Being connected within Industry 4.0 – Sharing and securing data across the value chain

The Smart Factory merges the material and virtual world of production by exchanging, analysing and processing huge amounts of data across the entire production process and value chain. To unfold the full potential of Industry 4.0 Smart Factories need to exchange data across all stages of the value chain. The exchange of sensitive data requires a high level of trust among stakeholders which can be achieved by applying Block Chain technology.

As described in the previous articles Industry 4.0 contains huge potential based on leveraging process efficiency by deploying data analytics across the entire value chain network. Massive amounts of data will be analysed across factory internal assembly lines in real-time controlling of production for achieving best results and efficiency gains. The concept of the Smart Factory will be applied by any participant to the production network scaling the overall manufacturing process into a "smart value chain". Suppliers and manufacturers will no longer only exchange goods and services but to an increasing extent the data corresponding to their individual value creation. This will not only be a side effect of industry 4.0 but rather a requirement for realisation of its full potential.

The exchange of data in Industry 4.0 raises questions regarding the security of data interfaces between suppliers and manufacturers in the value chain network. This is a general question of cyber-risk governance as outlined in the previous article. A further concern of manufacturers in exchanging data with their suppliers or customers from one stage in the value chain to another is trust in data integrity and acknowledgement of intellectual property rights. The concept of Industry 4.0 depends on the willingness of its participants to commonly

exchange data derived from the production process. This may require access to relevant data of production, quality, stock, usage, downtime and efficiency. Different stages of the assembly line will pass on data of the manufacturing process to the following process stage jointly or even prior to passing on the product itself. This same procedure will be applied across the entire value chain network with suppliers providing manufacturers or customers with information on the production process before even shipping the physical product.
Data analytics and digital trust are the foundation of Industry 4.0. In this respect full cooperation will only prevail, if all parties involved can trust in the protection of their intellectual property provided to the joined value chain network.

An example can be drawn from the automotive industry, where innovation is to a far extend driven by the supplying industry. Original Equipment Manufacturers (OEMs) largely depend on the innovation capability of their suppliers. OEMs cooperate with a wide range of suppliers for many different models of their product portfolio. In this environment efficiency gains through Industry 4.0 are expected to be significant. In order to leverage this potential OEMs and their suppliers need to cooperate fully integrated in the production process. This cooperation contains the exchange of sensitive data among all parties.

From on operational point of view suppliers need to provide the OEM with real-time quality-assessments of ordered spare-parts prior to delivery so that the OEM can anticipate the quality of parts and derive necessary action such as falling back on stock buffers of shifting supply orders to alternative suppliers. In return OEMs are required to inform the supplier of occupancy levels in production or downtime of machinery so that the supplier adapts the quantity of supply for shipment.
From a strategic perspective and when it comes to Industry 4.0 intellectual property rights are in the centre of attention of all parties exchanging data across the value chain. Suppliers will need to provide data on latest innovation to the value chain network. The sooner these data are available to all parties, the sooner production processes can be adapted in the value chain and the evolutionary development process can be initiated. However, suppliers whether in the automotive industry of elsewhere will only share crucial and sensitive information on innovation, if individual intellectual property rights are respected by all further parties involved. As a general standard this is usually done by common agreements and contracts. However,

the speed and complexity of a fully integrated value chain in Industry 4.0 will not allow sufficient time for the definition process and agreement of all involved parties to a common contract.

This is where the Block Chain technology is expected to add substantial value. The Block Chain technology is a network of interconnected junctions represented by the parties of the value chain network. Information saved in the network is commonly verified by all parties and saved to all junctions. New information will only be added as a block to the chain of already saved information (Block Chain). This ensures that no information in the network will ever be lost, deleted or over-written. Due to the decentralised and equal storage of data in the network, the Block Chain technology proves to be highly immune against cyber-attacks, system failure or manipulation of data. A successful cyber-attack would need to attack all junctions simultaneously. In case of a system failure of one specific junction the network of further junctions would automatically take over.

The concept of the Block Chain can effectively secure and protect intellectual property rights in a value chain network. As the history of any data saved in the network is trackable and commonly available to all network parties the owner of the intellectual property is identifiable in the network at any given time. The Block Chain technology provides a foundation to any value chain network for a trustful exchange and sensitive information and may serve a basis for leveraging the potential of Industry 4.0.

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