



2 Humanitarian Use Cases of 21st century Technologies

(Updated 11 April 2025) How can 21st-century technologies help address the challenges outlined above?

2.1 Use Case 1: Risk mitigation by savings and by solidarity

2.1.1 Base use case

In this narrative, we revisit the village in Vietnam with Mrs. Nguyễn thi Sáu, but now in the 21st century.

Mrs. Nguyễn thi Sáu continues to cultivate her small rice paddy and care for her five children, aged between 4 and 10. While not wealthy, she manages to save approximately \$1 each month. Her approach to future challenges has evolved as follows:

- **Basic Literacy and Mobile Communication:** Mrs. Sáu possesses basic reading and writing skills and owns a simple mobile phone, which she usually keeps switched off to conserve battery life. She utilizes this phone to communicate via SMS with local NGO staff who assists her. This staff member has educated her and other villagers (from 10-20 households) on how to obtain real-time market prices for crops and agricultural supplies through SMS.
- **Unaware use of cryptographic personal profile:** The helper staff regularly engages with Mrs. Sáu to update her household information, assets, and activities. Her responses are collectively signed using cryptographic methods and posted as a personal profile, akin to a IPFS decentralized version of LinkedIn. The cryptographic signature is stored on a blockchain, while the profile data resides on the Interplanetary File System (IPFS). Mrs. Sáu is unaware of this.
- **Central Bank Digital Currency (CBDC):** The Vietnamese government supports a CBDC. Although Mrs. Sáu prefers physical cash, she has been persuaded by her local helper to allocate a portion of her savings into CBDC, facilitated by SMS communication and blockchain technology.
- **Monetary Incentives for Profile Updates:** Mrs. Sáu receives payments from various organizations—both commercial and non-commercial—whenever she updates her profile with the help of her local NGO staff. This provides her with a financial incentive to maintain her profile actively.
- **Solidarity Fund:** Mrs. Sáu can access her CBDC savings at any time but has the option to designate a portion as a solidarity fund, which she can withdraw under specific conditions:
 - **Emergency Withdrawals:** She can withdraw her savings without fees if she can justify a family emergency (such as illness, crop failure, or broken tools). This justification must be approved by her "kinship" group through a blockchain-based voting process.
 - **Profile-Based Kinship Determination:** The degree of "kinship" is established through predefined rules that utilize AI-driven "word embedding" functions to assess the relationships between individuals.

- **Unapproved Withdrawals possible against fees:** If her justification is not accepted, she can still withdraw her funds but will incur a 20% fee, which is redirected to a community solidarity fund.
- **Community Support:** When a withdrawal request is approved, if it exceeds her personal solidarity fund, the additional amount is sourced from the community solidarity fund and contributed by members of her "kinship," in proportion to their relationship to her. This support can be given as a gift or a loan.
 - The amount of any support gift is determined by her figure of merit that is calculated by her profile of past contributions. The amount of loan is calculated from her credit rating from previous history.
 - This support must not be confused with "insurance" that is **risk-transfer**, this is a best-effort only community **risk sharing**².
- **Smart Contracts and Transparency:** The rules governing these transactions are embedded in smart contracts that are publicly accessible on the blockchain, ensuring transparency for all participants.

While Mrs. Nguyễn thi Sáu still considers insurance and bank loans for larger amounts, her digital profile allows banks and insurance companies to access relevant information (for a fee) to refine their risk assessments. This modern approach empowers her to manage her finances more effectively and enhances the support she receives from her community.

2.1.2 Supporting use case: who runs the infrastructure?

To support the operations described in the previous narrative, several key infrastructure components are necessary:

- **Telecommunication Services:** Cellular and internet connectivity is provided by local telecommunications companies, enabling Mrs. Nguyễn thi Sáu and her community to access digital resources and communicate effectively.
- **Power Supply:** Electricity is supplied through the local grid, which may also include village solar installations, ensuring a consistent power source for digital devices and local computing infrastructure.
- **Blockchain Accessibility:** To make blockchain technology user-friendly for individuals with limited literacy, a feature called **Account Abstraction** is utilized. <https://kvutien-yes.medium.com/blockchain-mass-adoption-with-account-abstraction-erc-4337-1-ae13b84ea81f>. This allows users to interact with blockchain systems without needing to manage complex cryptographic keys themselves. Such implementations are available as open-source solutions, facilitating easier adoption.
- **IPFS Data Storage:** The Interplanetary File System (IPFS) serves as a decentralized data storage solution. It does not require widespread infrastructure; instead, one selected station in every few villages can host the local NGO's data. A micro-computer equipped with a 500 GB solid-state disk (SSD) can effectively store profile data for thousands of individuals. This hardware costs less than \$100 and consumes under \$20 annually in electricity. The design of IPFS ensures resilience to outages, as data is replicated across multiple nodes. <https://kvutien-yes.medium.com/machu-picchu-persistent-ipfs-node-on-raspberry-pi3-part-1-fb6fd67e421a>.
- **Blockchain Nodes:** Similar to IPFS, blockchain nodes can be hosted on low-cost servers. Modern protocols like **Polygon** are designed to operate efficiently with minimal computing resources, making them suitable for low-cost transactions typical in this context. ([https://en.wikipedia.org/wiki/Polygon_\(blockchain\)](https://en.wikipedia.org/wiki/Polygon_(blockchain))). Given the small monetary amounts involved, cybersecurity requirements can be simplified.
- **Artificial Intelligence (AI):** The same low-cost micro-computers can utilize pre-trained and fine-tuned LLM parameters to analyze relationships between profiles. This enables the calculation of "kinship" degrees among community members, enhancing the personalization of support and services. (<https://www.tomshardware.com/raspberry-pi/raspberry-pi-ai-kit-review>).

This infrastructure collectively enables the decentralized, technology-driven support system for individuals like Mrs. Nguyễn thi Sáu, ensuring they can access financial services and community assistance efficiently and effectively.

² "**Risk-transfer**" means you pay someone who accepts to take your risk, up to a maximum. "**Risk sharing**" means mutual helps by members of your community. It is "best effort". You bear part of the damage, the community bears the rest, up to the maximum available in the common pot.