ERF:
4. Digital Competence

Jordan Youth Innovation Forum

Duration: 6.5 Hours

Project Consortium

Coordinator:

Partners:

Project Details

Title: "Joint Development, Piloting, and Validation of Entrepreneurial Mindset and Key Skills Curricula and Training Materials for Third Countries"
Acronym: EMSA (Entrepreneurial Mindset and Skills for All)
Agreement Number: 101092477 – EMSA – ERASMUS-EDU-2022-CB-VET
Programme: Erasmus+ Capacity Building in the Field of Vocational Education and Training (VET)
Call for Proposals: ERASMUS-EDU-2022-CB-VET
Start Date: 01.01.2023
End Date: 31.12.2025

General Principles, Mechanisms, and Logic Underlying Evolving Digital Technologies

Training Aim

To provide a comprehensive understanding of the key mechanisms and logic behind evolving digital technologies. This session will introduce participants to the fundamentals of digitalization, data protection, and GDPR, alongside data management skills essential in both personal and professional settings.

Descriptor
Learning Outcomes

All LOs of the Competence

In terms of **knowledge**:
- ✓ *Define digitalization and its core principles.*
- ✓ *Analyze reliable digital sources and retrieve relevant data.*
- ✓ *Describe GDPR compliance, data protection, and internet safety issues.*

In terms of **skills**:
- ✓ *Demonstrate the ability to use cloud-based platforms for collaboration and digital content creation.*
- ✓ *Develop and share digital content using appropriate media platforms (text, images, audio, video).*
- ✓ *Apply tools like Google Analytics to evaluate the impact of digital content.*

In terms of **attitudes**:
- ✓ Show respect for GDPR, data protection, and ethical standards while using digital technologies.
- ✓ Exhibit confidence in applying online etiquette and netiquette in various digital environments.
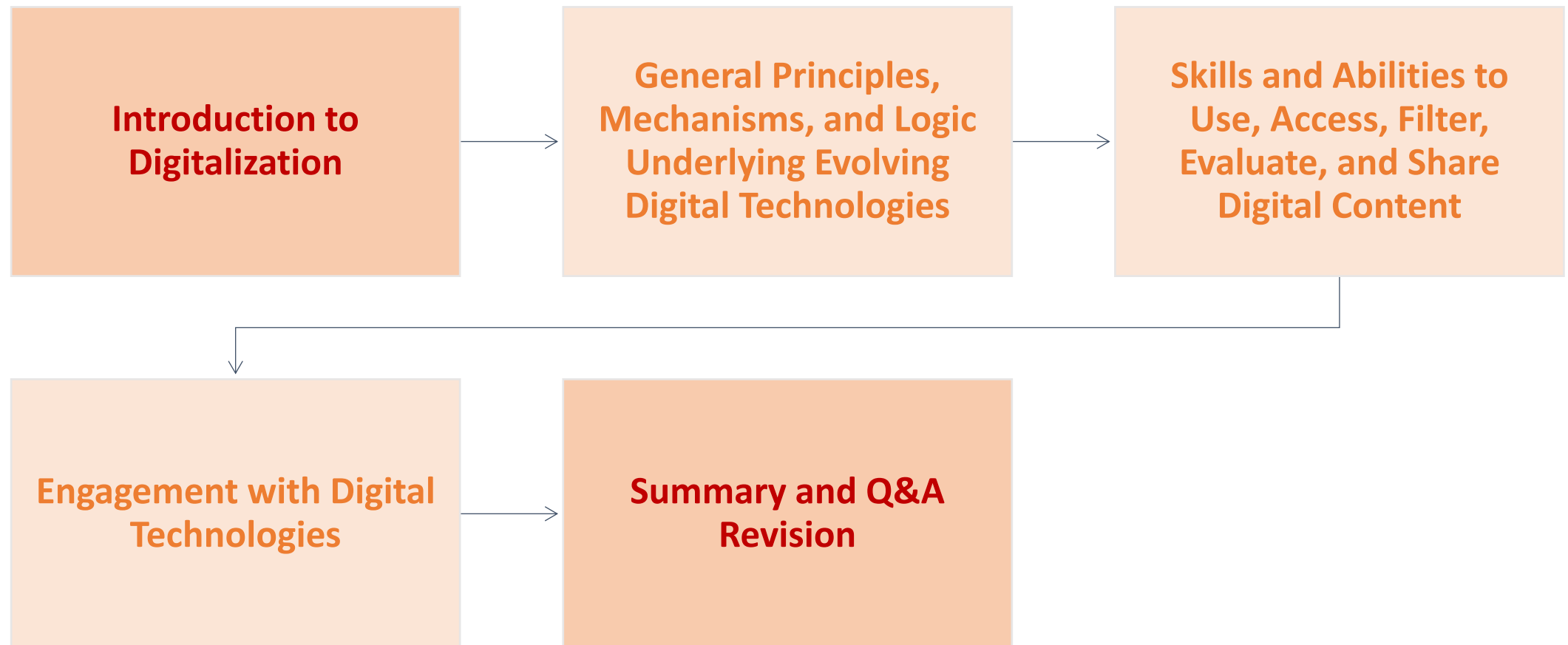- ✓ Implement strategies to protect oneself and others from online dangers and risks.

