Training Course
How to use Labour Market Intelligence

Module 5

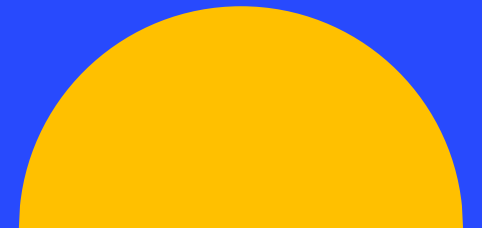# Shaping the future resources of LMI
Trends, sources and technologies

Training outline

In this module, we will analyse how the sources of LMI that we currently know will evolve and what new sources and technologies will emerge in the future in this field, with the aim of having identified all the possible sources and tools that will be at our disposal, in order to perform the most complete analyses possible.

Lesson 1
TRENDS
Analysis of current and future digital trends

Lesson 2
SOURCES
How known sources have evolved and the emergence of new sources

Lesson 3
TECHNOLOGIES
How technologies for data analysis and visualization will evolve

Lesson 4
ETHICS
Considerations for the correct use of new LMI sources and technologies

Lesson 5
DATA ANALYST SKILLS AND KNOWLEDGE
What knowledge and skills should users develop for the correct handling of the LMI

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INTRODUCTION

Objectives

- Analyse the **latest trends** in the field of technology

- Analyse how the **sources** and **technologies** of LMI that we currently know will evolve

- Know the essential **skills** and **knowledge** of analysts for the development of their occupation

- Explore **new future trends**

- Identify **new sources** and **technologies** of LMI that allow a better analysis of information

- Observe what **opportunities** new trends, sources and technologies will provide for a better analysis of information and what risk they can entail

- Consider **ethics** at all stages of the data life cycle and management

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Lesson 1: TRENDS

1.1 Current Digital Trends

- **Artificial intelligence**
- **Social networks**
- **Science-technology binomial**
- **Audiovisual content**
- **Natural Language Processing**
- **Voice searches**
- **Audiovisual content**
- **Data fabric and data mesh**
- **AI for decision making**
- **Data enrichment**
- **Security**
- **Legislation and protection**
- **Virtual and augmented reality for data visualization**
- **User-friendly data visualization with a Smartphone**

1.2 Future Digital Trends

- **Multi-cloud**
- **Ethical AI**
- **Process automation and orchestration**
- **Digital transformation**
- **Data monetisation**
- **Artificial Intelligence (AI)**
- **3D GIS and augmented reality (AR)**

Lesson 1: TRENDS

1.1 Current Digital Trends

- **Artificial intelligence:** the introduction of **models** that are already trained and show a remarkable **ability to adapt to different tasks** is one of the great advances.

- **Social networks:** they are a valuable source of information for the analysis of the labour market, providing **demographic data, trends and behaviors, opinions and perceptions, dissemination of job offers and the possibility of interacting directly with professionals**.

- **Science-technology binomial:** we have entered a stage of "Big Bang" in which **science and technology will accelerate each other** very quickly.

- **Automatic content recognition:** the main function of Data ACR (automatic content recognition) is to **recognise the content we have seen and suggest and propose a new one** in relation to our tastes and preferences.

- **Natural Language Processing:** is the field of knowledge of Artificial Intelligence that deals with **investigating the way machines communicate with** people through the use of natural languages, such as Spanish, English or Chinese.

- **Voice searches:** one of the main reasons why voice searches do not stop growing is because it is much **faster to talk than to type**.

Lesson 1: TRENDS

1.1 Current Digital Trends

- **Audiovisual content:** audiovisual content is **gaining more ground every day** to the text.

- **Data fabric and data mesh:** in 2022, the adoption of two data architecture approaches accelerated: Data Fabric and Data Mesh. These architectures were accelerated to **better manage and access distributed data**, since it is more common for organizations to have distributed data instead of centralized.

- **AI for decision making:** organizations that adopt artificial intelligence as part of their business processes will be increasing. It is logical, since the **advantages offered by this technology are many at different le**vels, such as, for example, at the level of processes, creation of new business models, interaction with the client, and even interaction between the people of an organization.

- **Data enrichment:** AI can **enhance the gathered data by matching it with existing labour market databases**, such as employment statistics, wage data, sentiment analysis and industry reports, expanding the scope and completeness of the intelligence gathered.

