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Deloitte.

Cloud strategy for
manufacturing companies

Enhance and enlarge your business
with a hybrid cloud

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Abstract

Cloud adoption is a growing reality across the manufacturing industry. This calls for a fundamental paradigm shift in how business models and IT services are planned, built, and orchestrated. Bundling IT services into highly standardized packages and the industrialization of IT will lead to the next level of operational excellence with a direct impact on manufacturing business models.

Cloud computing offers innumerable opportunities for manufacturers to enter new markets and to enhance customer satisfaction. New developments in products and services such as cloud-managed tools, home appliances, and other smart devices are only the first steps towards cloud-based business models.

Successful manufacturing companies strive to increase customer value and to gain a competitive advantage by enriching existing products with cloud services. These services may provide advice on ideal operating time for different appliances based on additional information available in the cloud, such as the weather forecast, a customer's schedule for a day, or other relevant information about the direct and indirect environment. In addition, customers can control connected appliances autonomously or remotely from any place in the world via the cloud. Customers are beginning to value such features more and more and to include them in their buying decisions.

Such cloud services will be based on direct feedback from end-users and offer new business opportunities for established manufacturing companies as well as for new competitors. Missing this opportunity places manufacturers at the risk of falling behind their competition. Manufacturing companies therefore need an appropriate cloud approach in order to maintain a competitive position and to benefit from these new business models.

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This article is intended to guide manufacturing companies through their successful cloud journey by helping them to design a comprehensive cloud strategy with identified key motivations, defined principles, and underlying implications. This strategy should be developed in joint workshops between management and the IT department in order to achieve a product and cloud service portfolio that are aligned with each other.

1. Cloud strategy for manufacturing companies

The manufacturing industry is now and will remain highly affected by the digital transformation. Technological trends such as the Internet of Things (IoT) and Industry 4.0 present IT departments with new challenges. Companies affected by these new trends are faced with increasing demands for new products and services that cannot be completely met by the company's existing IT.¹

Cloud Computing offers innumerable opportunities for manufacturers to enter new markets and to enhance customer satisfaction.

For manufacturing companies with a truly global value chain², the advantages of the new technologies are obvious. On the one hand there are significant market opportunities for products enriched with new digital services that can attract new customers and increase revenue growth, securing and building up the company's market position. And on the other, manufac-

turing companies can enhance process automation, leading to shorter time-to-market, cost reductions, and an increase in efficiency. In order to seize revenue opportunities, achieve cost reductions and at the same time set industry-wide standards through aggressive innovation, manufacturing companies need to work out a well-defined IT strategy. This strategy needs to address the question of how to use cloud computing to enable the IT department to meet market demands in a simple, flexible, and efficient way.

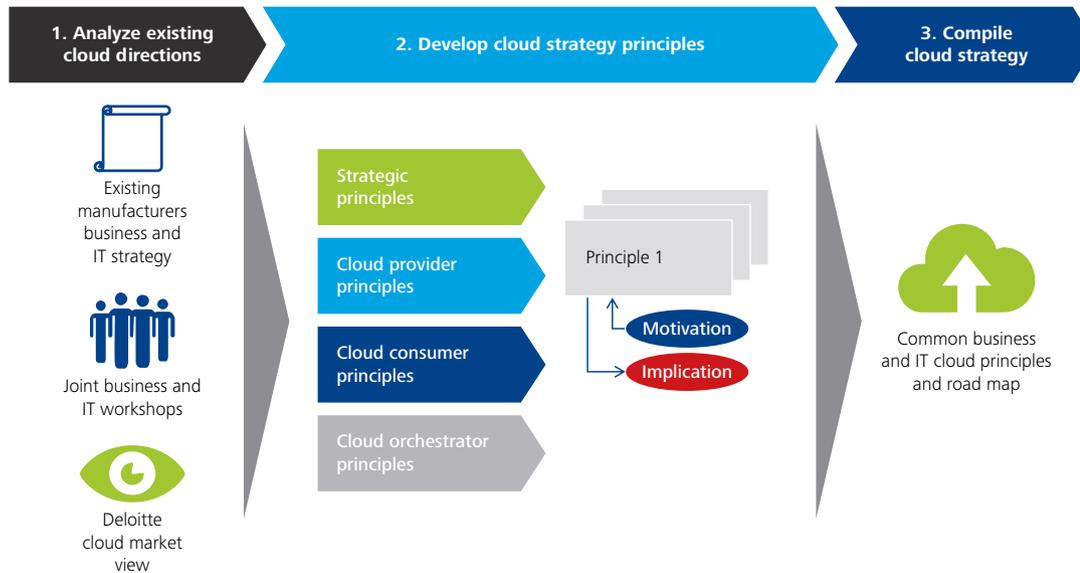
In order to benefit from cloud computing, expand markets, and defend existing ones, IT departments will be responsible for the operation and support of cloud services as well as enabling IoT business models (Internet of Things Cloud Services) in the foreseeable future. A well-worked out cloud strategy is the key success factor in enabling IT departments to meet future business demands. To facilitate the development of a cloud strategy, general trends and a set of general principles for cloud governance, cloud architecture, and commitments to existing standards must be defined (see Figure 1).

