
 **Makerere University Business School**

INTERMEDIARY ICT

BCOM II
ACADEMIC YEAR 2024/2025

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TOPIC 1

**INTRODUCTION TO DATA
MANAGEMENT**


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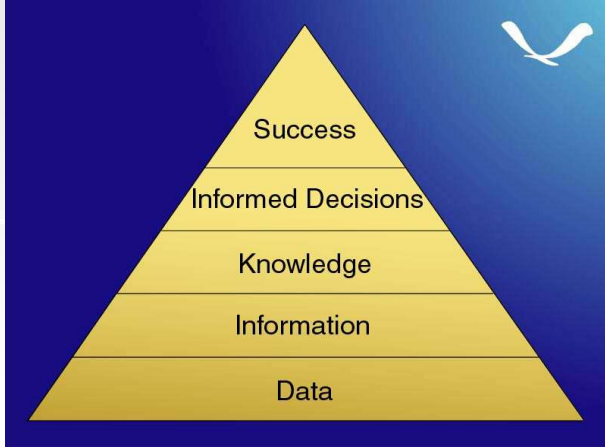
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Data Is the Foundation on Which Business Success is built

Successful management of data is critical to
any organizational mission to make
informed decisions.

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Success
Informed Decisions
Knowledge
Information
Data

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Data Management

- Data Management is a broad field of study, but essentially is the process of managing data as a resource that is valuable to an organization or business.
- **Data management** is the **development** and **execution** of **architectures, policies, practices** and **procedures** in order to manage the information lifecycle needs of an enterprise in an effective manner.

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Motivation/Importance of Data Management

- Data management plays a significant role in an organization's ability to generate revenue, control costs
- Successfully being able to share, store, protect and retrieve the ever-increasing amount of data can be the competitive advantage for organizations today.
- Data management helps organizations to mitigate risks.
- It enables decision making in organizations

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What Are the Benefits of Good Data Management?

- Optimum data quality
- Improved user confidence
- Efficient and timely access to data
- Improved knowledge and understanding of the agency's data holdings
- Improves decision making in an organization

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Costs of Poor Data Management

CASE:

Vacation-goers booked flights with Hawaiian Airlines, they were surprised to find that their tickets which were intended to be free award flights actually costed thousands of dollars. The culprit of this was a faulty airline booking application that accidentally charged customer accounts in dollars instead of airline miles. A ticket that was supposed to be redeemed for 674,000 miles turned into a sky-high price of \$674,000 USD!

This is an example of the impact that poor data quality can have, sometimes with these types of embarrassing results.

The value of a company can be measured by the performance of its data

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What Are the Costs of Poor Data Management?

- ❑ Misinterpretation of the data
- ❑ Lost data
- ❑ Inaccessible data
- ❑ Indefensible data
- ❑ Wasted time and money
- ❑ Missed deadlines
- ❑ Lost user confidence



Managing data Resources:

- ❑ An **information system** provides users with timely, accurate, and relevant information.
- ❑ The information is stored in **computer files**.
- ❑ When files are properly arranged and maintained, users can **easily access and retrieve the information** when they need.
- ❑ If the files are not properly managed, they can lead to chaos in information processing.
- ❑ Even if the hardware and software are excellent, the information system can be very inefficient because of poor file management.



Key principles of good data management

- ❑ *A clearly defined **Data management plan**.*
- ❑ *Implementation of **Data lifecycle control**.*
- ❑ *Identification of **Data ownership and stewardship**.*
- ❑ *Ensuring **Data security**.*
- ❑ *Maximizing **Data usefulness***
- ❑ *Ensure **Data quality***
- ❑ *Collect and analyze **Metadata**.*



Key principles of good data management

- ❑ *A clearly defined **Data management plan**. A data management plan defines the types of data that exist and how they are stored and secured. It also outlines the best practice workflows and quality assurance procedures, including data verification and data validation.*
- ❑ *Implementation of **Data lifecycle control**. From the time data is collected or acquired until the end of a project and even beyond, we need to have a clear understanding of how the data is being managed in order to maintain the data quality and usefulness. Thinking about the lifecycle of our data allows us to store, validate, and manage the appropriate data and also gives us guidance on when to archive or delete data.*



Key principles of good data management

- *Identification of **Data ownership and stewardship**.* Identifying data owners and data stewards allows us to **ensure that the right people are assigned to the right roles within our data management system**. We integrate our data management team with our subject matter experts to ensure that data integrity and quality is maintained while also making smart decisions about what information needs to be captured.
- *Ensuring **Data security**.* In this digital age, data security is vital for every business, regardless of industry. We must ensure appropriate, industry standard security protocols are in place for all systems, including our data management system.



Key principles of good data management

- *Maximizing **Data usefulness**.* None of the other data management principles matter if a company doesn't maximize the use of the data it collects. Data has no value unless it's used, so organizations need to ensure that data is accessible and usable for anyone who needs it.
- *Ensure **Data quality**.* Data increasingly guides how successful companies make choices. Hence, it is critically important to guarantee decision-makers can trust the data they work with. To manage data quality, organizations should ensure that they understand stakeholders' requirements for quality and measure data against these requirements.



