FCC Construcción

Technology Surveillance Bulletin

2024

JUSTIFICATION

Technological Surveillance is an activity that is part of the R&D&I Management System (certified by AENOR according to the UNE 16602 standard) and is fundamental for understanding the organization's environment, as well as for strategic intelligence.

The Technological Surveillance system is based on the following process:

- *Annually establish the **strategic lines** on which Technological Surveillance will be based, supported by the analysis of the context (internal and external), R&D&I policy, needs and expectations of interested parties, R&D&I objectives...*
- *Detect **information sources** to address the technological needs applied to the different internal processes of the organization.*
- *Extract the most relevant information through the **files** on technological trends, innovations, inventions, potential technological partners for R&D&I actions, news from companies in the sector...*
- *Develop the **Annual Bulletin** with a summary of the most relevant news.*
- *Analyze the information by the R&D&I Management to establish action plans in line with the latest technological advances... **R&D&I Strategy**.*

*Technological Surveillance allows detecting market opportunities through efficient information management, and this process is managed by the **National R&D&I Department** with the voluntary collaboration of different departments of **FCC Construcción and FCC Industrial.***

Construcción

Industrial

Tabla de contenido

BIM (Building Information Modelling)

1. IFC 4.3 Aproved as a Final Standard

Date: 04/01/2024

BuildingSMART International announces that it has approved **IFC 4.3** as a final standard. This means it is internationally accredited as the latest version following the **ISO 16739** standard

Following the list of improvements, **IFC 4.3** received 100% approval and will be formally published in the coming weeks.

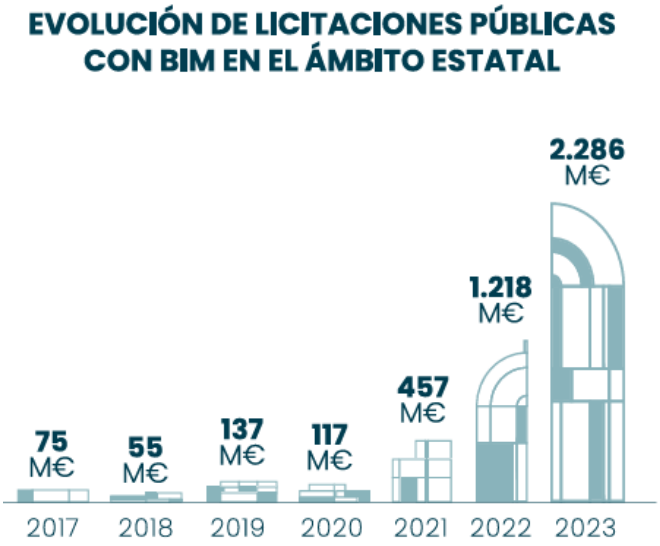
From buildingSMART, they comment: "Receiving formal approval from ISO for IFC 4.3 to become an internationally accredited standard is excellent news for our sector. I do not doubt that the quality of the standard has improved through this process, and I commend the work of everyone involved over several years. Now we look forward to supporting the adoption and use of this new standard by the industry and the software vendor community

Source: *https://www.buildingsmart.org/ifc-4-3-approved-as-a-final-standard/*

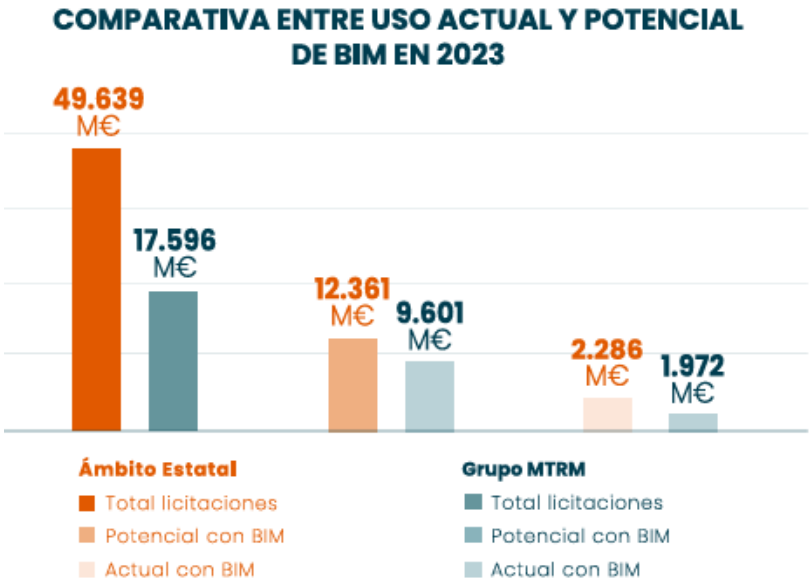
2. BIM, impulsando la eficiencia en la contratación pública

Date: 13/03/2024

The **Interministerial BIM Commission of Spain**, aligned with the objectives and initiatives of the **European Commission**, is committed to the digital and sustainable transformation of all economic sectors, including the construction sector. The incorporation of **BIM** in bidding is not new. At the end of 2023, a 6-year analysis cycle was completed, providing valuable information on the evolution of voluntary use of **BIM** in contracts from 2017 to date



Although the current use of **BIM** continues to trend upwards, the estimated potential is much higher. It is estimated that **BIM** could be employed in 25% of all public tenders. At the state level in 2023, 5% of contracts were tendered with **BIM** requirements. The graph represents the current usage, which accounts for 18% of its estimated potential.



The Plan establishes an internal instruction for the gradual and progressive use of **BIM** in public contracts with a timeline from 2024 to 2030, with the first milestone taking place in April 2024. The scope of application includes public contracts related to the construction of assets, such as buildings or infrastructure.

TABLA DE CALENDARIO Y NIVELES BIM (PLAN BIM)

Valor estimado del contrato	2024 1 de abril	2025 1 de octubre	2027 1 de octubre	2030 1 de abril
> 5,538 M€	Nivel inicial	Nivel medio	Nivel avanzado	Nivel integrado
< 5,538 M€, y > 2 M€	Nivel recomendado inicial	Nivel inicial	Nivel medio	Nivel avanzado

In the next milestone, a year and a half later, on October 1, 2025, the two types of contracts differentiated by their estimated value must use **Medium and Initial BIM levels**, respectively, in their contracts. To understand these milestones, the implementation schedule should be noted. A four-stage gradation is established for the incorporation

of **BIM**: Initial, Medium, Advanced, and Integrated levels. Each **BIM** level is defined within minimum information requirements: Strategy, Processes, Technological Support, and People.

- **Strategy**: vision, objectives, and commitment of the body for the implementation of **BIM** in its tenders.
- **Processes**: working procedures of the contracting body related to the tender stages; and coordination between the different parts of the contract.
- **Technological Support**: involves the digitization of the contracting body's information, and the use of technological solutions for its production, storage, and management. CDE and standards.
- **People**: training of human teams both from the contracting body and the awardees. Training ensures that the requirements are clear to all parties.

These four categories and their associated **BIM** information requirements are included in the Table in the Executive Summary of the **BIM Plan** published in October 2023 (https://cibim.mitma.es/)

DEFINICIÓN REQUISITOS

NIVELES BIM

	DE ESTRATEGIA	DE PROCESOS		
	Estrategia	Procedimientos de trabajo requeridos en el contrato	Coordinación entre partes	Información del contrato
1 PREVIO/ NO BIM	Sin estrategia para el uso de BIM en contratos.	No se requieren procedimientos para la gestión de la información del contrato.	Reuniones presenciales, virtuales y correos electrónicos.	Información gráfica, como planos CAD, no vinculada automáticamente a datos contenidos en otros archivos. No se utilizan modelos BIM.
2 INICIAL	Proyectos piloto o licitaciones aisladas con BIM.	Basados en sistemas de gestión de calidad (UNE-EN ISO 9000 o equivalente).	No se requiere que sea a través del CDE.	Planos CAD y modelos BIM para usos de obtención de planos y coordinación 3D.
3 MEDIO	Plan de uso BIM para fases de diseño y obra.	Basados en sistemas de gestión de calidad (UNE-EN ISO 9000 o equivalente). + Guías o manuales específicos BIM de CIBIM y organismos reconocidos.	Se realiza a través del CDE.	Modelos BIM para usos de obtención de planos, coordinación 3D y mediciones. Se puede producir alguna información o plano CAD no obtenida del modelo.
4 AVANZADO	Plan de uso BIM para todo el ciclo de vida y multidepar-tamental.	Basados en sistemas de organización y digitalización de la información (UNE-EN ISO 19650 o equivalente). + Guías o manuales específicos BIM de CIBIM y organismos reconocidos.	Se realiza a través del CDE, con simulaciones y validaciones.	Modelos BIM para usos de obtención de planos, coordinación 3D, mediciones, mantenimiento o conservación y explotación y gestión de activos. Se gestionan y emplean librerías de objetos BIM. Residualmente cabe información o plano CAD no obtenida del modelo.
5 INTEGRADO	Procedimiento sistemático de integración de procesos innovadores para la gestión de contratos.	Procedimientos certificados bajo UNE-EN ISO19650 o equivalente. + Guías o manuales específicos BIM de CIBIM y organismos reconocidos + Manual de entrega de la información basado en UNE-EN ISO 29481 o equivalente.	Se requiere que sea únicamente a través del CDE, con simulaciones y validaciones.	Modelos BIM para cualquier uso. Se gestionan y emplean librerías de objetos BIM. Residualmente cabe información o plano CAD no obtenida del modelo.

DE NIVELES BIM MÍNIMOS

DE TECNOLOGÍA		DE PERSONAS	
Entorno Común de datos (CDE)	Formatos de archivos	Capacitación órgano de contratación	Capacitación licitante
Sin repositorios comunes para la gestión de la información del contrato.	Sin estándares.	No se requiere personal con conocimientos de BIM.	No se requiere personal con experiencia en contratos con requisitos BIM.
Repositorio común con control de acceso. + Reglas para nomenclatura estandarizada de archivos y carpetas.	Formatos basados en estándares abiertos. Para modelos BIM, IFC según UNE-EN ISO 16739 o equivalente. Adicionalmente, se podrá requerir formato propietario.	Al menos una persona tiene formación BIMy actúa como responsable BIM del contrato.	Se requiere medios humanos con experiencia en contratos con requisitos BIM.
Repositorio común con control de acceso. + Reglas para nomenclatura estandarizada de archivos y carpetas. + Flujos de trabajo y estados de la información definidos, en línea con UNE-EN-ISO 19650.	Formatos basados en estándares abiertos. Para modelos BIM, IFC según UNE-EN ISO 16739 o equivalente. Adicionalmente, se podrá requerir formato propietario.	Todo el equipo de trabajo que participa en el contrato está formado en BIM. Se define un responsable BIM del contrato.	Se requiere medios humanos con experiencia en contratos con requisitos BIM
Solución tecnológica diseñada específicamente como CDE según UNE-EN ISO 19650 con distintas funcionalidades. + Reglas para nomenclatura estandarizada de archivos y carpetas.	Formatos basados en estándares abiertos. Para modelos BIM, IFC según UNE-EN ISO 16739 o equivalente. Para comunicaciones relacionadas con el modelo IFC, formato BCF o equivalente. Adicionalmente, se podrá requerir formato propietario.	Todo el equipo de trabajo que participa en el contrato está formado en BIM conforme a UNE-EN ISO 19650 + Experiencia previa en contratos gestionados con BIM. Se define un responsable BIM del contrato.	Se requiere medios humanos con experiencia en gestión de proyectos u obras y modelado BIM.
Solución tecnológica diseñada específicamente como CDE según UNE-EN ISO 19650 con distintas funcionalidades. + Reglas para nomenclatura estandarizada de archivos y carpetas. + Acceso de datos a través de servicios web	Siempre formatos basados en estándares abiertos. Para modelos BIM, IFC según UNE-EN ISO 16739 o equivalente. Para comunicaciones relacionadas con el modelo IFC, formato BCF o equivalente.	+ Todo el equipo de trabajo que participa en el contrato está formado en BIM conforme a UNE-EN ISO 19650. + Experiencia previa en contratos gestionados con BIM. Se define responsable BIM del contrato con 3 años de experiencia gestionando contratos con BIM.	Se requiere medios humanos con experiencia en gestión de proyectos u obras y modelado BIM con al menos 3 años y se valorará la implantación de UNE-EN ISO 19650 y su uso en contratos.

Source: https://twitter.com/transportesgob/status/1767953662964289617/

3. Information Delivery Specification (IDS) v1.0 is Approved as a Final Standard

Date: 04/06/2024

The **Ministry of Transport, Mobility and Urban Agenda (Mitma)** has presented the **BIM Plan for public procurement** to public employees of the autonomous communities and local entities in sessions held on July 13 and 14 in a telematic format. These sessions were inaugurated by the Undersecretary of the Department, **Jesús Manuel Gómerz**, as president of the **Interministerial Commission for the incorporation of the BIM methodology in public procurement (CIBIM).**

BuildingSMART International has announced that **Information Delivery Specification (IDS) v1.0** has achieved final standard status. This milestone enhances the definition and implementation of **openBIM** workflows, reflecting the need for precise and reliable data exchanges

IDS is a standard for defining information requirements in a way that is easily read by humans and interpreted by computers. It allows for automation for end-users and creates clarity, confidence, and consistency.

With this standard, you can specify what data must be included in a BIM dataset and subsequently validate if it is delivered. It is designed as a free, lightweight, standardised approach to delivery specification and subsequent checking as intended in ISO 19650. Unlike traditional non-interpretable formats like spreadsheets or PDFs, IDS facilitates accessible and relevant data for all stakeholders.

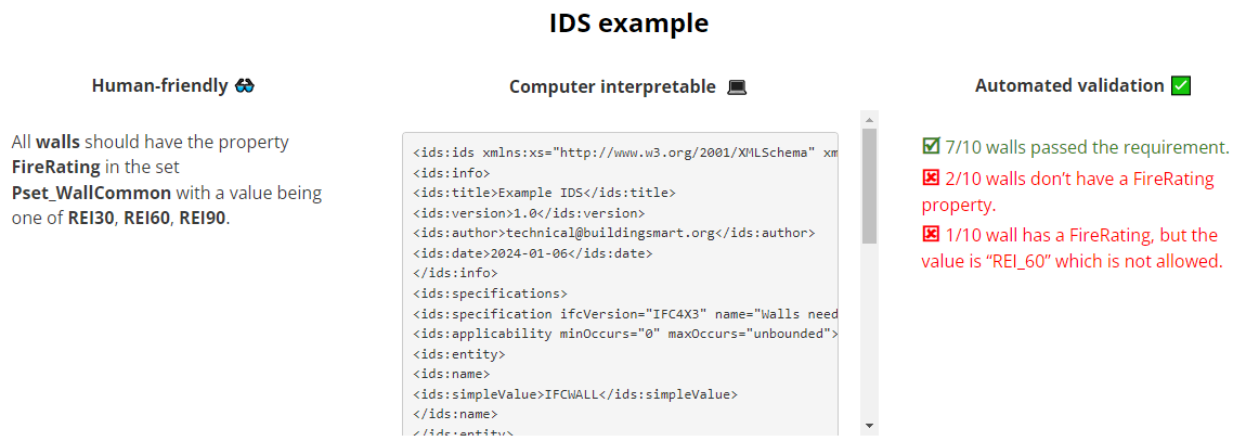
Developed with input from over 200 people across 34 countries, including various industry stakeholders, IDS ensures reliable information exchanges. The availability of multiple stable implementations at launch highlights the standard's maturity.

More information:

bSI has recently launched a new webpage for IDS, so for more information, please visit: *https://www.buildingsmart.org/standards/bsi-standards/information-delivery-specification-ids/*

You can also visit our technical GitHub page to learn more about the technical specifications of the standard here: *https://github.com/buildingSMART/IDS/releases/tag/v1.0.0*

For users with limited access to GitHub, visit: *https://gitee.com/buildingsmart/IDS*



Source: *https://www.buildingsmart.org/information-delivery-specification-ids-v1-0-is-approved-as-a-final-standard/*

4. Role of AI, Robotics, and Site Cameras in Construction Safety

Date: 16/08/2024

In today's construction landscape, staying ahead of risks and ensuring the safety of teams is paramount. To remain vigilant, businesses should redefine their approach to this critical aspect of work by embracing emerging technologies, such as artificial intelligence (AI), robotics, and advanced job-site cameras to support their commitment to safer jobsites and achieve better project outcomes.

