TECH GROW

VET training on technological watch

Methodological guide

Methodological guide to define a Technology Watch System based in a personalised information audit.

Co-funded by the European Union

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Methodological guide to define a Technology Watch System based in a personalised information audit

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Why this guide?

In the dynamic realm of technology, maintaining a competitive edge requires a proactive approach, and this begins with technology watch. This process involves systematically gathering, analysing, and interpreting information on technological developments.

One crucial initial step in this journey is the undertaking of an information audit. An information audit serves as the foundation for an effective technology watch process, providing valuable insights and ensuring a strategic approach to harnessing technological advancements.

This guide, developed in the framework of the TechGrow project, will show the necessary steps, with key examples, on how to carry out an audit information for any industry sector. The guide could be used for any interested company, business organisation or cluster that want to launch the first steps of a systematic technology watch. The present guide could be also useful to train current and future professionals, through initial or continuous training courses, on how to implement audit information in their companies and/or industry sectors.

You can know more about the TechGrow project in www.techgrow-project.eu

Content

1. Technology Watch introduction

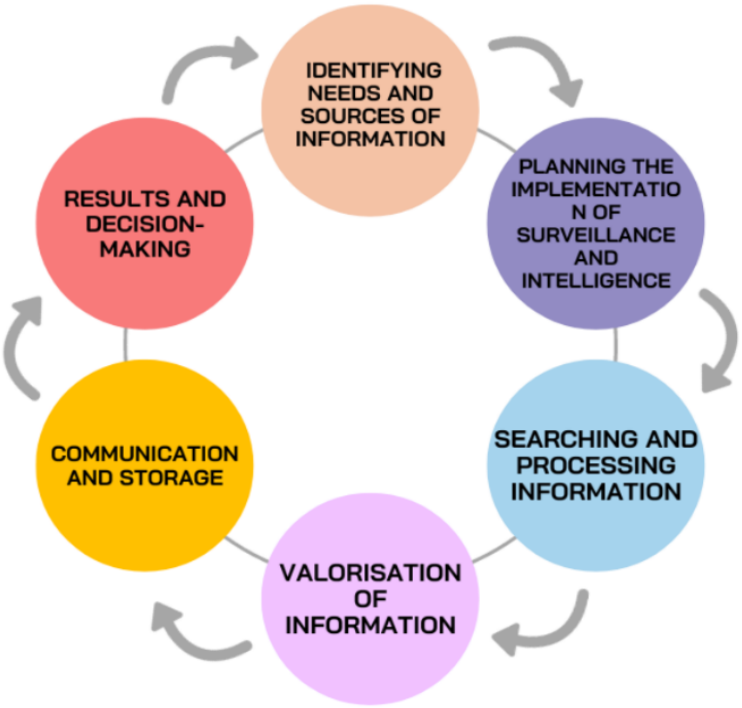
Technology Watch (TW) is a process that empowers an organization to conduct an organized, selective, and ongoing procedure for gathering, selecting, analysing, and disseminating information. This is done to transform the acquired information into knowledge, guiding decision-making, and anticipating future trends. The TW process unfolds through cyclical and self-reinforcing steps.

The implementation of a technology watch system in an organization can yield numerous benefits, including:

- Anticipation of changes and expectations in the analysed environment.
- Encouragement of the creation of new ideas, proposals, and R&D+i projects.
- Compliance with norms and regulations.
- Identification of potential collaborators.
- Enhancement of decision-making processes.

2. Technology Watch process

The TW process is developed through the following cyclical and 'self-feeding' steps.



2.1 Identifying needs and sources of information

The starting point for implementing a technology watch system in any organisation is to have a clear understanding of the organisation's information needs, through factors like development, stakeholder concerns, legal changes, ongoing initiatives.

In this step establish Critical Watch Factors (CWF) in areas like technology, market, legislation, economics, sociodemographic, and competition.

