

ICTs FOR ORGANIZATIONAL TRANSFORMATION



Microsoft. (n.d.). Bing.

Week 12 :

ICT Trends and Strategies

ICT Trends

Otala Abraham

Kumi University- Uganda

Email: abrahamotl@gmail.com

Tel: +256 775- 614-411

ICTs for Organizational Transformation. Week Twelve (Lecture Twelve).

Agenda

1.

**Flash back of the
previous Lecture 11.**

2.

ICT Trends

- ▣ Artificial Intelligence
- ▣ Machine Learning
- ▣ The Internet of Things
- ▣ Blockchain Technology
- ▣ Cloud Computing and Virtualization
- ▣ Big Data

Flash back to the previous Lecture 11

ICT Sustainability

Three Pillars of Sustainability

1. Environmental Sustainability-

- Environmental Impact
- Green ICT
- Measuring and Reporting Sustainability

2: Social Sustainability

- Digital Divide and Access
- Digital Inclusion
- Ethical Considerations in ICT

3. Economic Sustainability

- ICT: A Catalyst for Economic Growth
- The Challenge of Job Displacement
- The Challenge of Job Displacement
- Bridging the Digital Divide for Economic Inclusion

4. The Role of Organizations in Sustainable ICT

ICT TRENDS

ICT trends refer to the ongoing innovation and development in information and communication technology (ICT). This encompasses a wide range of fields, including:

- **Digital devices like computers**, smartphones, tablets, etc. with more powerful processors, better screen resolutions, and improved functionalities.
- **Software applications** that are designed to meet the needs of individuals and businesses, such as productivity suites, social media platforms etc.
- **Communication technologies** like the internet, mobile networks, and satellite communications

ICT TRENDS

- Information and Communication Technologies (ICT) are constantly evolving, shaping the way we connect, access information, and function in today's world.
- These different areas of ICT are also constantly converging to create new possibilities.
- Therefore this lecture explores some of **emerging trends in ICT**, examining their potential.

ICT TRENDS-**Artificial Intelligence**

Artificial intelligence, is a technology that allows machines and computers to act like humans in the way they think and solve problems. *IBM. (2021)*



IBM. (2021)

ICT TRENDS- Artificial Intelligence

AI Potential

a). AI in Everyday Interactions

- **Virtual Assistants:** AI-powered assistants like Siri, Alexa, and Google Assistant are transforming how we interact with technology.
 - ▣ They can answer questions, set reminders, control smart home devices, and more, using natural language processing.
- **Chatbots:** These AI-driven programs simulate conversation with users, offering customer service, answering FAQs, and providing product recommendations.

ICT TRENDS-**Artificial Intelligence**

AI Potential

b). Autonomous Vehicles and Robotics

- **Autonomous Vehicles:** Self-driving cars powered by AI are revolutionizing transportation.
 - ▣ **Technology:** Sensors, cameras, and complex algorithms allow them to navigate roads, perceive their surroundings, and make decisions.
- **Robotics:** AI is transforming the field of robotics, creating intelligent machines capable of performing complex tasks.
 - ▣ **Applications:** Industrial robots for manufacturing, surgical robots and in healthcare

ICT TRENDS- Machine Learning

ML allows computers to learn without being explicitly programmed)

a). How Machines Learn

□ Machine learning algorithms can be categorized based on the type of data they use for training:

i). **Supervised Learning:**

- ▣ **Concept:** Imagine a teacher showing a student labeled examples (think flashcards).
- ▣ **Data:** Requires labeled data where each data point has a corresponding output value (the "label").

Example: A spam filter is trained on labeled emails (spam vs. non-spam) to identify future spam messages.

ICT TRENDS- Machine Learning

Machine Learning Potential

a). Learning Paradigms: How Machines Learn Cont.

ii). Unsupervised Learning:

- ▣ **Concept:** Let's say a student is given a pile of unsorted documents and asked to find patterns.
- ▣ **Data:** Unlabeled data, where the algorithm must identify patterns or relationships on its own.

Example: Recommender systems analyze user behavior patterns to suggest relevant products or content.

ICT TRENDS- Machine Learning

Machine Learning Potential

a). *Learning Paradigms: How Machines Learn Cont.*

iii) . **Reinforcement Learning:**

- ▣ **Concept:** Think of an animal learning through trial and error.
- ▣ **Data:** The algorithm interacts with an environment and receives rewards or penalties for its actions.

