# Industry 4.0 technologies in humanitarian assistance

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- Introduction and theoretical background
- Blockchain in humanitarian assistance
- Big Data analytics and Artificial Intelligence
- Notable use cases and pilot projects

# Blockchain fundamentals

- There are two general high-level categories for blockchain approaches that have been identified: **permissionless**, and **permissioned**.

- In a permissionless blockchain network **anyone can read and write** to the blockchain without authorization.

- Permissioned blockchain networks limit participation to specific people or organizations and allow finer-grained controls. Knowing the differences between these two categories allows an organization to understand which subset of blockchain technologies may be applicable to its needs.

# Blockchain fundamentals



CENTRALIZED
(A)

DECENTRALIZED
(B)

DISTRIBUTED
(C)
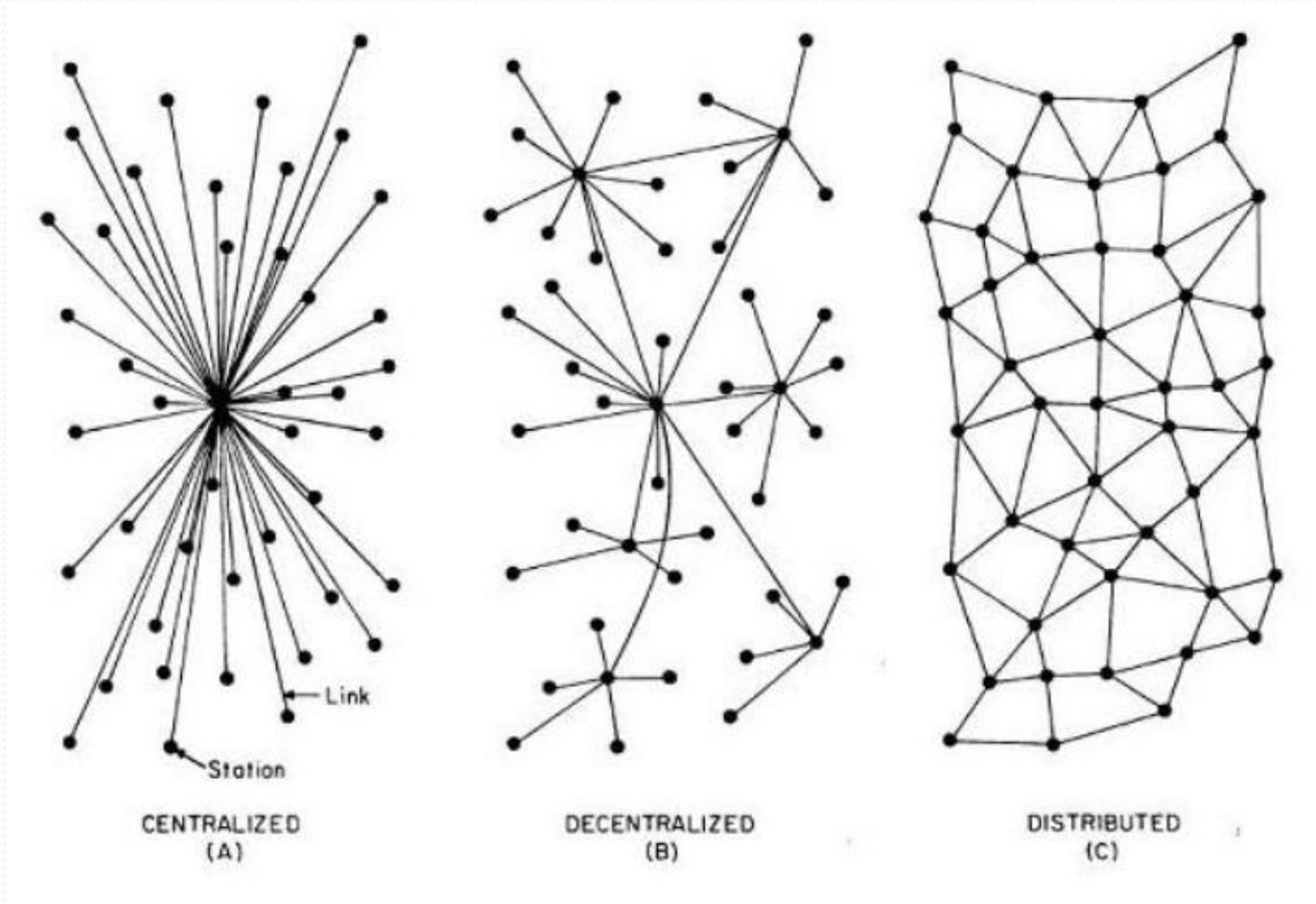
# Blockchain fundamentals