Most of all, the cloud strategy will need define a cloud model. With an unavoidable shift towards cloud services, manufacturing companies will face increasing demand for the implementation of a hybrid cloud model. IT departments therefore need to have a clear picture of their journey towards a hybrid cloud. As the number of cloud services used within an enterprise increases, the wish to integrate cloud services with existing core legacy systems, data, and other cloud services grows. The NIST (the U.S. Dept. of Commerce's National Institute of Standards and Technology) defines several delivery models for the cloud: private, community, and public. Each

¹ According to a Deloitte study that analyzed industry trends for the manufacturing industry in 2014, U.S. and Chinese companies will increase investment by 47 percent in 2015, in Germany by 24 percent. Companies in these countries may be considered as top leading figures among all competitors within the industry, forging future digitalization of manufacturing processes and enriching products with digital services.

² "10 Ways Cloud Computing Is Revolutionizing Manufacturing" on <http://www.forbes.com/sites/louiscolumbus/2013/05/06/ten-ways-cloud-computing-is-revolutionizing-manufacturing/> (last accessed on 11/10/2015 at 09:09pm)

Fig. 1 – Cloud strategy development approach



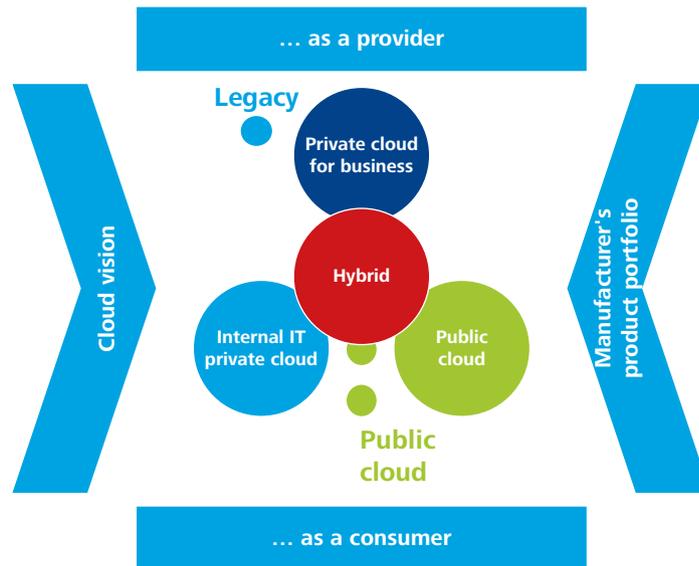
delivery model determines the availability of applications, the services provided, and the data accessible by the public. Sensitive data, services, and applications meant to support internal processes may normally be considered to be best implemented and stored in a private cloud. By contrast, services available to all customers and also to other possible users are best served by a public cloud. A distinct number of organizations that share and manage a common cloud platform are considered as a community cloud. A hybrid cloud is a composition of two or more of the above-mentioned delivery models which remain as distinct cloud infrastructures but are linked by standardized or proprietary technology that enables data and application portability (NIST, 2011).

Hybrid cloud models provide the opportunity of integrating privately-hosted cloud services with best-of-breed public or community cloud services, while protecting the manufacturer’s intellectual property and avoiding having to develop each application individually. Furthermore, low cost capacity can be bought in the form of Infrastructure as a Service (IaaS) if required. The legacy IT system and private cloud capacity can focus on high value services. In the hybrid cloud model, the IT department and management have to make a key decision about which applications and data are to remain within the close control of the company and which can be made available to the public.

Manufacturers will therefore have to define a clear and consistent cloud strategy with publicly and privately available cloud services in order to be able to act appropriately as a cloud provider and/or consumer. In addition, the orchestration (integration) of various deployment models required to provide a consistent appearance to consumers places the IT department in

the role of a cloud broker. A cloud broker as an entity manages the use, performance, and delivery of cloud services and negotiates relationships between cloud providers and cloud consumers (Liu, et al., 2011).³ This shapes the role model for the IT department as a cloud consumer, cloud provider, and cloud orchestrator (see Figure 2).

Fig. 2 – Cloud strategy roles



³ See also NIST (2011).

In order to define an appropriate cloud strategy, the following approach can be used: motivation, principle, implication. Key principles define fundamental rules and guidelines for development, enhancement, and the use of future cloud services. Each of the principles is based on motivation, which justifies a principle, and entails implications for the IT department, which contain more detailed activities (see Figure 3). Consequences outlined by implications provide a detailed view on how to realize the respective principle.