Example: AI agents playing games learn by trial and error, receiving rewards for winning and adapting their strategies.

ICT TRENDS- Machine Learning

Machine Learning Potential

b). Predictive Modeling and Pattern Recognition

Machine learning excels at two key tasks:

- **Predictive Modeling:** Using learned patterns from data, the algorithm can make predictions about future events.
Example: A credit card company uses machine learning to predict the risk of fraud based on past transactions.
- **Pattern Recognition:** Algorithms can identify hidden patterns within large datasets.
Example: Medical imaging analysis software can detect abnormalities in X-rays or scans, aiding in early diagnosis.

ICT TRENDS- The Internet of Things (IoT) -

IoT *Potential*

a). A Symphony of Connected Things:

Refers to a vast network of interconnected physical devices embedded with electronics, software, sensors, and actuators. These devices can collect and exchange data over the internet, enabling them to:

- **Communicate with each other**
- **Respond to their environment**
- **Be remotely controlled**
- This interconnected world creates an "Internet of Things" where everyday objects become smart and can be integrated into our lives.

ICT TRENDS- The Internet of Things (IoT) -

IoT Potential

b). Sensors, Devices, and Data Collection

The foundation of IoT lies in three key elements:

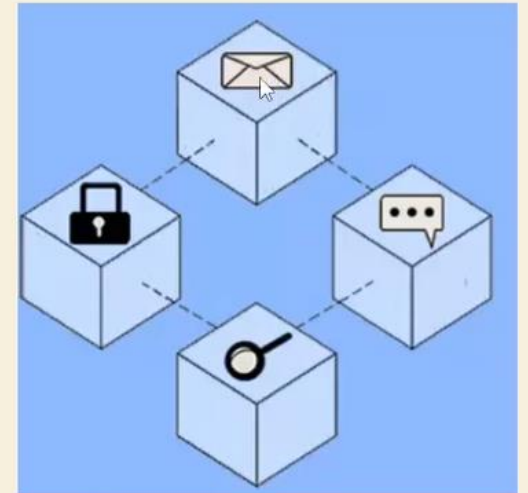
- **Sensors:** These are the eyes and ears of the IoT, collecting data from the physical world. They can measure various parameters like temperature, pressure, motion, and more.
- **Devices:** These are the physical objects equipped with sensors and processing capabilities.
- **Data Collection:** The data collected by sensors is transmitted through various communication protocols like Wi-Fi, Bluetooth, or cellular networks. This data is analyzed to gain insights and enable intelligent decision-making.

ICT TRENDS- Blockchain Technology

Blockchain Technology is a secure, distributed database for recording transactions.

Imagine a digital record keeper, but instead of one copy, everyone has their own, and they all have to agree on what's written for it to be true.

This shared record is secured by storing information in linked blocks, making it tamper-proof.



Hayes, A. (n.d.).

ICT TRENDS- Blockchain Technology

Blockchain Technology *Potential*

a). Core Principles of Blockchain:

- **Immutability:** Once recorded, data cannot be altered, ensuring data integrity.
- **Transparency:** All participants can access and verify the ledger, fostering trust.
- **Security:** Cryptographic hashing ensures data security and tamper-proof records.

ICT TRENDS- Blockchain Technology

Blockchain Technology *Potential*

b). Cryptocurrencies and Smart Contracts

- While blockchain is famous for cryptocurrencies like Bitcoin, its applications extend further:
- **Cryptocurrencies:** Digital assets that use blockchain to enable secure and transparent online transactions.
- **Smart Contracts:** Self-executing contracts stored on the blockchain. When pre-defined conditions are met, the contract automatically executes, removing the need for intermediaries.

ICT TRENDS- **Blockchain Technology**

Blockchain - Transforming Industries

The secure and transparent nature of blockchain affects various sectors:

I. Secure Financial Transactions and Money Transfers:

- ❑ **Faster and Cheaper Payments:** Eliminating intermediaries can streamline and reduce transaction costs.
- ❑ **Enhanced Security:** Cryptographic features ensure secure and tamper-proof transactions.

II. Supply Chain Traceability and Asset Management:

- ❑ **Tracking Goods:** Products can be tracked throughout the supply chain, ensuring authenticity and origin verification.
- ❑ **Improved Efficiency:** Streamlining logistics and reducing counterfeit goods.