## Characteristics of high-potential use cases

**Shared repository**
A **shared repository** of information is used by multiple parties

**Multiple writers**
**More than one entity** generates transactions that require modifications to the shared repository

**Minimal trust**
A level of **mistrust exists between entities** that generate transactions

**Intermediaries**
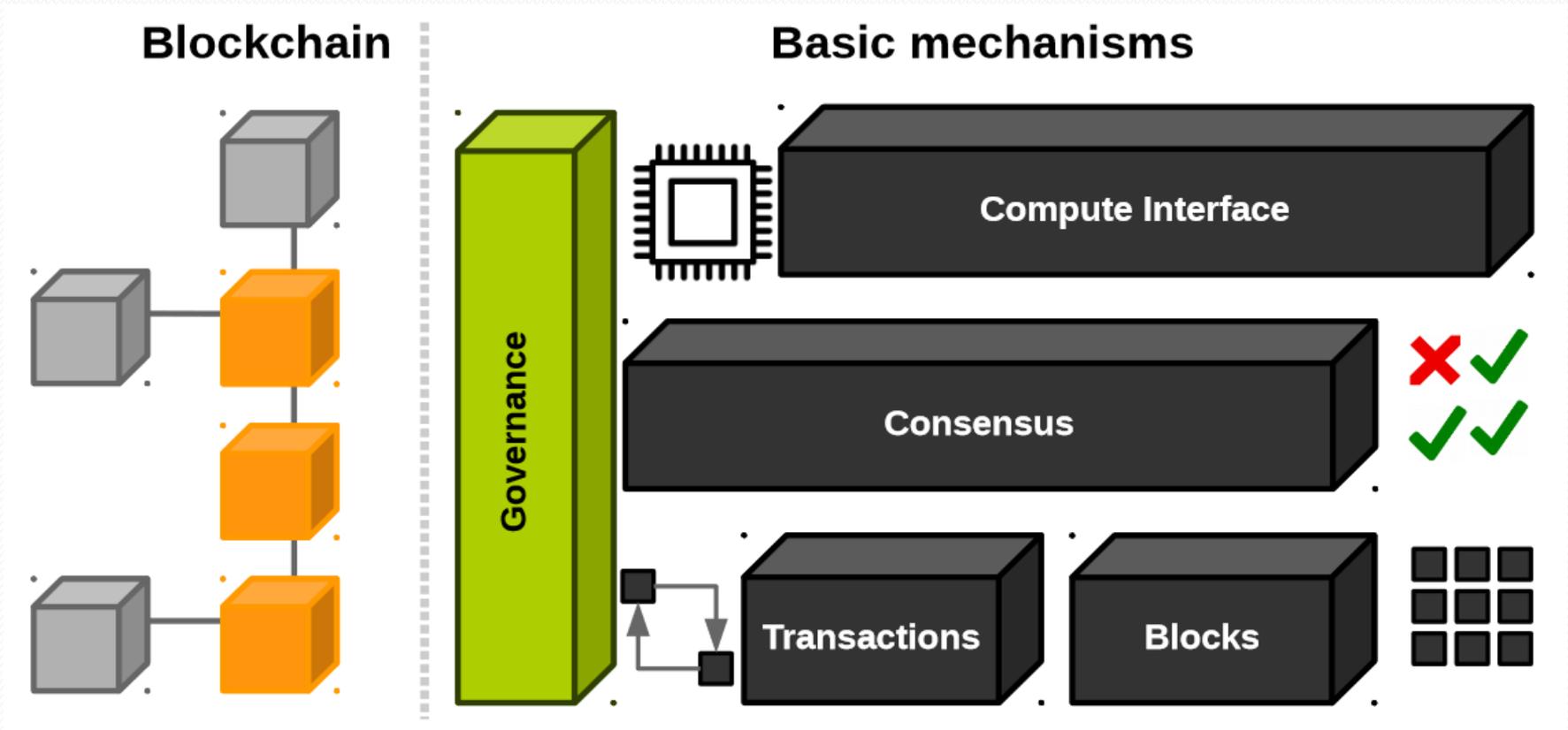**One (or multiple) intermediary** or a central gatekeeper is present to enforce trust

