutions independently. In addition, Repsol will focus on fostering a collaborative environment where employees can share their DIY projects and learn from each other's experiences. Repsol's commitment to the DIY approach underscores its dedication to innovation and operational excellence.

Related Trends

- Low-Code & No-Code
- Self-Generated Software

⊗ Productivity & Automation

Microservices and APIs

Moment: **Adopt**

State: **Old**

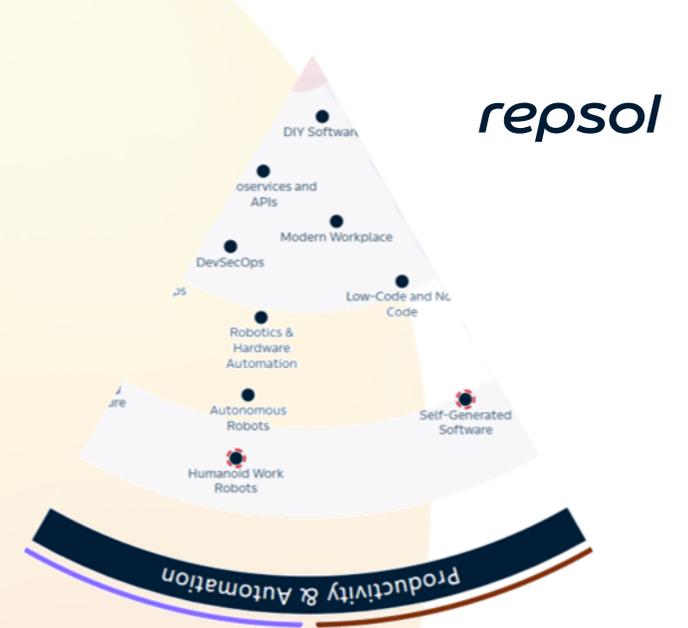
Areas: **IT & Digital**

Description

Microservices and APIs (Application Programming Interface) are architectural approaches used in software development to build scalable, modular, and distributed systems. Microservices break down applications into smaller, independently deployable services, while APIs define how different software components communicate with each other.

Capabilities

Microservices architecture promotes the development of complex applications as a set of small, independently deployable services. APIs serve as the interface between these services, allowing them to communicate and interact with each other. This approach improves scalability, agility, and maintainability in software development.



To promote the success of a composable microservices architecture, it is key to implement concepts such as DDD (domain driven design). It is a working model with a domain-based design, i.e. organizing systems/business objects around basic business concepts (domains).

Another key concept to enhance the microservices paradigm is an event-oriented architecture (EDA). On a global scale, it provides the ability to build agile, scalable systems capable of reacting in real time to changing conditions, which is essential in the face of current business demands. In particular, EDA makes it easier for microservices to interact in a decoupled way, ensuring flexibility and scalability of solutions. It also impacts the IoT domain, because EDA is key to handling millions of device events, ensuring efficient operations in environments with large volumes of real-time data.

Microservices and APIs

This type of composable architecture is an enabler for better adoption of company agentification:

- The DDD architecture based on composable APIs provides a flexible, scalable, and secure architecture that facilitates the integration and adoption of the use of AI agents.
- EDA architecture has a direct impact on AI adoption by facilitating the integration of intelligent algorithms into event streams, allowing companies to react intelligently and not just with basic automation.

Some key concepts are:

- Microservices
- Apis
- Containerization
- DDD-EDA

Adoption at Repsol

Repsol has adopted the use of Microservices and APIs to improve its digital architecture and operational efficiency. This approach enables the development of resilient and dynamically scalable applications, away from traditional cluster-based scaling. By adopting a microservices architecture, Repsol has been able to decompose complex applications into small, independent services that communicate with each other using language-independent APIs.

This has significantly improved the agility and scalability of Repsol's IT infrastructure.

In addition, Repsol has agreed on a strategy for the use of EDA, with the aim of improving flexibility and scalability in the synchronization of information between systems. This strategy also seeks to enhance AI initiatives through the availability of real-time data and events, as well as optimize the operation of industrial platforms. In parallel, a cross-cutting technological framework is being developed to facilitate its adoption.

- Composable Architecture
- Technical Design
- EMS/VAM Development Environment

Repsol's Future Plans

Repsol plans to expand the use of microservices in more business units, ensuring seamless access to information and resources. Repsol's commitment to leveraging Microservices and APIs underscores its dedication to innovation and operational excellence.

Related Trends

- DevSecOps

Productivity & Automation

Modern Workplace

Moment: **Adopt**

State: **Old**

Areas: **Corporation**

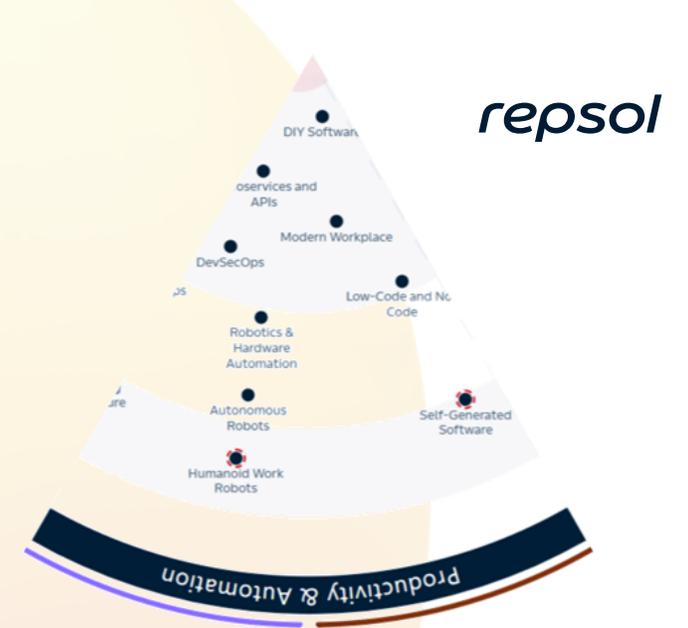
Description

Modern Workplace refers to a flexible, technology-based work environment that supports remote work, collaboration, and productivity through digital tools and platforms. It emphasizes the use of cloud services, communication tools, and collaborative software to create an efficient and adaptable work environment.

Modern Workplace leverages technology to enhance the employee experience, enhance collaboration, and increase productivity. It includes tools for virtual meetings, project management, file sharing, and real-time communication, allowing employees to work from anywhere and stay connected.

Key Components:

- Collaboration tools
- Cloud Services
- Safety



Modern Workplace

Adoption at Repsol

Repsol has been actively transforming its workplace to align with digital standards and needs. The concept of Modern Workplace at Repsol goes beyond physical spaces, encompassing various platforms and data used by employees. This transformation aims to foster a more agile, flexible, and collaborative environment that is employee-centric and innovation-oriented. We have adopted digital systems that support remote work and meetings between remote sites around the world.

Repsol's Future Plans

Repsol plans to continue evolving its Modern Workplace strategy by incorporating more advanced technologies and tools. The company aims to further improve the employee experience by providing more personalized and intuitive digital solutions. In addition, Repsol will focus on fostering a culture of continuous learning and development to ensure that employees are equipped with the skills necessary to thrive in a digital work environment.

By continuously improving and expanding this initiative, Repsol seeks to empower its employees, drive digital transformation, and maintain a competitive advantage in the industry.

Related Trends

- AI Multi-Agents
- Intelligent Applications
- Self-generated software

⊗ Productivity & Automation

DevSecOps

Moment: **Adopt**

State: **Old**

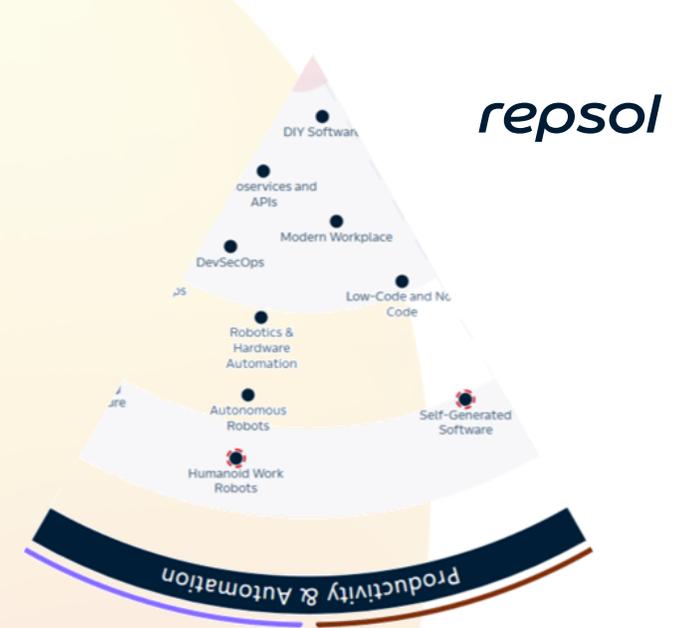
Areas: **IT & Digital**

Description

DevSecOps (Development, Security, and Operations) is a software development approach that integrates security practices into the DevOps process. It ensures that security is a shared responsibility throughout the development lifecycle, promoting collaboration between development, operations, and security teams. This approach aims to identify and address security issues as early as possible, reducing vulnerabilities and improving the overall security posture of the application.