There are five areas construction companies should assess for safety – human-machine interface, falls, energized systems, line of fire, and lifting operations – in which a staggering 93% of all serious incidents on construction jobsites occur. Focusing safety efforts on these key areas reinforces safety standards, promotes consistent planning, and cultivates responsibility. In addition to assessing safety efforts, businesses can rely on advanced technology to monitor safety conditions, alert potential hazards, and enable quick responses, ensuring the well-being of all team members.

Through consistent safety evaluations and innovative use of technology, the construction industry can commit toward creating a safer working environment for everyone.

AI's predictive power allows companies and their workers to proactively identify potential hazards, enabling timely interventions that can prevent accidents before they occur. Site safety cameras act as ever-watchful eyes on the ground, providing real-time data that helps monitor operations closely and allows for swift reactions should any signs of danger occur. The introduction of robotics is adding another layer to how the industry approaches safety. From automated equipment checks to performing tasks in hazardous conditions, robots are reducing risks associated with manual labor and improving overall site safety.

Together, these technologies are not only transforming how companies and workers maintain and enhance safety standards across all jobsites, but they are also redefining what it means to work safely in construction.

Enhancing Safety on Jobsites with Drones

Aerial drones have become everyday tools used by teams for real-time monitoring of construction progress. Drone-captured data offers valuable insights into project status and improves quality control measures. By leveraging drones for tasks like roof inspections, construction teams can remotely identify potential safety hazards. This lowers the possibility of fall accidents and reduces the need to work at dangerous heights.

The integration of new technologies is also not a one-time event but rather an ongoing process that demands continuous improvement.

Similarly, the adoption of underwater drones addresses the challenges inherent in waterfront construction projects. These projects often entail unpredictable conditions, necessitating labor-intensive and hazardous physical diver inspections. By deploying

underwater drones, companies can enhance visibility into underwater construction conditions while eliminating the need for on-site divers. This both mitigates safety concerns for divers and preemptively addresses unforeseen issues during construction, aligning with the commitment to creating the safest possible jobsites.

Drones can also be equipped with sensors that can detect heat signatures. These advanced machines can identify early signs of fires or equipment overheating, revolutionizing the way we safeguard against potential hazards.

Advancing Safety with Terrestrial Robots

Companies should look for opportunities to pilot terrestrial robots tailored to specific construction tasks across jobsites. In limited testing, these tools, focused on automating layout and installation processes, have shown promising results, including increased safety standards, improved worker productivity, and accelerated project schedules.

Currently, there is technology available using BIM data to autonomously print trade-layout lines. Tasks once physically demanding and potentially hazardous can now be executed automatically with precision and efficiency, reducing the likelihood of worker injuries. Similarly, these innovations represent a leap forward in semi-automated drilling technology, enhancing productivity and safety on projects. Technology of this nature relieves construction workers of the physically taxing process of overhead drilling by precisely marking and drilling holes for mechanical, electrical, and plumbing installation while following digital drawings as the guide.

By automating dangerous and repetitive jobs, robots can enhance workers' safety by lowering the possibility of accidents and injury. Additionally, by leveraging robotic technology, it allows companies to navigate challenging or hazardous conditions with increased safety, guaranteeing that safety is always a top priority across all phases of the project lifecycle.

Rather than replacing workers, robots often serve as a complement to them - taking over mundane or dangerous tasks and allowing teams to focus on more strategic or complex problem-solving activities.

Empowering Safety Through Advanced Site Cameras

Advanced site cameras are essential for improving operational effectiveness and safety on the jobsite. Equipped with features such as remote monitoring and high-resolution imaging, these cameras provide real-time visibility into project progress, enabling proactive risk management. By integrating AI and computer vision, site cameras can automatically identify safety hazards and enhance site security, which helps promote a culture of safety excellence.

Moreover, site cameras serve as valuable tools for documenting safety procedures and conducting incident investigations. Construction teams can conduct in-depth analyses of safety accidents, pinpoint the underlying reasons, and put corrective measures in place to stop them from happening again thanks to high-definition video footage. Also, remote access to site camera feeds allows project stakeholders to monitor safety protocols in real-time, facilitating immediate intervention in case of safety violations or emergencies.

The application of AI and robotics in construction paves the way for enhancements that last well beyond the project-completion phase.

Transforming Safety Behaviors with Video Intelligence

Site safety cameras equip experts with the ability to review and optimize performance based on captured video footage, similar to the post-game analysis in sports. Strategically positioned cameras in areas of high work activity enable workers to identify risk profiles.

Leveraging machine learning can enhance analytics capability, aiding in identifying these conditions and capturing essential data for thorough quality assessment. Portable cameras on jobsites diligently record video throughout the day. This footage can be subsequently audited overnight using AI technology and time-lapse searches, enabling workers to monitor energized equipment, live loads, workers on ladders or lifts, and more.

These cameras can then compile data into comprehensive daily and weekly reports - complete with flagged videos - which are sent directly to frontline supervisors via tablet-based Power BI applications.

When reviewing these video clips, site managers can see that many of the captured incidents may have otherwise gone unreported. Because of this technology, it provides a valuable opportunity to learn, communicate, mentor, coach, and ultimately change behaviors. Sharing these videos with people on the jobsite can help workers understand unsafe behaviors. These videos act as powerful tools that allow supervisors to show workers how certain actions put themselves and others at risk; they effectively shift the conversation and help influence safer behavior.

Video intelligence provides an avenue for identifying behaviors that need improvement while also facilitating positive reinforcement. Moreover, it allows companies to spot unforeseen risk conditions such as improper ergonomics or inadequate ladder usage (such as maintaining three points of contact), offering further opportunities for mentoring.

This iterative process of data analysis sets the stage for predictive analytics, which means companies are better equipped than ever before to enhance safety measures continually.

Safety Post-Construction

The application of AI and robotics in construction paves the way for enhancements that last well beyond the project-completion phase. Their utility is not confined to just the building process; they also guarantee long-term benefits that contribute significantly to safety and operational efficiency.

By capitalizing on AI, robotics, and automation, construction companies are able to construct 'digital twins' of buildings - virtual models that mirror their physical counterparts. This digital replication allows workers to plan maintenance proactively and monitor a building's performance in real-time. For instance, AI algorithms can be employed to analyze data from various sensors integrated into a building's systems. These algorithms are adept at identifying anomalies or deviations from established safety benchmarks in this data.

These advanced technologies not only enhance safety standards during construction but also establish a foundation for safer, more efficient operations throughout the lifespan of our buildings. By emphasizing health and safety from the construction phase and extending it well into the future, workers can ensure each project's long-term wellbeing.

Empowering Safety Through Innovation

The integration of AI, robotics, and advanced site camera systems presents enormous potential to improve safety outcomes for project teams. Leveraging AI allows for better data analysis which can inform safer work practices on jobsites. In turn, decisions based on accurate data lead to more effective risk-management strategies.

The implementation of these technologies requires workers to acquire new skills and knowledge. It's important to invest in training programs that keep teams up to date and ensure workers and teams feel empowered to accurately and regularly use these technologies once introduced.

The integration of new technologies is also not a one-time event but rather an ongoing process that demands continuous improvement. Regular evaluations should be conducted to assess the effectiveness of these technologies and make necessary adjustments or improvements.

By aligning emerging technologies with safety initiatives, the industry can reinforce its dedication to creating safer jobsites, fostering a culture of responsibility, and delivering projects that uphold the highest standards of safety and quality.

Source: *https://www.forconstructionpros.com/business/construction-safety/article/22913214/skanska-role-of-ai-robotics-and-site-cameras-in-construction-safety*

5. Transports tenders a contract worth 5 million euros to implement the BIM methodology in the Directorate General of Roads

Fecha: 16/10/2024

- **Building Information Modeling (BIM)** promotes a collaborative way of working around a digital model, leveraging new technologies.
- This technology is one of the pillars of the **State Road Network Digitalization Plan** as it allows for the optimization of planning, design, and construction of infrastructures, laying the foundations for future comprehensive management.
- This tender is part of the strategy of the **General State Administration** to progressively incorporate the BIM methodology in public procurement.

The **Ministry of Transport and Sustainable Mobility** has tendered a service contract worth **4.96 million euros**, including VAT, to support the **Directorate General of Roads (DGC)** in defining and developing the strategy and necessary tasks for the implementation of the BIM methodology in its projects and works. The corresponding announcement will be published soon in the **Official State Gazette (BOE)**.

The incorporation of this technology into the **Directorate General of Roads** will optimize the planning, design, and construction of infrastructures, as well as lay the foundations for future comprehensive management.

In particular, the technical assistance service will include the following tasks:

Definition of the strategy for BIM implementation in the DGC: preliminary analysis, definition of objectives, monitoring, review, and updating.

Development of the BIM Requirements to be included in the procurement specifications, starting from those already established by the DGC.

...

Additionally, the BIM requirements must evolve during the course of the contract, taking into account, among other aspects, the milestones of the BIM Plan.

Development of BIM Guides and Manuals, linked to the processes, procedures, and workflows of the Directorate General of Roads.

BIM training for the staff of the Directorate General of Roads. Continuous assistance and support for the use of the BIM methodology in projects and works, including assistance for resolving doubts.

Review of BIM deliverables, including the review of execution plans. This will allow for feedback on the initially defined implementation strategy, as well as ensure the quality and homogeneity of these deliverables.

Preparation of reports on BIM matters.

Building Information Modeling

Building Information Modeling (BIM) is a collaborative working methodology for managing building or civil works projects through a digital model. This digital model forms a large database that allows for the management of the elements that are part of the infrastructure throughout its life cycle. The use of this methodology enables a sustainable construction policy and greater efficiency in public spending.

This tender is part of the strategy of the **General State Administration** to progressively incorporate the BIM methodology in public procurement, as outlined in the BIM Plan developed by the **Interministerial BIM Commission** and approved by the **Council of Ministers** on June 27, 2023.

Fuente: *https://www.transportes.gob.es/el-ministerio/sala-de-prensa/noticias/mie-16102024-1323*

Sustainability in Construction

6. At KEOPS, we achieve more sustainable and high value-added cementing solutions for the industry.

CETIM, in collaboration with the industrial sector, is developing a new binding material from construction and demolition waste and steel slag to minimize the environmental impact of producing such materials.

Fecha: 23/01/2024

One of the main challenges facing the construction sector is finding alternatives to Portland cement, a material with significant environmental burdens, as it is the second largest source of carbon dioxide emissions globally and a major consumer of resources (a large amount of materials is used for its production). If we add to this the millions of tons of construction and demolition waste (CDW) generated annually, as well as electric arc furnace slag, we see the need to find solutions that relieve the sector of its environmental burden.

And it is precisely in seeking these solutions that we have focused at **CETIM** through the **KEOPS research project**, which aims to investigate geopolymeric cementing solutions of integral sustainability and high added value from construction and demolition waste and steel slag.

The Materials team of Sustainable Construction at our Technological Center has worked on this initiative alongside five leading companies in the construction sector in Spain: **Extraco, Cementos La Cruz, Adec Global, Cromogenia, and Prefhorvisa**.

CETIM's Expertise: At **CETIM**, we began the first stage of the **KEOPS** research through the development and optimization of different fast-setting and low-rebound geopolymeric formulations for shotcrete applications, for heavy metal capture aimed at environmental remediation, and for high chemical resistance in concretes resistant to chlorides and sulfates.

Additionally, several tests were conducted at our Technological Center to find the best formulation of the geopolymeric paste for each of the applications proposed in the project. Finally, our Sustainable Construction Materials team managed to create a new binding material from construction and demolition waste and steel slag, eliminating one of the components with the highest carbon footprint used in cement production, clinker. The new cement, besides being more environmentally friendly compared to Portland cement, also presents better resistance properties to high temperatures, certain acids and salts, as well as a greater capacity for heavy metal capture.

In this way, we have managed to replace conventional cement with different CDWs and two types of steel slag through their alkaline activation in geopolymeric concretes. All this was done by conducting a Life Cycle Analysis of both the mortar for 3D printing and the concretes. This way, we confirmed that the environmental impact of both materials is lower than that of those conventionally used in almost all categories (global warming, environmental performance, water consumption, etc.).

Recycled Newspaper, a Highly Effective Thermal Insulator

A team of researchers from the **Technological University of Panama (UTP)** has found that there is an insulating material with great capacity and effectiveness, made from rice husks and recycled newspaper. Nacarí Marín, one of the researchers, noted that "the developed material has competitive thermal conductivity compared to many natural and recycled insulating materials."

This new thermal insulator represents a significant advance in the production of more sustainable insulators, as the most common ones until now have been made from materials like fiberglass, rock wool, or polyurethane foam, which have drawbacks such

as high energy consumption in their production. Fortunately, new, more eco-friendly alternatives are gaining ground, such as industrial hemp, which is also a powerful thermal and acoustic insulator.

The team led by Marín assures that "it is possible to create a new alternative insulating material from recycled newspaper and rice husks." Rice husks are a common product in Panama, where these investigations are being conducted, and are currently considered agricultural waste, often ending up incinerated or in landfills. If these studies succeed, their true potential will begin to be harnessed, as the tests conducted have been very promising.

To create this new thermal insulator, the research team ground the rice husks into 0.6 mm particles, then added cellulose obtained from recycled and subsequently ground newspapers. Glue was added to this mixture for consistency, along with borax, turning the resulting mass into thermal panels for construction that could provide great resistance to fungi, as well as having fire-resistant properties to comply with fire regulations.

This innovative material for making a new thermal insulator weighs half as much as aluminum and is three times stronger than steel. The research team is taking its production very seriously, as it will have numerous advantages if its production can finally move forward. During the research process, the experts made different combinations with the materials to find the most suitable one to guarantee the desired results

Source: *https://cetim.es/en-keops-logramos-soluciones-cementantes-mas-sostenibles-y-de-alto-valor-anadido-para-la-industria/*


Sustainability in
Construction

7. AI and Sustainability: How Artificial Intelligence is Contributing to Eco-Friendly Architectural Designs

Fecha: 16/03/2024

Artificial Intelligence has its pros and cons, but what is undeniable is that it is revolutionizing sustainable architecture, optimizing designs, and managing resources efficiently for a greener future.

How are architects using AI for a greener future?

Artificial Intelligence is already enabling the creation of virtual models that predict how buildings will perform in terms of energy efficiency. Through intelligent algorithms, architects can now optimize a building's orientation, insulation, natural ventilation, and even the placement of each floor to maximize sunlight, without sacrificing aesthetics for functionality.

Additionally, AI is making it possible to intelligently manage resources in construction, reducing material waste and promoting the use of sustainable alternatives. Imagine a world where every brick counts and is placed guided by this intelligence, which calculates the exact amount of material needed, avoiding excess and favoring the circular economy.

According to a report by the Global Alliance for Buildings and Construction, integrated by UN Environment, buildings with AI-optimized design can reduce their

energy consumption by up to 50%. This not only means considerable economic savings but also a drastic reduction in the carbon footprint of constructions.
Management of already constructed buildings

And let's not just stay in the design and construction phase. AI also plays a crucial role in the management of already constructed buildings. Intelligent energy management systems that learn from the usage patterns of their occupants can autonomously adjust heating, lighting, and other systems to maximize efficiency. It's like having an eco-friendly butler ensuring we don't spend more than necessary. (…)

Source: *https://www.arquitecturaydiseno.es/pasion-eco/sostenibilidad-ai-como-inteligencia-artificial-esta-contribuyendo-disenos-arquitectonicos-ecologicos_9787*

8. Hongos, corontas y algas: Los biomateriales que desarrolla la UTEM para la construcción

Date: 27/06/2024

A team of researchers is developing construction materials from renewable raw materials and agro-industrial waste, promoting a circular economy and significantly reducing the environmental impact of the construction industry

Imagine a future where our homes not only protect us from the weather but also care for the planet. This is the goal of the biomaterials being developed at the **Metropolitan Technological University (UTEM)**. Using fungal mycelium and agro-industrial waste such as corn cobs, wheat residues, and algae, they create thermo-acoustic insulators that not only match the thermal resistance of expanded polystyrene but also surpass it in fire resistance, offering a safer and more efficient alternative.