**Transaction dependencies**
Interaction **or dependency between transactions** is created by different entities

# Blockchain fundamentals



An overview of blockchain architecture

# Blockchain benefits in the humanitarian sector

Tracking Ownership of Complex Issues Over Time:

- Blockchain technology is particularly effective in managing and tracking complex issues in humanitarian contexts that evolve over time.
- Provides a dynamic and secure method for continuous oversight and monitoring of developments and changes.
- Facilitates long-term tracking of aid, resources, and their impact on targeted issues.

# Blockchain benefits in the humanitarian sector

Absence of a Well-Established or Effective Central Authority

- Blockchain offers unique advantages in situations lacking a central authority for management and coordination.
- Provides a decentralized framework for autonomous operation and decision-making.
- Ensures transparent and equitable distribution of aid and resources in challenging environments.

# **Blockchain benefits in the humanitarian sector**

Collaborative Work Among Groups or Actors

- Ideal for scenarios where different groups need to work collaboratively.
- Offers a transparent and decentralized platform for coordination and information sharing.
- Facilitates trust and mutual accountability among participating organizations.

# Blockchain benefits in the humanitarian sector

Increased Transparency and Traceability

- Blockchain enhances transparency and traceability in aid delivery.
- Real-time recording and tracking of all transactions on a tamper-proof ledger.
- Builds confidence among donors and beneficiaries, ensuring aid reaches intended recipients.
- Example: impactMarket's UBI distribution tracked in real-time on a Global Dashboard.

# Blockchain benefits in the humanitarian sector

Reduced Costs and Faster Transactions

- Significantly lowers operational costs and accelerates transaction speeds in aid delivery.
- Eliminates intermediaries for more direct and efficient resource distribution.
- Example: Web3 initiatives for Ukraine, including direct crypto donations, demonstrating rapid and efficient aid mobilization.

# Blockchain benefits in the humanitarian sector

Greater Accountability and Reduced Corruption

- Creates a transparent, immutable record of transactions, enhancing accountability.
- Utilizes smart contracts for automated, condition-based aid disbursement.
- Minimizes mismanagement and fraud, leading to more effective aid delivery.
- Example: Hypercerts token standard for tracking and rewarding positive impact in humanitarian projects.

# Blockchain benefits in the humanitarian sector

Direct Access to Aid for Beneficiaries:

- Streamlines aid distribution by eliminating intermediaries like banks and government agencies.
- Utilizes tools like stablecoins for quick, secure aid delivery to beneficiaries.
- Example: UNHCR and Stellar Development Foundation partnership for delivering cash assistance via USDC stablecoin to Ukrainian refugees.