2.2 Planning the implementation

In the planning phase, the strategy, methodology, tools and assigning resources are defined, ensuring systematic implementation and the involvement of all departments.

Technology Watch is a demanding job that requires regular research and commitment from the whole team. There are certain types of software used to automate the process, although they always require the participation of the whole technology watch team.

The software allows a comprehensive and systematic management of watch practices during the process. There are a multitude of offers free of charge, according to the diverse sources of information and functionalities.

2.3 Searching and processing information

Once sources, methodology and participants are defined, this crucial phase of searching, selecting, and processing information begins. This phase is a fundamental pillar in the whole process, as it entails the acquisition of raw data that will be used to meet the identified needs of the company. During this phase, the information collected is validated, compared, and enriched, allowing for a significant expansion of the available knowledge and improving decision-making capacity.

2.4 Valuation of the information

Evaluating the data collected means to carry out a thorough analysis, selecting information, and converting it into useful knowledge for decision making.

In this phase, the information retrieved is evaluated and analysed to identify the most relevant information. In addition, products are developed with the results obtained, such as newsletters or reports.

Assessing the quality and reliability of the information, as well as determining its usefulness to the company, is one of the main phases of the Strategic Intelligence and Technology Watch process.

Therefore, the organisation must have the capabilities and resources capabilities and resources (human and technological) to analyse the flow of raw information form a wide variety of information sources.

2.5 Dissemination and storage

Dissemination is fundamental, as a TW and intelligence management system will be useless if the information retrieved is not received by the right person.

Therefore, any technology watch and competitive intelligence system must ensure a communication plan to be truly effective.

There are many software programmes, such as e-mails, newsletters, forums, intranet, and multimedia support to disseminate information within an organisation.

Processed information must always be stored and retrievable and accessible. The TW and intelligence product must be distributed to the organisation's participants according to their needs.

2.6 Results and decision-making

The main outcome of any watch and intelligence management process is knowledge gained by the organisation to reduce uncertainty in making appropriate decisions and to minimise risks by having valuable information.

3. First step: the information audit

This guide put the focus in the first step of the technology watch process, identifying needs and sources of information, To successfully get the proposed objectives it is necessary to implement an information audit. It refers to a systematic and organized process of reviewing and evaluating relevant information for a specific organization. The goal is to gain a clear and updated insight into its technological environment.

The introduction to information audit involves defining specific audit objectives, identifying necessary resources, developing a work plan, and in a second step implement procedures for collecting, analysing, and presenting information.

3.1 Key concepts of the information audit

Information needs and Critical Watch Factors

In the process of implementing a systematic TW process two essential concepts play a key role in guiding organizations toward informed decision-making: Information Needs and Critical Watch Factors.

- Information need refers to the desire or requirement for specific information to satisfy a particular goal or task related to innovation and competitiveness. These needs can range from monitoring general technological developments to identifying emerging trends and opportunities for collaboration with key industry actors.

- Critical Watch Factors (CWF) are external elements critically influencing an organization's competitiveness, acting as focal points in a technology watch system. The main objective of CWF is to guide and document R&D activities of an organization by identifying and collecting any related information. Thus, they serve as the primary guide, enabling the identification of relevant information by providing appropriate keywords, search formulas, and sources of information. They are also variable and evolve over time, adapting to new tendencies and challenges in the business environment. Without defining them, generating reports that support the organization's decision-making will be impossible.

Information sources

Once the information needs of the organization and its CWF have been identified, the next step is to define the different sources of information and tools available to optimize the strategic intelligence and watch process in each of its phases.