The biomaterials research conducted by this state university contributes to a world fighting against climate change. With each advancement, we move closer to a future where buildings are not just shelters but also guardians of the environment. As the saying goes, "from trash to treasure," and in this case, biomaterials represent the gain that promises to revolutionize sustainable construction.

Challenges, Promises, and Sustainable Innovation

The proposal innovates in both materials and processes. By using agro-industrial waste and algae stranded on the coast, they turn what was once trash into valuable resources. This approach not only reduces the amount of waste ending up in landfills but also promotes a circular economy, where materials can be reused and recycled at the end of their life cycle.

The acquisition of raw materials and resistance to change in the industry are obstacles that **Ségeur**, the lead researcher, and her team face with determination. The promising results of their fire, compression, and moisture tests indicate they are on the right track. In comparative tests, while polystyrene melted under the flame, the mycelium turned into charcoal, demonstrating surprising resistance.

Fuente: *https://infogate.cl/2024/06/hongos-corontas-y-algas-los-biomateriales-que-desarrolla-la-utem-para-la-construccion/*

9. It Lives Under the Sea, but It's the Best Insulator in Construction: Goodbye to Cement with This New and Strange Material

Date: 18/07/2024

Construction companies are seeking alternatives to cement due to its high greenhouse gas emissions. A promising solution is biocement, which self-repairs thanks to microalgae and bacteria incorporated into its mix. These organisms activate with moisture, filling cracks and extending the material's lifespan.

Living Cement is the Future

This technology seems to be the most effective way to say goodbye to traditional cement, as it mimics nature. Generally, it consists of bacteria and fungi encapsulated in hydrogel. The microorganisms remain in a dormant state until a crack occurs in the structure, moisture enters, which is quickly absorbed by the hydrogel, and "awakens" the organisms.

These living beings feed on the moisture and typically produce calcium carbonate, which reacts with the cement to fill the cracks. In some laboratories, genetically modified bacteria are being studied that can fill the cracks in structures while transmitting real-time information about the areas where damage occurs most frequently.

In this way, not only is the lifespan of the material radically increased thanks to its self-repairing properties, but we can also study with great precision the areas of the material where damage occurs most frequently. This could extend the lifespan of cement for a very long time, reducing its production, which involves two tons of CO2 for every ton of cement.

Biocement not only reduces CO2 emissions by 90%, but also decreases maintenance and replacement costs. Additionally, it allows for real-time monitoring of damaged areas. This technology could replace traditional cement in a few years, offering a more sustainable and economical option for construction.

Source: *https://www.ecoticias.com/hoyeco/cemento-algas-construccion/7677/*

10. The Spanish 'Solar Brick' that is Revolutionizing Construction

Date: 06/12/2024

Spanish researchers have developed an innovative solar brick that combines textile ceramic technology and perovskite photovoltaic cells. This brick allows buildings to generate their own solar energy, representing a significant advancement in sustainable construction. Manufactured by **Flexbrick S.L.** in collaboration with the **UIC Barcelona School of Architecture**, the brick is assembled dry, making installation easier and reducing construction times. Additionally, it is impact-resistant and offers various aesthetic options.

An Easy-to-Install Material

This product is developed by the Spanish company Flexbrick S.L., in collaboration with the UIC Barcelona School of Architecture. Its uniqueness lies in the fact that, unlike traditional bricks, it is constructed 'dry,' meaning it consists of long sheets of varying lengths that are assembled together. The integration of photovoltaic pieces has been developed through grooves in the bricks, and the electrical connections to these cells have been soldered.

The company, along with the researchers, conducted a series of tests to verify its resistance to external elements, such as hail impacts, demonstrating its great durability. This new construction material presents multiple advantages, such as reducing construction times, as the large size of the sheets, combined with their method of installation, allows for time savings. Additionally, it offers great versatility in terms of aesthetics, as the pieces can be of different shapes and colors

Source: *https://as.com/actualidad/sociedad/el-ladrillo-solar-espanol-que-revoluciona-la-construccion-n/*

Knowledge Management

11. Senior Talent Management Programs Increase by 8% in Spain, Still Below the European Average

Date: 04/01/2024

In Spain, the management of senior talent has become an increasingly important issue due to the aging population and the need to integrate older professionals into the labor market. Statistics show that the activity rate of seniors (professionals between 55 and 69 years old) is significantly lower compared to other European countries.

A recent report highlights that 40% of recruiters automatically discard applications from professionals over 55 years old and that 75% of unemployed seniors believe they will not work again. This reflects a contradiction in a society that values youth as an economic driver, while senior talent is often relegated to a precarious transition towards retirement.

The first White Paper on the management of senior talent in Spain, prepared by the Adecco Foundation and the SERES Foundation, seeks to raise awareness about the need to act promptly in a rapidly aging society. The document also aims to give visibility to senior talent and change the mindset that considers them too old to contribute significantly to the labor market.

Organizations face the challenge of adapting their leadership models to meet the needs of an age-diverse workforce. Leaders must incorporate interpersonal skills to manage multigenerational teams and leverage the experience of senior workers through initiatives such as mentoring and tutoring.

In summary, the management of senior talent in Spain is a challenge that requires an urgent response to harness the skills and experience of older professionals, ensuring their inclusion and contribution to the country's economic growth and competitiveness.

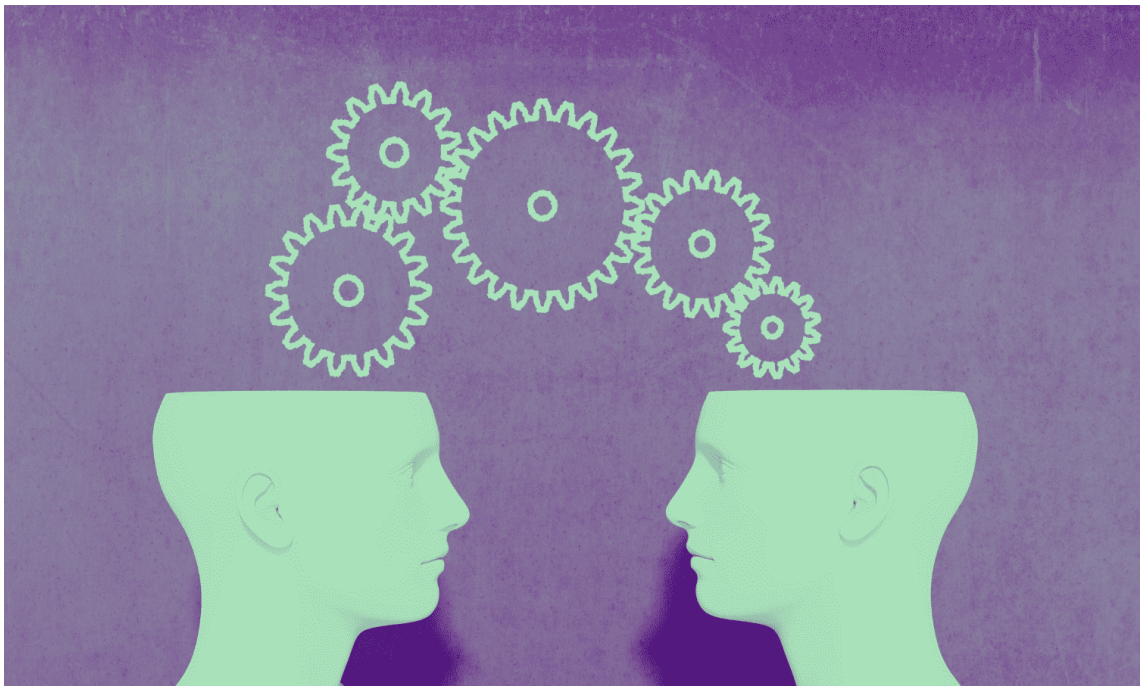
Source: *https://www.corresponsables.com/actualidad/buen-gobierno/gestion-talento-senior-aumenta-espana/*

12. What is effective knowledge management?

Date: 22/04/2024

The article from Ethic titled "What is Effective Knowledge Management?" explains that knowledge management is a valuable resource that offers humans the ability to make accurate decisions and perform activities without errors. In general terms, knowledge management involves optimally managing knowledge to improve its use and maximize its utility, quality, and exploitation.

The article highlights that, unlike countries such as the United States, Japan, Germany, Norway, or Sweden, there is a significant lack of awareness about knowledge management and the benefits of its implementation in Spain. Knowledge management encompasses numerous activities and practices, such as facilitating access to and assimilation of knowledge, updating it, creating new knowledge, identifying key knowledge, organizing it, retaining critical notions, sharing best practices, and detecting the most important knowledge gaps.



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Source: *https://ethic.es/2024/01/que-es-la-gestion-eficaz-del-conocimiento/*

13. Learning in Organizations and Knowledge Management: The Role of Educational Technology and InnovationFecha: 01/08/2024

In today's dynamic business environment, continuous learning and effective knowledge management are essential to remain competitive and foster innovation. Educational technologies (EdTech) and innovative strategies are transforming the way organizations train their employees and manage knowledge. In this article, we will explore the importance of organizational learning and knowledge management, and how educational technology is driving these processes.

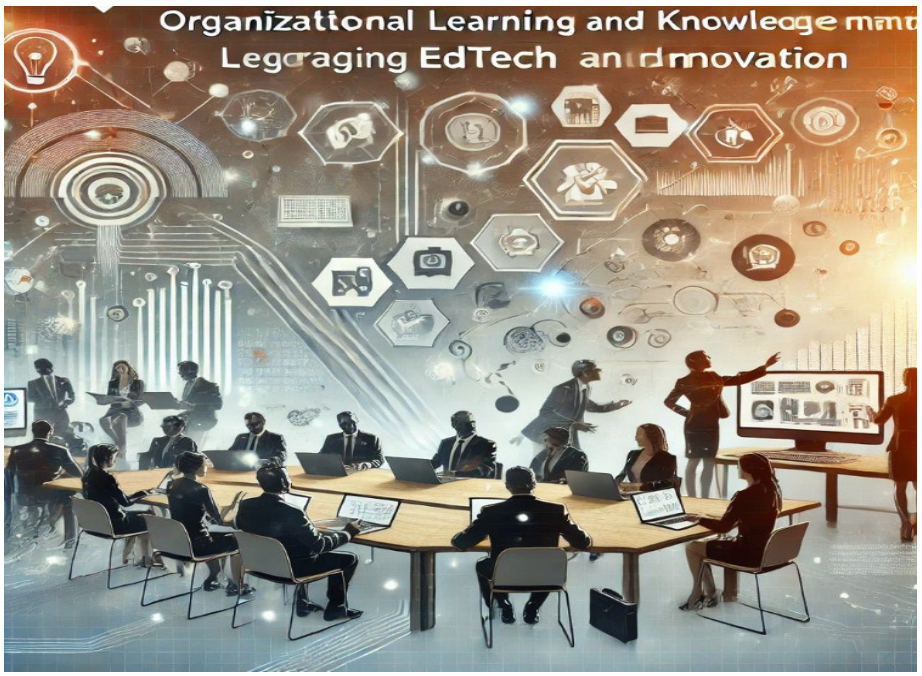
The Importance of Learning in Organizations

Learning in organizations refers to the processes through which employees acquire new skills and knowledge that are crucial for the company's success and adaptation. This learning is fundamental for several reasons:

Adaptability and Resilience: Organizations that promote continuous learning can adapt more quickly to market changes and new technologies. This increases their resilience to crises and allows them to seize new opportunities.

Performance Improvement: Well-trained employees are more productive and efficient. Continuous training helps improve their skills, which in turn enhances the quality of work and job satisfaction.

Talent Retention: Companies that invest in the professional development of their employees tend to have higher talent retention rates. Employees value growth and development opportunities, which increases their commitment to the company.



Knowledge Management in the Company

Knowledge management involves the creation, capture, storage, and dissemination of information and knowledge within an organization. Effective knowledge management is crucial for innovation and informed decision-making. The benefits include:

1. **Innovation and Creativity:** By facilitating access to information and fostering collaboration, knowledge management promotes innovation. Employees can share ideas and best practices, driving creativity and problem-solving.
2. **Operational Efficiency:** Knowledge management helps reduce redundancy and improve operational processes. Employees can quickly access the information they need, saving time and resources.
3. **Competitiveness:** Organizations that effectively manage their knowledge can respond faster to market trends and make more informed decisions. This gives them a significant competitive advantage.

The Role of Educational Technology (EdTech) in Learning and Knowledge Management

Educational technologies are transforming the way organizations train their employees and manage knowledge. Some of the most notable innovations include:

1. **eLearning Platforms:** eLearning platforms allow employees to access courses and training materials online at any time and place. This facilitates autonomous and continuous learning.
2. **Learning Management Systems (LMS):** LMS, such as Moodle or Blackboard, enable organizations to manage and monitor employee progress in training programs. These platforms offer tools for assessment and performance tracking.
3. **Artificial Intelligence and Learning Analytics:** AI and learning analytics tools help personalize the training experience for each employee. These technologies can identify knowledge gaps and recommend specific courses to address those needs.
4. **Virtual and Augmented Reality (VR/AR):** VR and AR offer immersive learning experiences that are especially useful for practical training. These technologies allow employees to practice skills in a simulated environment before applying them in the real world.

5. **Corporate Social Networks:** Corporate social network platforms, such as Microsoft Teams or Slack, facilitate collaboration and knowledge sharing among employees. These tools enable real-time communication and access to shared resources.

Highlighted Use Cases

- **Deloitte:** Uses an advanced eLearning platform to offer professional development programs to its employees worldwide. The platform is equipped with learning analytics to personalize course recommendations.
- **Siemens:** Implements virtual reality simulations for training in highly complex environments, such as engineering and manufacturing. This has significantly improved employee preparedness and safety.
- **IBM:** Uses an AI-based knowledge management system that allows employees to efficiently access information and best practices. This has improved collaboration and innovation within the company.

Source: *https://educacionconinnovacion.com/2024/08/01/aprendizaje-en-las-organizaciones-y-gestion-del-conocimiento-el-rol-de-la-tecnologia-educativa-y-la-innovacion/*

14. The Transformative Power Of Generative AI And Knowledge Management

Date: 19/072024

In today's fast-paced business landscape, the need for speed has become a driving force. Organizations that fail to adapt quickly to changing market demands often fall behind their competitors. This realization has led to a shift in operating models, where traditional policies and processes have given way to a culture of fail-fast experimentation and agile working methods.

Collaboration And Knowledge-Sharing

At the heart of this transformation lies the importance of collaboration. Organizations must break down silos and enable seamless information sharing across departments, allowing insights and issues to flow freely and trigger the development of new ideas or solutions. Knowledge management and generative AI (genAI) are two powerful enablers of this new way of working.

Combining knowledge management and genAI can unlock a new level of knowledge-sharing and collaboration. Users can now seamlessly ask questions and receive personalized responses. This conversational approach to knowledge access and utilization can foster a more engaging and efficient knowledge-sharing environment, ultimately driving innovation and business success.

For example, IT operations professionals can improve decision-making by using AI to process vast amounts of data quickly, providing insights that humans might miss. Humans, on the other hand, can add critical judgment and ethical considerations to AI-generated recommendations.

Embracing Agility

Traditional knowledge management practices often followed a waterfall methodology, where knowledge articles were meticulously crafted and published, only to become outdated when they reached the end users. This approach no longer aligns with the need for speed. Instead, organizations are embracing a more agile approach, capturing knowledge snippets in the workflow and making them immediately available to everyone, even if the information is not perfectly polished.

The introduction of genAI can accelerate this agility even further. By applying genAI to knowledge management, many time-consuming tasks, such as creating summaries, generating metadata, and formatting content, can be automated. This frees up knowledge workers to focus on more value-added activities while ensuring that knowledge is accessible and easily consumable by all users, regardless of their technical expertise.