Key practices:

- Automated security testing
- Security Training
- Continuous monitoring



DevSecOps

Adoption at Repsol

Repsol is promoting DevSecOps practices to improve the security and efficiency of its software development lifecycle. This approach integrates security practices within the DevOps process, ensuring that security is a continuous and integral part of the development workflow.

- Secure Development Lifecycle
- Safety Champions
- Continuous integration and deployment

Repsol's Future Plans

Repsol is evolving its DevSecOps practices to stay ahead of emerging security threats and improve its overall security posture. The company plans to expand its DevSecOps initiatives by incorporating advanced security tools and techniques, and fostering a culture of security awareness across teams.

Related Trends

- Microservices and APIs

⊗ Productivity & Automation

Self-Generated Software

Moment: Watch

State: New

Areas: IT & Digital

Description

Self-Generated Software refers to the use of artificial intelligence to automatically generate code based on user prompts. This technology leverages generative AI and NoCode platforms, representing their evolution.

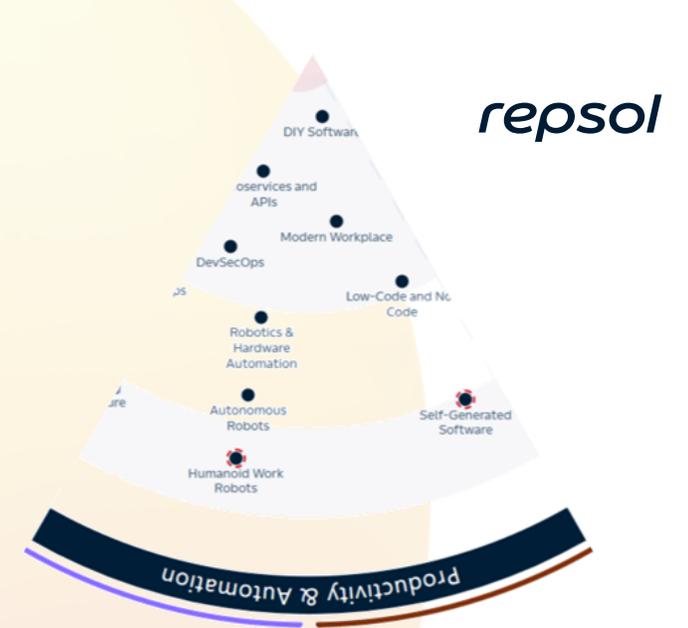
It has the potential to revolutionize the way applications are developed, benefiting both IT and Digital teams and end users. It ensures that code is generated automatically, reducing the need for manual coding and enabling faster development cycles. This approach improves the ability to create complex applications with minimal effort, making it accessible to both technical and non-technical users.

Capabilities

- Automatic code generation based on user prompts.
- Integration of generative AI and NoCode platforms.
- Increased speed and efficiency in development.
- Accessibility for technical and non-technical users.

Potential:

- For IT and Digital teams
- For End Users



Self-Generated Software

Generative AI and NoCode support:

Self-generated software is backed by advances in generative AI and platforms NoCode. La generative AI enables the creation of code based on natural language prompts, while NoCode platforms provide the infrastructure to build and deploy applications without the need for traditional coding. This combination represents the next evolution in software development, making it more intuitive and efficient.

Maturity level:

The maturity level of Self-Generated Software varies. While technology continues to evolve, robust solutions already exist that can handle a wide range of development tasks. As AI continues to advance, capabilities and reliability are expected to improve, becoming an increasingly viable option for both professional developers and casual users.

Related Trends

- Low-Code & No-Code
- Modern Workplace
- DIY Software



Open Connectivity

5G

Moment: **Adopt**

State: **Old**

Areas: **E&P** **ITyEC** **LCG**

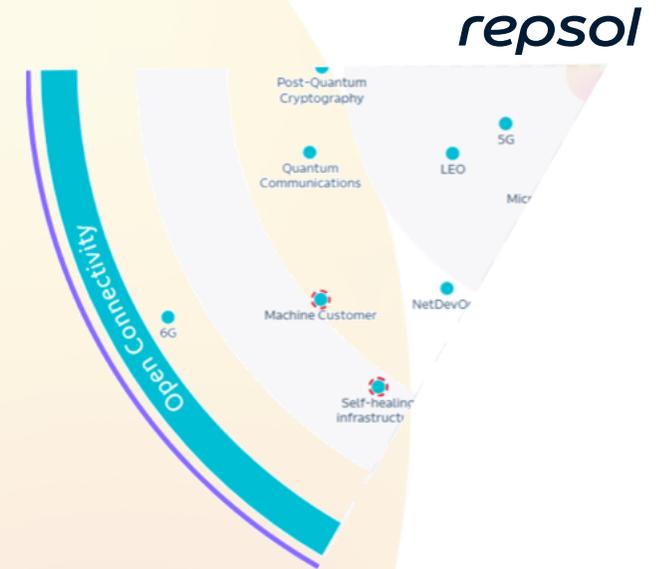
Description

5G is the fifth generation of mobile network technology, designed to provide higher data speeds, lower latency, and higher capacity compared to previous generations. It enables a wide range of applications, including enhanced mobile broadband, mass machine-to-machine communications, and ultra-reliability, low-latency communications.

5G technology uses higher frequency bands, advanced antenna technologies, and network slicing to deliver higher data rates and support a greater number of connected devices. It is expected to revolutionize industries such as healthcare, transportation, and manufacturing.

Some key features are:

- High data rates
- Low latency
- Massive connectivity





5G

Adoption at Repsol

Repsol has adopted 5G technology to advance digitalization and the way we communicate and interact with machines.

We value and use 5G as an enabler for our digital transformation. In industrial complexes, 5G is essential to digitize and optimize processes, making them more energy efficient, sustainable and safe.

Since 2019, Repsol has deployed 5G networks for private use at TechLab with the aim of testing and enabling industrial use cases such as tablet AGVs from which a virtualized control room was managed.

Subsequently, after certain pilots at Petronor, we began the deployment of 5G for private use in the plant, currently covering the entire plant and our facilities in the port for use cases such as MCPTX (Mission Critical Push To X. Where X = anything. More colloquially called ""Push To Talk"" or ""phone as a Walkie Talkie"" vitaminized), AGV (Autonomous Guided Vehicle), Expert Remote Assistance, Connected Operator or Thermal Imaging Cameras.

We have recently started the project to provide 5G network service for private use to the rest of our centres in Spain (A Coruña, Tarragona, Puertollano and Cartagena), to also provide them with coverage throughout the plant and enable various use cases with cameras, AGVs, smartphones, etc.

Within this framework, the IRIA Project stands out:

- Energy efficiency improvements
- Enhanced security protocols

Repsol's Future Plans

Repsol plans to further expand the use of 5G technology in more industrial complexes and business units (5G implementation plan in the CCII).

In addition, we will focus on developing new applications and use cases that leverage 5G to drive innovation and operational efficiency.

Repsol's commitment to 5G technology underscores its dedication to innovation and operational excellence.

