Blockchain and Distributed Ledger Technologies: beyond the hype – socio-economic and legal perspectives for the EU digital sovereignty

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Blockchain and DLT

Blockchain is a type of technology that allows information to be stored in a secure, transparent, and unchangeable way. Think of it like a digital ledger or record book, but instead of one person controlling it, many people (or computers) share and maintain the same copy. This means that when something is added, everyone can see it, and no one can change it without others knowing. It's commonly used to track transactions, like in cryptocurrencies (e.g., Bitcoin), but it can be used for other purposes too, such as keeping records or tracking goods.

Distributed Ledger Technology (DLT) is the broader term that includes blockchain. DLT refers to any system where information is stored and shared across multiple places (computers or nodes) rather than being held by a single authority. Blockchain is just one kind of DLT, where data is stored in blocks that are linked in a chain. Other types of DLT may store and manage data differently, but they all follow the same basic idea of distributing the control of information.

They HYPE

Since its peak in 2017, the hype around blockchain technology has decreased, but the technology continues to hold potential across various fields, including public administration. Back then, adding "blockchain" to a company’s name could dramatically boost its stock price. Despite the initial excitement fading, governments and analysts are still exploring how blockchain can improve bureaucratic processes. Estonia was an early adopter, followed by countries like the UK, the Netherlands, and Lithuania, each launching pilot projects and platforms. The European Commission has even launched a 'Blockchain Observatory' to monitor developments

in the space. Ref: *Beyond the Hype: Distributed Ledger Technology in the Field of Public Administration* | *Niklas Kossow*

Socio-Economic Impacts of Blockchain and DLT

Economic Transformation:

1. **Digital Economies**: Blockchain is the foundation of digital currencies like Bitcoin and Ethereum. It also powers *Decentralized Finance (DeFi)*, where people can borrow, lend, or trade assets without needing a bank. Another key concept is the *tokenization of assets*, where physical assets (like real estate or artwork) are represented as digital tokens on the blockchain, making them easier to trade.
2. **Supply Chain Optimization**: In supply chains, blockchain can help increase transparency by allowing everyone to see the history of a product (like where it was made or shipped from). This helps prevent fraud and improves efficiency because everyone has access to the same information in real-time.
3. **Job Market and Skills Demand**: Blockchain technology has created new job opportunities, such as blockchain developers, project managers, and cybersecurity experts. As more industries adopt blockchain, there's a growing demand for people with skills in this area.

Potential Challenges:

1. **Digital Divide**: If blockchain technology is only accessible to certain regions or communities, it could widen the gap between those with access to digital tools and those without, potentially leading to inequality.
2. **Scalability Issues**: Blockchain currently has limitations when it comes to handling a large number of transactions quickly, which is a problem if it's to be used on a massive scale like traditional financial systems.

3. **Energy Consumption**: Some types of blockchain, like those using *proof-of-work* (because of lots of computation for hashes solving etc), require a lot of computing power, leading to high energy usage. This raises concerns about the environmental impact of blockchain technology.

Legal and Regulatory Considerations for the EU

EU Legal Framework on Blockchain and DLT:

1. **Existing Regulations**: The EU has introduced regulations like the *Markets in Crypto-Assets Regulation (MiCA)* to govern how cryptocurrencies and blockchain-based assets are traded. This helps protect consumers and ensures a stable financial system. However, blockchain also needs to align with laws like the *General Data Protection Regulation (GDPR)*, which controls how personal data is handled.

In terms of **GDPR** (the EU's privacy law), blockchain faces a big challenge. GDPR allows people to ask for their personal data to be deleted (*Right to be Forgotten*), but blockchain is designed to keep data permanently. Once data is added to a blockchain, it can’t easily be changed or erased, which conflicts with GDPR rules.

This means the EU needs to figure out how blockchain can work with GDPR. Possible solutions might include making personal data stored outside the blockchain or using encryption methods so that data can be hidden or made unreadable without breaking blockchain's structure. However, these are ongoing discussions, and no clear solution exists yet. So, the future of blockchain in Europe depends on finding a balance between innovation and strict privacy protections.

Data Sovereignty and Privacy:

1. **GDPR Compliance**: The EU has strict privacy laws, such as the *Right to be Forgotten*, which allows individuals to request that their data be deleted. Since blockchain is designed to store information permanently, this creates a conflict with GDPR, raising questions about how blockchain can comply with these laws.
2. **Cross-Border Data Transfers**: Blockchain often involves transferring data across borders, but this can clash with EU regulations that govern where and how data can be stored, especially when data moves to countries outside the EU with less stringent privacy protections.

Smart Contracts and Legal Liability:

1. **Smart Contracts**: Smart contracts are self-executing agreements coded into the blockchain. The EU is still figuring out how to legally recognize these contracts and address issues like *who is responsible if a smart contract malfunctions*. If the contract fails or is hacked, determining legal liability can be complex.
2. **Anti-Money Laundering (AML) and Know Your Customer (KYC)**: Blockchain's anonymity poses a challenge for AML and KYC regulations, which require businesses to verify the identity of users to prevent fraud and illegal activities like money laundering. Balancing blockchain's benefits with these regulatory requirements is an ongoing challenge for the EU.

Blockchain and DLT in EU Digital Sovereignty

Role of Blockchain in Strengthening EU Digital Sovereignty:

1. **Decentralized Infrastructure**: Blockchain can help the EU reduce its reliance on non-EU cloud services and tech companies. By using decentralized networks, Europe can maintain greater control over its technology and data.

2. **Data Sovereignty**: Blockchain's decentralized nature allows data to be stored in a way that gives Europe more control over its data, reducing the risk of it being accessed or controlled by foreign governments or corporations.

Challenges to Digital Sovereignty:

1. **Dependence on Non-EU Blockchain Technologies**: Many blockchain technologies are currently developed and controlled by companies outside the EU, which can undermine the EU's digital sovereignty. Relying on non-EU platforms could expose Europe to security risks or foreign influence.
2. **Fragmented Regulatory Frameworks**: Different EU member states may have different rules and regulations regarding blockchain, making it harder to create a unified approach across Europe. This fragmentation could slow down the adoption of blockchain technology in the EU.

Concerns for the EU: The key concerns for the EU when it comes to blockchain and DLT include ensuring privacy under laws like GDPR, maintaining control over digital infrastructure (sovereignty), addressing energy consumption, and avoiding over-reliance on foreign technologies. Legal clarity on issues like smart contracts and cross-border data transfer is also critical for safe and widespread adoption. Finally, ensuring that the technology is accessible to all and does not widen inequality or create new challenges for regulatory compliance is essential.