Knowledge-Capacity Building

The success of this integration between knowledge management and genAI hinges on the organization's knowledge capacity. Outdated or neglected knowledge repositories can propagate inaccurate or irrelevant information, resulting in the dreaded "hallucinations" that can plague generative AI systems. To combat this, organizations must prioritize the active curation and maintenance of their knowledge assets, ensuring that the information fed into the genAI models is accurate, up to date, and valuable.

Beyond managing the knowledge, organizations must also focus on empowering their knowledge community. This means breaking down the traditional silos and barriers that have often stifled the free flow of information and ideas. By fostering a culture of trust, where knowledge-sharing is encouraged and valued, organizations can unlock the true potential of their employees, allowing them to contribute their insights and spark innovative solutions.

The Transformative Power Of Generative AI And Knowledge Management

While the potential of this convergence is undeniable, organizations must also be mindful of the challenges that come with it. Issues such as bias, data quality, and continuous training and refinement must be addressed to ensure the reliable and ethical deployment of genAI within the knowledge-management ecosystem.

By embracing the synergy between knowledge management and genAI, organizations can position themselves as champions in the knowledge economy. This transformation requires a shift in mindset, from simply capturing knowledge to actively cocreating it, as well as shifting from finding information to discovering new possibilities. Organizations can unlock unprecedented levels of innovation, collaboration, and business success by empowering their knowledge community, fostering a culture of trust, and leveraging the capabilities of genAI.

The Future Looks Bright

The future of knowledge work is undoubtedly bright, with the convergence of knowledge management and genAI poised to revolutionize how organizations operate. By embracing this powerful combination, leaders can empower their teams, drive innovation, and position their organizations for long-term success in the ever-evolving knowledge economy.

Source: *https://www.forbes.com/sites/forrester/2024/07/19/the-transformative-power-of-generative-ai-and-knowledge-management/*

15. 5 Ways AI Improves Knowledge Management

Date: 24/08/2024

Given the buzz around it, it's a little strange you don't hear much about the possibilities of AI in Knowledge Management.

If you've been using large language models like ChatGPT for a while, you know their strengths and weaknesses. They're excellent at summarizing, can communicate information clearly, and can assist with various tasks.

However — and this is no small detail — they can also occasionally produce blatantly false information. Despite this, LLMs can be potent tools with the proper guidance and oversight.

This combination of strengths makes LLMs uniquely suited for tasks like Knowledge Management. KM involves capturing, storing, and making accessible the collective knowledge within an organization, ensuring that the correct information is available to the right people at the right time.

Effective KM can enhance a company's decision-making, streamline operations, and foster innovation by making critical information readily accessible. It can also educate your users about the company and its processes, which is invaluable.

In particular, knowledge bases play a critical role in KM. These centralized repositories store valuable information, from troubleshooting guides and FAQs to best practices and procedural documentation. Knowledge bases ensure that information is not siloed within individual teams or departments but accessible across the organization.

This accessibility is crucial for maintaining consistency, improving efficiency, and enabling continuous learning and development. Suppose organizations can leverage the capabilities of LLMs to enhance their knowledge bases. In that case, they're immediately relieving tremendous pressure and making things easier for everyone at every step of the way.

Source: *https://thenewstack.io/5-ways-ai-improves-knowledge-management/*

Digitalization of Processes

16. SOSTEVAL-TEC: Research and Development of an Integrated System for Improving and Evaluating Sustainability in Different Phases of Civil Engineering Projects

Date: 26/02/2024

SOSTEVAL-TEC: Research and Development of an Integrated System for Improving and Evaluating Sustainability in Different Phases of Civil Engineering Projects

The "SOSTEVAL-TEC" project, led by FCC Construcción and comprising companies such as MATINSA, AENOR, IDP, SIGNE, IECA, GLOBAL FACTOR, DRONE HOPPER, and BILDIA, includes the collaboration of technological centers like TECNALIA and the Polytechnic University of Madrid, as well as the collaboration of FI GROUP as an external R&D&I consultant

SOSTEVAL-TEC will have a duration of 36 months and has been funded under the "Open Innovation Business Hubs" grants co-financed by the Community of Madrid and the European Regional Development Fund to contribute to the improvement of public-private cooperation in R&D&I by supporting technological innovation projects with a tractor effect developed by open innovation hubs in the Community of Madrid.

SOSTEVAL-TEC: Research and Development of an Integrated System for Improving and Evaluating Sustainability in Different Phases of Civil Engineering Projects

The main objective of SOSTEVAL-TEC is to research and develop a series of solutions for evaluating sustainability in project management within the construction sector, as well as to review and immediately correct elements that deviate from the set objectives. To achieve this, the project proposes to automate and digitalize the evaluation process to make more effective decisions and optimize project sustainability, through the research and development of three products:

- **Innovative Methodology:** To evaluate sustainability throughout the civil construction value chain and improve decision-making for its achievement.
- **Advanced Digital Platform:** Incorporating the methodology and a series of advanced technologies based on data capture, digital twins, advanced data analytics, and digital identity and traceability. This will improve the precision, efficiency, and comparability of results, generating proposals for improving sustainability in the sector.
- **Certification System by External Agents:** Thanks to a tool that automates data collection and comparison with evaluation standards and protocols for certification, incorporates novel digital solutions and

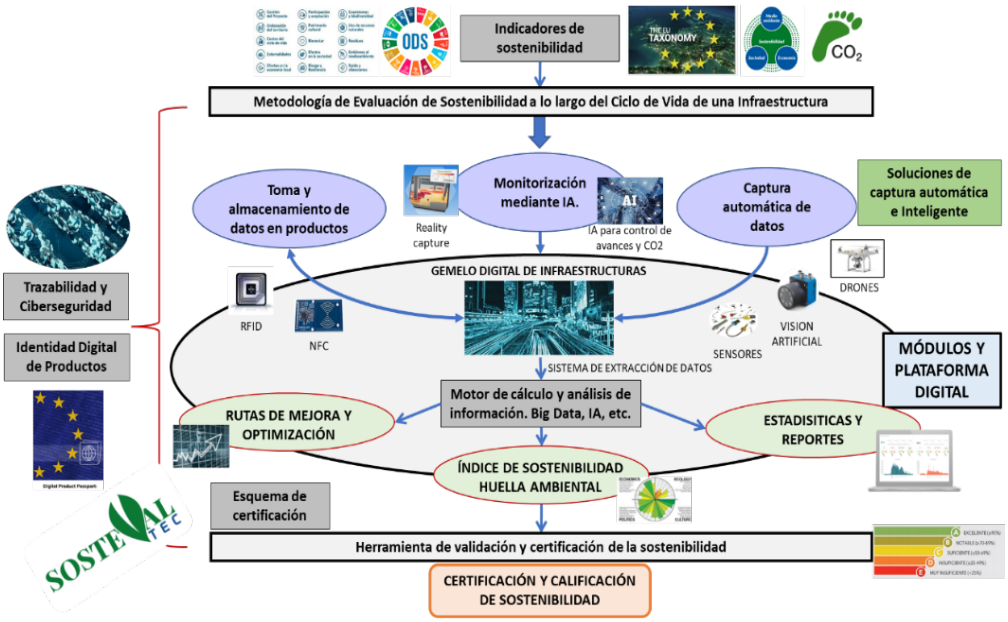
technologies to validate information, and maintains the confidentiality of sensitive data within a supply chain.

With the results obtained from the project, a critical analysis and study will be conducted to:

- Quantify the environmental and economic impact of the solutions using the information collected in the implemented cycle closure pilot. Lay the foundations for new businesses and the exploitation of different products and services.
- Analyze the technical, economic, and environmental impacts for the implementation of the technologies and products developed during the project.
- Identify new business models and new ways to exploit results.
- Generate knowledge and disseminate it in the sector, both locally and internationally.
- Achieve 100% traceability and facilitate strategic decision-making in design and construction processes.

For its execution, SOSTEVAL-TEC has been planned in six work packages (WP):

- **WP1:** Definition of requirements and specifications. Research and development of the sustainability evaluation methodology.
- **WP2:** Research on solutions for intelligent data capture.
- **WP3:** Research on digital solutions for monitoring, analyzing, and evaluating sustainability.
- **WP4:** Research on traceability, validation, and certification solutions.
- **WP5:** Demonstration and optimization under real conditions.
- **WP6:** Project management and dissemination.



SOSTEVAL-TEC Project Outline

Finally, for the validation and demonstration of all proposed developments, the SOSTEVAL-TEC project proposes the execution of unique demonstrators where the different solutions and systems developed will be integrated, monitoring them to validate and give visibility to the technical and environmental aspects of the different solutions. SOSTEVAL-TEC is undoubtedly a project that combines sustainability, innovation, and circular economy in a sector like construction, which is key to the development of cities and the transformation of infrastructures.

The SOSTEVAL-TEC project "Research and Development of an Integrated System for Improving and Evaluating Sustainability in Different Phases of Civil Engineering Projects" has been subsidized through the 2023 Call for Grants co-financed by the European Regional Development Fund to contribute to the improvement of Public-Private Cooperation in R&D&I by supporting Technological Innovation Projects with a tractor effect developed by open innovation hubs in the Community of Madrid, within the framework of the strategic areas of smart specialization of the Madrid economy (S3), within the ERDF Operational Programme of the Community of Madrid for the period 2021-2027.

Dirección General de Investigación e Innovación
CONSEJERÍA DE EDUCACIÓN E INVESTIGACIÓN
Comunidad de Madrid

Cofinanciado por la Unión Europea

Fuente: *https://plataformaptec.es/noticias/*

17. New Technologies in Construction

Date: 15/04/2024

Digitalization is a Key Ally for the Sector, Alongside AI and Robotics

Spot, the agile mobile robot from Boston Dynamics, provides a data capture solution to document the progress and status of construction sites.

The construction industry in Spain is undergoing a technological revolution thanks to NextGenerationEU funds. With a focus on sustainability and efficiency, digitalization becomes the driving force of change. From robotics to Artificial Intelligence, each tool redefines the way we build. From occupational safety to energy efficiency, new technologies are transforming every aspect of the industry. With initiatives like the Acelera Pyme Offices, the sector is promoting the digitalization of SMEs and freelancers, preparing them to lead global innovation.

In our sector, which created up to 50,000 jobs in 2023, more than 70% of which are permanent, and where a worker earns above average and has conditions not found elsewhere—such as the historic pension plan that CNC has agreed with the unions, benefiting more than a million workers—there is an increasing demand for qualification and constant adaptation.

The fact that digitalization is making its way into construction is confirmed by the report on The Construction Sector and ICT 2023, published by the Industrial Construction Observatory of the Construction Labor Foundation. The report highlights the progress made in terms of company digitalization, starting with the web tool used by 68% of firms, the 1.7-point increase between 2022 and 2023 in ICT specialists in the sector, and, in the data analytics section, it is noted that construction excels in location-related analysis using portable devices or vehicles (36.3% in construction, compared to 26% in other sectors).

The latest chapter in this field has been the collaboration agreement between the Spanish Technological Platform for Robotics (HispaRob) and the Spanish Technological Platform for Construction (PTEC)—which I currently have the honor of presiding over—to strengthen the use of this technology in construction and lead the sector in Spain to global technological leadership. A great leap into the future.

Robots, Allies of Construction In this regard, robotics in construction is one of the most in-demand emerging technologies today. It constitutes one of the priority lines of the European R&D framework program Horizon Europe. Both the International Federation of Robotics (IFR) and the International Association for Automation and Robotics in Construction (IAARC) highlight the growing interest of companies in these new solutions.

In terms of construction, robotics encompasses a wide range of solutions. From manipulator applications to mobile systems, including terrestrial robots, autonomous submarines, or intelligent drones for tasks such as prefabrication, assembly, and finishing on-site; also for demolition, automatic machinery guidance, civil work inspection and maintenance, large surface cleaning, or underground work.

More AI, More Safety, Efficiency, and Sustainability It doesn't end there. Let's talk about the different uses of Artificial Intelligence (AI). AI is already rapidly transforming our activity. Solutions based on this discipline exist and are applied to strengthen safety, efficiency, and sustainability in construction sites. In terms of occupational risks and safety, AI-based tools can be used to monitor sites for potential hazards such as falls, electrical risks, and collisions. This is a revolution in progress that will reduce the number of accidents.

In terms of business efficiency, it has long been known in construction that scheduling systems and drones connected to AI can help optimize resource allocation, knowing what we need at all times and how not to waste efforts in vain. This is a significant change, as it affects labor, materials, site inspections for defects, or the precise location of those defects that need to be repaired based on their priority.

Now let's move on to sustainability. With AI, it is now possible to design more energy-efficient buildings with technology that allows us to choose the most sustainable and least polluting materials. Similarly, AI allows us to optimize building operations by automatically controlling installations.

There are many more examples pointing to more sustainable construction. Returning to the selection of environmentally friendly materials and construction processes, AI can minimize the use of polluting materials. The same goes for energy and water consumption, optimizing energy use in machinery or controlling plant irrigation. Also for classifying waste and recycling or reusing it. Something similar to buildings, but in the workplace.

We live, it must be said, in times of abrupt climate changes and extreme temperatures, and technological tools, not just AI, are capable of addressing the adverse effects of climate imbalance by constructing solutions that create more well-being for citizens. Sustainable development exists.

Let's look at some of these tools. Let's get to know them by their specific names. There's Blueprint, which analyzes data on skills, employment, and labor; VRoad, which improves risk prevention; EPIU, which identifies households at risk of Energy Vulnerability; Icons and BIM Technology, which develop the ability to understand and use technical construction information; Bionic, which evaluates occupational risks in real-time, and many others already present in our companies, world leaders in construction.

Acelera Pyme Offices to Promote Digitalization That is why it is necessary to take advantage of the tractor effect of NextGeneration funds and bet on ambitious public-private investment that allows technological transformation, especially in the case of

smaller companies. In our sector, more than 95% of companies are small and medium-sized enterprises or freelancers.

We at CNC are doing something about this. At the end of 2023, we contributed with the opening in Palma de Mallorca of our first Acelera Pyme Office (OAP), through which we aim to help digitalize at least 1,000 freelancers and companies.

The Acelera Pyme Offices, promoted in Spain by Red.es, a public entity attached to the Ministry of Economic Affairs and Digital Transformation through the Secretary of State for Digitalization and Artificial Intelligence, are funded by the State and the Smart Growth Operational Program, translated into European Regional Development Funds (ERDF) for the 2021-2027 programming period.

The offices consist of deploying a central information point with technicians to provide free advice to all types of companies by size and activity to bring available digitalization aids closer. A way to encourage Spanish freelancers and SMEs to take the digital leap. To look to the future to continue being world leaders.

Fuente: *https://www.cicconstruccion.com/texto-diario/mostrar/4815146/nuevas-tecnologias-construccion*

18. The Renovation of Santiago Bernabéu at REBUILD 2024

Date: 15/04/2024

The Renovation of Santiago Bernabéu Thanks to BIM and the Implementation of the Methodology in Public Projects, to be Discussed at REBUILD 2024

The digital revolution in construction has led to the implementation of various solutions, with BIM marking a before and after in the sector. The collaborative work model that the tool follows, in order to gain efficiency and reduce errors, began to be applied a few years ago and has now positioned itself as the technology defining Construction 4.0. This has crystallized in the approval of the Plan BIM España, which instructs the General State Administration to use the solution in certain public contracts, with a gradual implementation schedule from April 1, 2024, to 2030.

In this regard, REBUILD 2024, the pioneering summit of industrialized construction in Spain, will shed light on what the application of this plan means at the national level, which aims, among other aspects, to improve the efficiency of public spending on contracts and, at the same time, serve as a driver to continue the digitalization of construction. To this end, within the framework of the National Congress of Advanced Architecture and Construction 4.0, national experts promoting the method in Spain, such as Sergio Muñoz, director of buildingSMART Spain, or Nerea Castillo, project director at Build:inn, will argue the changes perceived with the implementation of the project that will bring Spain in line with other neighboring countries.

REBUILD will also study the success story of one of the most ambitious projects in the world of football: the construction of the new Santiago Bernabéu. The iconic stadium, home of Real Madrid, has been undergoing a complete renovation since 2019 to adapt to current standards and join the trend of enhancing such facilities with uses that go beyond the sports field. In this transformation process, BIM has helped facilitate the design and development of its large-scale remodeling.

