"Blockchain and trust in the Internet of Things era: a unique business opportunity"

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Blockchain and bitcoin are winning ground in a world that is more and more affected by the changes brought by the 4th Industrial Revolution. These are the topics addressed in the 55th session of the INSME*Academy* held by Mr. Stefano Pepe, founder of UniqID, a company dealing with one of the main issues of the Industry 4.0 which is the management of data.

The speaker introduced the first industrial revolution characterized by the mechanization that made possible to stop the use of animals for heavy jobs. After that, the world quickly headed towards the mass production revolution, which was subsequently impacted and modified by computerization. Finally we are now in the 4th Industrial Revolution whose main peculiarity is an hyper connection of devices that enables us to communicate very quickly and to be essentially ubiquitous.

Given this hyper connection, factories have:

- A **better agility** to change production lines in order to adapt them to the new market challenges
- A **better efficiency** that combined with agility could give companies a competitive advantage
- **Higher innovation:** in order to remain competitive and keep the pace of the markets, it is crucial to enhance innovation skills within companies.

These three characteristics - agility, efficiency, innovation - will bring a reinforced customer satisfaction and as a consequence revenues could increase and/or costs be reduced.

According to the speaker the 4th Industrial Revolution has an impact of huge proportion, in particular it is affecting:

- **Society:** the new generation - the so-called millennials - has different habits with regard to goods and services that are driving us towards a service industry where the way people use or purchase devices is totally different if compared to 10-15 years ago. To better meet these changes and create value for stakeholders there is a need for a long term **strategy** that takes emerging issues such as an higher care of the environment into account.
- A new strategy will require new and different **talents**. The speaker reported the example of TESLA that is working on highly automated systems and struggles to find the right talents to be involved on the supply chain. Industry 4.0 needs talents able to work on the whole chain, meaning that they are expected to have the ability to program robots as well as to maintain them.

- **Technology:** the way in which consumers will buy and sell products, will shape the society, change communities and business models.

The expert also addressed the unresolved problem of trust in the new digital technologies highlighting two main preambles (1) we still refer to an old set of rules that cannot work in an hyper connected world (2) the global financial crisis entailed an impressive loss of trust in rules, banks and in the whole economic system.

Bitcoin born at that time as an alternative and 'entered into force' one year later the global financial crisis in 2009. By summarizing, **bitcoin can be defined as a peer to peer protocol to exchange and verify value**. It has been created in a way that enables to remove trusted intermediaries. The speaker defined bitcoin a **reliable and decentralized network** and referred to it as a *digital bazar* that people can join to exchange value and that is built in a way that no government is strong enough to prevent its development. This digital bazar is like a programmable platform that makes the automation of the exchange of value possible and does not require human attention.
Bitcoin can also be seen as a **distributed, shared, digital ledger** where the protocol keeps track of all the transactions, including the amount, the origin, and where those data have been reported. It is a breakthrough revolution also because no single person is in charge of the custody of this ledger.

By taking inspiration from bitcoin and block chain the speaker put the attention on a very relevant issue: the **need for an Industry 4.0 protocol** that could establish a new trusted way to connect devices and industries. Such a protocol would enable:

a. To have a **decentralized infrastructure** that does not have a central authority keeping track of the transactions between industries, implying the absence of a unique point of failure and of a unique target that if attacked can hang the system. This decentralization also enables to have a distributed cost model characterized by a pay per use approach where the infrastructure works by itself. Bitcoin is the perfect example of a decentralized infrastructure since there is no bitcoin corporation or bank, but billions of dollars circulate every day. The huge revolution of bitcoin is that the infrastructure is created by bitcoin users themselves which are paying tiny amount for the electricity needed to run a computer, so everyone can participate in this Industry 4.0 protocol network.
b. To **automate rules**. The speaker highlighted the relation between block chain and smart contracts that are a mathematic, deterministic way to enforce rules. This means less human labour and the possibility to have an extremely fast and efficient bazar that works on rules mathematically and software designed, that is to say rules reinforced in a protocol. For example, a machine that can assess the quality of raw materials, or control the speed of the process or the supply chain, would enable really cheaper and faster settlements. A smart contract can take care of everything, including the money transactions.
c. Have an 'unpermissioned business network'. It is not mandatory to use bitcoin, it is just an alternative to the currencies everyone is linked to by birth. Through bitcoin it is not possible to monetize the goods themselves, but we can monetize the know-how, the speed, the quality, the agility and the efficiency. Bitcoin provides the governance.
d. A **radical transparency and coordination**. Bitcoin success is due to the fact that it is an anonymous, transparent and shared ledger. This radical transparency requires anonymous features to avoid risks for people investing a considerable amount of money. The speaker highlighted three opportunities: (1) an automated provenance audit, to track the origin of certain materials or products (2) an automated process audit, to know how much time some devices

spend to move back and forth, how much time is needed for the industry to coordinate the production and (3) this coordination can be kept at the edge.

There are of course challenges and risks related to this new phenomenon and in order to fully embrace this revolution it is crucial to identify which the Industry 4.0 problems are, where the trust bottleneck is and to track KPIs.

Mr. Pepe shared also some advices for those companies that are willing to play a role in the 'block chain game': first of all they have to build a reasonable roadmap that has to take into account which bottlenecks are inside the company (i.e. talent, capital, technology), which POCs have the most measurable results, which are the obstacles to the company's growth. An element of radical importance that companies has to consider is their technical maturity. If a company has the willingness to be involved in block chain it should build an internal task force that identifies a champion and part time participants with different fields of expertise to be involved in this task force.

In conclusion the speaker gave a very concise overview of Block chain and Industry 4.0 by stating that it is all about **networks, coordination and transparency**. No information asymmetry, no central coordination, no permission, it is a bazar that could be joined by everyone to exchange value. Protocols can save a lot of human labour and costs and by doing so bring the fluidity that is required by the market.