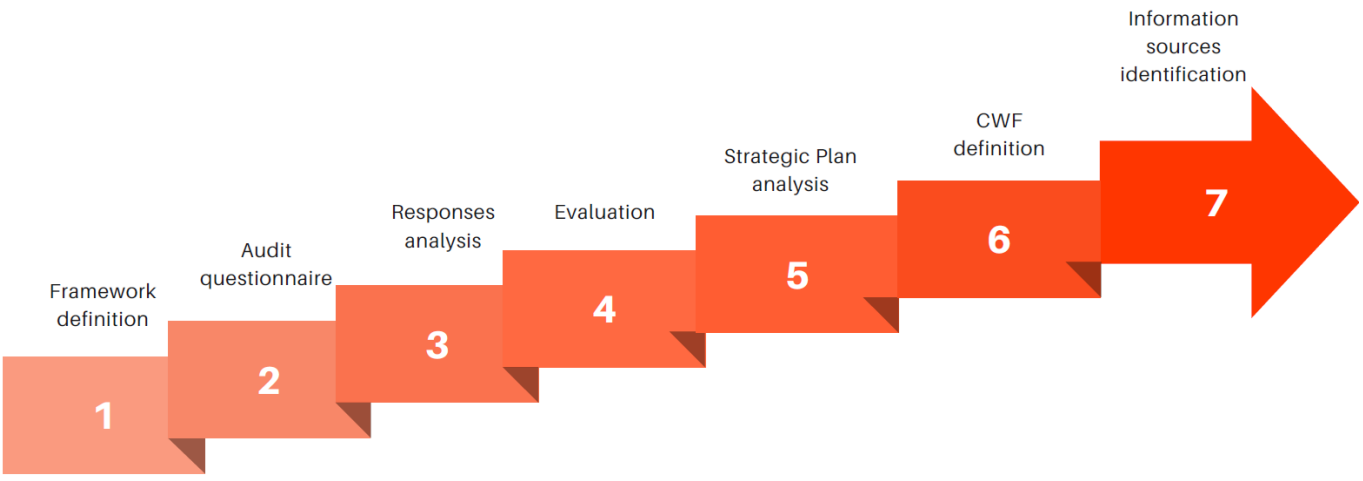
Nowadays, the Internet is the largest source of open information available, providing a large quantity of quality tools for any company or organisation. Quality information can be retrieved on a wide range of topics, from economics and business, through finance or markets, to technology, design, or production. The internet provides access to various resources and digital tools that are useful for technology watch, such as:

- Specialised databases:
    - → Industrial property databases.
    - → Scientific paper databases.
    - → Theses and research project databases.
    - → Funding databases.
    - → Statistical, economic, and business information databases.
    - → Legal monitoring databases.
- Sector-specific journals.
- Sectoral associations.
- Research institutes.

3.2 Information Audit process

The information audit process typically begins with clearly defined objectives, outlining what aspects of the information landscape the audit seeks to explore. This may involve reviewing internal and external sources, digital and physical repositories, and data management practices. By doing so, organizations can identify strengths, weaknesses, opportunities, and threats related to their information assets.

The following figure shows the seven steps to develop a complete information audit.



1. Framework definition

The first step is to establish the context and scope of the information audit. This entails clearly delineating the objectives and goals, ensuring their alignment with the organization's needs and priorities. Additionally, key focus areas are identified, and evaluation criteria are established to ensure the relevance and effectiveness of the audit process.

2. Audit Questionnaire design

During this phase, a structured questionnaire is developed, containing specific questions designed to gather information relevant to the audit. The questionnaire includes both open-ended and closed-ended questions, facilitating the collection of both quantitative and qualitative data. These questions are carefully aligned with the previously defined objectives and may address various aspects, such as the organization's experience in technology watch, existing and emerging technologies within the sector, and different inquiries related to the organization's Strategic Plan.

The questionnaire must be answered by managers of the company and responsible of information management.

3. Analysis of Responses

Once responses to the questionnaire are collected, a detailed analysis ensues for each question to identify patterns and trends. This step involves reviewing and assessing the obtained responses, identifying areas of compliance, best practices, and potential deficiencies. Information is systematically classified to facilitate interpretation and provide a solid basis for the implementation of the technology watch system.