Thus, leaders such as Alejandro Lorca, Partner and Director of L-35, the firm in charge of the renovation; David Barco, Business Development Director of the BIM-specialized company Berrilan; and Iván Guerra, BIM Consulting Director at Hiberus, will share their experience and knowledge to explain how a complex new structure with a fixed roof, weighing over 9,000 tons of steel, has been planned.

BIM in Construction: Advancing Towards Full Implementation In recent years, European Union countries such as the Scandinavian countries, the United Kingdom, France, and Germany have begun to apply the methodology in administrations, far from being functional only in the field of buildings. Consequently, it is being used in other types of constructions such as sports infrastructures, bridges, or roads. However, despite the progress of BIM due to its multiple facilities, there is still a long way to go in its implementation in a large part of the works carried out.

One of the model's objectives is to centralize all project information in a digital format, and for this, it needs all agents in the construction, building, and civil works sectors to be involved in the processes. To this end, Rubén San León, Head of the BIM area at Valladares Ingeniería; María Eugenia López, BIM Manager at Ingennus; Fabrizio Pásara, BIM Manager at Culmia; and Aitor Otero, Head of BIM at Arpada, will delve into the specifications that the builder needs to scale its use and break down the barriers currently encountered.

The Expansion of BIM Design through algorithms and computational methods to create buildings and spaces has experienced a significant revolution with the BIM methodology. This fusion, which aims to create projects in the most optimized way possible, establishes adaptable architectural solutions as BIM captures and manages data throughout the building's lifecycle.

On this topic, experts such as Daniel García, BIM Manager at GCA Architects; César Frías, CEO and Creative Director at Morph Estudio; or Ignacio Llana, BIM Manager at Vrame Consult, will explain, among other topics, how generative algorithms can adjust designs based on predictive or real-time information, thanks to BIM.

Another concept that greatly facilitates work and stimulates efficiency in construction is Lean Construction, a procedure that encourages all actors involved in a project to work together simultaneously in the different phases. To achieve this goal, the methodology develops specific operations that minimize waste, increase productivity, and competitiveness in the industry. In this line, it is worth noting that the Passivhaus construction model also contributes to increasing efficiency, in this case, energy efficiency, thanks to the construction of homes and buildings under bioclimatic standards. Within the framework of REBUILD 2024, Marga García de Celis, Director of Real Estate Promotion at Construcciones García de Celius; Albert Gassull, Director of Public Space Services at AMB; and Ana Bodoque, Head of Quality and Export at Multipanel, will analyze the multiple possibilities when combining processes with BIM, with a view to maximizing resource profitability.

From BIM to PIM: Products Also Digitalize In the development to perfect the design and installation of buildings, BIM is undergoing constant transformation. In this regard, the methodology has allowed other modalities to emerge, such as PIM (Product Information Modeling), which highlights the importance of digitalizing materials and products in construction. This way, decision-making, efficiency, and sustainability can be improved by allowing more precise information management throughout the project's lifecycle. Specialists in the field, such as Mario Ortega, General Director of BIMobject Spain, and Alex Maymó, Head of Digital Innovation & Smart Data at Soler & Palau, will discuss how this change has occurred and the importance of optimal product selection in the quest for improved final construction quality.

Source: *https://obrasurbanas.es/la-reforma-del-santiago-bernabeu-en-rebuild-2024/*

19. CETIM Develops 4.0 Technologies to Improve the Recycling Process of Construction and Demolition Waste

Date: 23/04/2024

Smart2ReDuCe is a project we are working on at our Technological Center to contribute to the Circular Economy and the decarbonization of the sector, converting waste into new sustainable materials for construction.

Smart2ReDuCe

INVESTIGACIÓN EN SOLUCIONES 4.0 EN ECONOMÍA CIRCULAR PARA LA INDUSTRIA DE RECICLAJE DE RCD MEDIANTE VISIÓN ARTIFICIAL, FOTÓNICA AVANZADA E IMPRESIÓN 3D

Construction and operation of buildings account for nearly 40% of natural resource depletion and generate 25% of global waste. Construction and Demolition Waste (CDW) has become one of the main sources of urban waste, often representing between 10% and 30% of the total waste deposited in landfills. Therefore, in addition to reducing waste generation, it is important to facilitate its reuse, and for this, current recycling processes need to be improved.

To seek solutions, our Smart2ReDuCe project emerges, in which we develop new artificial vision and advanced photonic technologies to achieve better on-site separation of CDW. The main objective is to convert waste into new sustainable

materials for construction, something that will be evaluated with recycled aggregates through research in materials and 3D printing technology.

CETIM in Smart2ReDuCe From CETIM's Sustainable Construction Materials line, we condition construction and demolition waste as recycled aggregate and optimize mortar and concrete formulations based on this aggregate. Specifically, these materials are processed for 3D printing of various construction elements.

Additionally, from our Digital Industry area, we analyze different material identification technologies based on artificial vision, in the non-visible spectrum, and photonic techniques, to improve the waste separation process with the aim of facilitating its subsequent recycling and reuse.

Demo Day: Digitalization in the Circular Economy A few weeks ago, the Smart2ReDuCe project and the progress made to date were presented at the Demo Day on 'Digitalization in the Circular Economy: CDW and Technological Advances in Environmental Projects' held in Ferrol. The event was organized by Viratec, the Galician cluster of Environmental Solutions and Circular Economy that leads the project.

Our colleague from Sustainable Construction Materials, M. Alberto Miguéns, along with our Digital Industry Manager, Elena Hidalgo, participated in the event explaining the work we have developed at CETIM and that we have just mentioned.

Additionally, the entire Smart2ReDuCe consortium participated in the meeting: RECINOR, as experts in waste recovery and circular economy; GESTÁN, specialists in the development and implementation of environmental solutions; INOVA, a technology consultancy in innovation, digitalization, and sustainability; ITG, the Technological Center of Galicia; HIMIKODE, specialists in the design and development of technological solutions; CLUSTER DA MADEIRA, which acts as a dynamizing agent of the wood sector through support for the projects of all its associates; and MEDRAR, an AGROTECH consultancy specialized in providing R&D&I services in the agri-food sector with a focus on sustainability and digitalization.

Smart2ReDuCe Project Consortium during Demo Day.

Smart2ReDuCe Project Consortium during Demo Day. Smart2ReDuCe is an industrial research project in digital technologies directly linked to Industry 4.0, aiming to improve the competitiveness of the CDW recycling sector, especially the SMEs involved as drivers of the need. Thanks to the development of a collaborative platform based on advanced digitalization tools using neural networks, we will achieve a CDW value chain with a lower carbon footprint. Most importantly, we will advance in digitalization focused on the separation and validation of aggregates as concrete formulas and 3D printing tests.

The SMART2REDUCE project receives funding from the 2023 call of the support program for Innovative Business Groups (AEI) of the Ministry of Industry, Commerce, and Tourism.

Source: *https://cetim.es/cetim-desarrolla-tecnologias-4-0-para-mejorar-el-proceso-de-reciclaje-de-los-residuos-de-construccion-y-demolicion/*

20. A European Project Will reduce construction waste with AI, advanced robotics, and the BIM model

Date: 02/12/2024

The European project Discover, led by the Universitat Politècnica de Catalunya - BarcelonaTech (UPC), will help reduce construction and demolition waste through Artificial Intelligence technologies, advanced robotics, and the Building Information Modelling (BIM) model.

The objective is to transform the sector towards "a more sustainable and efficient model," and the project advocates for the reuse of materials and the reduction of greenhouse gas emissions, the university reported in a statement this Monday.

The project is led by the researcher and director of the Centre de Disseny d'Equips Industrials (CDEI) of the UPC, Alba Pérez, who states that "with this project, we aim to contribute to the incorporation of digital, automatic, and robotic technologies in the construction sector."

"We want to help create precision demolition based on access to information for all stakeholders, improving efficiency in processes and the recovery and reuse of materials," she adds.

It will contribute to analyzing real-time construction data; optimizing demolition processes with BIM-based protocols to facilitate the identification of materials that can be recovered and reused; and creating a database of secondary materials, "offering traceability and accessibility."

ECONOMIC OPPORTUNITIES The Discover project will also offer "new economic opportunities for the construction and recycling industry" and will last for 4 years with a total budget of nearly 6 million euros, funded by Horizon Europe, the European Union's research and innovation framework program.

A consortium of 14 partners from 8 European countries is participating, and from the UPC, which leads the project, researchers from the Analysis and Technology of Structures and Materials (ATEM) and Geophysics and Seismic Engineering (GiES) research groups, as well as from the UPC Innovation and Technology Center (CIT UPC), are involved.

Source: *https://www.lavanguardia.com/sociedad/20241202/10162651/proyecto-europeo-reducira-residuos-construccion-ia-robotica-avanzada-modelo-bim-ep-agenciaslv20241202.html*

21. FCC Construcción finalist in the III Edition of the Forbes Innovation Awards

Date: 09/12/2024

Finalists in the III Edition of the Forbes Innovation Awards, awards that celebrate the transformative impact of technology in the business world. Congratulations to José Carlos Rico Pérez, BIM Manager at FCC Construcción, and the entire team for being finalists in the "Leadership and Innovation" category with the ATLAAS tool. We have been part of the 35 finalist projects out of a total of 250 applications submitted. Our project contributes to sustainable growth and social progress by applying new business models and processes, redefining the way we work, or creating new customer experiences.

The digital revolution in building has led to the implementation of various solutions, with BIM being the one that has marked a before and after in the sector. The collaborative work model that the tool follows, in order to gain efficiency and reduce errors, began to be applied a few years ago until it has positioned itself today as the technology that is defining construction 4.0. This has crystallized in the approval of the BIM Spain Plan, which instructs the General State Administration to use the solution in certain public

contracts, with a gradual implementation schedule from April 1, 2024, to 2030. In this regard, REBUILD 2024, the pioneering summit of industrialized construction in Spain, will shed light on what the application of this plan means at the national level, which aims, among other things, to improve the efficiency of public spending on contracts and, at the same time, serve as a driver to continue the digitalization of building. To this end, within the framework of the National Congress of Advanced Architecture and Construction 4.0, national experts promoting the method in Spain, such as Sergio Muñoz, director of buildingSMART Spain, or Nerea Castillo, project director at Build:inn, will argue the changes perceived with the implementation of the project that will bring Spain in line with other countries in its environment. REBUILD will also study the success story of one of the most ambitious projects in the world of football: the construction of the new Santiago Bernabéu. The iconic stadium, home of Real Madrid, has been undergoing a complete renovation since 2019 to adapt to current standards and join the trend of enhancing such facilities with uses that go beyond the sporting realm. In this transformation process, BIM has helped facilitate the design and development of its large-scale remodeling. Thus, leaders such as Alejandro Lorca, Partner and Director of L-35, the firm in charge of the renovation; David Barco, Business Development Director of the BIM-specialized company Berrilan; and Iván Guerra, BIM Consulting Director at Hiberus, will share their experience and knowledge to explain how a complex new structure with a fixed roof, with more than 9,000 tons of steel, has been planned. BIM in construction: advancing towards its full application In recent years, European Union countries such as the Scandinavian countries, the United Kingdom, France, and Germany have begun to apply the methodology in administrations, far from being functional only in the field of buildings. Consequently, it is being used in other types of constructions such as sports infrastructures, bridges, or roads. However, despite the fact that the development of BIM is advancing due to its multiple facilities, there is still a long way to go in its implementation in a large part of the works carried out. One of the objectives of the model is to centralize all project information in a digital format, and for this, it needs all agents in the construction, building, and civil works world to be involved in the processes. To this end, Rubén San León, Head of the BIM area at Valladares Ingeniería; María Eugenia López, BIM Manager at Ingennus; Fabrizio Pásara, BIM Manager at Culmia; and Aitor Otero, head of BIM at Arpada, will delve into the specifications that the builder needs to scale its use and break down the barriers it currently faces. The expansion of BIM Design through algorithms and computational methods to create buildings and spaces has undergone a significant revolution with the BIM methodology. This fusion, which aims to create projects in the most optimized way possible, establishes adaptable architectural solutions as BIM captures and manages data throughout the building's life cycle. On this subject, experts such as Daniel García, BIM Manager at GCA Architects; César Frías, CEO and Creative Director of Morph Estudio; or Ignacio Llana, BIM Manager at Vrame Consult, will explain, among other topics, how generative algorithms can adjust designs based on predictive or real-time information, thanks to BIM. Another concept that greatly facilitates work and stimulates efficiency in building is Lean Construction, a procedure that encourages all actors involved in a project to work together simultaneously in the different phases. To achieve this goal, the methodology develops specific operations that minimize waste, increase productivity, and

competitiveness in the industry. In this line, it is worth noting that the Passivhaus construction model also contributes to increasing efficiency, in this case, energy efficiency, thanks to the construction of homes and buildings under bioclimatic standards. Within the framework of REBUILD 2024, Marga García de Celis, Director of Real Estate Promotion at Construcciones García de Celius; Albert Gassull, Director of Public Space Services at AMB; and Ana Bodoque, Head of Quality and Export at Multipanel, will analyze the multiple possibilities when combining processes with BIM, with a view to maximizing resource profitability.

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Source: *https://es.linkedin.com/posts/fcc-construcci%C3%B3n_finalistas-en-la-iii-edici%C3%B3n-de-los-premios-activity-7270879113270231040-kkaG*

Railway Infrastructures

22. Consolidation of the ground under a railway track in Switzerland

Date: 27/02/2024

In the project of the new railway industrial plant (NSIF) in Castione, Switzerland, an innovative injection system called Uretek Multipoint was implemented to address the challenge of crossing the railway embankment and the road with a 1.4-meter diameter reinforced concrete pipe underneath the line

Here are the key aspects of the intervention:

Ground Consolidation: To prevent ground subsidence due to the driving of the pipe, Uretek Geoplus expansive resin injections were carried out in the embankment foundation. The technology used included Uretek Deep injections and the Uretek Multipoint injection system.

Capillary Diffusion of the Resin:

The Uretek Multipoint system allowed for a homogeneous diffusion of the resin throughout the ground, thus maintaining the optimal characteristics of the embankment. Quick and Minimally Invasive Intervention: The Uretek intervention was carried out without interrupting the operation of the adjacent track, avoiding problems in the railway infrastructure. Phases of the Intervention: Horizontal Drilling and Injections: Drilling and injections were carried out from the slope in the downstream embankment, under track 482 (which was in operation). These operations extended over 3 days. Vertical Drilling and Injections: Vertical drilling and injections were carried out directly from the platform of line 382, which was already blocked for railway maintenance interventions. This phase was completed in a single day. In summary, the application of Uretek technology provided an efficient and effective solution to maintain the integrity of the embankment and ensure safety in the railway infrastructure.

Source: *https://magazine.mafex.es/consolidacion-del-terreno-bajo-una-via-ferroviaria-en-suiza/*

23. The advantages of SIL2 Certification in Railway Engineering.

Date: 05/04/2024

Safety Integrity Level (SIL) is an acronym widely used in the railway world. It represents the probability that a system will satisfactorily perform the required safety functions. The goal is to avoid failures that could generate unacceptable risks. These failures are divided into two categories:

Systematic: These errors stem from design, manufacturing, or maintenance issues.

Random: These failures occur in mechanical and electronic equipment due to wear and aging, without direct human intervention.

To evaluate safety integrity, several concepts are considered, such as the probability of failure of a safety function with low demand or continuous use, the failure rate, and the mean time between two consecutive failures. The safety level is numerically expressed using the acronym SIL, with SIL1, SIL2, SIL3, and SIL4 certifications. The latter is the safest, with a high improbability of systematic and random failures.

The determination of the necessary integrity level for each system is based on a risk analysis that evaluates the consequences and probability of failure. At EEE, we design systems with SIL certification, meeting the most rigorous standards of quality and efficiency in safety systems. SIL2 certification is a crucial standard in the railway world.

