Blockchain per la filiera produttiva: potenzialità, caratteristiche e barriere

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security models, infrastructures in mobile, pervasive and IoT environments, blockchain technologies (POR FESR Smartchain project)
Agenda

- Blockchain: definition and potential benefits
- Blockchain taxonomy and guidelines for adopting a blockchain infrastructure
- Transforming the technology value in business value: current barriers

Blockchain in the Top 10 strategic technology trends
Is blockchain still a hype?

Blockchain ≠ Bitcoin

Bitcoin (cryptocurrency) based on Blockchain ("technology")

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**Gartner's Blockchain Spectrum**

<table>
<thead>
<tr>
<th>Preblockchain</th>
<th>Public Blockchain</th>
<th>Public, Private, Hybrid, Consortium Blockchain</th>
<th>Programmable-Economy-Based on Blockchain</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>2012</td>
<td>2016</td>
<td>2020 2022 2025</td>
</tr>
</tbody>
</table>

- Phase 1: Enabling Technologies
- Phase 2: Inspiring Disruption
- Phase 3: Complete Solutions
- Phase 4: Enhanced Solutions

Source: Gartner
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**Bitcoin: A Peer-to-Peer Electronic Cash System**

Satoshi Nakamoto
satoshi@gmx.com
www.bitcoin.org

**Abstract.** A purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without involving a financial institution. Digital signatures provide message authentication and security, ensuring that a message is sent only by an authorized sender.
Blockchain

A *blockchain* is an *append-only ledger*

- *distributed* on many nodes of a P2P network
- *decentralized* (nobody owns it)
- composed by a *chain of immutable blocks*

Based on *cryptography* and on the *digital signature* to guarantee user anonymity, integrity, and authenticity.

To append new data (a *block*) to the blockchain, the blockchain provides a protocol to ensure that:

- only valid transactions are inserted in the blockchain
- all the nodes agree on the same version of the blockchain (*distributed consensus*), thus making it *really immutable*

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**Evolution of the Blockchain Technology**

**Blockchain 1.0:** Cryptocurrency

**Blockchain 2.0:** Smart Contracts

**Blockchain 3.0:** DApps

**Blockchain 4.0:** blockchain in real business cases (industry 4.0)… ……at the beginning…. 
Use cases

https://consensys.net/blockchain-use-cases/

<table>
<thead>
<tr>
<th>CAPITAL MARKETS</th>
<th>CENTRAL BANK DIGITAL CURRENCIES</th>
<th>DIGITAL IDENTITY</th>
<th>ENERGY AND SUSTAINABILITY</th>
<th>FINANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOVERNMENT AND THE PUBLIC SECTOR</td>
<td>HEALTHCARE AND THE LIFE SCIENCES</td>
<td>LAW</td>
<td>MEDIA AND ENTERTAINMENT</td>
<td>REAL ESTATE</td>
</tr>
<tr>
<td>RETAIL FASHION AND LUXURY</td>
<td>SOCIAL IMPACT</td>
<td>SPORTS</td>
<td>SUPPLY CHAIN MANAGEMENT</td>
<td>SYNDICATED LOANS</td>
</tr>
</tbody>
</table>

Blockchain benefits:
• Accessibility
• Transparency
• Cost reduction
• Automation
• Data/process integrity, tracking and timestamping

Blockchain and Industry 4.0

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## Blockchain and Smart Supply Chain

### Blockchain benefits:
- Transparency into provenance of goods from sourcing all the way to the point of consumption.
- Accurate asset tracking
- Automation
- Greater visibility into participant’s activities along the value chain

### Blockchain taxonomy

<table>
<thead>
<tr>
<th>Depending on access regulation:</th>
<th>Depending on permissions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public blockchains</td>
<td>Permissionless blockchains</td>
</tr>
<tr>
<td>Private blockchains</td>
<td>Permissioned blockchains</td>
</tr>
<tr>
<td>Consortium or federated</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Depending on the kind of incentives:</th>
<th>Depending on the operation mode:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tokenized blockchains</td>
<td>Logic–oriented blockchains</td>
</tr>
<tr>
<td>Non–tokenized blockchains</td>
<td>Transaction–oriented blockchains</td>
</tr>
</tbody>
</table>
Now the crucial question: should I adopt the blockchain paradigm?

The answer depends on various factors:

• trust relationships among participants
• which and how many are the interactions/processes that need a notarisation support to prevent participants from propagating fake data or tampering information of interest
• if information state should be really shared among participants
• level of integration among ERP systems
• tradeoff between business benefits and blockchain infrastructure/integration/transaction costs and

Transforming the technology value in business value: current barriers

Cultural barriers: complexity of technology and difficulty to understand how to transform the technology value in business value

Technological barriers: great effort toward infrastructure building blocks, less attention and technological immaturity of advanced tools for supporting the design/deployment of enterprise business applications (tools for data collection, state verification and analysis, for facilitating collaboration among companies...); interoperability; data privacy

Economical barriers: lack of fee models for predicting and calculating transaction fees

Legal and tax barriers: some legal initiatives but none well established yet (Decreto legge135/2018 DL Semplificazioni, Gazzetta Ufficiale12 Febbraio2019, European Parliament resolution of 3 October 2018 on distributed ledger technologies and blockchains: building trust with disintermediation)
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