4. Evaluation of Emerging Technologies and Sector Trends

In this phase, a thorough evaluation of emerging technologies relevant to the organisation is conducted, and industry trends that could influence information management are analyzed.

5. Analysis of the Strategic Plan and/or research lines

After the previous evaluation, the alignment between information management and the organization's strategic objectives is analysed. The research lines and/or

the Strategic Plan of the organisation are reviewed and analysed, to deeply understand their approaches regarding technology watch. The goal is to identify opportunities to enhance the contribution of information toward achieving strategic objectives.

6. Identification of Critical Watch Factors

There is no exact methodology for identifying and defining CFW. The best approach is usually adopted from common sense and considering the real needs of the information recipients, i.e. the organization's decision-makers. Some tools or methods, which may be complementary, are:

- Using the organization's Strategic Plan as a starting point helps examine threats and opportunities related to the market, technology, suppliers, competitors, and the socioeconomic environment (regulations, trends, etc.).
- Conducting a detailed analysis of the organization's value chain helps identify the departments or business areas that play a critical role in the functioning of the organization.
- Conducting individual interviews with people responsible for different departments or thematic areas will help identify specific information needs and potential monitoring factors that are relevant to each area.

Finally, it's important to breaking down the information needs into four areas:

- Market
- Technology
- Suppliers
- Competitors

7. Identification of Information Sources

In this phase, relevant internal and external information sources for the organization are collected and evaluated. Additionally, ensuring the diversity and reliability of these sources is prioritized by establishing mechanisms to keep them updated and ensuring their effectiveness over time. The identification of sources of information that can be automated is also addressed to enhance the efficiency of the information gathering process. Furthermore, suggestions for new sources of sectoral information are provided, which the organization and associated companies may consider.

4. Example of Information Audit in the furniture, textile and footwear sectors

In the dynamic landscape of the footwear, furniture, and textile sectors, the importance technology watch practices cannot be overstated and its crucial to boost innovation in such manufacturing and traditional industries.

As key European sectors, they have been chosen to implement and carry out a complete information audit. This collection of audit information delves into key aspects of each sector, shedding light on the challenges, technology trends, and environmental considerations that shape the success and reputation of companies.

4.1 Selection of key actors

To start the information audit in those sectors, it was selected three representative's organisations, that could encompass all the relevant aspects of each sector and could monitor their related advances and challenges. The selected actors are:

- CETEM – Technological Centre of Wood and Furniture of Spain aims at transferring any kind of innovation to industries, actively contributing towards their socio-economic development through consultancy services, R&D activities, and the arrangement of training programmes according to the industry needs.
- CLUTEX - Cluster Technical Textiles is only one Czech cluster focused on textiles. It represents 36 members from SME´s, large enterprises, associations, universities, and R&D institutions.
- CTCP - Technology Centre of Portugal Footwear aims at supporting all companies of Footwear, Components and Leather Goods cluster in a total of 1900 SMEs at all fronts, from training to consultancy, on products technology innovation to sustainability.

4.2 Questionnaire

Once actors were defined, the following step was to start with the information audit. For that, it was set a questionnaire to be answered in each of the organisations by the responsible on information management.

The questionnaire comprises the following 9 questions:

1. What types of sources do you consider you frequently use in your technology watch process? (You can select more than one option)

- ☐ Technology news
- ☐ Scientific articles
- ☐ Newspapers
- ☐ Official bulletins
- ☐ Reports or attendance at fairs and events
- ☐ Patents
- ☐ Others (please specify all): _____

2. How much time do you think you dedicate per day to read important technological information for your organization?

3. Do you have any communication channels with your department or centre to exchange results of Technology Watch?

- ☐ No
- ☐ Teams or similar
- ☐ Email
- ☐ Informal conversations
- ☐ Other (please specify all): _____

4. Briefly explain the organization's experience in Technology Watch both internally and externally for companies

5. What purpose does the technologic information, retrieved either personally or distributed through internal newsletters, serve for you?