Here are the main advantages: Safety Shield on Every Journey: SIL2 certification acts as a vigilant guardian in railway signaling and control systems. It provides an additional layer of safety by detecting potential failures and mitigating risks, reassuring both travelers and operators. High Reliability, Reduced Interruptions: SIL2 certified systems are designed to withstand weather conditions, operational challenges, and the daily demands of railway transport. This translates into a significant reduction in interruptions, ensuring smoother and more efficient journeys. Adaptability to Emerging Technologies: SIL2 certification not only meets current standards but also prepares the ground for the seamless integration of tomorrow's innovations. It is a firm step towards a technologically advanced railway future. Regulatory Compliance without Compromises: More than a badge of excellence, SIL2 certification is essential regulatory compliance. By adopting these standards, you not only commit to safety but also ensure compliance with ever-evolving railway regulations. Earned Trust, Peaceful Journeys: Every journey on a SIL2 certified railway is backed by rigorous safety evaluations, exhaustive testing, and an unwavering commitment to operational integrity. It is the peace of mind that defines the travel experience. At Triple E, they embrace SIL2 certification as the safe path to the future of rail transport, constituting a promise of safe and trouble-free journeys on the railway network.

Source: *https://eeesa.com/es/las-ventajas-de-la-certificacion-sil2-en-ingenieria-ferroviaria/*

24. The role of AI in predictive and preventive maintenance of trains

Date: 10/09/2024

The railway industry is constantly evolving, and one of the most exciting areas of development is the use of artificial intelligence (AI) to improve predictive and preventive maintenance of trains. This technology optimizes the operation and safety of trains, reduces costs, and enhances operational efficiency. But how is AI transforming railway maintenance? What benefits does it bring to the industry?

Transformation of Railway Maintenance Traditionally, train maintenance has been based on scheduled inspections and reactions to already occurred failures. This reactive approach can be inefficient, considering the costly downtime and unexpected repairs. However, the introduction of AI is revolutionizing this approach by using data and advanced algorithms to predict and prevent problems before they occur. What is Predictive Maintenance? Predictive maintenance uses sensors and real-time data to monitor the condition of train components. AI analyzes this data to identify patterns and warning signs that may indicate an imminent failure. For example, sensors on wheel

bearings can detect unusual vibrations that indicate wear. AI can predict when a failure is likely to occur, allowing timely repairs before they become major issues.

Benefits of Predictive and Preventive Maintenance Cost Reduction: Prevention, in this sense, is always a saving. It is better to prevent at affordable prices than to fix major breakdowns. Additionally, this also maximizes train utilization time. Improved Safety: AI can identify and address safety issues before they become risks. This is crucial in an industry where safety is paramount. Operational Efficiency: Predictive maintenance allows for better planning of repairs and maintenance, reducing the impact on daily operations. Trains can remain in operation longer and with fewer interruptions. Resource Optimization: AI can prioritize repairs based on criticality and impact. Real Applications of AI in Railway Maintenance Numerous railway companies are already implementing AI solutions for predictive and preventive maintenance. For example, Siemens has developed a platform called Railigent, which uses AI to monitor and analyze train data in real-time. Meanwhile, Alstom uses AI to analyze sensor data on its trains and predict maintenance needs.

Future Trends in Railway Technology

AI is only in its early stages in the railway industry, and its impact is expected to grow in the coming years. Some future trends include: Greater Integration of IoT: The Internet of Things (IoT) will enable greater data collection and deeper integration with AI systems, leading to even greater improvements in predictive maintenance accuracy. Development of More Advanced Algorithms: As technology advances, AI algorithms will become more sophisticated, allowing for even more precise predictions and better resource optimization. International Collaboration: Railway companies around the world are beginning to collaborate and share data, fostering the development of more robust and effective AI solutions. Artificial intelligence is transforming train maintenance, leading the railway industry towards an era of greater efficiency, safety, and sustainability. The transition to predictive and preventive maintenance is not only a technological innovation but a crucial step towards the future of railway transport.

Source: https://eeesa.com/es/ia-ferroviario/

25. The FCH2RAIL project has successfully concluded, marking the first hydrogen train to undergo testing on the Spanish and Portuguese railway networks

Date: 27/112024

The population of large cities has been experiencing an upward transformation in recent years with the creation of urban centers close to them as an extension of these cities. Currently, according to the World Bank, with the global population nearing 8 billion individuals, 56% of them live in cities, which is practically 4.4 billion people. This number is expected to gradually increase to 6 billion by 2045.

The final event of the FCH2RAIL project was held within the framework of the RailLive 2024 congress, which took place over the last two days in the city of Zaragoza. Over the past four years, the project has developed a bimodal demonstration train with hydrogen fuel cells and tested it on the Spanish and Portuguese railway networks.

The event began with a presentation on the project's development and a detailed review of the main milestones and achievements. Paloma Baena, Director of Global Strategy at Renfe; José Conrado Martínez, Deputy Director of Strategic Innovation at Adif; Iosu Ibarbia, Technology Director at CAF; and Emilio Nieto, Director of CNH2, participated in a roundtable discussion on the results and strategic conclusions of the FCH2RAIL project.

Next, the prototype made a journey, allowing guests to experience a ride on the hydrogen train on a route between CAF's facilities in Zaragoza and the Villanueva de Gállego station. The event was attended by Valerie Bouillon-Delporte, Director of Clean Hydrogen Partnership, as well as important executives from the companies participating in the project and other companies that have actively supported the project. The FCH2RAIL project lasted 4 years and had a budget of over 14 million euros, of which around 70% was funded by European funds. It began in January 2021, when the FCH JU (now the Clean Hydrogen Partnership), the European Commission agency to promote the development of hydrogen and fuel cells, selected the FCH2RAIL proposal. The project partners -CAF, DLR, Renfe, Toyota Motor Europe, Adif, IP, CNH2, and Faiveley Stemmann Technik- have more than met the goal of developing a hydrogen-powered prototype train. The so-called Fuel Cell Hybrid PowerPack (FCHPP) was developed and manufactured for an existing commuter train provided by Renfe. This innovative zero-emission power generation system uses electrical energy from fuel cells and LTO batteries to power the train on non-electrified lines, and the catenary when available. It is the first hydrogen fuel cell demonstrator train in the Iberian Peninsula. The first phase of the project, which began in 2021, consisted of developing the new power generation solution and integrating it into the vehicle's existing traction system. To this end, the Fuel Cell Hybrid PowerPack was tested outside the vehicle and the operation of the energy management system was validated and optimized. Once the demonstrator train was completed, static tests began in 2022 at CAF's plant in Zaragoza, where the correct installation and integration of the new system were verified, as well as all interfaces and their correct operation, in addition to performing hydrogen tightness tests and the first hydrogen refueling of the train to power the fuel cells. In mid-2022, dynamic tests of the unit began, initially on a closed track, which served to optimize the new system and equipment, and then these tests began on an external track. The aim was to optimize the hybridization of fuel cells and batteries on the routes defined as representative in the project, simulating commercial operation on all routes and thus testing the new system in a wide range of demand and power conditions. One of the most important milestones of the project was obtaining authorization to carry out tests on the General Interest Railway Network (RFIG) and the departure of the vehicle for the first operational test on the Zaragoza-Canfranc route, in the Aragonese Pyrenees. This is the first authorization from Adif for the trial operation of a hydrogen train on the RFIG,

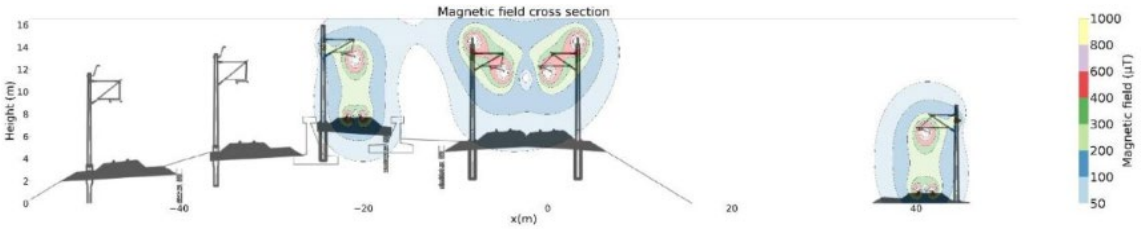
with all the risk analysis and safety validation processes associated with testing new technologies. The arrival of the train at the Canfranc station, in the Aragonese Pyrenees, demonstrated the reliability of the technology used. The Zaragoza-Canfranc route is particularly demanding due to its steep and high ramps, which poses a great challenge for the new onboard power generation systems. To test the new technology in a wide range of power and energy demand conditions, the train traveled different routes for several months, mainly in Aragon, Madrid, and Galicia. The demonstrated scenarios included operation in different climatic and operational conditions. During the train's stay in Galicia, another important milestone of the project was reached when the train crossed the border and was tested on a Portuguese route. This allowed for a more exhaustive characterization of the new technology for a subsequent evaluation of the competitiveness of the new bimodal hybrid propulsion solution with hydrogen fuel cells as a sustainable alternative to the diesel traction currently used. The project also met another fundamental objective, which consisted of participating in European railway standardization committees, with a view to promoting the drafting of new standards or updating existing ones with the necessary conditions to accommodate hydrogen fuel cell technology in the European railway network. In short, the success of the project confirms and reinforces the commitment of the companies that make up the FCH2RAIL consortium to the development of environmentally friendly mobility solutions. In this context, it is worth highlighting the growing interest of numerous public and private transport authorities within and outside the EU in hydrogen fuel cell technology in railway transport in recent years

Source: *https://www.adif.es/-/finaliza-exito-proyecto-fch2rail-primer-tren-hidrogeno-circula-pruebas-redes-ferroviarias-espanola-portuguesa*

26. New software from Ingerop for electromagnetic simulations

Fecha: 21/11/2024

IKUSI, LKS Next, and SQS have developed IoTTrain, an inspiring example of how technology can be a game-changer in the rail industry. The R&D department of INGEROP has developed an innovative software tool in Python, specialized in the simulation of electric and magnetic fields, as well as induced voltages in OCS (Overhead Contact Systems) and other elements of railway infrastructure



This software makes advanced use of the first three Maxwell equations, allowing for the precise recreation of electromagnetic phenomena associated with power systems in railway systems. The use of Python not only brings flexibility and efficiency in development but also facilitates integration with other data analysis and visualization tools. This language enables advanced processing capabilities, improved graphical visualization, and versatility, making this software a robust and adaptable tool to the various needs of the railway sector. It addresses the growing need to model and analyze the effects of electromagnetic fields on the components of modern railway systems, thus ensuring optimal operation and protection of the elements interacting in this environment. In practice, simulating these fields is crucial to anticipate and mitigate issues such as interference, energy efficiency losses, and potential damage to critical components of the power and signaling system. This tool represents a significant advancement in simulation technology applied to the railway sector, offering a precise and flexible analysis environment that allows railway operators to meet the highest standards of quality and efficiency in their power infrastructures.

Source: *https://magazine.mafex.es/ingerop-adquiere-leedeo-engineering/*

Cybersecurity and permissioned networks for tracking and control platforms

27. La UE adopta el esquema de certificación de ciberseguridad EUCC basado en Common

Fecha: 18/02/2024

Tras la reciente publicación del primer esquema de certificación de ciberseguridad adoptado en **la Unión Europea dentro del marco del Reglamento (UE) 2019/881 (conocido como Cybersecurity Act), la Entidad Nacional de Acreditación (ENAC)** anuncia que está en disposición de acreditar a laboratorios de acuerdo a los requisitos del nuevo esquema europeo basado en Common Criteria (EUCC), elaborado por la Agencia de Ciberseguridad de la Unión Europea (ENISA).

El nuevo esquema de la UE tiene como objetivo elevar el nivel de ciberseguridad de los productos, servicios y procesos de TIC en el mercado comunitario. En concreto, este esquema permite a los proveedores del sector que deseen demostrar la seguridad de sus productos TIC, tales como componentes tecnológicos (chips, tarjetas inteligentes), hardware y software, someterse a un proceso de evaluación común de la UE para certificar estos productos.

El esquema es el resultado de un intenso trabajo desarrollado en el seno de ENISA y en el que ENAC ha desempeñado un papel protagonista como miembro de la representación de la European Accreditation (EA); en particular, en el desarrollo de los documentos “Accreditation of ITSEFs for the EUCC Scheme” y “Accreditation of CBs for the EUCC Scheme”.

“Desde 2020, trabajamos en el desarrollo de este esquema de certificación” explica Rosalina Porres, responsable de los esquemas de acreditación en materia de Ciberseguridad en ENAC, quien ha participado en estos trabajos, “primeramente, en la propuesta sobre cuáles deberían ser los requisitos de acreditación para los laboratorios que realizan evaluaciones de productos dentro del esquema EUCC y, actualmente, seguimos trabajando en los requisitos que se deberán aplicar a los certificadores”.

Herramientas para ayudar a los auditores en estas evaluaciones

Adicionalmente, hace unos meses ENAC puso en marcha, a instancias del Centro Criptológico Nacional (CCN). Se trata de un programa piloto que ha permitido iniciar los procesos de evaluación antes de la publicación del esquema. Para este programa, ENAC ha trabajado, junto al CCN, analizando los cambios más importantes que introduce el esquema y se han creado herramientas para ayudar a los auditores en estas evaluaciones. Todo este trabajo desarrollado dentro de este programa piloto ha permitido que, en el momento de aprobación del esquema, ya existan diferentes procesos de evaluación avanzados. Esto ha acortado sensiblemente el tiempo para conceder las primeras acreditaciones y facilitará que la industria española pueda iniciar cuanto antes los procesos de evaluación frente al esquema.

Como primer esquema de certificación de ciberseguridad de la UE que se adopta, se espera que el EUCC allane el camino para los próximos esquemas que están actualmente en preparación, como el de certificación sobre servicios en la nube (EU Certification scheme on Cloud Services, EUCS) y el de certificación para redes móviles 5G (EU 5G scheme).

Fuente: *http://www.enac.es/*

28. Dos asociaciones 'open source' alertan del intento de sabotaje de varios softwares populares

Fecha: 16/04/2024

Open Source Security Foundation y la OpenJS Foundation han señalado que este intento de introducir una puerta trasera en XZ Utils, de Linux, no es un hecho aislado.

El reciente intento de un actor de amenazas desconocido por sabotear un programa de software popular, XZ Utils, puede haber sido uno solo de muchos casos para subvertir piezas clave de la infraestructura digital de Internet, según han denunciado dos asociaciones de código abierto, tal y como se hacen eco desde Reuters.

En una declaración conjunta, la Open Source Security Foundation y la OpenJS Foundation han señalado que este intento de introducir una puerta trasera en el software –un programa poco conocido pero que está integrado en los sistemas operativos Linux en todo el mundo– "puede no ser un incidente aislado". De hecho, citan al menos tres proyectos diferentes de JavaScript que han sido atacados por personas no identificadas que exigían actualizaciones sospechosas o solicitaban que se les hiciera mantenedores del software objetivo

Fuente: *https://www.computerworld.es/*

29. Exploits se utilizan solo 22 minutos después del lanzamiento de una PoC

Fecha: 14/07/2024

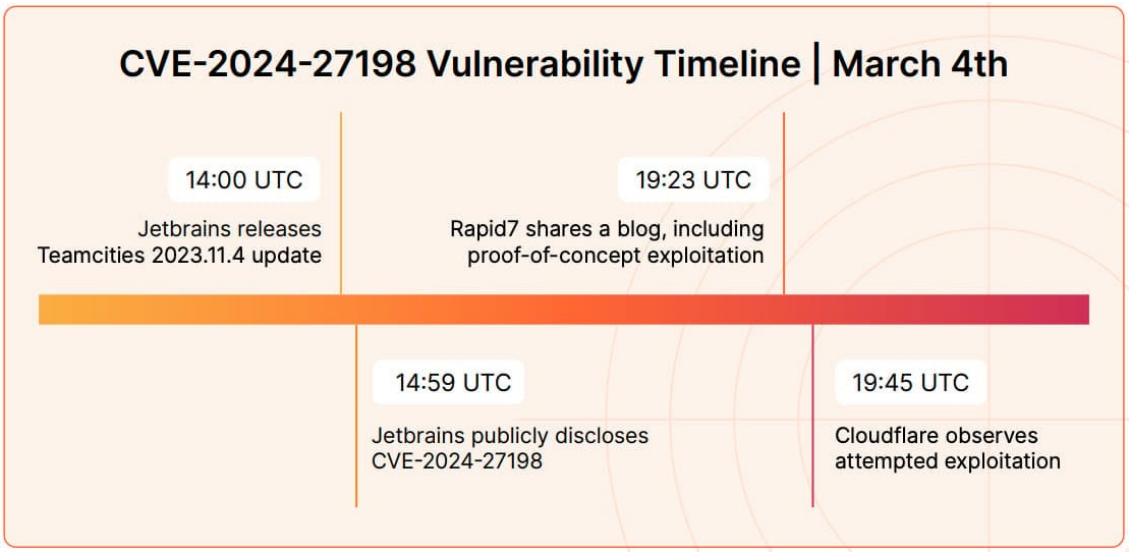
Los actores de amenazas se apresuran a utilizar como arma los exploits disponibles en ataques reales, a veces tan pronto como 22 minutos después de que las prueba de concepto (PoC) se ponen a disposición del público.