- **Security:** is a big concern when it comes to leveraging big data. The solution is to use technologies that **guarantee secure data management**.

- **Legislation and protection:** the **different government administrations are ordering and creating the appropriate legislation** regarding data analytics in particular, and artificial intelligence in general.

Lesson 1: TRENDS

1.1 Current Digital Trends

Related to **data visualization**...

- **Virtual and augmented reality for data visualization:** virtual and augmented reality (AR/VR) are emerging as powerful tools for data visualization, offering **immersive and interactive experiences**

- **User-friendly data visualization with a Smartphone:** data visualization for mobile phones is gaining importance in the industry. It is **essential for effectively conveying information to mobile users**

Lesson 1: TRENDS
1.2 Future Digital Trends

- **Multi-cloud:** in many companies the data is distributed between different clouds and locations (several business units with their own service provider in the cloud). In the near future, FinOps will gain momentum as a critical initiative to **help enterprises better manage hybrid and multi-cloud c**loud → **FinOps** is a management practice that promotes shared responsibility for an organization's cloud computing infrastructure and costs.

- **Ethical AI:** when artificial intelligence decides the final outcome, there is currently no way to suppress the bias inherent in the algorithm. Therefore, emerging regulations are beginning to **establish a regulatory framework around the use of AI in commercial organizations**.

- **Process automation and orchestration:** process automation and workflow orchestration will become increasingly important in the field of data analytics. These technologies make it possible **to streamline and optimise data collection, preparation and analysis**.

- **Digital transformation:** digital transformation will continue to drive the development of technologies related to data and analytics, such as the Internet of Things (IoT), machine learning and big data. These technologies will **combine to harness the enormous amount of data generated and extract meaningful insights that drive strategic and tactical decision-making.**

- **Data monetisation:** with the rise of big data, more companies are expected to use **data as a key part of their business** and start monetizing their own data. The concept of data economy emerges due to the economic, business and social impact generated by the incorporation of these technologies.

Lesson 1: TRENDS

1.2 Future Digital Trends

Related to data visualization…

- **Artificial Intelligence (AI):** the integration of artificial intelligence in data visualization will allow a better interpretation and understanding of the information presented. **AI can help** identify patterns, perform advanced analytics, and **generate interactive visualizations that facilitate decision-making**.

- **3D GIS and augmented reality (AR):** the ability to create and visualise maps in three dimensions, along with AR integration, **will allow users to interact with the physical and virtual world in a more intuitive way**. This includes applications such as augmented reality navigation and geospatial data visualization in 3D environments.

Lesson 2: SOURCES

2.1 Evolution of current sources

- **Global Approach**
- **Big Data and Predictive Analytics**
- **Open and Collaborative Data Sources**
- **Focus on digital and technological skills**
- **Partnerships with Employers**
- **Better Graduate Outcome Tracking**

2.2 New sources

- **Social networks**
- **Data from Online Education and Training Platforms**
- **Business and HR data**
- **Internet of Things (IoT)**
- **Virtual reality and big data**
- **Expert opinion**

2.3 Advantages and disadvantages

Advantages
- **Reduction of time and costs**
- **Real-time information**
- **Simplify search**
- **Generation of value and competitive advantage**

Disadvantages
- **Digital gap**
- **Ethical dilemmas**
- **Dependence on technology and systems**
- **Challenges in updating and maintenance**

Lesson 2: SOURCES
2.1 Evolution of current sources

Global Approach

Current sources of labour market data provide a comprehensive and detailed view of the social and employment outlook in the world, and in the coming years this **global approach** will become increasingly important. This global coverage is essential for understanding global labour patterns and challenges and enables users to make informed decisions.

Big Data and Predictive Analytics

The use of Big Data and predictive analytics will be consolidated as fundamental tools to better understand the **dynamics of the labour market**. The availability of large volumes of data will allow a broader and deeper view of labour trends and market needs. It is key to pay attention to the emerging trends that will define **the future of work** because of the importance of adapting to the challenges of the ever-changing work environment and taking advantage of the opportunities offered by new ways of working and talent management.

Lesson 2: SOURCES

2.1 Evolution of current sources

Open and Collaborative Data Sources

Increase the use of open and collaborative data sources. **Collaboration between organizations, institutions and governments** will facilitate access to valuable labour market data and promote transparency in available information.