Related Trends

● LEO

● 6G



Open Connectivity

LEO

Moment: **Adopt**

State: **Updated**

Areas: **E&P**

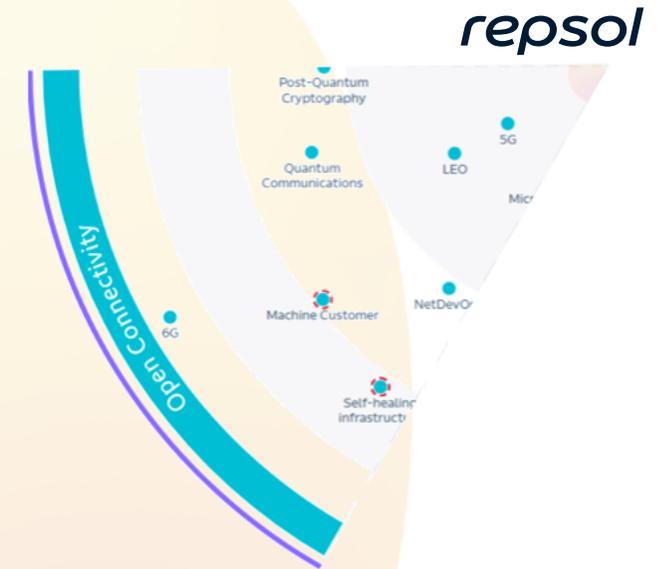
Description

Low-Earth orbit (LEO) satellites are satellites that orbit the Earth at altitudes ranging from 160 kilometers (99 mi) to 2,000 kilometers (1,200 mi) above sea level. LEO satellites offer advantages such as lower latency, higher data transmission rates, and better coverage compared to satellites in higher orbits. They are deployed in constellations to provide global broadband internet access, improve weather forecasting, and enable global connectivity for IoT devices.

Capabilities

Applications:

- Broadband Internet
- Earth Observation
- Communications





Open Connectivity

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LEO

Adoption at Repsol

Repsol has actively integrated LEO satellite technology to improve its communications infrastructure. This technology has been key to providing reliable coverage in assets located in remote areas, including Spain, Peru and the United States.

The implementation of LEO networks, such as Starlink, has significantly improved communications latency, enabling real-time monitoring and better connectivity for various operations.

Notable initiatives:

- Starlink technology in unconventional assets in the USA, due to connectivity problems in compressor stations, improving operational efficiency
- Smart Office Initiative
- Real-time monitoring
- User connectivity

Repsol's Future Plans

Repsol plans to expand the use of LEO technology to more remote locations and integrate it with other digital initiatives.

Future plans include exploring the use of LEO to:

- Autonomous Vehicle Communication
- Improving communication systems for disaster recovery
- Optimizing Real-Time Data Analytics

Related Trends

● 5G

● 6G



Open Connectivity

NetDevOps

Moment:

Try

State:

Updated

Areas:

IT & Digital

Description

NetDevOps is a methodology that applies DevOps principles to network operations (NetOps), integrating software development practices with network infrastructure management. It focuses on automation, collaboration, and continuous improvement to streamline network deployment, configuration, and monitoring processes.

NetDevOps enables organizations to accelerate network innovation, improve operational efficiency, and increase network reliability through automation and collaboration. Aligns network infrastructure with agile development practices, enabling faster delivery of network services and applications.

Main practices:

- Infrastructure as Code (IaC)
- Integration and Continuous Deployment (CI/CD)
- Collaborative workflows





NetDevOps

Adoption at Repsol

Repsol has been implementing NetDevOps practices for several years in specific network services, such as networks in CAMPUS and CORUÑA, and plans to expand them to other locations and the CCII. F5-based releases are made with API integration and developments.

Key Benefits:

- Network Automation
- Integration and continuous deployment
- Enhanced Security

Repsol's Future Plans

Repsol plans to extend the concept of DevOps in various ways, not only to the network, but to what is currently managed in a traditional way (computing, hypervisors, storage, networking, security, etc.). It will need to be based on IaC and adopt DevOps, applying a continuous cycle of CI/CD deployment and integration.

Future initiatives:

- Advanced Network Monitoring
- Collaboration with external partners

Related Trends

- Self-healing infrastructure



Open Connectivity

6G

Moment:

WAIT

State:

New

Areas:

E&P

ITyEC

LCG

Description

6G is the next generation of wireless communication technology, which is expected to succeed 5G in the future. It aims to provide even faster data speeds, lower latency, and higher reliability than its predecessor. 6G is expected to enable new applications and services, such as holographic communication, telepresence, and advanced AI, and leverage technologies such as terahertz frequency bands, advanced beamforming, and quantum communications to achieve its performance goals. It is designed to support new use cases that require ultra-reliable, low-latency communication, mass connectivity, and advanced wireless applications.

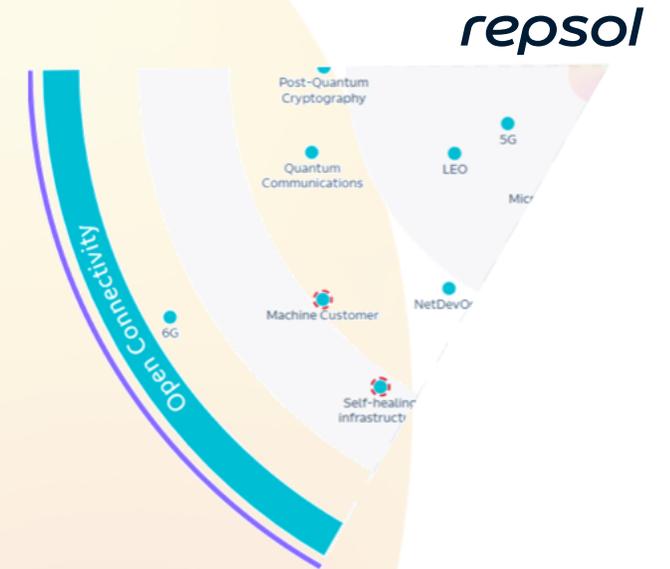
Some key technologies include:

- Terahertz communication
- Quantum communications
- AI-powered networks

Related Trends

● 5G

● LEO





Open Connectivity

Post-Quantum Cryptography

Moment:

Try

State:

New

Areas:

IT & Digital

Corporation

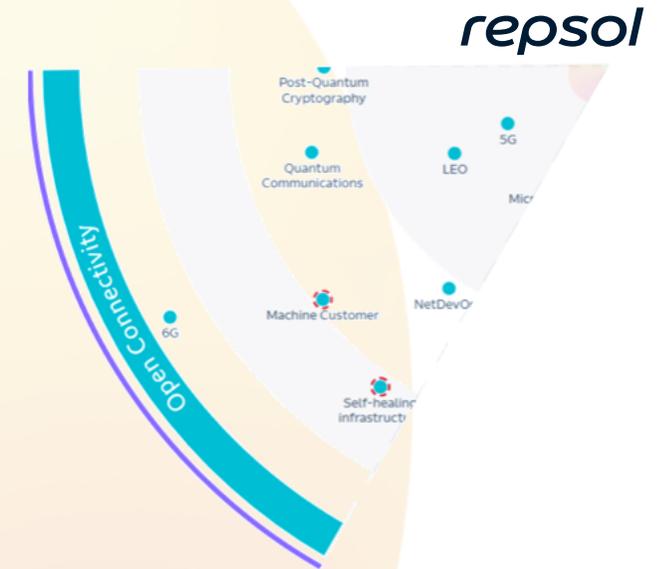
Description

Post-Quantum Cryptography refers to the development of encryption algorithms that are resistant to attacks by quantum computers. These algorithms are designed to protect data and communications in a world enabled by quantum computing.

Post-Quantum Cryptography seeks to address the security challenges posed by quantum computing, which could compromise the conventional cryptographic schemes used to protect information. By employing quantum-resistant algorithms and advanced cryptographic techniques, this discipline ensures the confidentiality, integrity, and authenticity of digital information in a quantum environment.

Key strategies:

- Development of quantum-resistant encryption algorithms.
- Design of secure communication protocols against quantum adversaries.





Post-Quantum Cryptography

Adoption at Repsol

Repsol is actively exploring post-quantum cryptography technologies to strengthen the security of its digital infrastructure. These technologies leverage the principles of quantum mechanics to provide advanced security measures, resistant to traditional cyber threats.

Post-Quantum Cryptography is a nascent technology and closely linked to quantum communications. The combination of the two represents a high degree of uncertainty, but also a great disruptive potential, which is why Repsol is closely monitoring its evolution.

Initiatives at Repsol:

- Quantum Advisory Team
- Market Standards Development

Repsol's Future Plans

Repsol will continue to monitor the evolution of post-quantum cryptography and plans to expand its initiatives as these technologies mature. The company is looking to integrate these solutions into its existing processes to improve the security and efficiency of its digital infrastructure.

Next steps:

- Advanced quantum technologies
- Collaboration with external partners

Post-Quantum Cryptography is emerging as a valuable solution at Repsol, contributing to greater security and efficiency in its digital infrastructure.

Related Trends

- Quantum Key Distribution (QKD)
- Quantum Communications



Open Connectivity

Quantum Communications

Moment: **Try**

State: **New**

Areas: **IT & Digital**

Description

Quantum Communications leverages the principles of quantum mechanics to ensure data transmission, providing unmatched security and efficiency in the exchange of information. By utilizing the unique properties of quantum entanglement and superposition, these communications ensure that information is transmitted in a way that is fundamentally resistant to interception and manipulation.