Key principles of good data management

- *Collect and analyze **Metadata**.* Data that describes another set of data is called metadata. Managing any asset requires having data about that asset (number of employees, accounting codes etc.). It gives data users a deeper understanding of a data set. It tracks all aspects of that data such as how it has been collected and analyzed, giving insights into the content, characteristics, uses of the data.



Data management process

- *Step 1-**Defining a data architecture**.* A data architecture is **designed and deployed, with database systems and other types of repositories for an organizations data**. This helps to define all databases and data tools that you want to use as an organization as well as knowing where your data will be stored and how your data is related.
- *Step 2-**Assign responsibilities**.* Decide which **people** in your organization will be **in charge of capturing specific data**. A lack of clarity in a group's roles and responsibilities often leads to poor data quality or uncertainty about the data.



Data management process

- **Step 3-Define how you will name things.** Define standards for naming files, and decide how changes will affect a file's name. this helps a user figure out what the file is for and what data it holds just by looking at the name.
- **Step 4-Collect data.** Once you define what data you need and what output you expect then go ahead and collect your data through suitable means.
- **Step 5-Prepare data.** This is the first part of data manipulation. Data is validated and checked for accuracy.
- **Step 6-Process data.** Involves converting the constructed dataset into data that a specific piece of software can understand. Includes tasks such as; formatting data, sorting, editing, merging, back up etc

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Data management process

- **Step 7-Analyze data.** Involves using specific software to examine the dataset with intention to collect meaningful results. When you've analyzed the data, those results can help you improve existing services or processes. For example, you might find out that customers actually want a functionality that you haven't previously offered
- **Step 8-Interpret data.** This helps your business document all the previous steps and their results. Gathered results can be summarized into a report, video, or presentation.
- **Step 9-Share your documentation.** It is important to share documentation about your data management process with team members. Educate them about the data management process and any new tools so as to fully understand the standards and associated responsibilities.

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Data management process

- **Step 10-Collaborate.** For larger organizations, cross-department collaboration and communication are especially important. For example, different departments might have different data management processes. Therefore, make sure to communicate your processes with other departments that handle the same type of data.
- **Step 11- Data archiving and disposal.** Data archiving describes the intentional preservation of data in a format that makes it easy for collaborators to refer back to while data disposal is the process of deleting data in a safe and responsible manner. Data archiving helps to lower storage costs and increase security while preserving potentially valuable files.

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Data management tools

These tools help to store, process, analyze, protect and discover value in an organization's data. In order to manage and automate the data management process, organizations use data management tools from all the five categories below;

- **Cloud Data Management tools.** Software and technologies designed for operating and monitoring data across cloud platforms. Examples of cloud platforms include Amazon Web Services(AWS), Google Cloud Platform(GCP), Microsoft Azure, Alibaba Cloud, Dropbox, DigitalOcean, Zoom etc. These tools provide flexibility to move, manage and use data across diverse cloud and on-premises environments.

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Data management tools

- **ETL (Extract, Transform, Load) tools.** ETL allows businesses to gather data from multiple sources and consolidate it into a single, centralized location. ETL also makes it possible for different types of data to work together. The ETL process starts with data extraction, transformation and loading.
- **Master Data Management (MDM) tools.** Tools that ensure master data is coordinated across the enterprise for purposes of consistency and accuracy. Master data refers to the core data within the enterprise that describes objects around which business is conducted/data which are agreed on and shared across the enterprise. This data could be about products, customers, suppliers or locations. This enables the organizations to eliminate duplicate records with mismatched data, giving operational workers, business executives and data analysts a complete picture of the business entities without having to piece together different entries

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Data management tools

- **Reference Data Management (RDM) tools.** Tools used to manage classifications and hierarchies across systems and business lines. Often provided as part (subset) of MDM suites, define business processes around reference data, and help stakeholders populate reference data and manage it over time. Reference data is the subset of master data that defines the set of permissible values to be used by other data fields. For example; country codes
- **Data visualization and data analytics tools.** These tools help organizations explore, analyze and visualize big data sets, and generate reports and dashboards to extract insights and guide business decisions. Data visualization tools are used to graphically represent data using visual elements like charts, graphs, and maps in order to provide an accessible way to see and understand trends, outliers and patterns in data. Data analytics tools make it easier for users to process and manipulate data, analyze relationships and correlations between data sets, and it also helps to identify patterns and trends for interpretation. Examples include; Excel, SPSS, python.

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Advantages of data management tools

- They can handle any volume
- They facilitate global working
- They eliminate redundancies and omissions
- They guarantee a high level of security and privacy
- They save on storage
- They optimize data access
- Increased efficiency and productivity

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Disadvantages of data management tools

- They are costly (to acquire and train employees)
- Requires specialized personnel to implement
- Might take a while to implement and adapt to depending on the complexity of your company's data structure.
- Its time consuming.