ERF: The European Reference Framework
(Key Competences for Lifelong Learning)

Literacy

Personal, social and learning to learn

Mathematical, science, technology and engineering

Digital

Citizenship

Multilingual

Entrepreneurship
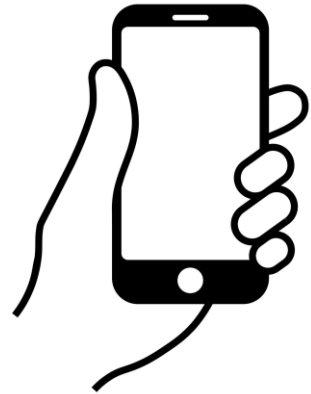
Cultural awareness and expression

Digital competence is the ability to use digital technologies confidently and responsibly in personal and professional context. This course will cover this principle and mechanisms of digitalization, focusing on data protection and GDPR compliance. Participants will explore the evolving digital landscape and learn to apply digital management skills for data safety, accuracy, and ethical use.

What ERF competence is our training about?

Training Route Map

Introduction to Digitalization → **General Principles, Mechanisms, and Logic Underlying Evolving Digital Technologies** → **Skills and Abilities to Use, Access, Filter, Evaluate, and Share Digital Content**

Engagement with Digital Technologies → **Summary and Q&A Revision**

Training Rules

Participation

give respect → get respect
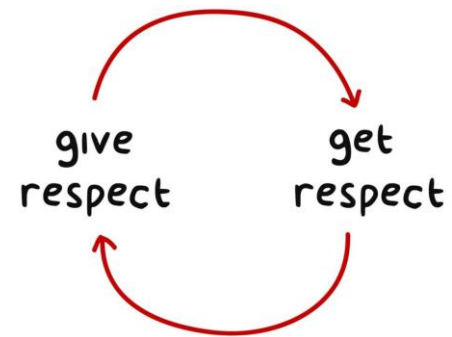
YOUR OPINION MATTERS

"Digital Footprint Bingo" is a 15-minute activity where participants mingle to find others with shared digital experiences, marking Bingo cards with tasks like attending a virtual meeting or using cloud storage. The first to complete a row or column wins, followed by a discussion on participants' unique digital experiences.