Quantum Communications is transforming the data security landscape by leveraging quantum entanglement and other quantum phenomena to ensure that data is transmitted securely. Unlike classical communication methods, which can be vulnerable to attack, quantum communications offer a virtually unbreakable encryption system. This is achieved through the use of quantum key distribution (QKD), where data security is based on the principles of quantum mechanics rather than mathematical algorithms.

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Quantum key distribution (QKD) is a cornerstone of quantum communications, providing a method to securely exchange encryption keys between two parties. If an intruder attempts to intercept the key, the nature of quantum mechanics ensures that the intruder's presence is detected, thus alerting the communicating parties to a breach. This level of security is unattainable with classical encryption techniques, which depend on the computational difficulty of certain mathematical problems.

Capabilities

Unprecedented security through quantum key distribution (QKD), which detects any interception attempts and secures communication. This method uses quantum bits (qubits) to encode data, making it impossible for an interceptor to listen in undetected. The security provided by QKD is based on the fundamental laws of physics, making it theoretically unbreakable.



Quantum Communications

Potential to revolutionize encryption and data security in various industries, including finance, healthcare, and government. Quantum communications can protect sensitive information and maintain privacy even against future advances in computing power, such as quantum computers that could break current cryptographic codes.

Increased efficiency in data transmission by reducing the risk of data breaches and ensuring that communication channels are secure. Quantum communications also promise faster data transfer rates and lower latency compared to classical methods. The gains in efficiency are due to the ability to transmit information using entangled particles, which can instantly correlate their states over long distances.

Long-term data integrity by ensuring that encrypted data remains secure indefinitely, as quantum keys are not subject to the same vulnerabilities as classical keys, which can eventually be cracked by advances in computing power or algorithmic discoveries.

Adoption at Repsol

Repsol is exploring the potential of Quantum Communications as a way to strengthen the security and efficiency of communications.

Although it is a technology in its infancy and with a high degree of uncertainty, it has tremendous disruptive potential, so Repsol is closely monitoring its evolution.

- Exploration and Production Testing
- Quantum Key Distribution (QKD)
- Quantum Advisory Team

These technologies enable the secure transmission of information using the principles of quantum mechanics.

Repsol's Future Plans

Repsol is closely monitoring the evolution of Quantum Communications technologies and plans to expand its initiatives as these technologies mature. The company aims to integrate these technologies into its existing workflows to improve the security and efficiency of its communications.

- Advanced Quantum Technologies
- Collaboration with External Partners.

Finally, Repsol aspires to be an actor in the future European Quantum Communication Networks, as we have infrastructures among other assets.

Related Trends

- Quantum Key Distribution (QKD)
- Post-Quantum Cryptography



Open Connectivity

Machine Customers

Moment: **Adopt**

State: **Old**

Areas: **E&P** **ITyEC** **LCG** **Client** **Corporation**

Description

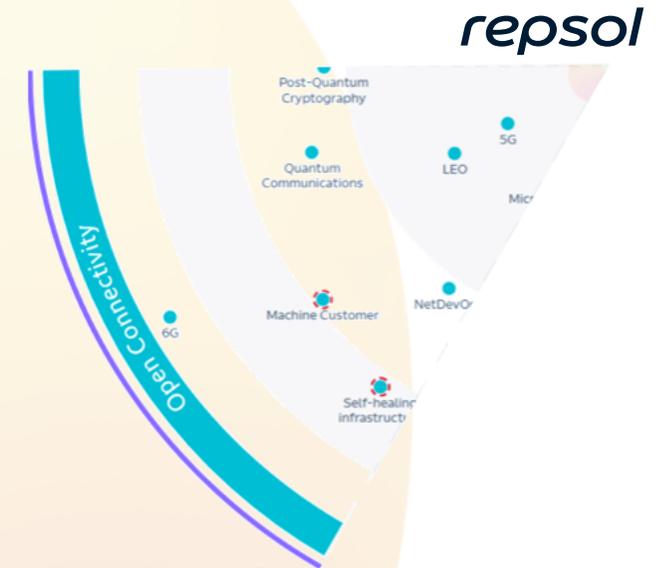
Machine Customers are essentially non-human automated systems that act as negotiators and buyers, procuring goods or services without human intervention, by leveraging advanced AI and IoT technologies. Examples include virtual shopping assistants, smart home devices, connected vehicles, and industrial equipment with IoT.

These systems are designed to streamline purchasing processes, improve efficiency, and reduce the need for human supervision. AI Agents can be seen as a subset of Machine customers, or Machine customers can be considered an evolution of AI Agents. The combination of traditional AI features with emerging technologies, such as RAG, agent and multi-agent frameworks, or function calls, along with components such as memory, planning, perception, tools, and safeguards, allows systems using LLM to possess "agency" and thus achieve Machine customer capabilities.

Capabilities

- Autonomous negotiation and purchase of goods and services.
- Management of smart appliances and connected devices.
- Operation of connected cars and industrial equipment with IoT.
- Increased efficiency and reduced need for human intervention.
- Integration with advanced AI and IoT technologies.

There are five key and independent dimensions associated with Machine customers: Adaptability, Proactivity, Complexity of Objectives, Complexity of the Environment and Degree of Autonomy.



Machine Customers

Machine Customers represent a spectrum, ranging from traditional AI systems with "limited agency" that perform specific tasks under defined conditions, to future Machine customers with "full agency" that learn from their environment, plan strategies, make decisions, and perform tasks independently.

Repsol's Future Plans

The integration of Agéntica AI is expected to significantly improve the capabilities of Machine Customers, making them more adaptable and autonomous. This evolution will allow Machine customers to select actions to achieve specific outcomes, further reducing the need for human intervention and increasing operational efficiency.

Related Trends

- AI Multi-Agents
- Intelligent Assets and Operations



Open Connectivity

Self-Healing Infrastructure

Moment: **Watch**

State: **New**

Areas: **IT & Digital**

Description

Self-Healing Infrastructure refers to IT systems capable of detecting, diagnosing, and correcting faults automatically without human intervention. Leverage technologies such as artificial intelligence, behavioral analytics, and automation to maintain the availability and performance of digital operations.

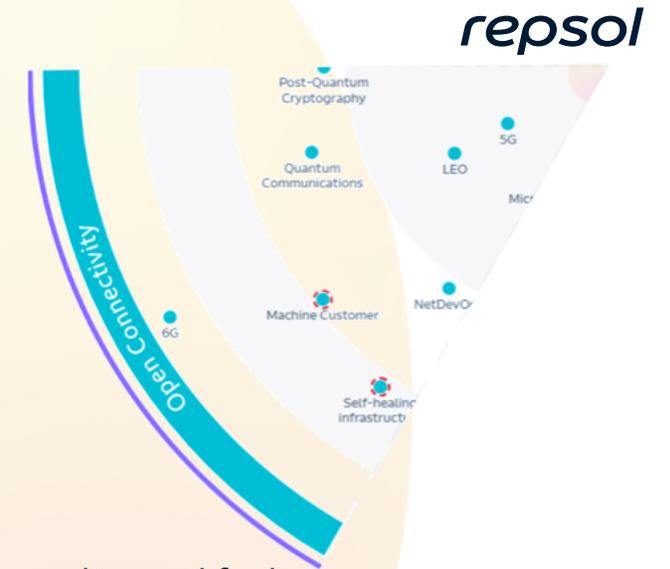
This type of infrastructure represents a paradigm shift towards resilient and continuously resilient environments, critical to support the increasing complexity of today's technological ecosystems.

Capabilities

- Automatic detection of anomalies and faults.
- Real-time intelligent diagnostics.
- Autonomous execution of corrective actions.
- Reduced downtime and operational costs.
- Continuous learning to improve system resilience.