Focus on digital and technological skills

Data will be defined to respond to competency issues, with special emphasis on digital and technological skills. **Competency-oriented analyses** are becoming particularly important due to the changes brought about by new technologies and the digital age, which have led to a paradigm shift in the conception of work. There is no longer so much emphasis on a person's career path, but rather on their skills, because they allow employees to be more efficient in their functions and contribute positively to the achievement of the objectives of the organization.

Lesson 2: SOURCES

2.1 Evolution of current sources

Partnerships with Employers

Universities might (will) form stronger partnerships with employers and industry leaders **to obtain up-to-date labour market insights directly**. Collaborating with businesses can provide universities with valuable information about skill gaps, job requirements, workforce needs…

Better Graduate Outcome Tracking

Universities might improve their **tracking of graduate outcomes by integrating labour market data**. This would provide more accurate data on employment rates, salary levels, career trajectories of their graduates…

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Lesson 2: SOURCES

2.2 New sources

Social networks

They continue to play an important role in working life, data from professional profiles on platforms such as LinkedIn or even public data from other social networks could offer valuable information about **work trajectories, skills, interests and working relationships**. Social Network Analysis involves examining the relationships and connections within social networks to understand labour market dynamics.

Data from Online Education and Training Platforms

As online education and training platforms continue to grow, these services could provide data on the **skills most in demand by employers, booming knowledge areas and skills gaps in different sectors**

Lesson 2: SOURCES

2.2 New sources

Business and HR data

Companies may share more data about their **workforce, hiring policies, career development and employee retention**. The trend towards transparency in business has been on the rise in recent years and is likely to continue to grow in the future.

Internet of Things (IoT)

Integrating IoT into the workplace could generate data on **employee performance and productivity in real time**, allowing employers to make more informed decisions about the labour market and human resource management.

Lesson 2: SOURCES

2.2 New sources

Virtual reality and big data

In the future, virtual reality simulations and big data analytics could be combined to create **virtual environments** where employers can assess candidates' skills and competencies in practical, realistic situations, leading to richer, more objective data about workers.

Expert opinion

It is a valuable source of labour market information for several important **reasons**: experience and expertise, informed analysis and predictions, historical context and perspective, identification of skills gaps, recommendations and practical advice, validation of decisions...

Lesson 2: SOURCES

2.3 Advantages

- **Reduction of time and costs:**
  - ✓ Every day we are witnessing an unprecedented evolution of technologies, in some cases aimed at the appearance of **new tools** not available until now and in other cases aimed at **increasing the capabilities of technologies** that we already had. In the field of LMI, the tools will improve to offer the information we need more quickly **decreasing the response time** to have the necessary information.

  - ✓ **Automation and digitalization** in data collection will become more frequent, allowing faster and more efficient collection of information relevant to the labour market.

- **Real-time information:**
  - ✓ A few years ago the time between the collection of information and its visualization was higher than today. Nowadays, new technologies have enabled tools capable of **collecting, exploiting and visualizing information in record time**, but that time will be even more reduced by the increase in the capabilities of new technologies.

  - ✓ This will allow **real-time information** to be obtained, for example, by implementing online surveys, real-time data analysis, using sensors and connected devices to obtain real-time data on work and the workforce... Real-time data is becoming **one of the most valuable sources**

Lesson 2: SOURCES

2.3. Advantages

- **Simplify search:**
  - ✓ New technologies have played a pivotal role in **simplifying data search**. As we live in the information age, the amount of data generated and stored continues to grow exponentially. Fortunately, modern technologies have emerged to address this challenge and make it easier to search, access, and manage data.

  - ✓ Some **ways** in which new technologies help simplify data search: efficient storage, cloud computing, advanced database management systems, data mining and automated analysis…

- **Generation of value and competitive advantage:**
  - ✓ Data analytics has become a fundamental tool to generate value in organizations. Thanks to new technologies, such as artificial intelligence and advanced data analysis**, patterns, trends and opportunities that previously went unnoticed can be identified**. This allows for a better understanding of the labour market, customer needs, and competition, giving a competitive advantage to those companies that leverage this information effectively.

Lesson 2: SOURCES

2.3 Disadvantages

- **Digital gap:**
  - ✓ New technologies in data analysis can lead to various digital divides that affect different groups in society (**access gap, skills gap, gender gap and socio-economic gap**). These digital divides can have significant **consequences in terms of access, use and exploitation** of information and communication technologies.