Digital Bingo

MT3.1_6
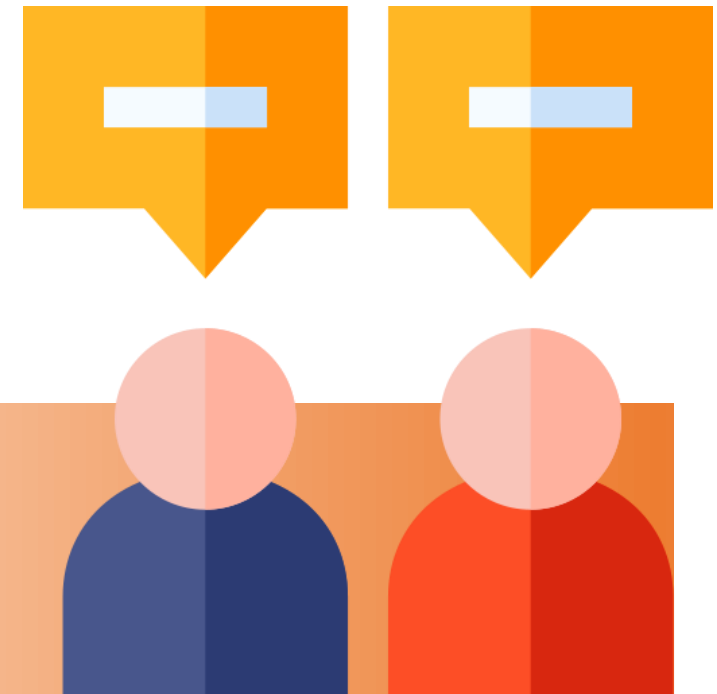
Introductions

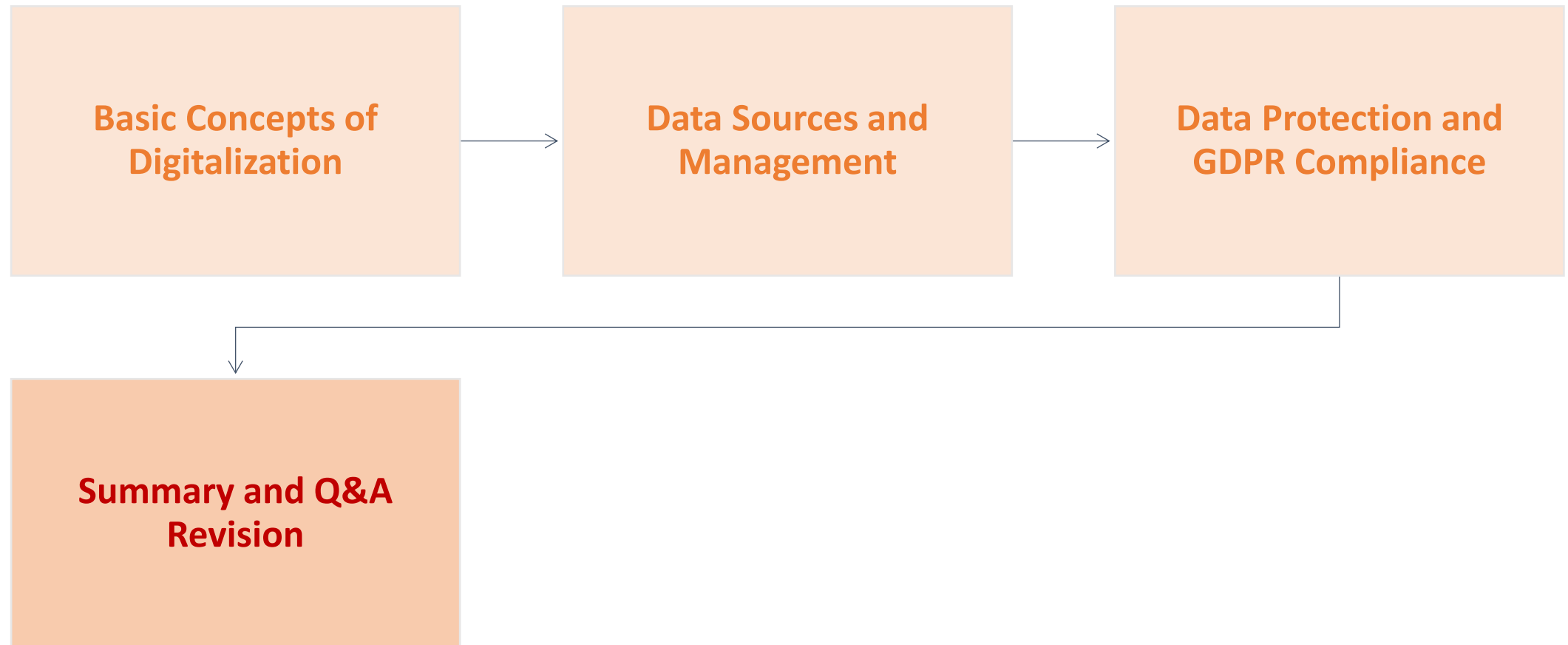*Let's get to know each other!*

"Technology is best when it brings people together."
Matt Mullenweg, Founder of WordPress

Topic 1 Route Map

Basic Concepts of Digitalization → **Data Sources and Management** → **Data Protection and GDPR Compliance**

Summary and Q&A Revision

Introduction to the General Principles, Mechanisms, and Logic Underlying Evolving Digital Technologies.

Introduction to Digitalization

- **Definition of Digitalization:**

Digitalization refers to the integration of digital technologies into everyday processes and activities, transforming how businesses, governments, and individuals operate. It involves converting information into a digital format, optimizing workflows, and enabling new ways of communication and service delivery. Digitalization extends beyond merely digitizing existing data—it reshapes entire business models, economic sectors, and societal functions by harnessing the power of digital technologies to create value, improve efficiency, and enhance experiences.

Aspects and Examples

- **Key Aspects:**

- **Automation**: Replacing manual tasks with automated digital processes, improving speed and reducing human error.

- **Data-Driven**: Leveraging digital data to make informed decisions, analyze trends, and predict future outcomes.

- **Connectivity**: Enhancing communication through networks and the internet, allowing real-time collaboration across geographic boundaries.