Related Trends

● NetDevOps





Industry Platform & Enablers

repsol

Quantum Key Distribution (QKD)

Moment:

Watch

State:

New

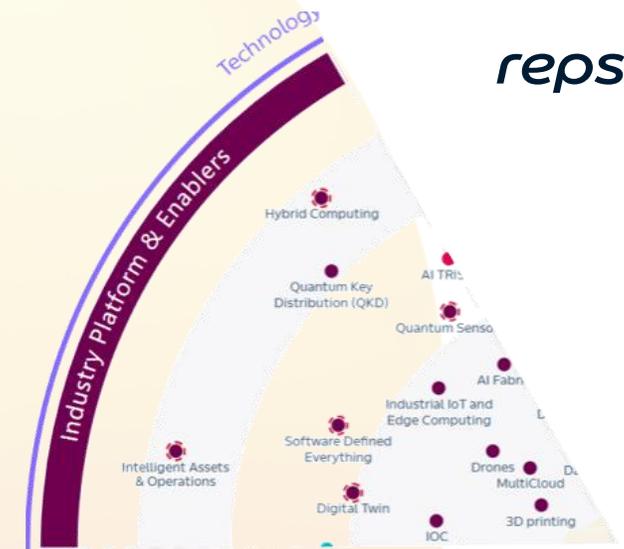
Areas:

IT & Digital

Description

Quantum Key Distribution (QKD) uses quantum principles to securely distribute encryption keys over long distances. This technology ensures that cryptographic keys are transmitted without degradation, providing additional security in communications.

QKD seeks to address the security challenges posed by the advent of quantum computing, which has the potential to break conventional cryptographic schemes used to protect data and communications. By leveraging quantum-resistant algorithms and advanced cryptographic techniques, QKD aims to ensure the confidentiality, integrity, and authenticity of digital information in a world enabled by quantum computing.



Some key strategies include:

- Using quantum principles to securely distribute encryption keys over long distances.
- Design of communication protocols that remain secure against quantum adversaries.

Quantum Key Distribution (QKD)

Adoption at Repsol

Repsol is actively exploring QKD technologies to improve the security of its digital infrastructure.

Quantum QKD is a very incipient technology, closely linked to Quantum Communications. The union of the two presents a high degree of uncertainty, but also enormous disruptive potential. For this reason, Repsol is monitoring its evolution:

- Quantum Advisory Team
- Market Standards Development

Repsol's Future Plans

Repsol is following the evolution of QKD technologies and plans to expand its initiatives as these technologies mature. The company seeks to integrate these solutions into its existing processes to improve the security and efficiency of its digital infrastructure.

- Advanced Quantum Technologies
- Collaboration with external partners

Related Trends

- AI TRiSM
- Self-Adaptive Cybersecurity with AI
- Post-Quantum Cryptography
- Quantum Communications



Industry Platform & Enablers

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Drones

Moment:

Adopt

State:

Updated

Areas:

E&P

ITyEC

LCG

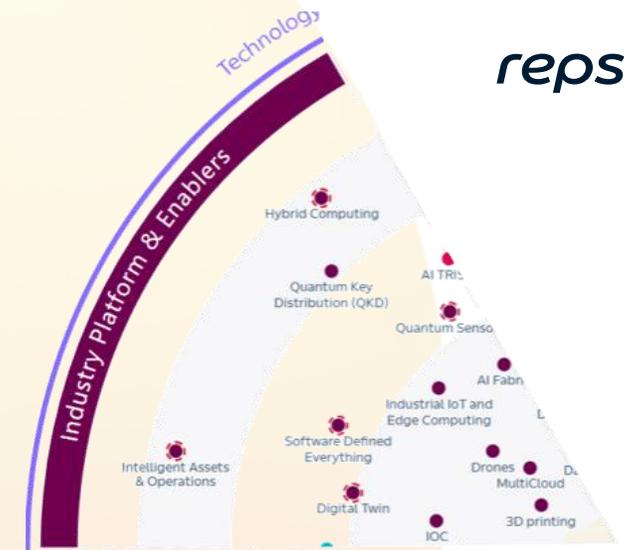
Description

Drones, also known as unmanned aerial vehicles (UAVs), are aircraft operated remotely by a human pilot or autonomously using onboard computers. They are used for various purposes, such as aerial photography, surveillance, delivery, and inspection. Drones have revolutionized industries such as agriculture, construction, and filmmaking by providing cost-effective aerial capabilities. They are equipped with cameras, sensors, and other payloads to capture data and perform tasks in hard-to-reach or dangerous areas for humans.

Capabilities

Applications:

- Aerial photography and videography
- Surveillance and security
- Delivery and logistics





Drones

Adoption at Repsol

Repsol has been exploring the use of drones to improve various operational processes. Drones make it possible to inspect areas and carry out specific routes at a lower cost compared to manned equipment, in addition to accessing areas that are difficult to access for conventional vehicles.

Various use cases have been tested and developed, including inspections, monitoring, and data collection. Prominent examples include:

- Inspection of Pipe Racks
- Underwater inspections
- Chimney Inspection

Potential uses in inspections in the CCII, within the roadmap of the Autonomous Plant.

In addition, Repsol is collaborating in the development of an ATEX drone for industrial environments.

Repsol's Future Plans

Repsol plans to continue expanding the use of drones in more operational areas. Future initiatives include integrating drones with advanced analytics, computer vision, and machine learning models to improve data processing and decision-making.

Repsol is also looking to explore new use cases for drones, such as environmental monitoring, emergency response, and inspection in liquids (such as tanks with liquid), to maximize the benefits of this technology.



Industry Platform & Enablers

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Industrial IoT and Edge Computing

Moment:

Adopt

State:

Old

Areas:

E&P

ITyEC

LCG

Client

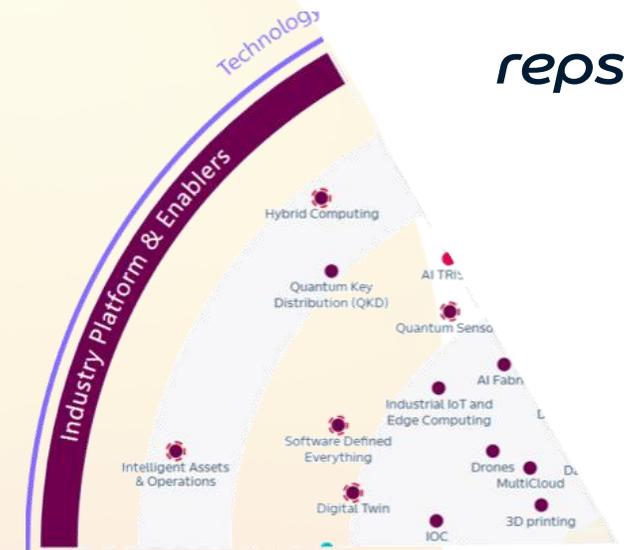
Description

Industrial IoT and Edge Computing are complementary technologies that enable decentralized data processing and analysis at the edge of the network in industrial environments. IoT devices collect data from industrial equipment and processes, while edge computing brings computing and analytics closer to the data source, reducing latency and bandwidth usage. The combination of Industrial IoT and Edge Computing enables real-time data analysis, lower latency, and better scalability for industrial applications. Edge computing devices process data locally, enabling faster response times and better support for use cases that require low latency and high reliability.

Capabilities

Proceeds:

- Latency reduction
- Improved security
- Scalability





Industrial IoT and Edge Computing

Adoption at Repsol

At Repsol, we have integrated Industrial IoT and Edge Computing technologies to improve our operational processes and analytical capabilities.

This data simultaneously feeds into operational processes and advanced analytical models. Edge computing integrates with our machine learning solutions to leverage the benefits of this technology and provide real-time results. This approach brings processing power closer to the data source, working in synergy with the cloud to take advantage of both technologies.

The initiatives developed within our Digital Program have identified this technology as a key component for the implementation of Industry 4.0.

Notable initiatives:

- Real-time monitoring
- Machine Learning Integration

Other practical cases that can benefit from this technology: asset monitoring, advanced inspection, optimization of production processes...

Repsol's Future Plans

Repsol plans to continue advancing in Industrial IoT and Edge Computing by expanding the implementation of these technologies in more assets and integrating them with other digital initiatives.

During this year, E&P is in the process of starting to use Edge Computing technology in the area of Production engineering to make lifting mechanisms more efficient.

Future plans include developing new use cases for real-time data processing and strengthening the synergy between Edge Computing and cloud solutions.

In addition, Repsol will continue to work to increase the sensorization of its industrial assets and automation.