# Building Blocks

**Project Overview**: Building Blocks is a corporate project of the WFP and represents the largest blockchain-based cash distribution system in the humanitarian sector. The system is designed to transfer cash assistance to refugees securely and efficiently, coordinating with other humanitarian agencies.

| 4M+ | 4 | US$ 325M | US$ 555M | US$ 3.5 M |
|---|---|---|---|---|
| people supported every month | active countries - Bangladesh, Jordan, Lebanon, and Ukraine | in assistance provided | in cash-based transfers processed to date | saved in bank fees to date |

# Building Blocks

**Decentralized Blockchain Network**: Building Blocks is a network of blockchain nodes, with each node operated independently by participating organizations, forming a humanitarian blockchain network for collaboration and secure information sharing in real-time.

**Network Neutrality and Equality**: The network operates without a hierarchy of ownership, ensuring that all member organizations are equal co-owners, co-operators, and co-governors. This equality extends to their roles in maintaining and governing the network.

**WFP's Application for Assistance Coordination**: The World Food Programme has developed a robust application on this network for tracking, coordination, and delivery of various types of assistance, including cash, food, WASH (water, sanitation, and hygiene), medicine, and more.

**Open-Source Technical Infrastructure**: The technical infrastructure of the Building Blocks network is based on open-source software, making it freely accessible to all participating organizations. Applications deployed on the network are also available at no cost to network members.
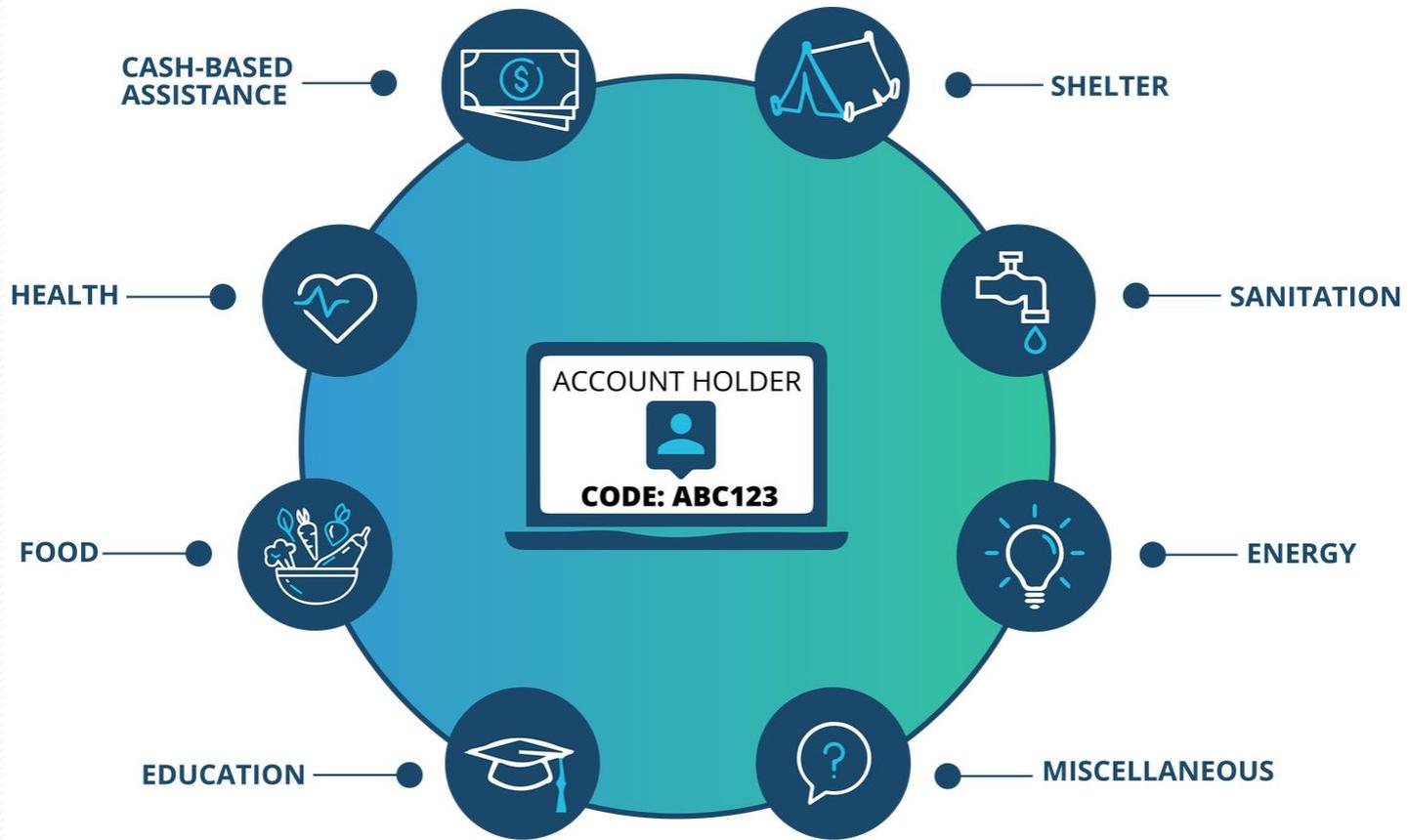
**Call for Collaboration**: WFP encourages other United Nations agencies and humanitarian actors to join this neutral blockchain network to enhance cooperation, reduce fragmentation, boost efficiency, and ultimately empower the people they serve.