- **Innovation**: Digitalization enables the creation of new products, services, and even industries by utilizing technological advancements.

- **Examples:**

- **Healthcare**: Using digital patient records, telemedicine, and AI-driven diagnostics.

- **Retail**: E-commerce platforms transforming the way customers shop and interact with brands.

- **Education**: Online learning platforms providing access to education for students worldwide.

4.1.1: **Basic Concepts of Digitalization**

Digital Puzzle

MT3.1_7

"It's not the strongest or the most intelligent who will survive, but those who can best manage change." — Charles Darwin

4.1.1 Basic Concepts of Digitalization

The Need for Digitalization:

Imagine a world where manual tasks slow down businesses, customer experiences are generic, and operational costs remain high. In today's fast-paced, technology-driven environment, traditional processes can no longer keep up with growing customer demands or the complexity of managing vast amounts of data.

This is where **digitalization** comes in. By automating routine tasks and integrating digital tools, businesses are able to significantly improve their **efficiency and productivity**. Tasks that used to take hours or days can now be completed in minutes, allowing operations to flow seamlessly without delays or bottlenecks.

Moreover, **digitalization** allows businesses to engage with customers in more personalized and innovative ways. Whether through AI-powered product recommendations or tailored user experiences, companies can create deeper connections with their customers, leading to **enhanced customer experiences**.

Additionally, the shift to digital platforms reduces the reliance on physical infrastructure and manual labor, ultimately leading to **cost reduction**. For instance, banks are now using digital platforms to manage customer accounts, eliminating the need for in-person visits and streamlining operations.

In a world where agility and customer-centricity are key, digitalization is not just a luxury—it's a necessity for any business that aims to stay competitive and thrive in the modern era.

Digitalization Vs Digitization

Digitalization vs. Digitization:

•**Digitization** is the process of converting analog information into a digital format (e.g., scanning documents).

•**Digitalization** is the broader process of using these digitized assets and incorporating digital technologies into business processes to drive improvements and innovations.

Aspect	Digitization	Digitalization
Focus	Converting analog data into digital form	Using digital tools to transform processes
Scope	Limited to conversion	Broader scope that impacts business processes
Example	Scanning documents	Automating document management and workflow
End Goal	Digital representation of physical data	Improved efficiency, innovation, new business models
Type of Change	Static (format change)	Dynamic (process transformation)
Impact	Easier access to information	Increased efficiency, enhanced customer experience, and innovation

Understanding Digitalization vs. Digitization

MT3.1_8

Challenges of Digitalization

Data Privacy and Security:
As more data is generated and stored digitally, the risk of cyber-attacks and data breaches increases. Protecting sensitive data and ensuring compliance with regulations like GDPR is crucial.

Digital Divide:
Not all regions or individuals have equal access to digital technologies, creating a digital divide between those who can benefit from digitalization and those who cannot.

Resistance to Change:
Organizations often face resistance to digital transformation due to the complexity of new technologies, the need for upskilling employees, and cultural shifts within the workplace.

Digitalization Impact

Society:
Communication: Real-time global communication through social media and messaging platforms.
Education: E-learning and remote education make knowledge more accessible.
Healthcare: Telemedicine improves access to care and patient data management.
Challenges: Digital divide, privacy concerns, and the rise of cyberbullying.

Economy:
Automation: Increases efficiency, reduces costs, and enhances productivity.
New Business Models: Gig economy, e-commerce, and digital entrepreneurship (e.g., Uber, Airbnb).
Global Market Expansion: Digital platforms allow businesses to reach global markets.
Data as an Asset: Companies leverage big data for personalized marketing and business insights.
Challenges: Job displacement due to automation, market monopolies, and regulatory concerns.

Understanding Digitalization's Key Concepts

MT3.1_1

4.1.2: Data Sources and Management

4.1.2 Data Sources and Management

What are Data Sources?

- Internal Data Sources:
    - Data generated within an organization, such as sales figures, customer records, employee information, and product data.

- External Data Sources:
    - Data that comes from outside the organization, including market research, social media data, competitor analysis, and data from government reports.

Examples:

Retail: Customer purchase history, online user behavior.

Healthcare: Patient records, treatment outcomes.

Finance: Transactional data, market trends.

4.1.2 Data Sources and Management

Why is Data Management Important?

- Ensures Data Accuracy:

Proper data management ensures that data is reliable, up-to-date, and free from errors, which is crucial for decision-making.

- Data Security:

Protecting sensitive data from breaches and ensuring that it is only accessible to authorized users.

- Improves Decision-Making:

Well-organized and easily retrievable data allows businesses to make informed decisions, analyze trends, and develop strategies.