- **Ethical dilemmas:**
  - ✓ Technological advances in the field of data analysis can pose various ethical dilemmas (privacy and data protection, bias and discrimination, responsibility and accountability, transparency and explainability, ethical use of data…). As artificial intelligence, big data and other related aspects advance, **ethical and moral issues arise that need to be addressed**.

- **Dependence on technology and systems:**
  - ✓ The use of new technologies to collect and analyse data **implies a greater dependence on technological systems and infrastructure**. A technical failure or disruption in systems could affect data availability and accuracy.

- **Challenges in updating and maintenance:**
  - ✓ **Keeping data sources up-to-date and relevant is critical** to obtaining accurate and up-to-date information on the labour market. However, this can be challenging, especially if data sources are dynamic and change over time.

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Lesson 3: TECHNOLOGIES

3.1 Emergence of new technologies

- **Machine learning**
- **Blockchain technology**
- **Web scraping**
- **5G technology**
- **Geo-mapping**
- **No-code technology**
- **Graph databases**

3.2 Advantages and disadvantages

Advantages
- **Advanced Data Analytics**
- **Evidence-based and faster decision-making**
- **Risk management**

Disadvantages
- **Lack of privacy**
- **Need for continuous training on analyst**
- **Biased information**

Lesson 3: TECHNOLOGIES
3.1. Emergence of new technologies

Machine Learning:

AI and **machine learning algorithms can analyse vast amounts of labour market data**, including job vacancies, resumes, and employee profiles. By training the algorithms to detect patterns and correlations, these technologies can provide insights into job trends, skill demands, and even predict future labour market dynamics.

In the same way, machine learning **helps to design more efficient work environments** by analysing workflows and proposing improvements in the organization and management of tasks.

Blockchain Technology:

Blockchain can be **used to create decentralised and secure platforms** for verifying credentials, work experience, and skills. Such platforms can enhance transparency, reduce fraud, and facilitate better matching between job seekers and employers.

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Lesson 3: TECHNOLOGIES
3.1. Emergence of new technologies

Web scraping:

AI-powered solutions can scrape job postings, online job boards, career websites, and social media platforms to collect large volumes of labour market data.

In addition, it helps identify emerging trends in demand for skills and occupations, which can be valuable for planning training and job search strategy.

5G technology:

The widespread adoption of 5G networks will facilitate faster data transmission, enabling real-time analytics and IoT applications at a larger scale

5G offers much faster data transmission speeds and minimal latency. This enables the transfer of large volumes of data in real time, which is essential for real-time data analytics applications such as IoT (Internet of Things) monitoring and real-time decision-making. In addition, the enhanced capacity of 5G makes it possible to process and analyse large amounts of data efficiently.

Lesson 3: TECHNOLOGIES
3.1. Emergence of new technologies

Geo-mapping:

Geo-mapping is **an essential tool to analyse the labour market from a geographical perspective**, which helps companies, governments and professionals to make more informed and strategic decisions in the management and search of employment.

This technology **makes it possible to identify specific labour trends** in specific geographic regions, which facilitates decision-making based on the demand and supply of employment in particular areas.In the same way, it allows to identify labour inequalities based on location, which can drive efforts to address problems such as lack of employment in specific areas.

→ GIS technology: A geographic information system (GIS) is an environment for collecting, managing, and analysing data. Analyse spatial location and organize layers of information into visualizations using maps and 3D scenes.

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Lesson 3: TECHNOLOGIES

3.1. Emergence of new technologies

No-code technology:

No-code platforms have **emerged as a way to simplify the process of data analysis and AI integration**. No-code platforms allow users to create complex data analysis channels and models without writing code, making it easier for non-technical users to take advantage of AI in their data analysis.

Graph databases:

Graph databases work by storing relationships along with data. Because the related nodes are physically linked in the database, access to those relationships is as immediate as access to the data itself.

Graph databases excel in managing interconnected data, making them ideal for social network analysis, fraud detection, and recommendation systems

Lesson 3: TECHNOLOGIES

3.2. Advantages

- **Advanced data analytics:**
  - ✓ Advanced data analytics **enables enhanced predictive analytics, providing key insights into trends and changes in the labour market**. It will also allow to match different databases obtaining more detailed and useful information, expanding the scope and completeness of the intelligence gathered.