# Building Blocks



| Proof of Concept | Pilot | Growth | | Scale Up | |
|---|---|---|---|---|---|
| JANUARY 2017 | MAY 2017 | JANUARY 2018 | MARCH 2020 | NOVEMBER 2020 | MARCH 2021 |
| **100** | **10,000** | **106,000** | **10,000** | **BEIRUT 2020** | **1 MILLION** |
| People supported in the Pakistan pilot | People supported in the Jordan pilot | Syrian refugees supported in Jordan | People supported in Cox's Bazar refugee camp in Bangladesh | Enabled a multi-organizational response to the 2020 Beirut Blast in Lebanon | People supported in Bangladesh & Jordan |

# Building Blocks

# Big Data analytics and Artificial Intelligence in the humanitarian sector



THE INTERNET IN 2023 EVERY MINUTE

22,831 visits to ChatGPT
241.2M emails sent
18.8M text messages sent
271,309 IOS & Android app downloads
3.02M photos created with smartphones
2.4M Google searches
6.94M emoji sent
694,000 video hours viewed
11,834 chats on Microsoft Teams
347,222 tweets
34,247 Slack messages
3.47M snaps created
6.3M total Zoom meeting minutes
11,035 fake accounts removed
10.4M viewing minutes

60 SECONDS

Created by: eDiscovery Today & LTMG

# Big Data analytics and Artificial Intelligence in the humanitarian sector

## Types Of Big Data

- Structured
- Unstructured (80%)
- Semi-structured

## 5Vs of Big Data

- Volume
- Velocity
- Variety
- Value
- Veracity
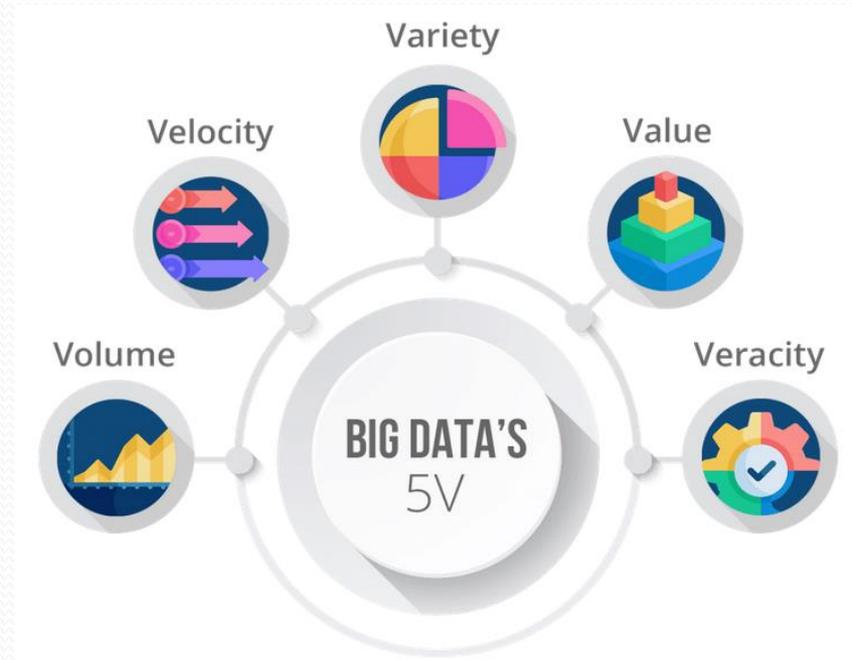