- Regulatory Compliance:

Proper data management ensures compliance with laws like GDPR, reducing the risk of fines and reputational damage.

Key Takeaways:

- Data sources can be internal or external, and both are vital for business intelligence.
- Effective data management is crucial for accuracy, security, and compliance, and it directly impacts business success.

Data Collection, Storage, and Organization

Data Collection Methods:

•**Surveys**: Gathering customer feedback and preferences.

•**Digital Transactions**: Collecting data from online purchases and user behavior.

•**Sensors**: IoT devices gathering environmental or operational data.

Example: E-commerce platforms tracking customer purchases.

Types of Data Storage:

•**Cloud Storage**: Internet-based storage, scalable, accessible anywhere (e.g., Google Cloud, AWS).

•**Physical Servers**: On-premise storage providing more control but requiring maintenance.

Example: Companies using cloud storage for scalability and reduced costs.

Data Organization:

•**Structured Data**: Organized in rows/columns (e.g., SQL databases).

•**Unstructured Data**: Includes images, social media, emails (requires advanced tools).

Example: Retail companies organizing data in databases for real-time analysis.

Data Retrieval, Protection, and Security

Data Retrieval:

•**Database Management Systems (DBMS)**: Organize and retrieve data efficiently.

•**Metadata**: Descriptive information about data that aids in organization and retrieval.

Example: Companies using DBMS to manage inventory and sales data.

Data Protection and GDPR:

•**GDPR Compliance**: Protecting personal data and ensuring privacy (e.g., consent, right to access).

•**Encryption**: Converting data into secure, unreadable formats to protect from breaches.

•**Access Control**: Limiting access to sensitive data through permissions and multi-factor authentication (MFA).

Example: Healthcare providers using encryption and access control to protect patient data.

Data Management in Action

Data Management Tools and Automation

- **Common Data Management Tools:**

- **SQL Databases**: Manage structured data (e.g., customer info, sales data).
  - Examples: MySQL, PostgreSQL.

- **Cloud Databases**: Scalable, cost-effective storage for real-time collaboration.
  - Examples: Google Cloud, AWS, Azure.

- **Big Data Platforms**: Handle large volumes of unstructured data (e.g., social media, sensor data).
  - Examples: Hadoop, Apache Spark.

- **Use Cases**:

- Retail companies use cloud databases for real-time inventory tracking.

- Social media platforms use big data to analyze user behavior.

- **Automation in Data Management:**

- **AI-Powered Data Cleansing**: Automates the detection and correction of data errors.

- **Machine Learning for Data Analysis**: Models predict trends and provide actionable insights.

- **Real-Time Processing**: Automated systems process data instantly for quicker decision-making.

- **Example**:

- E-commerce companies use AI to automatically segment customers for personalized marketing.

Case Study and Summary

Case Study: Retail Company Transformation

Problem: Manual data processing delayed decision-making.

Solution: Implemented a cloud-based system (AWS) with automated analysis using AI.

Results:

Improved Decision-Making: Real-time data access led to quicker decisions on inventory and promotions.

Efficiency Gains: Automated analysis reduced reporting time by 80%.

Cost Savings: Lowered data management costs by 30%.

Summary of Key Points:

- SQL and Cloud Databases help manage structured and unstructured data.

- Big Data Platforms handle vast data sets for detailed analysis.

- Automation with AI and Machine Learning enhances efficiency and decision-making.

- Effective Data Management transforms business operations, boosts efficiency, and leads to better decision-making.

Common Data Management Tools

SQL (Structured Query Language):

- **Purpose**:
  SQL is a standard programming language used to manage structured data stored in relational databases. It allows you to perform operations like inserting, updating, deleting, and querying data.

- **Examples**:
  - **MySQL**: An open-source relational database management system widely used by web developers and businesses to manage data.
  - **PostgreSQL**: Known for its robustness and scalability, often used in industries requiring complex queries and large-scale applications.
  - **Microsoft SQL Server**: A database management system developed by Microsoft, often used in corporate environments for data warehousing and business applications.

- **Key Use Case**:
  A retail chain uses MySQL to manage their product inventory and sales data across multiple stores. By querying their SQL database, managers can instantly check which products are running low and restock efficiently.

Common Data Management Tools

Cloud Databases:

- **Purpose**:
  Cloud databases are hosted on cloud platforms (e.g., AWS, Google Cloud) and provide scalable and cost-efficient solutions for businesses. They are ideal for real-time collaboration, remote access, and flexible storage.

