Master Data Management

Shared Data on the Internet of Things and in Industry 4.0

Few developments in history have changed the world as profoundly as digitalization. What are the business models of tomorrow, and what points must be taken into account in data management so that an efficient data architecture results?
The goal of Industry 4.0 is the intelligent factory, which is characterized by adaptability, efficiency in the use of resources, ergonomics, and the integration of customers and business partners into business and value creation processes. Technological pillars are cyber-physical systems and the Internet of Things. This latter term refers to the linking of uniquely identifiable physical objects (“things”) with a virtual representation in a structure similar to the Internet. It no longer consists exclusively of human actors, but expands to encompass objects as well. Automatic identification using RFID, barcode, and sensors is often regarded as the foundation for the Internet of Things. The goal of the Internet of Things is to minimize the information gap between the real and virtual world. One important step toward reaching this goal, overriding all others, is the standardization of the components and services on the Internet of Things.

The Internet of Things differs from the concept of self-control in logistics. Self-controlling objects do not necessarily need interconnected structures similar to the Internet. Nonetheless, synergies can be achieved, so that there is a definite tendency, at least in research, to link the two concepts.

Drawing data management boundaries via the partners involved in the process

The following scenario is an example of primarily internal use of data. The coffee maker records the consumption of coffee and can alert the customer of the need to buy a new supply from a provider before it runs out. In addition, maintenance is initiated in good time, and in the event of a malfunction, the repair work is requested. Examples of similar applications using sensors can be imagined for washing machines, printers, or predictive maintenance work. The information returns to the companies per microchip and Internet and is available for the marketing of their own new services or related services. Package tracking makes use of a new artificial identifier, the tracking number, for the interaction between package and customer. Ultimately, however, no sensitive data requiring protection is disclosed to outside parties, and interfaces exist primarily in the customer's own application environment.

Data management must concentrate especially closely on internal requirements for this largely internal use of the data collected over the Internet and elsewhere. Correct assessments of the supplied information can be performed and the actions determined to be necessary on the basis of the results initiated only if the master data are unambiguous and correct.

This differs from the situation in which information gathered from various external sources is combined into new value creation chains – shared data. Whether car companies or machine construction – nothing works without information technology. The Internet even helps when work is done on the farm.

Figure 1: Data Used Internally

Figure 2: Shared Data
Figure 3: The Master Data Management, MDM Procedural Model

Source: Detecon
one-fourth of value creation today, and in ten years this figure may have risen to one-half.

Products and production are becoming intelligent. They communicate with one another, order maintenance service or partial replenishment of supplies. The key word for this digital revolution is Industry 4.0. For data management, this means that various companies or providers access data which are used in common. If the capability to integrate the data into the firms’ own processes is desirable, common standards must be used. Industrial standards such as EDIFAKT and EDI are already providing support of this type in a few sectors. However, internationalization (global brokers) of certain master data for materials, parts, and customers is needed so that communication can be barrier-free.

Examining data management holistically

The implementation of successful master data architecture requires the examination of four fields. In data management, the initial step is the collection of the strategy for data management and the master data architecture the strategy requires. A concept and the necessary steps for implementation are drawn from this strategy. These results can in turn be used for the development of KPIs which will make the data quality measurable in the long term. Once the “global” and “local” information has been identified, a cross-system harmonization of the data can be carried out. The specific requirements are cataloged and matched with the general data strategy in central applications and management. In addition, disruptive factors within and outside of the applications are identified and recorded as necessary improvements. The supportive data maintenance processes, processes for quality assurance, and the required organization are defined in processes and governance. Frequently technical elements or tools are required to migrate the productive legacy data to the new master data architecture. This brings in the subjects of data cleansing, migration, and data archiving.

Since all of the areas interact with one another and this must usually be processed in conjunction with complex data landscapes, realization requires a structured procedural method which can fall back on best practices.

Additional requirements for the use of “shared data”

Whenever possible, common identifiers must be created. If they are available, the use of global brokers for international number management is a sensible practice. Otherwise, number mapping will be needed.

Special attention is devoted to data protection and data security. The opening of the company system, including access to external data sources, heightens the system’s vulnerability to data attacks and espionage. This must be prevented without fail.

The creation of a sophisticated authorization concept is a third important requirement. The customers and even the products stored in the system are regarded today as business secrets. When these data are used in conjunction with other, external information, it is essential to protect the company’s own data from unauthorized eyes or third-party companies. The use of so-called black and white lists can master the first hurdles here.

Harmonized master data and integrated processes secure digital transformation

The importance of data management will grow significantly in the coming years, independently of the future technology that is used. Companies have a considerable backlog to work through in this area. Without harmonized master data and integrated processes, digital transformation in companies cannot be realized without disruptions and the targets enterprises have set for themselves cannot be reached.

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