# Big Data analytics and Artificial Intelligence in the humanitarian sector

# Big Data analytics and Artificial Intelligence in the humanitarian sector

**Satellite Imagery and Remote Sensors**: This technology offers up-to-date data on areas affected by disasters, aiding organizations in assessing damage and strategizing their response.

**Social Media Platforms**: These platforms are crucial for real-time information during emergencies, as users post about their experiences, seek assistance, and update on the situation. This helps aid organizations in collecting important information.

**Mobile Phone Data**: In even the most remote areas, mobile phones are widespread. The data from these devices can reveal information about the movements of populations, communication trends, and needs during emergencies.

# Big Data analytics and Artificial Intelligence in the humanitarian sector

**Ground Surveys and Data Collection**: Conducting surveys and gathering data on the ground remains vital to confirm and complement the information obtained from remote sensing technologies.

**Open Data Initiatives**: Platforms like the Humanitarian Data Exchange (HDX) provide a space for the sharing and accessing of essential data in a collaborative environment.

# Big Data analytics and Artificial Intelligence in the humanitarian sector
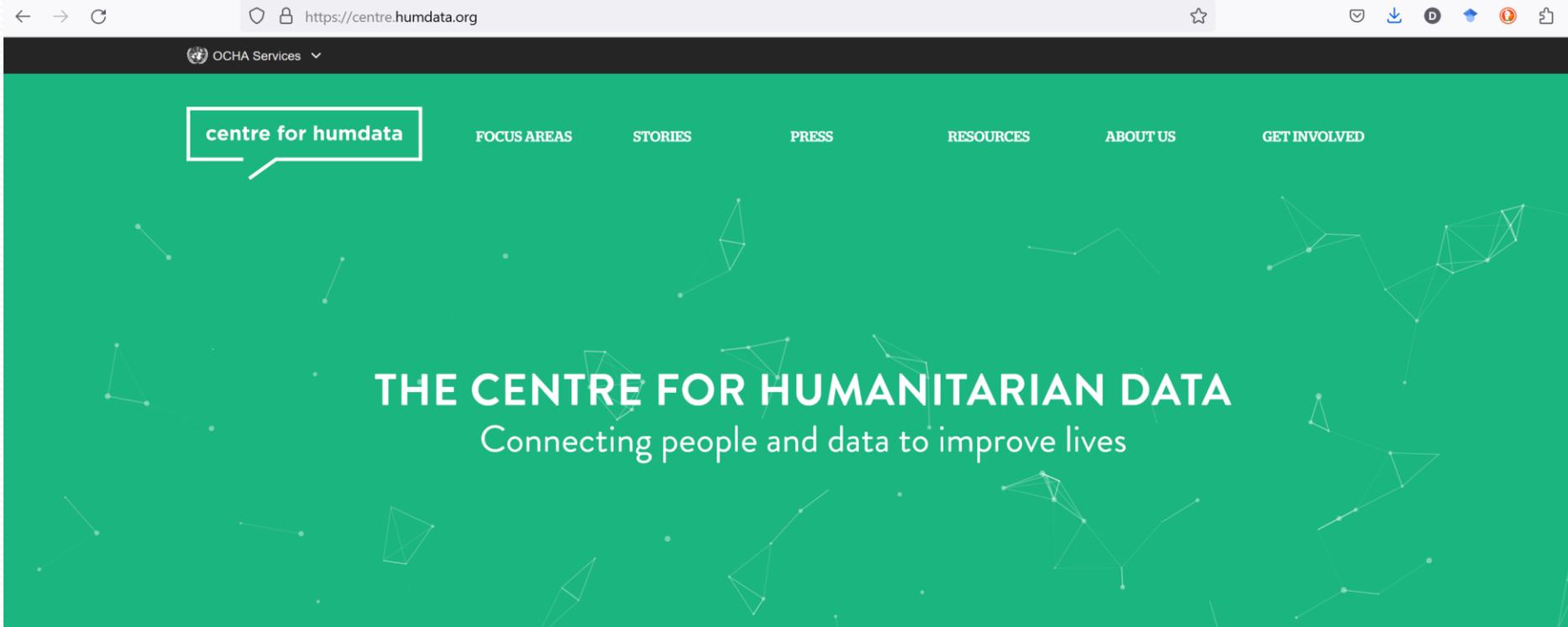
# Big Data analytics and Artificial Intelligence in the humanitarian sector