Esto es según el **informe de seguridad de aplicaciones de Cloudflare para 2024**, que cubre la actividad entre mayo de 2023 y marzo de 2024 y destaca las tendencias de amenazas emergentes.

Cloudflare, que actualmente procesa un promedio de 57 millones de solicitudes HTTP por segundo, continúa viendo una mayor actividad de escaneo de CVE divulgados, seguida de inyecciones de comandos e intentos de convertir los PoC disponibles en armas.

Durante el período examinado, las fallas más atacadas fueron CVE-2023-50164 y CVE-2022-33891 en productos Apache, CVE-2023-29298, CVE-2023-38203 y CVE-2023-26360 en Coldfusion, y CVE-2023- 35082 en MobileIron.

Un ejemplo característico del aumento en **la velocidad de la utilización de armas es CVE-2024-27198,** una falla de omisión de autenticación en JetBrains TeamCity. Cloudflare observó un caso en el que un atacante implementó un exploit basado en una PoC 22 minutos después de su publicación, lo que prácticamente no dejó a los defensores ningún margen para la oportunidad de remediar el problema.



La empresa dice que la única forma de combatir esta velocidad es emplear asistencia de inteligencia artificial para desarrollar rápidamente reglas de detección efectivas.

"La velocidad de explotación de los CVE revelados suele ser más rápida que la velocidad a la que los humanos pueden crear reglas WAF o crear e implementar parches para mitigar los ataques", explica Cloudflare en el informe. "Esto también se aplica a nuestro propio equipo interno de analistas de seguridad que mantiene el conjunto de reglas administradas WAF, lo que nos ha llevado a combinar las firmas escritas por humanos con un enfoque basado en ML para lograr el mejor equilibrio entre pocos falsos positivos y velocidad de respuesta".

Cloudflare dice que esto es en parte el resultado de actores de amenazas específicos que se especializan en ciertas categorías y productos CVE, y que desarrollan una comprensión profunda de cómo aprovechar rápidamente las nuevas revelaciones de vulnerabilidades.

El 6,8% de todo el tráfico de Internet es DDoS

Otro punto destacado sorprendente en el informe de Cloudflare es que el 6,8% de todo el tráfico diario de Internet es tráfico distribuido de denegación de servicio (DDoS) destinado a hacer que las aplicaciones y servicios en línea no estén disponibles para los usuarios legítimos.

Se trata de un aumento notable en comparación con el 6% registrado durante el período de 12 meses anterior (2022-2023), lo que muestra un aumento en el volumen general de ataques DDoS.

Cloudflare afirma que durante grandes ataques globales, el tráfico malicioso puede representar hasta el 12% de todo el tráfico HTTP. "Centrándonos únicamente en las solicitudes HTTP, en el primer trimestre de 2024 Cloudflare bloqueó un promedio de 209 mil millones de amenazas cibernéticas cada día (+86,6 % interanual) [... lo que] es un aumento sustancial en términos relativos en comparación con el mismo período del año pasado".

El informe, disponible para descargar aquí, proporciona recomendaciones adicionales para los defensores y conocimientos más profundos sobre las estadísticas compiladas.

Fuente: *https://blog.cloudflare.com/*

30. Índice Global de Ciberseguridad 2024

Fecha: 17/09/2024

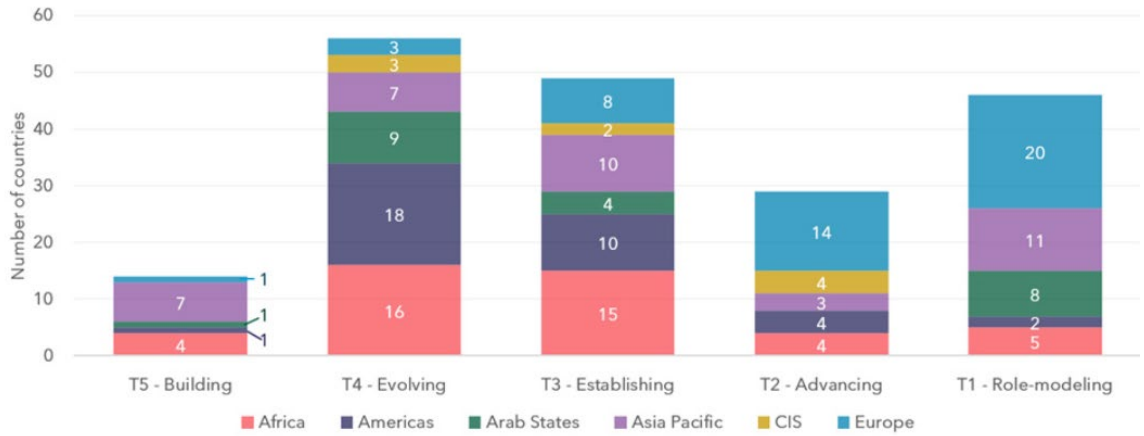
La quinta edición del **Índice Global de Ciberseguridad (GCI)** mide el compromiso de los países con la ciberseguridad en el contexto de medidas que abarcan los siguientes cinco pilares:

La GCI, lanzada en 2015 por la Unión Internacional de Telecomunicaciones (ITU), busca ayudar a los países a identificar áreas de mejora y alentar a los países a actuar en la creación de capacidades bajo cada pilar. El GCI se ha adaptado continuamente en todas las ediciones para responder a los riesgos, prioridades y recursos cambiantes, con el fin de proporcionar una instantánea más relevante de las medidas de ciberseguridad adoptadas por los países.

Desde 2021, los países, en promedio, han tomado más medidas relacionadas con la ciberseguridad y han mejorado sus compromisos con la ciberseguridad. La puntuación media mundial de los países ha aumentado a 65,7/100.

En los cinco pilares del GCI, la mayoría de los países son más fuertes en el pilar legal. Por el contrario, el país promedio es más débil en los pilares técnico y de desarrollo de capacidades.

Cada región tiene países que son modelos a seguir o están avanzando, y cada región también tiene países que se encuentran en las etapas iniciales de construcción de sus compromisos en materia de ciberseguridad. Para captar estas diferencias, el desempeño de los países se mide en cinco niveles (Nivel 1 es más alto). Estos niveles proporcionan grupos de pares basados en puntuaciones para ayudar a los países a comprender e identificar modelos a seguir para mejorar.



Los esfuerzos sólidos y coordinados en materia de ciberseguridad por parte de los países se han vuelto más importantes desde la edición anterior del Índice Global de Ciberseguridad (GCI). Con aproximadamente 5.400 millones de personas en línea. Incluso las poblaciones fuera de línea se ven afectadas por la aceleración continua de los desarrollos tecnológicos con la adopción de la inteligencia artificial, los esfuerzos renovados hacia la digitalización y los avances generalizados hacia una conectividad universal y significativa.

Fuente: *https://www.itu.int*

31. El factor humano y la cadena de suministro, principales desafíos para la adaptación a la NIS2

Fecha: 12/12/2023

Las empresas ya no pueden permitirse ser sorprendidas por ciberataques. El año 2024 afronta una oleada de ciberataques sin precedentes que ha hecho saltar las alarmas y ha situado a España en el 8º país más atacado a nivel mundial. Por ello, las medidas a implementar para aumentar la seguridad han de ser más rigurosas, lo que implica mejores evaluaciones de riesgos y gestión de estos. Como resultado, la UE ha actualizado la normativa NIS2 (Network and Information Security Directive) de 2016.

La nueva Directiva, que tiene que ser transpuesta a los **ordenamientos jurídicos de los Estados miembros antes del 17 de octubre**, pretende ampliar la capacidad de respuesta ante incidentes para hacer frente a un contexto complicado de ciberamenazas, que año tras año se vuelven más numerosas, complejas y severas.

Muchas empresas –se estima que más de 2.000 en España– de sectores, como la energía, el transporte, la salud o las finanzas, deberán adoptar medidas encaminadas a mejorar la gestión y el control del riesgo, incorporar procesos de notificación de incidentes más rápidos, y estar preparadas para una mayor cooperación para hacer frente a las vulnerabilidades y ciberataques, ya que la normativa fomenta la coordinación y el intercambio de información entre los sectores público y privado, el sector de la ciberseguridad y los reguladores, para articular una respuesta eficiente ante las amenazas.

“Tenemos un trabajo importante de nuestro lado en conocer en detalle la directiva y hacer que las empresas con las que trabajamos sean conscientes y preparen una hoja de ruta que les ayude a integrar está normativa en la medida adecuada a sus realidades”, explica Iván Bermejo, Defensive Security Team Lead de Innovery by Neverhack España.

Según este experto, cumplir con **NIS2 implica una revisión profunda de los sistemas operativos y tecnológicos de las empresas**, pero los verdaderos desafíos de esta normativa están relacionados con el factor humano y la cadena de suministro:

Formación y concienciación. La tecnología actual está preparada para repeler los ciberataques en todos los frentes, pero es importante hacer hincapié en proteger a las personas, ya que el factor humano sigue siendo el eslabón más débil de la cadena. Y es que la falta de concienciación de los empleados abre la puerta a un mayor número de ciberataques. Entre el 75 y el 95% de los incidentes de ciberseguridad tienen su origen en un error humano. La formación en ciberresiliencia de los empleados, poniéndolos en el centro de la estrategia de ciberseguridad, se convierte en obligatoria.

Gestión de la cadena de suministro. Este punto de la normativa cambia el paradigma de cómo ha estado operando hasta ahora. Las compañías están obligadas a evaluar a sus proveedores y analizar cómo interactúan. Se les debe dar un acceso de VPN segregado, diferente al de los empleados y hacer uso de todas las medidas de securización ante mails externos. Esto exige una monitorización de todos los usuarios procedentes de proveedores y ver sus flujos de trabajo. En caso de que los proveedores no puedan adaptarse, muchas empresas tendrán que cambiar su relación con terceros para poder cumplir la normativa.

Las sanciones por incumplimiento pueden alcanzar los 10 millones de euros en el caso de las organizaciones que operan en sectores de alta criticidad, pero el impacto reputacional y la pérdida de confianza de clientes y partners pueden resultar aún más costosos a largo plazo. Por ello, es crucial que las empresas desarrollen planes claros

para cumplir con los requisitos establecidos por esta normativa y proteger así su infraestructura tecnológica.

“Con esta normativa en mente, es esencial comenzar a implementar los cambios necesarios para garantizar la protección de sus redes y sistemas de información. Como buen punto de partida, recomiendo a las empresas realizar un análisis para ver dónde se encuentra y comprobar qué tienen que poner en marcha, seguido de una priorización adecuada y dedicarle los recursos necesarios”, explica el experto. “Desde Innovery by Neverhack ofrecemos el conocimiento para guiar a las empresas en este proceso, proporcionando soluciones personalizadas que aseguran un cumplimiento integral con los requisitos de la normativa”.

Fuente: *https://cybersecuritynews.es/*

Virtual and Augmented Reality for use in simulators and training

32. OpenXR updates to reduce fragmentation and simplify the development of advanced XR applications

Fecha: 16/04/2024

The Khronos consortium has released an update for the OpenXR standard, integrating widely used API extensions into its core and adding new features. This OpenXR 1.1 version aims to streamline the development of more powerful and efficient XR applications and make them cross-platform. The updates in this release, the first since OpenXR 1.0 was launched in 2019, are very technical and can be found on the Khronos Group website or in the SDK registry on GitHub. Among the functions now integrated are primary view configuration for foveated rendering with eye tracking or fixed foveated rendering and a standard hand pose identifier. In addition to integrating existing features, new functions have been added to improve integration profiles, streamline programming, error identification codes, etc.

In the near future, the OpenXR working group will add features to include full-body tracking and standardized methods for interacting with the user's environment in advanced spatial computing applications. This latter feature seems to be a nod to Apple, although the company has ignored OpenXR in its Vision Pro glasses. Most XR platforms today use OpenXR (Meta, Magic Leap, PICO, Valve, Varjo, XReal, Sony, Qualcomm, Cannon, Acer, HTC, etc.). The main game engines and rendering tools have also adopted this standard: Autodesk, VRED, Blender, Godot, Nvidia Omniverse, StereoKit, Unreal Engine, and Unity.

Source: *https://www.khronos.org*

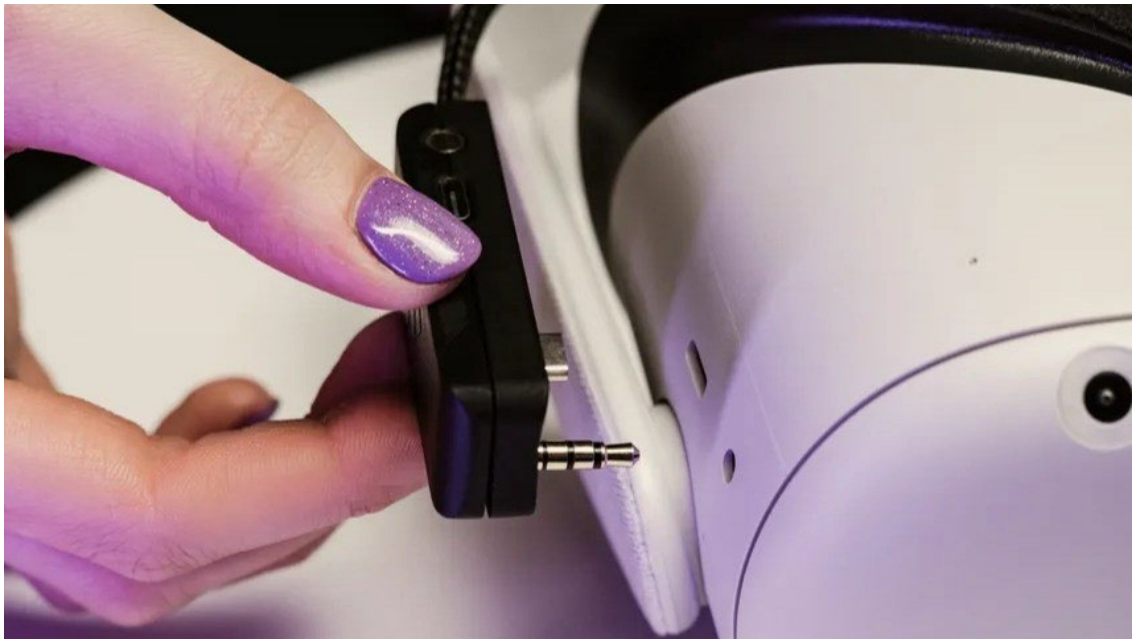
33. Inseye Lumi, eye tracking for Quest 2 and 3

Date: 24/05/2024

Two years ago, the company Campfire introduced a tool for holographic collaboration in 3D design. Now, the application and its XR headset are a reality and can be acquired with "freemium" business plans starting at $1,500 per user per year. The company Inseye is working on an eye-tracking module for Meta Quest 2 and 3 headsets that, instead of using cameras, will use photosensors. This system, being more economical, would allow them to launch Inseye Lumi to the consumer market at a price of $160, although it is not yet known when it will be available.

Just like Tobii does in the eye-tracking system mounted on PSVR2 and other headsets, Inseye Lumi will also use infrared LEDs. However, instead of cameras that track pupil movement, it will use six photosensors that measure the intensity of the infrared light reflection in the eye.