Related Trends

- Intelligent Assets and Operations
- Integrated Operational Centers



Industry Platform & Enablers

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Digital Twin

Moment:

Adopt

State:

Updated

Areas:

E&P

ITyEC

LCG

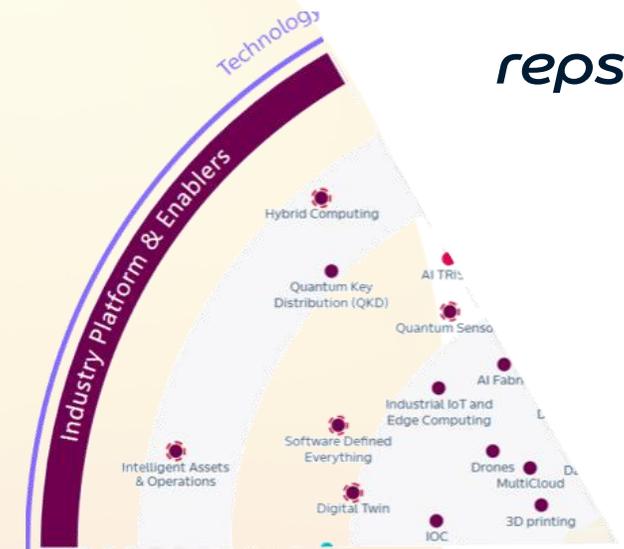
Client

Description

A Digital Twin is a virtual representation of a physical object, process, or system. It is created by combining real-time data with simulation models and machine learning algorithms to simulate the behavior and performance of the physical entity in a digital environment. Digital twins enable organizations to monitor, analyze, and optimize the performance of physical assets and systems in real-time. They are used in various industries, such as manufacturing, healthcare, and smart cities, where they support predictive maintenance, process optimization, and performance simulation.

Key Components:

- Sensors and data collection
- Simulation models
- Analytics and machine learning





Digital Twin

Adoption at Repsol

At Repsol, the adoption of Digital Twin is at different stages of maturity. Currently, some solutions have already been implemented, while others are in the conceptualization or evolution phase:

- Digital Twins already implemented: AI. InWell, the Renewable Energy Control Center and the Service Station Control Center.
- Evolving Digital Twins: The conceptualization of BIM in Operation and Maintenance is currently being finalized and the Business has limited its ambition to the use of photogrammetries, which limits the scaling towards a true Digital Twin .

Digital Twins integrate data models, analytics, and knowledge bases to provide a comprehensive view of assets and processes, enabling better management and optimization. Repsol continues to evolve its capabilities with the incorporation of AI, which helps us advance in prescriptive maintenance, among other technologies. This is an ongoing process of adoption.

Examples of Digital Twins at Repsol:

- Production Management Digital Twin
- Digital twin of refinery operations
- Asset Integrity Digital Twin
- Digital twin of service stations
- Process Twin that simulate the behavior of the plant, its production process, etc.

Repsol's Future Plans

Currently, E&P is working on the deployment of capabilities associated with Digital Twins, with cases in Norway, Brazil and implementations in the USA. Future efforts will focus on improving the capacities of these actors to provide more comprehensive oversight and governance.

Related Trends

- Intelligent Assets and Operations
- Integrated Operational Centers



Industry Platform & Enablers

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Quantum Sensors

Moment:

Try

State:

New

Areas:

E&P

ITyEC

LCG

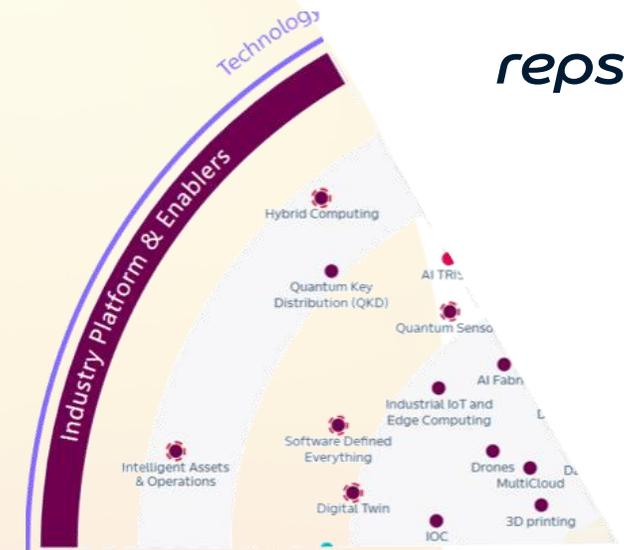
Client

Description

Quantum Sensors leverage the principles of quantum mechanics to measure physical properties such as magnetic fields, gravitational fields, and electromagnetic radiation with unprecedented accuracy. They have applications in fields such as geology, navigation, medical imaging, and environmental monitoring.

Advantages:

- High precision
- Ultra-low noise
- Wide range of applications





Quantum Sensors

Adoption at Repsol

Repsol has made progress in the simulation of sensor values through RepSens. This proprietary AI model reduces the need for physical devices, enabling cost savings and greater operational efficiency.

At the same time, Repsol is closely following the evolution of physical quantum sensors, which use quantum phenomena to measure physical properties with high precision. These sensors have the potential to further improve data accuracy and operational efficiency in the future.

Repsol's Future Plans

Repsol plans to continue integrating quantum sensors into various projects to improve data accuracy and operational efficiency. Priority will be given to expanding the use of RepSens and tracking advances in quantum physical sensors.

In addition, it will work collaboratively with leading technology partners to stay at the forefront of advances in quantum sensors.

Quantum Sensors have great potential for Repsol, offering unprecedented precision and sensitivity in measurements.

Related Trends

- IoT Industrial y Edge Computing
- Integrated Operational Centers



Industry Platform & Enablers

repsol

AI Fabric

Moment:

Adopt

State:

New

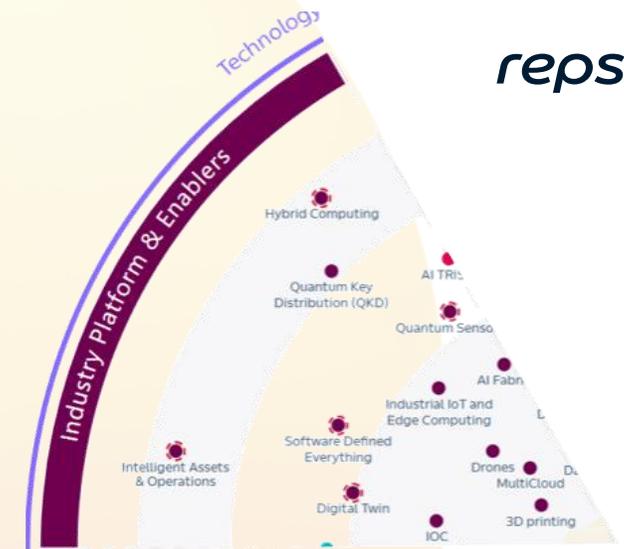
Areas:

IT & Digital

Description

AI Fabric (sometimes also called AI Ops) refers to an integrated framework that enables the seamless deployment, management, and scaling of AI models and applications across diverse environments. It provides the infrastructure and tools needed to support the entire AI lifecycle, from data ingestion and model training to deployment and monitoring.

AI Fabric is designed to streamline the development and deployment of AI solutions. It integrates various components such as data pipelines, model training environments, deployment platforms, and monitoring tools into one cohesive system. This integration facilitates efficient data processing, robust model training, and scalable deployment, ensuring that AI applications can be quickly developed and deployed in production environments.



Capabilities

- Seamless integration of data pipelines and AI models.
- Efficient training and deployment of models in various environments.
- Scalable infrastructure to support large-scale AI applications.
- Comprehensive AI operations monitoring and management tools.
- Support for the entire AI lifecycle, from data ingestion to model deployment.



AI Fabric

Adoption at Repsol

Repsol has adopted AI Fabric to drive its digital transformation initiatives. A key enabler of this framework is ARiA, Repsol's Data and Artificial Intelligence cloud platform.

ARiA centralizes company data, facilitating the development of analytical models and algorithms that optimize processes, improve decision-making, and support AI Fabric.

By integrating AI Fabric, Repsol facilitates efficient data processing, robust model training, and scalable deployment of AI applications, aligning with AI Ops principles.

Repsol's Future Plans

Repsol plans to continue expanding its AI Fabric capabilities by incorporating more advanced tools and frameworks to support increasingly complex AI applications.

Future initiatives include improving ARiA to further optimize data ingestion, model training, and deployment processes.

Related Trends

- Data Fabric



Industry Platform & Enablers

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Hybrid Computing

Moment:

Watch

State:

New

Areas:

IT & Digital

Description

Hybrid Computing integrates various computing environments, including classical, quantum, neuromorphic, and photonic systems. This approach improves computational efficiency, flexibility, and scalability, enabling more complex and resource-intensive applications.