- **Examples**:
  - **Google Cloud SQL**: A fully-managed relational database that allows you to run SQL-based databases in the cloud. Supports MySQL, PostgreSQL, and SQL Server.
  - **Amazon RDS (Relational Database Service)**: Simplifies database setup, operations, and scaling in the cloud. Supports a wide range of database engines.
  - **Azure SQL Database**: Microsoft's cloud database service that offers full SQL server capabilities in a cloud environment.

- **Key Use Case**:
  A global e-commerce company uses Google Cloud SQL to store real-time data from their website. This allows for instant scalability during high-traffic periods (e.g., Black Friday sales) without compromising performance.

Common Data Management Tools

Big Data Platforms:

- **Purpose**:
  Big data platforms are designed to handle and process massive datasets, especially unstructured data like social media feeds, sensor data, or large volumes of customer interactions.

- **Examples**:
    - **Hadoop**: An open-source framework that stores and processes big data across clusters of computers. It can handle both structured and unstructured data.
    - **Apache Spark**: A fast, in-memory data processing engine that works on large datasets. Often used for real-time analytics, machine learning models, and large-scale data processing.

- **Key Use Case**:
  A social media company uses Hadoop to process petabytes of user-generated content, including comments, posts, and photos, to generate insights into trending topics and user behaviors.

Automation in Data Management

The Role of Automation in Data Management:

- Automation simplifies and speeds up routine tasks in data management, allowing businesses to focus on high-level strategic decision-making.

- Automation tools often involve **AI** and **machine learning**, which can identify patterns in data, correct errors, and predict future trends.

How AI and Machine Learning Automate Data Management:

- **AI-Powered Data Cleansing**:
  AI algorithms can automatically identify and correct data inaccuracies, ensuring that data is clean and ready for analysis. This reduces manual effort and the chances of human error.
  - **Example**: An AI system used by a financial institution that automatically identifies duplicate or erroneous transaction records.

- **Machine Learning for Data Analysis**:
  Machine learning models are trained to recognize patterns in data and make predictions. Over time, these models become better at identifying trends and anomalies.
  - **Example**: A retail company uses machine learning to predict customer behavior based on past purchase data, allowing them to create personalized marketing campaigns.

- **Real-Time Processing**:
  Automated systems can process data in real-time, allowing companies to react quickly to changes in market conditions or customer behaviors.
  - **Example**: An online retailer automatically adjusts product pricing based on real-time demand using AI-driven tools.

Case Study - Data Management Transforming

Background:

- **Company**: A global retail corporation operating in multiple countries.

- **Problem**: The company struggled to manage and analyze sales data from its international stores. Their existing manual data processing methods led to delays in reporting and missed opportunities to optimize inventory.

Solution:

- The company implemented **AWS cloud databases** to centralize data from all regions in a single platform. They integrated **AI-powered tools** to automate sales data analysis and used **SQL databases** to structure and store transactional data.

- **Automation in Action**:
  - Machine learning algorithms were used to forecast sales trends and recommend optimal inventory levels.
  - AI tools were integrated to cleanse the data regularly, ensuring accuracy and reducing data management costs.

Results:

- **Improved Decision-Making**:
  Store managers now had access to real-time sales data, enabling them to adjust stock levels and pricing strategies on the fly, which led to more agile and responsive decision-making.

- **Increased Efficiency**:
  Automated data processing reduced report generation time by 80%, allowing the company to act faster on data-driven insights.

- **Cost Savings**:
  By centralizing their data and using cloud-based automation, the company cut down data management costs by 30%. They also reduced the need for manual data handling, leading to a more efficient and error-free process.

4.1.3 : Data Protection and GDPR Compliance

4.1.3 Data Protection and GDPR Compliance

Definition of Data Protection

Protecting personal data from unauthorized access, loss, or corruption:
Data protection is the process of safeguarding personal and sensitive data, ensuring that it is accessible only to authorized personnel. In the digital age, the risk of data breaches, hacking, and other cyberattacks makes protecting data a critical priority for businesses.

Data Confidentiality, Integrity, and Availability (CIA Triad):

- **Confidentiality**: Ensuring that sensitive data is accessible only to authorized individuals. For example, patient records in healthcare or financial data in banking systems should be kept confidential.
- **Integrity**: Ensuring that data is accurate and has not been altered or tampered with. This prevents unauthorized changes or corruption of data. For example, an accurate record of transactions in an online store's database.
- **Availability**: Ensuring that authorized users can access the data when needed. This is important for business continuity and avoiding downtime. For example, customers being able to access their account information on a bank's app at any time.