- Disaster Response and Risk Management
- Population Tracking and Resource Allocation
- Health Monitoring and Epidemic Prediction
- Program Monitoring and Supply Chain Optimization
- Communication Enhancement and Community Engagement

# Big Data analytics and Artificial Intelligence in the humanitarian sector

# Big Data analytics and Artificial Intelligence in the humanitarian sector

**Magic Box: a collaborative data sharing platform**

- UNICEF is leveraging Magic Box, a joint platform supported by private sector companies like Telefonica, Google, IBM, Amadeus, and Red Hat.
- These companies contribute data and expertise for public welfare. Utilizing real-time private sector data, UNICEF can better understand and respond to the needs of at-risk communities, particularly in emergencies like Zika or Ebola.
- This initiative not only challenges the industry but also offers a platform for collaboration and a tool that could transform UNICEF's emergency response approach.

# Big Data analytics and Artificial Intelligence in the humanitarian sector

**The innovative SKAI system**

- SKAI is shaping the future of emergency response and humanitarian efforts. A joint creation of the World Food Programme (WFP) and Google Research, SKAI is transforming our approach to combating world hunger and managing crisis situations.
- Leveraging artificial intelligence (AI) and satellite imagery, SKAI provides instant insights and critical information for effective decision-making during emergencies. Integrating advanced machine learning techniques with extensive satellite data, it enables organizations to make informed, data-driven choices quickly and accurately.
- SKAI's capabilities range from prompt assessment of building damage to enhanced situational awareness and efficient resource distribution, thus revolutionizing crisis response strategies.

# Big Data analytics and Artificial Intelligence in the humanitarian sector

**The innovative SKAI system**

- SKAI utilizes advanced machine learning to analyze satellite images for assessing building damage from natural disasters and conflicts, offering rapid, accurate, and scalable assessments.
- Its near real-time monitoring feature provides crucial data on damage, aiding organizations and authorities in resource allocation and targeted interventions by integrating information like population density and socio-economic vulnerability.
- Additionally, SKAI enhances situational awareness by detecting structural changes and predicting damage outcomes, thus aiding proactive disaster response.
- As a collaborative platform, SKAI fosters effective partnership among various stakeholders in disaster response and humanitarian aid, enhancing the overall impact of these efforts.

# Thank you!

# References

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