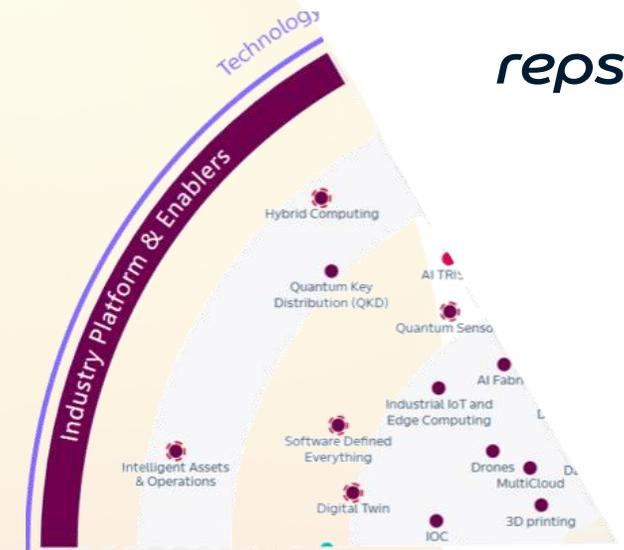
Hybrid Computing is not just a single technology or method, but a comprehensive system that combines different computing paradigms to optimize performance and efficiency. It ensures that computational tasks are distributed in the most appropriate environments, whether classical, quantum, neuromorphic, or photonic. This approach improves the ability to address complex problems that require significant computational resources. By leveraging the strengths of each computing environment, Hybrid Computing can achieve higher processing speeds, better energy efficiency, and greater scalability.

Capabilities

- Integration of classical, quantum, neuromorphic and photonic computing systems.
- Greater computational efficiency and flexibility.
- Scalability for complex and resource-intensive applications.
- Optimized performance by distributing tasks across different computing environments.

Potential:

- Advanced scientific research
- Artificial intelligence
- Health
- Financial services
- Energy sector
- Telecommunications
- Factory
- Energy efficiency



Hybrid Computing

Hybrid Computing is expected to improve the energy efficiency of computational processes. By distributing tasks in the most suitable computing environments, you reduce the total power consumption required for complex calculations. This is particularly important for large-scale data centers and high-performance computing applications, where energy costs are a major concern.

The Hybrid Computing Provisioning Model can be delivered in a similar way to cloud-based Software as a Service (SaaS) models. This means that organizations can access hybrid computing resources on demand, scaling their use based on current needs without requiring a significant upfront investment in hardware. This model offers flexibility, cost savings, and the ability to leverage the most advanced computing technologies as they become available.

Related Trends

 MultiCloud



Industry Platform & Enablers

repsol

MultiCloud

Moment:

Adopt

State:

Old

Areas:

IT & Digital

Description

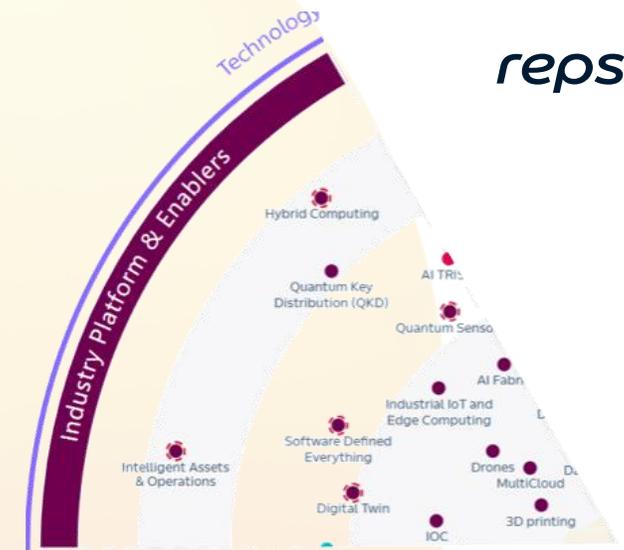
MultiCloud refers to the practice of using multiple cloud computing services from different providers to meet specific business needs. Organizations adopt a MultiCloud strategy to leverage the strengths of different cloud platforms, mitigate vendor lock-in, and improve redundancy, resiliency, and performance.

MultiCloud environments offer flexibility, scalability, and resiliency by distributing workloads across multiple cloud providers. This approach reduces vendor lock-in and minimizes the risk of service interruptions or data loss. However, managing and orchestrating resources across different clouds can present challenges in terms of interoperability, data transfer costs, and security.

Capabilities

Advantages and Considerations:

- Supplier flexibility
- Resilience
- Complexity





MultiCloud

Adoption at Repsol

Repsol operates in a MultiCloud environment to achieve various advantages such as independence and security. This model is divided into six strategic lines, including emerging container technology, which are being implemented at different levels within the company. This solution focuses on grouping your application code with the associated libraries, configuration files, and dependencies required for your application to function. This provides several benefits to DevSecOps practitioners, such as simplified development and deployment across different environments, isolation, increased security, elasticity, and resiliency.

In 2022, Repsol successfully deployed its Containers as a Service (CaaS) platform, available on both Azure and AWS. This platform enables the efficient management and deployment of applications, taking advantage of all the advantages of this technology while facilitating deployment and operation, as well as the optimization of cloud resources.

- CaaS Platform Deployment
- Increased security
- Resource optimization

Repsol's Future Plans

Repsol plans to continue advancing in the MultiCloud domain by providing more advanced services, adopting GitOps as a working method, and evaluating multicluster management software. Future initiatives will focus on improving the CaaS platform, integrating more cloud providers, and further improving security and resource optimization.

Related Trends

- Hybrid Computing



Industry Platform & Enablers

repsol

Integrated Operational Centers

Moment:

Adopt

State:

Old

Areas:

E&P

ITyEC

LCG

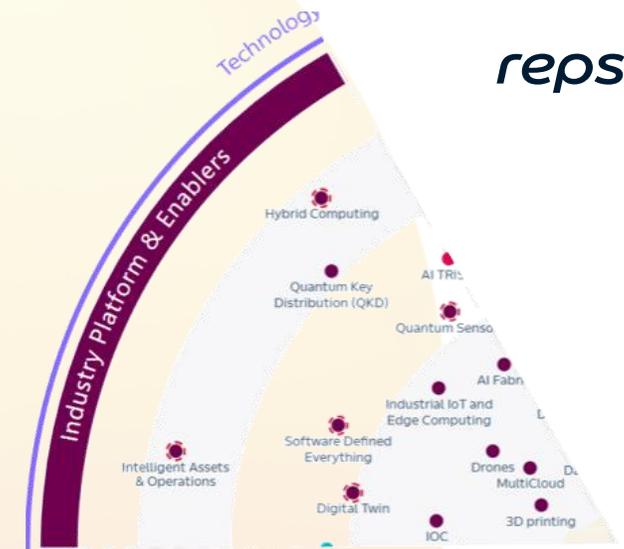
Description

Integrated Operational Centers (IOCs) are conceived as a new way of working enabled by technology and collaborative spaces. They break down organizational silos by integrating diverse disciplines through workflows and tools. One of the key tenets of this work philosophy is "complete situational awareness" within the Operations Center, acting as a bridge between field staff and office staff to ensure better and faster decision-making.

Integrated Operations Centers leverage advanced technology and collaborative environments to transform traditional work models. By integrating multiple disciplines and breaking down silos, IOCs facilitate seamless workflows and improve organizational efficiency. The "complete situational awareness" provided by these centers ensures that all stakeholders, whether in the field or in the office, have access to real-time information and insights, allowing for faster and better-informed decisions.

Key features:

- Collaborative tools
- Access to real-time data
- Integrated workflows





Integrated Operational Centers

Adoption at Repsol

The continued adoption of IOC technology is improving asset support and optimizing performance for operational, tactical, and strategic decisions. These centers serve as multidisciplinary centers where experts from various fields can access information, troubleshoot, monitor, and optimize oil and gas fields from a single location.

The IOC model creates synergies between the Operations and Performance Centers, located in a single physical space, thus unleashing the full potential of the IOC concept. Functional IOCs have been launched in Canada, Peru, Bolivia and Norway, focusing on collaborative, multidisciplinary, remote and real-time processes.

Repsol's Future Plans

Repsol plans to continue expanding the IOC model by integrating more advanced technologies and improving collaboration between different departments.

Future initiatives include developing new use cases for real-time data processing, improving synergy between IOCs and digital platforms, and further optimizing asset performance through advanced analytics and machine learning.

Finally, Repsol aspires to extend the model for the centralized and remote management of highly automated assets.