- ☐ Generating new ideas for future R&D projects
- ☐ Understanding the current state of technology in ongoing projects
- ☐ Identifying leading research organizations in the thematic areas of the centre for potential future collaborations
- ☐ Detect emerging technologies, products, materials, markets, ...

☐ Other (please specify all): _____

6.1 In your industry sector which emerging technologies are currently attracting the most interest of the companies?

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6.2 Additionally, which key trends or challenges are predominantly shaping the sector?

7. Does your organization have a strategic plan? If so, please attach it. If not, describe the lines of action and research of your centre.

8. Create a list with ALL the information sources currently used by your organization (it is important to list all to determine whether they are automatable or not). Underline or highlight in RED those information sources that you believe are used by companies in your sector.

Name of the source	Subscription or manual	Description	Link

9. What other sector-specific sources do you believe should be considered, both for your organization and for associated companies?

Name of the source	Description	Link

4.3 Definition of Critical Watch Factors process

Based on the previous questionnaire, and considering the strategic plan of each organisation it has been defined the Critical Wath Factors for each of the sectors/organisations, as follows:

Furniture Industry

Emerging Technologies	Trends	Strategic lines	CWF
Biomaterials, innovative materials, smart materials	Natural materials, biomaterials, ecomaterials, smart materials	Green and sustainable chemistry, solutions biological basis, Nanotechnology	New materials
Artificial intelligence, Renewable Energy	Integrated Technology, Technological Textiles, Smart and Connected Furniture, Wearables	Intelligent assistance environments (AAL), Internet of Things (IoT), Ambient intelligence (Aml), Embedded systems, WSNs and wearables	Electronic and environmental intelligence
Blockchain, artificial intelligence, metaverse	Collaborative robot, Mobile Robot, Industrial IoT, Soft robotics	Advanced and Collaborative Industrial Robotics, Virtual and Augmented Reality, Artificial Intelligence, Additive manufacturing	Industry 4.0
Biotechnology, recycle technologies	Sustainable Design, Second Hand Furniture and Upcycling	Ecodesign, Industrial symbiosis, Twin transition, green and digital transition, Eco-labeling, Environmental management	Circular economy en valorization
	Foreign trade, furniture market, R&D&I calls	Corporate Social Responsibility, furniture trade, regulations related to furniture, aid and subsidies	Environment of the furniture sector
	Sustainable Design, Modular Furniture, Minimalism, Personalization	Furniture Trend, Design Trends. Ecodesgin,	Design Trends

Footwear Industry

Emerging Technologies	Trends	Strategic lines	CWF
	Verry high-quality products, new materials,	Sustainable products, Innovative materials Recycling and Reuse of materials,	Sustainable design, materials and products
	Customisation, Sustainability, Circularity, new process, E-commerce,	Sustainable process, Design thinking, Product development, 3D modeling	Recycling process and circular economy
Software for product development and digital prototyping, IA for product development, IA applied to the production, robotic solutions, 3D printing, automatization	Short time to market, Cost of production	Flexibility and Quick Response, Production and prototyping technologies, Digitalization, Automation and Robotics	Industry 4.0
	Foreign trade, footwear market, R&D&I calls, Narrower regulation regarding HSW, Certification of products	Corporate Social Responsibility, footwear market, regulations related to footwear , aid and subsidies,Active Presence on the Markets.	Environment of the footwear sector
	Fashion, design, ecodesign	Sustainability trends, transparency regarding sources and the whole supply chain, the Comfort, the access to the final product, personalization, durability, etc	Customer demands and trends