Key Takeaway: Data protection ensures that personal and sensitive data remains secure and available only to those who need it while maintaining accuracy and completeness.

What is GDPR?

General Data Protection Regulation (GDPR):
GDPR is a comprehensive data protection and privacy law that applies to all businesses and organizations operating in the European Union (EU) or processing the personal data of EU residents. Its goal is to protect individuals' personal data and give them more control over how their data is collected, stored, and used.

- **Key GDPR Principles**:

  - **Consent**: Personal data must be collected only with clear, informed consent from the data subject. Consent must be freely given, specific, and revocable at any time.
    Example: A website must ask for explicit permission to collect a user's data through cookies.

  - **Data Minimization**: Organizations should collect only the data that is necessary for a specific purpose, and no more. This prevents the accumulation of excessive data. *Example*: An online retailer collecting only necessary information like name and address for a purchase, and not additional, unrelated details like social security number.

  - **Transparency**: Organizations must inform individuals about what data is collected, why it is collected, how it will be used, and who it will be shared with. This information should be presented in a clear, accessible privacy policy.
    Example: A privacy notice on a website explaining how users' personal data will be used.

  - **Accountability**: Organizations must take responsibility for ensuring compliance with GDPR and must demonstrate that they are meeting the regulatory requirements. They are required to implement data protection practices, conduct audits, and designate data protection officers if needed.

- **Key Takeaway**: GDPR places stringent requirements on organizations to protect personal data and ensure transparency, accountability, and respect for individual rights.
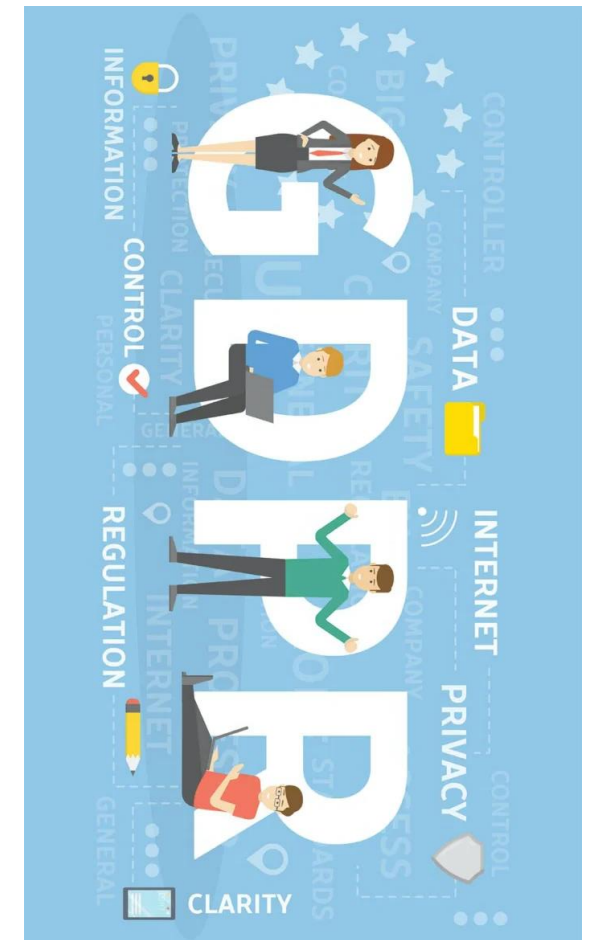
Importance of GDPR Compliance

- **Fines and Penalties for Non-Compliance**:
  Non-compliance with GDPR can result in significant fines, which can be as high as €20 million or 4% of a company's global annual revenue, whichever is higher. For example, a major technology company was fined for failing to obtain proper consent for data processing.

- **Building Customer Trust**:
  Proper handling of personal data is essential for building trust with customers. When customers know that their data is being handled responsibly and securely, they are more likely to engage with a business. Transparent data handling practices create a reputation of reliability and respect for privacy.

- **Mitigating Risk of Data Breaches**:
  Compliance with GDPR ensures that businesses have the necessary safeguards in place to protect against data breaches. This not only avoids financial penalties but also prevents the reputational damage that can result from mishandling personal data.
  Example: A company with strict data access controls and encryption is less likely to experience a costly breach compared to one without such measures.

- **Key Takeaway**: GDPR compliance not only avoids legal penalties but also fosters customer trust and reduces the risk of data breaches.

Information Reliability

Definition of Information Reliability:
• **Accuracy:** Data correctly reflects real-world scenarios.
• **Consistency:** Data remains uniform across systems and over time.