- **Evidence-based and faster decision-making:**
  - ✓ Using artificial intelligence**, large amounts of data can be analysed and translated into useful information for decision making**. By supporting decisions with solid data and technology, the risk of making costly mistakes or impulsive decisions is minimised and, therefore, the probability of making sound decisions and achieving objectives is increased

- **Risk management:**
  - ✓ The technology enables real-time monitoring of data and incidents, making it easy to **immediately identify problems and take corrective action**.

  - ✓ Data analytics helps identify and mitigate risks by assessing historical data and predicting potential issues, enabling proactive risk management strategies. Also allows to identify patterns and trends that help predict potential risks. This makes it easier to take preventive measures to prevent problems before they occur

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Lesson 3: TECHNOLOGIES

3.2 Disadvantages

- **Lack of privacy:**
  - ✓ Data collection and analysis may **raise concerns about the privacy and security of personal information**. Labour market analysis often involves the bulk collection of personal data, which **could expose individuals' private information**.

- **Need for continuous training on analyst:**
  - ✓ For a correct use of the new technologies that are emerging and will emerge in the future, it will be necessary a constant and continuous training in this field, to be **up to date with all its utilities** and so that the information exploited and analysed has the greatest possible benefit.

- **Biased information:**
  - ✓ **The algorithms** used in artificial intelligence **may have inherent biases**, as they are based on historical data that reflects existing prejudices or inequalities in society.

  - ✓ **Even the data collection process can be biased**. Sometimes data is recorded selectively, which influences the results

  - ✓ In addition, AI models are trained using **data** available on the web, **which may contain biased**, racist, or discriminatory **information**, which can perpetuate these biases.

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Lesson 4: ETHICS

- **Privacy and protection of personal data**
- **Responsible use of information**
- **Bias and discrimination**
- **Transparency and explainability of algorithms**
- **Accountability in decision-making**

Lesson 4: ETHICS

- **Privacy and protection of personal data**

The massive collection of data may involve the collection and storage of personal and sensitive information of individuals, such as their education, experience, skills and preferences... It is essential to ensure data privacy and take appropriate measures to protect it against unauthorized access or misuse. Failure to comply with **data protection rules could lead to the violation of the privacy and individual rights**.

- **Responsible use of information**

The democratization of information and access to data about candidates and employees can lead to misuse of it. **Companies must ensure that data is used only for work purposes** and prevent it from being used for other purposes that may adversely affect workers.
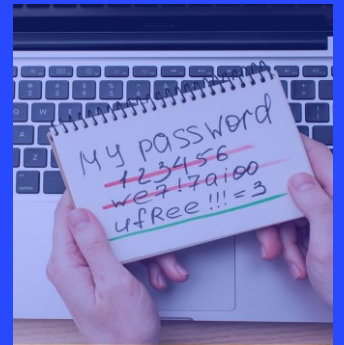
- **Bias and discrimination**

Data analytics **technologies can incorporate inherent biases** present in the data used to train algorithms. This could lead to the perpetuation of existing biases in the labour market, such as discrimination based on gender, race, age or other personal characteristics. It is critical to address these biases and work to ensure that employment-related decisions are made fairly and without discrimination.

Lesson 4: ETHICS

- **Transparency and explainability of algorithms**

Some technologies, such as "black box" algorithms, can be difficult to understand and explain how they arrive at certain conclusions or decisions. The opacity of these algorithms raises questions about how employment decisions are made and what specific factors influence them. It is essential to promote transparency in the operation of these systems so that **inidviduals understand how their data is used and how decisions that affect them are made**.
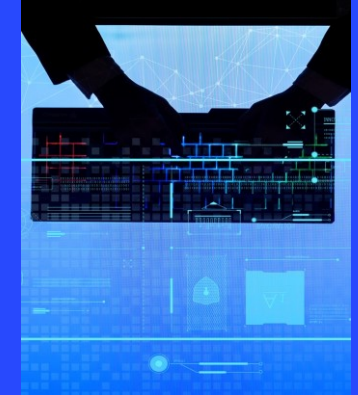
- **Accountability in decision-making**

As data technologies are increasingly it is critical to establish accountability in the decisions made. Both algorithm **creators and users need to be aware of the potential ethical consequences of their decisions and actions**. Ethical decision-making is crucial to ensure that the rights of individuals are respected and a fair and equitable work environment is promoted.