Related Trends

- IoT Industrial y Edge Computing
- Digital Twin
- Intelligent Assets & Operations
- Quantum Sensors



Industry Platform & Enablers

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Intelligent Assets & Operations

Moment:

Watch

State:

New

Areas:

E&P

ITyEC

LCG

Client

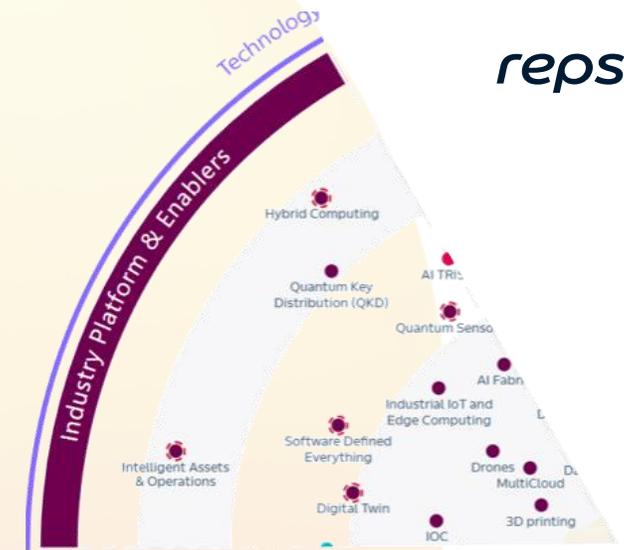
Description

Intelligent Assets & Operations aim to achieve the interconnectedness of value chains by automating them and incorporating decision-making capabilities.

This development will enable interconnected operations along the logistics chain, transcending the perimeter of individual companies.

However, this progress cannot be achieved in isolation, as it depends on a joint adoption by the market. Its real impact will materialize when a critical mass of connected assets is reached, generating network economies or a "WhatsApp effect", in which the value of the ecosystem grows as more elements are integrated.

Integrating diverse data sources and types, including structured, unstructured, and semi-structured data, will be key to providing comprehensive insight and greater control.



By leveraging AI, machine learning, IoT, and edge computing, Intelligent Assets and Operations can automate monitoring, predictive maintenance, and real-time analytics, reducing manual effort and improving reliability and performance.

Capabilities

- Interconnected operations along the logistics chain, extending beyond individual companies.
- Increased efficiency and productivity through intelligent orchestration.
- Automated monitoring, predictive maintenance, and real-time analytics using AI and machine learning.
- Integration of structured, unstructured, and semi-structured data for a holistic view.



Intelligent Assets & Operations

Related Trends

- Digital Twin
- Integrated Operational Centers
- Machine Customers
- Robotics & Hardware Automation
- Humanoid Work Robots
- Autonomous Robots
- IoT Industrial y Edge Computing
- Computer Vision



Industry Platform & Enablers

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3D Printing

Moment:

Adopt

State:

Old

Areas:

E&P

ITyEC

LCG

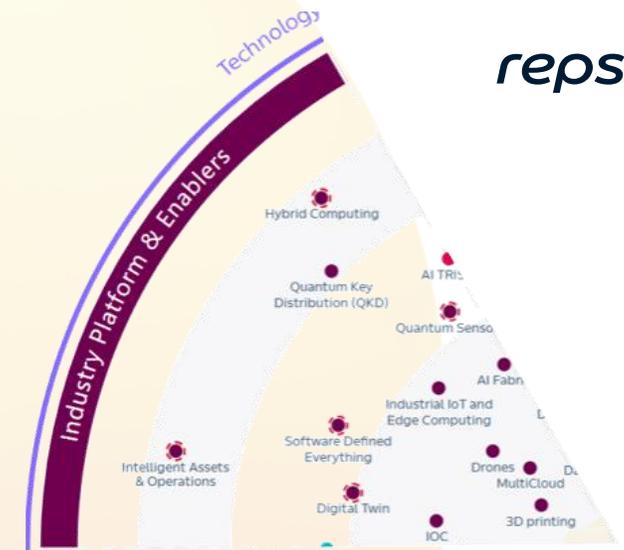
Client

Description

3D Printing, or additive manufacturing, allows the creation of three-dimensional objects from digital models, depositing material layer by layer. This technology transforms traditional manufacturing processes by enabling local, customized, and on-demand production, reducing time and waste. It has applications ranging from rapid prototyping to manufacturing functional parts.

Capabilities

- On-demand and custom manufacturing.
- Reduction of development times and production costs.
- Creation of complex geometries not possible with traditional techniques.
- Application in maintenance, repair and operations (MRO).





3D Printing

Adoption at Repsol

Repsol is integrating 3D Printing into its processes as part of its commitment to innovation, sustainability, and the advancement of product technologies. The company has developed a specialized range of modified polymers, particularly polypropylene (PP-3D), tailored for additive manufacturing technologies such as FFF/FDM (Fused Filament Fabrication / Fused Deposition Modeling) and FGF (Fused Granulate Fabrication). This adoption enables Repsol to:

- Optimize design from the early stages
- Minimize waste during prototyping
- Enable decentralized and on-demand production

Additionally, Repsol is evaluating the use of industrial 3D Printing as part of its strategy for reuse and advanced manufacturing, aiming to reduce production costs and accelerate the development of customized products, in line with circular economy principles.

Repsol also participates in collaborative R&D projects promoted by the MAV Cluster, including a 3D-printed bone tissue initiative, part of a call by the Ministry of Industry and Tourism with a total budget of €2.7 million.

Repsol's Future Plans

Repsol plans to continue advancing in 3D Printing, aiming for greater specialization and technical development of its materials, while expanding its polymer portfolio to meet the specific needs of various sectors. Key strategic lines include:

- Development of new grades of polypropylene with advanced properties for demanding applications.
- Expansion into emerging sectors such as sustainable packaging and industrial components.
- Integration of eco-design as a standard, facilitating the transition toward more sustainable and flexible production models.
- Collaboration with customers and technology centers to co-develop tailored solutions.



Industry Platform & Enablers

repsol

Software Defined Everything

Moment:

Try

State:

New

Areas:

IT & Digital

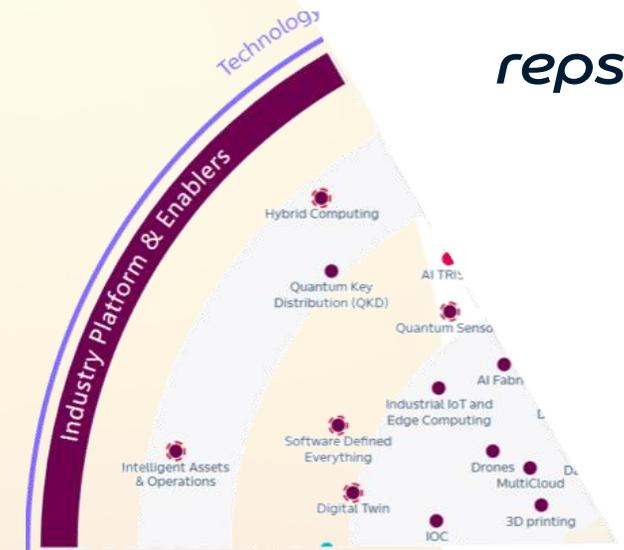
Description

Software Defined Everything (SDx) is an approach that virtualizes and automates all components of technology infrastructure, including servers, networks, storage, and data centers, using software. This allows for more flexible, scalable and efficient management of technological resources, turning infrastructure into a competitive advantage.

SDx is not a single technology, but a comprehensive architecture that allows you to control and orchestrate the entire infrastructure from a software layer. It facilitates the adoption of models such as hybrid cloud, edge computing, DevOps, and advanced automation, reducing reliance on physical hardware and improving operational agility.

Capabilities

- Complete virtualization of networks, storage, and servers.
- Infrastructure orchestration and automation from a software layer.
- Dynamic scalability and agile provisioning of resources.
- Integration with DevOps, Infrastructure as Code (IaC), and Hybrid Cloud.
- Reduction of vendor lock-in through open platforms.
- Centralized visibility and control of distributed environments.
- Improved energy and operational efficiency.
- Support for deployments at the edge, data center, and industrial environments.
- Strengthening cybersecurity through dynamic segmentation and Zero Trust.



“ We understand that **digital trends are already a fundamental and inseparable part of the strategy and evolution** of businesses, characterized by its rapid advancement and, at times, by its disruptive nature. Observation is key.



Esteban Montenegro García
Head of Strategy and Architecture

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“ The **Digital Trends Observatory** plays a key role in the digital strategy. It is a **strategic engine that connects vision and action**, anticipating disruptions, identifying opportunities, and **turning trends into real business value**.



Óscar Campillo Dávila
Head of IT&D Strategy

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