Why is Reliable Data Critical?
• **Business Decisions:** Accurate data leads to better decision-making (e.g., sales forecasting, inventory management).
• **Legal Compliance:** Industries like healthcare and finance require accurate data to meet regulatory requirements (e.g., GDPR, HIPAA).

Example:
A retailer using reliable sales data avoids overstocking or understocking products.

Challenges and Best Practices for Information

Challenges

- **Human Error**: Mistakes during manual data entry.
- **Inconsistent Data Collection**: Different departments using varied formats.
- **Outdated or Duplicated Data**: Records becoming outdated or existing in duplicate.

Example:

An incorrect customer address causes shipping delays.

Best Practices

- **Regular Audits**: Periodically reviewing data to identify and correct errors.
- **Automated Tools**: Using tools to validate and clean data (e.g., flagging duplicates).
- **Data Governance Policies**: Setting rules for data collection, storage, and processing to ensure consistency across departments.

Example:

A company using data validation tools reduces entry errors and ensures data quality.

Implementing GDPR Principles

MT3.1_3

Case Study – GDPR Compliance in Action

MT3.1_4

Revision-Summary and Q&A

Revision-Summary

Recap of Key Points

- **Basic Concepts of Digitalization**:
  - Digitalization refers to the use of digital technologies to transform business operations and processes.
  - Key concepts such as automation, efficiency, and enhanced customer experience were discussed in detail.

- **Data Sources and Management**:
  - We explored various data sources (internal and external) and the importance of data organization and retrieval.
  - Key takeaways include understanding the role of cloud storage, structured vs. unstructured data, and ensuring data reliability through best practices like audits and governance.

- **Data Protection and GDPR Compliance**:
  - We discussed the importance of protecting personal data and the role of GDPR in ensuring privacy and compliance.
  - The session covered key GDPR principles, including consent, transparency, accountability, and data minimization, along with real-world case studies on data breach responses.

Q&A

Topics for Discussion:

- How to ensure ongoing GDPR compliance in different sectors (e.g., retail, healthcare, finance).

- Challenges in managing large datasets and ensuring data reliability.

- How digitalization impacts organizations and potential pitfalls in adopting digital technologies.
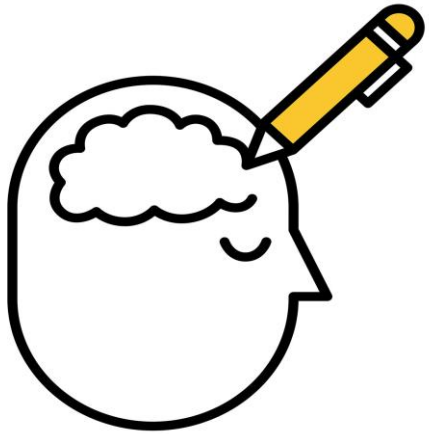
Individual Reflection Quiz

✓ General Principles of Digitalization:

✓Digitalization: Enhances efficiency, automation, and customer experience.

✓Data Management: Importance of organizing and protecting data.

✓GDPR Compliance: Ensuring data protection, transparency, and accountability.

Do you have any questions?

What will you keep from today's training?

Training
Evaluation

List of References

General Principles, Mechanisms, and Logic Underlying Evolving Digital Technologies

1. **Brennen, S., & Kreiss, D.** (2016). *Digitalization and Digitization: What the Difference Is and Why It Matters*.
    Available at: Culture Digitally

2. **Schwab, K.** (2017). *The Fourth Industrial Revolution*. Crown Business.
    Available at: Amazon Link

3. **Gartner** (2020). *Digital Business Transformation: The Disruption and the Opportunities*.
    Available at: Gartner

4. **Westerman, G., Bonnet, D., & McAfee, A.** (2014). *Leading Digital: Turning Technology into Business Transformation*. Harvard Business
    Review Press.
    Available at: Harvard Business Review

5. **Kane, G., Palmer, D., Phillips, A., Kiron, D., & Buckley, N.** (2017). *Achieving Digital Maturity*. MIT Sloan Management Review.
    Available at: MIT Sloan Review

List of Suggested Resources for Self-Directed Learning

1. General Principles of Digitalization

- **"Digital Transformation: Survive and Thrive in an Era of Mass Extinction"** – Thomas Siebel
  Available at: Amazon Link

- **"The Fourth Industrial Revolution"** – Klaus Schwab
  Available at: World Economic Forum

- **Coursera**: *Digital Transformation Courses*
  Available at: Coursera

- **"Digitalization and its impact on business models"** – McKinsey & Company
  Available at: McKinsey

- **FutureLearn**: *Introduction to Digitalization*
  Available at: FutureLearn

Thank you!