Lesson 5: DATA ANALYST SKILLS AND KNOWLEDGE

"Knowledge provides the foundation for skills. Skills require knowledge to be effectively applied"

Essential skills and competences

perform project management | conduct research across disciplines | process data | perform data analysis | think abstractly | gather data | mentor individuals

write scientific publications | apply for research funding | conduct quantitative research | publish academic research | synthesise information

cybersecurity | programming languages: python, R… | promote the transfer of knowledge | business intelligence | manage research data | perform scientific research

promote the participation of citizens in scientific and research activities | promote open innovation in research | operate open source software

manage open publications | speak different languages | commercial legislation, data protection and labour management | manage personal professional development

manage intellectual property rights | identify statistical patterns | interact professionally in research and professional environments | demonstrate disciplinary expertise

integrate gender dimension in research | execute analytical mathematical calculations | develop professional network with researchers and scientists

increase the impact of science on policy and society | evaluate research activities | draft scientific or academic papers and technical documentation

communicate with a non-scientific audience | compliance | apply scientific methods | apply research ethics and scientific integrity principles in research activities
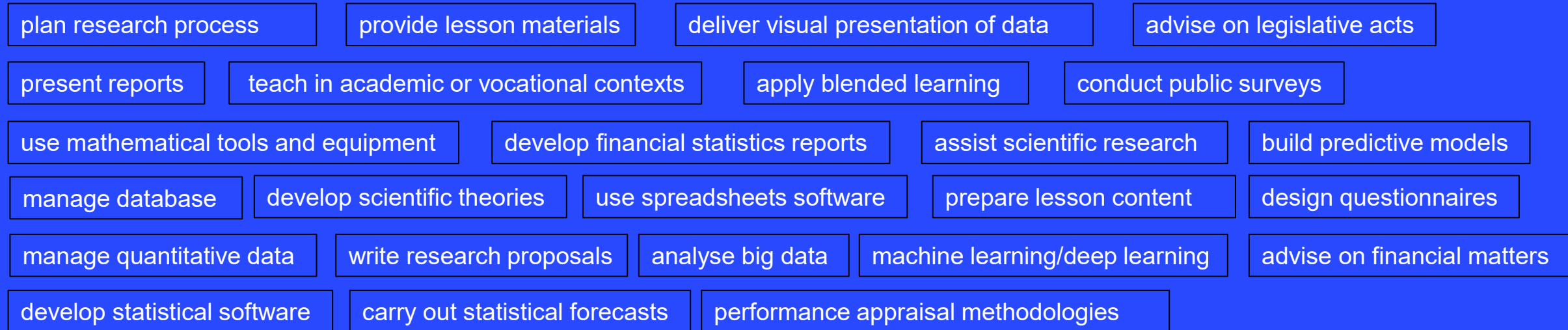
apply statistical analysis techniques | manage findable accessible interoperable and reusable data | work in the cloud | disseminate results to the scientific community

Lesson 5: DATA ANALYST SKILLS AND KNOWLEDGE

Optional skills and competences

| plan research process | provide lesson materials | deliver visual presentation of data | advise on legislative acts |

| present reports | teach in academic or vocational contexts | apply blended learning | conduct public surveys |

| use mathematical tools and equipment | develop financial statistics reports | assist scientific research | build predictive models |

| manage database | develop scientific theories | use spreadsheets software | prepare lesson content | design questionnaires |

| manage quantitative data | write research proposals | analyse big data | machine learning/deep learning | advise on financial matters |

| develop statistical software | carry out statistical forecasts | performance appraisal methodologies |

Essential knowledge

| data quality assesment | scientific research methodology | statistical analysis system software | mathematics | statistics |

Optional knowledge

| algorithms | biometrics | set theory | market research | demography | Information confidentiality | opinion poll |

What have we learned?
QUIZ

1 **Would you be able to mention an advantage and a disadvantage of the new LMI sources?**

a) Reduction of time and costs; Ethical dilemmas   b) Real-time information; Simplify search

c) Challenges in updating and maintenance; Digital gap   d) Easy access; Very heavy technology

2 **Mention a new emerging technology in the field of LMI**

a) Hyperspectral vision   b) Lidar technology

c) No-code technology   d) Data enrichment

3 **What does it consist of?**

a) a way to simplify the process of data analysis   b) a way to store relationships along with data
c) a tool to analyse data from a geographical perspective d) facilitate faster data transmission

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Thank you

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