Textile Industry

Emerging Technologies	Trends	Strategic lines	CWF
Waterless treatments and dyeing, treatments without PFAS	bio-based materials, waste, recycled fibers, oleophobic treatments without PFAS	Microplastics released from textiles during washing, recyclation	Sustainable materials
Smart textiles	Smart textiles, textile materials of the new generation, healing textiles, filter materials	Functionalization of textile materials, Smart textiles, safe and effective testing of protection against infectious viral particles	Advanced materials
Recycling, sustainable technologies	Use of waste, recycling	Processing of recycled and regenerated fibers	Sustainable textile production
Artificial intelligence; technology related to recycling	Artificial intelligence	Sustainable refining and dyeing technologies,	Textile recycling technologies
	Foreign trade, textile market, R&D&I calls	Corporate Social Responsibility, textile market, regulations related to textiles, aid and subsidies	Environment of the textile sector
	Fashion	Fashion, ecodesign, clothing trends	Fashion trends and sustainable design

4.4 Information sources identification

Once the different Critical Watch Factors are defined, it has been identified different information sources for each of the sectors/organisations. Nowadays most of the Sources of Information are online.

Furniture Industry

INFORMATION SOURCES

Residuos Profesional	TechCrunch	Techexplore
Trendhunter	Yanko Design	European Coatings
Green Biz	Printed Electronic World	World Furniture Info
BedTimes Magazine	Materials Today	Smart Green Post
New Atlas	Universal Robots Blog	Furninfo

Textile Industry

INFORMATION SOURCES

- Textilegence
- Textile Research Journal
- AATCC Journal of Research
- International Dyer and Finisher
- WTiN channel
- EURATEX
- Vlákna a Textil
- Colouration Technology
- Textil Plus
- European technology Platform (ETP)
- APAČ Informátor
- Atok revue
- Newsletter Eurolab
- APPLIA
- European Textile Technology Centre, CTT
- ECHA

Footwear Industry

INFORMATION SOURCES

- Footwear Science
- Footwear News
- Just Style
- Material District
- Footwearbiz
- World Leather
- World Footwear
- All3DP
- Design World
- Leatherbiz
- 3D Natives
- Robótica
- Automate
- Automation World
- Eletronic Design
- Robotics 24/7

4.5 Infographics

The following infographics encompass all the key information resulting from the audit performed for each of the sectors. teractive infographics are available in the TechGrow website: www.techgrow-project.eu

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AUDIT INFOGRAPHIC

FURNITURE SECTOR

The furniture industry, primarily comprised of small and medium-sized enterprises (SMEs) and micro firms, is characterized by labor intensity and dynamism. European manufacturers are globally renowned for creative designs, adaptability to new demands, and the integration of technology and innovation with cultural heritage, creating employment opportunities for highly skilled workers.

REPRESENTATIVE EXAMPLE OF THE FURNITURE INDUSTRY

CETEM has been chosen as a representative example in the furniture sector due to its outstanding expertise in technological watch and strategic implementation of innovations within the industry.

CETEM

TECHNOLOGY WATCH EXPERIENCE

CETEM has extensive experience in technological watch, anticipating changes, innovating strategically, and staying competitive. Using TW software, it issues internal and external newsletters, fostering adaptability and continuous innovation.

TYPES OF SOURCES USED

Technology news, Scientific articles, Newspapers, Official bulletins, Reports or attendance at fairs and events, Patents, R&D Projects information, business directory etc.

CRITICAL WATCH FACTORS

After analyzing emerging technologies in the sector, key trends and challenges and CETEM's research directions, the following are the defined CWF:

- NEW MATERIALS
- ELECTRONICS AND ENVIRONMENTAL INTELLIGENCE
- INDUSTRY 4.0
- CIRCULAR ECONOMY AND VALORIZATION
- ENVIRONMENT OF THE FURNITURE SECTOR
- DESIGN TRENDS

INFORMATION SOURCES

These are some of the sources of information identified through the information audit