Since each part of the eye reflects that light with a different intensity, this data will be processed to determine where the user is looking. The advantage of this system, besides being less expensive, is that it would consume 5 times less battery and its latency would be less than one millisecond, allowing for better foveated rendering. However, the accuracy of this eye-tracking system would be somewhat lower than the camera-based one, with two degrees compared to one, losing functions such as interacting with the gaze if the interface elements are very small and it would not detect pupil dilation either.



The module would connect to the headsets via USB-C, using a system that would allow continued use of that port for audio or charging the battery.

Source: *https://www.inseye.com/*

34. The new AR Spectacles incorporate a spatial engine that enables hand tracking

Date: 18/09/2024

Snap has introduced the fifth generation of Spectacles, its augmented reality (AR) glasses redesigned to integrate four cameras that power the Snap spatial engine, enabling hand tracking and user interaction with the environment, driven by the new Snap OS operating system. The tech company unveiled its latest innovations at the Snap Partner Summit, emphasizing its intention to enhance AR to facilitate "experiencing the world together with friends in entirely new ways." In this context, Snap presented its new fifth-generation AR Spectacles, which it defines as hardware that "breaks the boundaries of screens and brings people closer in the real world." This new model has been redesigned with lightness in mind, and with a weight of 226 grams, the tech company detailed that it reduces to less than half the weight of a typical virtual reality (VR) headset. Additionally, they have been equipped with four cameras that power the Snap spatial engine. With this technology, the glasses are capable of performing "perfect" tracking of users' hand movements, allowing interaction with the real world through gestures and AR.

As the company explained in a statement on its website, another new feature of the new Spectacles is the optical engine, which has been built from scratch using Snap's patented technology to enable a transparent AR display. When reproducing images, the glasses integrate liquid crystal on silicon (LCoS) microprojectors. These microprojectors are "incredibly small" but have a large capacity, allowing the company to ensure they can create "sharp and vivid" images. Additionally, the microprojectors are accompanied by waveguides, which allow the images created by the LCoS projector to be seen "without the need for lengthy calibrations or custom adjustments." This is because each waveguide has "billions of nanostructures" that move light into the users' field of view to combine AR images with the real world.

As a result of this technology, Snap has detailed that the optical engine can offer a diagonal field of view of 46 degrees with a resolution of 37 pixels per degree. This is equivalent to viewing a 100-inch screen from just 3 meters away, as exemplified. Snap also highlighted that the glasses' lenses automatically tint according to the ambient lighting. Therefore, if there is a lot of light, the lenses darken to maintain the projection of vibrant images, even in direct sunlight. This makes them easy to use in any space. Additionally, the new Spectacles are powered by a dual system-on-chip architecture. They integrate two Qualcomm Snapdragon processors, which, thanks to this infrastructure, divide the computational workload between them. This model allows for "more immersive" experiences while reducing power consumption thanks to its titanium vapor chamber, which improves heat dissipation.

Source: *https://www.europapress.es/portaltic/gadgets/noticia-nuevas-gafas-ra-spectacles-incorporan-motor-espacial-permite-seguimiento-manos-20240918121730.htmlhttps:*

35. Xpanceo presents prototypes of contact lenses with XR functions.

Fecha: 16/10/2024

The Dubai-based technology company Xpanceo has announced its advancements in smart contact lenses with XR functions, presenting two prototype models of contact lenses. Initial testing of the final products with all their features is scheduled for the last quarter of 2026. It is still too early to talk about a possible launch to the consumer market.

These small contact lens models were presented at the GITEX 2024 fair, an event attended by emerging technology companies. The first prototype allows users to view and interact with 3D content, positioning the images within the real environment in an immersive way.

The second prototype is a contact lens that has the ability to wirelessly receive and transmit data to mobile phones. It features several integrated biometric sensors and is designed to monitor users' health.

These new models represent an advancement over those previously developed, such as smart contact lenses for augmented reality and lenses capable of measuring

intraocular pressure more effectively than current methods, which would help detect early signs of glaucoma.

Source: *https://creal.com*

Artificial Intelligence

36. The European Union approves the first law on artificial intelligence.

Fecha: 07/02/2024

The European Commission has announced the entry into force of the Digital Decade policy program, a monitoring and cooperation mechanism to achieve the common goals for the EU's digital transformation by 2030.

The 27 member states of the European Union (EU) have approved the world's first law on artificial intelligence (AI). The legislative process is not yet complete, and it is expected that the official regulations will come into force by the end of 2026. However, the consensus reached in Brussels could establish new competition rules in an emerging market.

The approved document is provisional but final. This means that it may undergo modifications derived from the processes planned for its implementation, but the foundations on how AI should be used and developed within the bloc have reached consent among member countries with the approval of the European Commission, the Council, and the European Parliament.

The EU has agreed on the terms of the Artificial Intelligence Act, a new and important set of rules that will govern the construction and use of AI, and will have significant implications for Google, OpenAI, and other companies rushing to develop systems with this technology.

France, Italy, and Germany had requested that regulations regarding basic AI models, understood as those of general use that support tools like the simplest version of ChatGPT, be relaxed. Finally, the trio of nations dropped their objections and joined the rest of the group to approve the legislative initiative.

The next step is to study and establish the implementation phases for the regulations. During the process, companies and other stakeholders with particular interests will be able to engage in lobbying practices to try to influence the final decisions made by the EU's political authorities.

What does the AI law approved in the EU say?

The approved regulations prohibit biometric systems that identify people using sensitive characteristics such as sexual orientation and race, as well as the indiscriminate extraction of faces from the internet. Legislators also agreed that law enforcement can use biometric identification systems in public spaces to support investigations of certain crimes. Measures were included to facilitate the protection of copyright against generative AI; the regulation also requires systems to be more transparent about their energy consumption.

The law includes three levels of assessment for AI developments. It considers a section for models that integrate systems like GPT-4 or PaLM 2, on which most products of this technology are based; a second that would concentrate on "high-capacity" resources, characterized by having advanced resources to train algorithms; and a third that would consider general-purpose tools, those of common use with some market influence due to the number of users they can attract.

The European Union is ahead in AI regulation

The European Union is not the only one that has tried to regulate the use and development of AI-based systems. The authorities in the United States have presented

some proposals in this regard, although most of the progress has been left in the hands of the major companies in the sector. Since August, China has had a legislative framework for the use of generative AI, although it lacks more extensive regulations that consider the development and advancement of the technology. In Mexico, there are 31 initiatives presented to the Senate of the Republic to regulate artificial intelligence; 28 are related to the classification of crimes that can be committed using the technology, and only two propose constitutional reforms to moderate it.

Establishing a regulatory framework represents an advantage for the bloc. Analysts estimate that early regulation for the emerging market will dictate the competition rules between large companies and startups trying to grow within the sector, allowing the European Union to establish suitable conditions for local projects with the potential to grow exponentially.

A leaked report from Google concluded that the companies currently leading in the segment lack a sustainable competitive advantage in the AI business compared to smaller companies.

"Although our models still have a slight edge in terms of quality, the gap is closing at an astonishing rate. Open-source models are faster, more customizable, more private, and pound for pound, more capable. They do things with $100 and 13 billion parameters that cost us $10 million and 540 billion parameters. And they do it in weeks, not months," the report signed by engineers from the Mountain View company states.

With strict regulation on the use and development of artificial intelligence systems, a window opens for European AI startups to have more opportunities to compete with the large American corporations that have so far dominated the market.

Source: *https://www.elperiodico.com/es/internacional/20240202/francia-ue-inteligencia-artificial-aprobacion-ley-regulacion-ia-97655168*

37. .Microsoft presents Phi-3 Mini, a tiny AI model that can run on a cell phone and is as capable as GPT-3.5

Date: 23/04/2024

Microsoft has just launched Phi-3 Mini, an artificial intelligence (AI) language model that can match the capabilities of OpenAI's GPT-3.5, despite being a much smaller system.

The algorithm is the first in a series of three small language models (SLMs) that the company plans to release. It can understand and manage up to 3,800 parameters or complex instructions. It is trained with a significantly more limited dataset compared to systems like GPT-4, but it provides responses close to those of a model 10 times larger, according to its developers.

The advancement is the result of a training process based on a "curriculum." Microsoft drew inspiration from the way children learn. Phi-3 Mini acquired and refined its knowledge through children's stories and books with simple sentences that address broader and more complex themes.

Boyd explained that "there are not enough literary materials for infants, so we took a list of more than 3,000 words and asked a large language model (LLM) to create 'children's books'." The materials were used to train Phi-3 Mini.

The goal of Microsoft's new SML is to provide responses based on general knowledge. Phi-1 has coding skills, while Phi-2 acquired simple reasoning capabilities. The third generation built on the previous iterations to achieve improvements in problem-solving with a higher level of coding and reasoning

Source: *https://azure.microsoft.com/en-us/blog/introducing-phi-3-redefining-whats-possible-with-slms/*

38. AI frequently deceives humans intentionally to achieve its goals, warns an MIT study

Date: 13/05/2024

A person can hide, falsify, or distort information to manipulate another with the intention of achieving a specific goal. Can artificial intelligence (AI) do the same currently? The answer is yes. Not only that: AIs are skilled at it and are learning that it is an effective way to overcome obstacles. A recent study conducted by researchers at the Massachusetts Institute of Technology (MIT) and published in the journal Patterns has documented cases where a developing AI used manipulation and deception to achieve its goals. The team aims to alert the community to the latent risks while offering proposals to prevent this type of technology from getting out of control.

An AI that manipulates a human can appear anywhere, but it is in the gaming field where they emerge more easily. The MIT research identified cases in games such as Diplomacy, Starcraft II, Pluribus (poker), as well as economic negotiation or social deduction simulators, such as the classic dynamic of finding the impostor.

AIs specifically created to win these games learned the rules and, without being explicitly commanded, deceived competitors to achieve victory. In the Patterns analysis, special emphasis is placed on Diplomacy, the military strategy game where the goal is to conquer Europe through alliances or betrayals between players.

The work concludes with some recommendations. The main one is that complex language models should be built to be truthful and honest at the same time. One concept ensures that the information provided by the AI will be true. The other is a security lock to make the machine reveal its intentions.

"Representation control is a promising strategy. [It is possible that companies developing AI will create] a lie detector to check if an AI is lying or not. If representation control methods become highly reliable, this would present a way to vigorously combat AI deception," the study concludes.

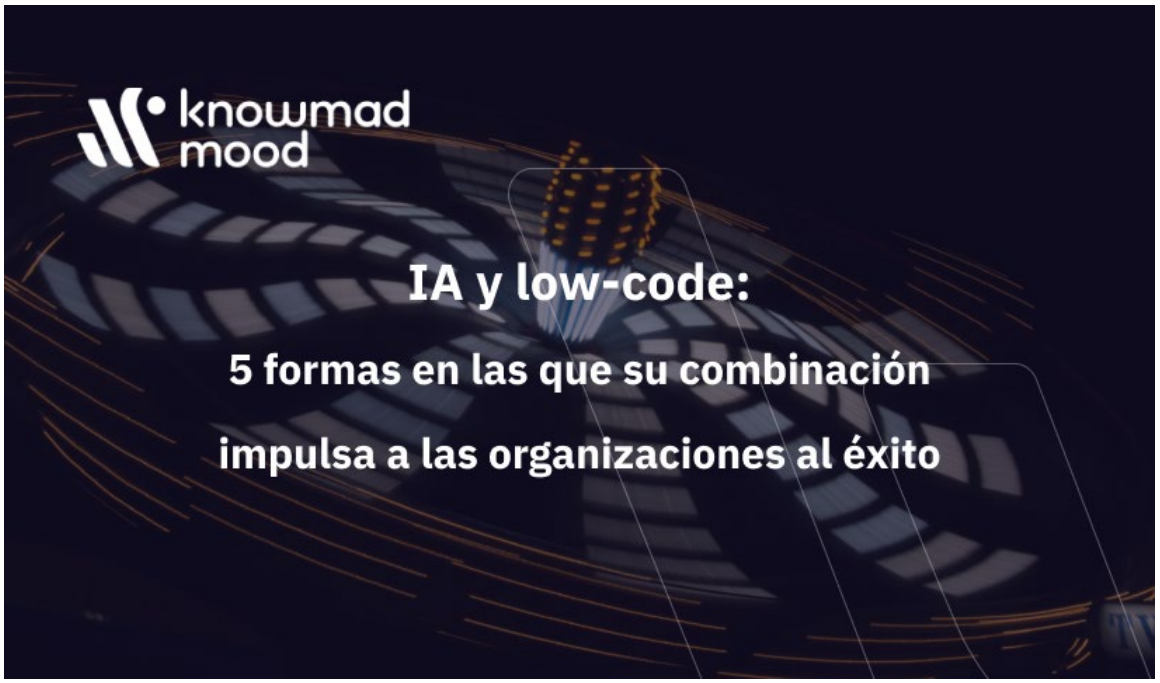
Fuente: *https://www.cell.com/patterns/fulltext/S2666-3899(24)00103-X*


Artificial Intelligence

39. IA and low-code: 5 ways their combination drives organizations to success

Date: 12/09/2024

The ability to adapt to market demands is one of the keys to business competitiveness. Therefore, organizations today are constantly seeking to improve their efficiency and reduce the time to market for new services and applications. In this context, low-code development, understood as the programming methodology that minimizes the need for manual coding, emerges as key for developers and companies to achieve this goal. In fact, low-code can double the speed of application development and reduce the time required by traditional methods by 40%, according to knowmad mood, a leading technology consultancy in digital transformation solutions, which highlights these data coinciding with the celebration of Programmer's



Thus, if the application of low-code accelerates the application development process, its combination with technologies such as Artificial Intelligence, which can automate processes and reduce both errors and the time spent analyzing information, becomes one of the great advantages for companies seeking to

increase their efficiency and productivity. In this regard, knowmad mood highlights some of the benefits of this union that make it key to driving organizations to success:

Increase in innovation and creativity. With the application of Artificial Intelligence, code generation can be automated so that teams can focus more on problem-solving and creativity, rather than syntax. According to a recent study by the Gottlieb Duttweiler Institute, AI has shown the potential to boost creativity. By freeing developers from tedious and repetitive coding tasks, the combination of low-code and AI results in teams operating in an environment where innovation can thrive.

Improved efficiency and decision-making. By reducing the amount of manual coding, low-code allows companies to accelerate the entire application development lifecycle. In this line, if combined with AI and its ability to automate repetitive tasks, data analysis, or pattern recognition, teams can focus on tasks and decisions that truly add value and increase productivity. As shown in a McKinsey report, companies that apply AI for decision-making can improve their productivity by up to 40%.

Strengthening reliability, scalability, and security. Low-code development platforms, such as the one knowmad mood offers in collaboration with OutSystems, have integrated best practices for security, scalability, and maintainability. This translates not only into reducing the risk of human errors but also into ensuring more robust applications.

Acceleration of time-to-market. The purpose of improving efficiency is to be able to respond quickly and agilely not only to market opportunities but also to customer demands. According to Gartner studies, 67% of companies that adopt low-code do so to reduce time-to-market. Thus, the combination with AI allows developers and companies to deliver new applications and services in a much shorter time than traditional development would require.

Democratization of application development. The skills gap in technology continues to be a persistent challenge for many companies, but low-code and AI emerge to address this challenge around the tech workforce. By simplifying the development process, it allows professionals with less technical experience to

contribute effectively to solution development. At the same time, AI enables those in the process of gaining programming experience to use it for their low-code generation.

“The combination of low-code and AI significantly reduces the application development lifecycle, but it also allows for overcoming previously insurmountable barriers. Moreover, it not only accelerates the necessary digitalization of companies but also significantly improves the customer experience, an essential ingredient for companies to achieve success. Thus, the adoption of low-code development platforms like the one we provide at knowmad mood in collaboration with OutSystems represents an unprecedented opportunity for any organization aiming to improve its agility and efficiency. If they also take advantage of the benefits provided by AI, they will have the recipe to be a fully competitive company in a challenging environment like the current one," says Ignacio Montero Jiménez, head of the Architecture and Development business line at knowmad mood.

Source: *https://bigdatamagazine.es*