ICT TRENDS- Cloud Computing and Virtualization

a). The Cloud Deployment Models

Cloud computing refers to on-demand access to computing resources (servers, storage, databases, software) over the internet. It eliminates the need for physical infrastructure and offers several deployment models:

- ❑ **Public Cloud:** Resources are shared among multiple users over the public internet.
- ❑ **Private Cloud:** Resources are dedicated to a single organization and offer greater control and security.
- ❑ **Hybrid Cloud:** A combination of public and private cloud resources provides flexibility and scalability.

ICT TRENDS- Cloud Computing and Virtualization

b) Benefits and Challenges

Cloud computing offers several advantages:

- **Scalability:** Easily scale resources up or down based on needs , **Cost-Effectiveness:** Pay for what you use, eliminating upfront hardware costs. , **Accessibility:** Access resources from anywhere with an internet connection.

ICT TRENDS- Cloud Computing and Virtualization

b) Benefits and Challenges Cont.

There are also challenges to consider:

- ❑ **Security:** Data security is a major concern when storing data in the cloud.
- ❑ **Reliability:** Reliance on internet connectivity can lead to disruptions
- ❑ **Vendor Lock-in:** Becoming dependent on a specific cloud provider.

ICT TRENDS- Cloud Computing and Virtualization

Optimizing the Cloud

b). Virtual Machines and Containerization:

There are two main approaches to virtualization:

- ❑ **Virtual Machines (VMs):** VMs mimic entire computer systems, including the operating system, applications, and data. They offer a high degree of isolation but can be resource-intensive.
- ❑ **Containerization:** Containers are lightweight and share the underlying operating system kernel.

ICT TRENDS- BIG DATA

a). The Four V's of Big Data:

- Big data refers to massive and complex datasets that are difficult to store, process, and analyze using traditional methods. These datasets are characterized by four key attributes:
- **Volume:** The sheer size of the data, often measured in terabytes, petabytes, or even exabytes.
- **Variety:** The diverse nature of the data, encompassing structured, semi-structured, and unstructured data (text, images, video, sensor data).
- **Velocity:** The speed at which data is generated and collected, often in real-time or near real-time.
- **Veracity:** The accuracy and reliability of the data, which can be a challenge due to its sheer volume and variety.

ICT TRENDS- BIG DATA

b). Data Collection, Storage, and Processing

- Big data requires specialized technologies for collection, storage, and processing:
- **Data Collection:** Techniques include sensors, social media feeds, log files, and web scraping.
- **Data Storage:** Distributed storage systems like Hadoop handle massive datasets efficiently.
- **Data Processing:** Big data analytics tools enable us to extract insights and value from complex datasets.

ICT TRENDS- BIG DATA

Data Visualization Techniques

a). Seeing is Believing: Charts, Graphs, and Infographics

- Data visualization is the art of transforming complex data sets into easily understandable visual representations. This allows us to:
- **Identify Trends and Patterns:** Visualizations reveal patterns and trends that might be difficult to discern from raw data.
- **Communicate Insights:** Compelling visuals can effectively communicate insights to both technical and non-technical audiences.

ICT TRENDS- BIG DATA

b). Big Data Analytics

Big data requires specialized tools and platforms to manage and analyze its vast volume and complexity. Here are some popular options:

- **Hadoop:** An open-source framework for distributed storage and processing of large datasets across clusters of computers.
- **Spark:** A fast and general-purpose analytics engine for large-scale data processing.
- **Tableau:** A popular data visualization tool that allows users to create interactive dashboards and reports from various data sources.

ICT TRENDS- BIG DATA

C). Deriving Insights from Big Data

Big data analytics goes beyond just storing and processing data. It's about extracting valuable insights that can be used to:

- **Improve decision-making:** Data-driven insights can inform better business decisions across various functions.
- **Optimize operations:** Analyze data to identify inefficiencies and optimize processes.
- **Develop new products and services:** Leverage customer data to understand preferences and develop targeted offerings.

Conclusion

- The range of emerging trends in ICT, include Artificial Intelligence, the Internet of Things, Cloud Computing, Blockchain Technology and Big Data.
- These trends hold the potential to reshape various aspects of organizations, from how to communicate, manage resources and make decisions.
- As these technologies continue to evolve, it's crucial to stay informed and adapt to navigate the opportunities and challenges they present.

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THANKS