- Residuos Profesional
- TechCrunch
- Techexplore
- Trendhunter
- Yanko Design
- European Coatings
- Green Biz
- Printed Electronic World
- World Furniture Info
- BedTimes Magazine
- Materials Today
- Smart Green Post
- New Atlas
- Universal Robots Blog
- Furninfo

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AUDIT INFOGRAPHIC

TEXTILE INDUSTRY

The textiles industry covers a range of activities, in a long and global supply chain, starting from the transformation of fibres into yarns and fabrics and then into final products. The EU textile industry produces added value and creates opportunities for investments and innovation. Competitiveness challenges are linked to an environmental footprint. A key challenge for the green transformation is boosting investments to accelerate sustainability and circularity.

REPRESENTATIVE EXAMPLE OF THE TEXTILE INDUSTRY

CLUTEX, Czech cluster focused on the textile sector, has been chosen as a representative example in the textile industry due to the great activity in R&D and Technological watch experience.

clutex
cluster technical textiles

TECHNOLOGY WATCH EXPERIENCE

CLUTEX has a continuously updated internal database of annotations of articles from selected domestic and foreign periodicals, currently approx 50,000. annotations.

TYPES OF SOURCES USED

Technology news, Scientific articles, Official bulletins, Reports or attendance at fairs and events

CRITICAL WATCH FACTORS

After analyzing emerging technologies in the sector, key trends and challenges and CLUTEX's research directions, the following CWFs are the defined:

- SUSTAINABLE MATERIALS
- ADVANCED TEXTILES
- SUSTAINABLE TEXTILE PRODUCTION
- TEXTILE RECYCLING TECHNOLOGIES
- FASHION TRENDS AND SUSTAINABLE DESIGN
- ENVIRONMENT OF THE TEXTILE SECTOR

INFORMATION SOURCES

These are some of the sources of information identified through the information audit

- Textilegence
- Vlákna a Textil
- Atok revue
- Textile Research Journal
- Colouration Technology
- Newsletter Eurolab
- AATCC Journal of Research
- Textil Plus
- APPLIA
- International Dyer and Finisher
- European technology Platform (ETP)
- European Textile Technology Centre, CTT
- WTiN channel
- APAČ Informátor
- ECHA
- EURATEX

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AUDIT INFOGRAPHIC

FOOTWEAR INDUSTRY

The European footwear industry is made of diverse products and industrial processes. The European Commission works to promote the innovation and competitiveness of companies in the field and to combat counterfeiting, while protecting consumer health and the environment.

REPRESENTATIVE EXAMPLE OF THE FOOTWEAR INDUSTRY

CTCP supports the footwear cluster. It was chosen as a representative example in the footwear sector due to its outstanding expertise on the technology watch and strategic implementatrion of innovation within the industry.

TECHNOLOGY WATCH EXPERIENCE

CTCP has over 2 decades of experience on Technology Watch related to the Footwear Industry. This is part of our mission, innovating strategically, understand the potential of the technologies for the industry, investigate and experiment and then transfer the acquired knowledge to the companies.

TYPES OF SOURCES USED

Technology news, Scientific articles, Newspapers, Official bulletins, Reports or attendance at fairs and events and Patents

CRITICAL WATCH FACTORS

After analyzing emerging technologies in the sector, key trends and challenges and CTCP's research directions, the following are the defined CWF:

- INDUSTRY 4.0
- SUSTAINABLE DESIGN, MATERIALS AND PRODUCTS
- RECYCLING PROCESSES AND CIRCULAR ECONOMY
- ENVIRONMENT OF THE FOOTWEAR SECTOR
- CUSTOMER DEMANDS AND TRENDS

INFORMATION SOURCES

These are some of the sources of information identified through the information audit

- Footwear Science
- Footwear News
- Just Style
- Material District
- Footwearbiz
- World Footwear
- All3DP
- Design World
- Leatherbiz
- 3D Natives
- World Leather
- Robótica
- Automate
- Automation World
- Eletronic Design
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