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Data management techniques

- **Inventory your data.** Data inventory is a list of datasets with metadata that describes their contents, source, licensing and other useful information. As a business **it is important to make a list or a catalogue of your products**, employees, customers, suppliers etc. Many companies store data in multiple locations, for example, in separate databases for each application, along with cloud-based storage apps like Dropbox for easy employee access.
- **Review/outline your business goals.** **Top data management techniques take into account what you want to get out of your data and how it aligns with what you want from your business.** For example, do you want to create or improve automation and processes, or do you want insight into customer buying habits and patterns? In other words, what you do with your data needs to align with your business goals.

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Data management techniques

- **Make data protection and security your top priority.** In today's world full of hackers, viruses, ransomware and other internal and external threats, businesses must be able to effectively secure their data. Confidential data is increasingly being copied to (or created on) employee hard drives, mobile phones or removable USB drives and because these devices are mobile, they are prone to loss, damage or theft without proper encryption, password protection, data backups. Encryption is one of the most effective techniques for keeping your data secure. Encrypt your data both when it's in transit and at rest, with decryption keys stored separately.
- **Ensure your data is readily accessible to your team.** A big part of data management is striking a balance between data security and easy access to the data your team needs to do their jobs. For example, customer service agents need immediate access to customer data. Set up role-based permissions for data so that team members get what they need without compromising the security of your entire data inventory. Setup tools to help your employees quickly find the data they need.

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Data management techniques

- **Limit your data entry points.** The more data entry points you have, the bigger your risk of duplicate or incorrect data. For instance, your customers may fill out paper forms. The key to accurately inputting data is to streamline data entry points.
- **Update your data frequently.** Lately, Organizations are feeling overwhelmed by too much data. They only want what's relevant to make better decisions, but overexcited data collection has swept up data that's irrelevant or redundant along with what's useful. Removing irrelevant data through **"data cleansing"** frees up much-needed space and reduces the feeling of being overwhelmed.

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Data management techniques

- **Control data backup and recovery.** It's extremely important to control data backup and recovery in case the worst happens. Businesses should always be prepared for any potential disaster. Even a minor error can cost you valuable lines of data. There are two ways you can do this: Back up data onsite, which can be costly, or use a cloud-based service. Make sure that whatever you choose will be accessible in the event of an emergency so that you can quickly restore your data and minimize the disruption to your business.
- **Ensure quality by reviewing and maintaining data.** It's important to review and maintain data to ensure you're working with quality data sets. Unlike data cleansing, data maintenance is an ongoing process. Regularly review and verify your data to be certain it's still reliable and usable. Reviewing and maintaining data also makes your database run faster by removing unnecessary files.

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Data management techniques

- **Create data documentation users can understand.** Data documentation includes data dictionaries, readme files, and embedded metadata. Good data documentation gives users meaning and context so they understand the data and can use it to solve business problems. Your data documentation should explain how to interpret data correctly.
- **Ensure data privacy.** Protecting data requires establishing procedures for handling data correctly, beginning with how data is collected and stored, regulatory compliance, and protocols for how it's shared with third parties. Data privacy differs from data security in that it deals with your internal processes versus mitigating external threats. For example, good data security keeps hackers from accessing your data. Data privacy makes sure you have permission to share users' information with third parties.
- **Have the proper data sharing channels available.** A key part of your data management plan is enabling data sharing channels. Data sharing is essentially sharing your data with multiple applications and/or users. Most companies share their information with outside partners and suppliers as well as employees. The channels you use will vary based on how your users consume data.

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Data management techniques

- **Choose the right data storage.** How you store your data will affect how well you manage your data. When you choose a data storage solution, you can select on-premises servers, a cloud-based solution, or a combination of both, known as hybrid storage. Cloud storage is an affordable way to store massive volumes of data without purchasing expensive servers. There are also several on-premises storage types available. Direct attached storage, like USB drives and external hard drives, can be connected directly to your computers. Network-attached storage (NAS) is the central server storage model, where everything is kept on servers and shared across the network.
- **Archive old data to reduce costs.** You can archive old data that you need but aren't currently using to free up space and reduce costs. Typical archived data includes older data that's still important to the company or data that needs to be kept for compliance reasons, such as spreadsheets, email, and other communications.

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Data management techniques

- **Be sure to comply with global data privacy regulations.** In the era of globalization, countries all around the world have an undeniable influence on our economy and business operations. The same applies to the way companies function and above all, how they process personal data. Even if you don't target or sell on the global market, make sure your company is compliant with global and local Data Privacy regulations to avoid significant potential fines.
- **Build a company data management team.** Equally important as the technology you use to handle your data, is the quality of your data management staff. Whether you have a dedicated team for this or not, the important thing to know is that you need trained and experienced staff to manage data collection (in accordance with privacy practices), data quality, data protection, data analysis, and implementations. Building a dynamic data management team is an essential part of any business.

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