These motivations, principles, and implications should be refined and adapted in joint business and IT workshop sessions in order to be reflected in a cloud strategy that is specific to the manufacturer’s business strategy, and aligned to the product and IT portfolio (for an example see Figure 4).

Fig. 3 – Cloud strategy definition model

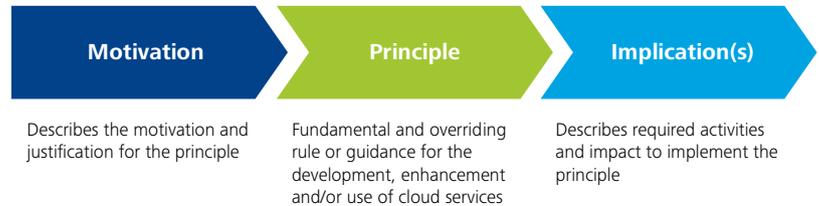


Fig. 4 – Example of a principle and derived implications for a company elaborated in a joint workshop with Deloitte Consulting

| Principle 1: One common global cloud strategy for the entire company has to be implemented | |
|--|---|
| Motivation | Implication |
| <ul style="list-style-type: none"> • The idea of a common IT strategy for the company has to apply to cloud technology as well • Cloud computing needs a centralized organizational setup and governance <ol style="list-style-type: none"> a. To avoid isolated solutions across the IT b. To make cloud solutions an integrated part of IT architecture c. To realize economies of scale | <ul style="list-style-type: none"> • The cloud strategy has to be approved by the CIO and communicated to the relevant stakeholders within the company (e.g. IT architects, business units). • The business needs to be involved in the definition of the cloud strategy to ensure their full support. • The company’s strategic IT plans must take cloud capabilities into account • The corporate IT has to anticipate the future evolution of cloud computing capabilities, and align them with expected business and technology changes |

2. Cloud provider and consumer strategy

2.1 Cloud provider strategy

As a cloud provider, the manufacturing company's IT department has to handle both the private cloud services for own business as well as public cloud services for consumers and other users.

As a first step, the manufacturer should start the cloud journey by providing cloud services from a private cloud to the company's internal IT consumers/business units. The company's developers may use cloud service APIs (XE "API" "Application Programming Interface") for the development of new business models. At this stage, it is crucial for the IT department to build up knowledge and transform the whole organization, so as to be well prepared for the next step.

2.2 Cloud consumer strategy

Many European manufacturers are still relying on legacy IT systems and private cloud services rather than public cloud services.⁴ However, the use of public or hybrid clouds should be addressed in the IT or cloud strategy, as business departments are interested in gaining benefits from the use of cloud services such as increased agility, decreased time-to-market or flexible costing.

Furthermore, market developments (e.g., software vendor strategies) may force a company to use such clouds in an increasing number of exceptional cases. However, as a minimum the company's general compliance and security guidelines have to be enforced in cases where public cloud services are unavoidable.

IT departments have to handle both the private cloud services for own business as well as public cloud services.

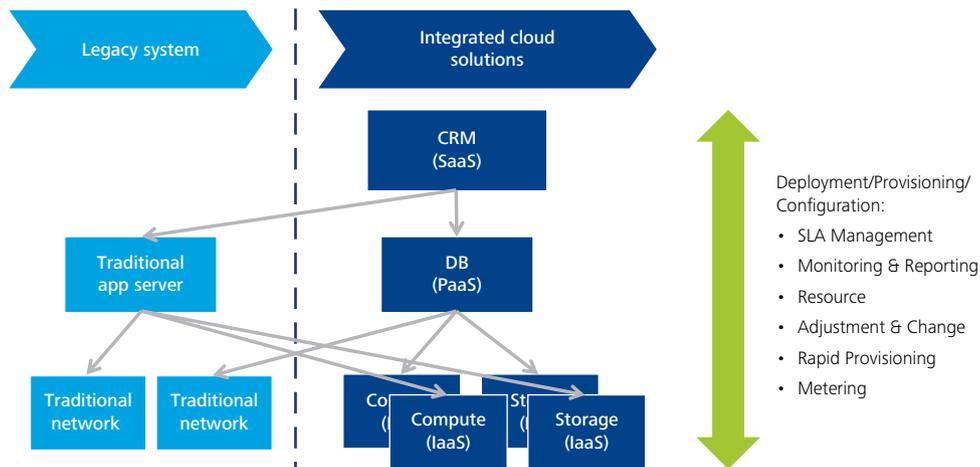
As a second step, the manufacturing companies may extend their existing private cloud to a hybrid cloud by integrating it with one or more public clouds. Cloud services can be developed in the private cloud and then extended to the customers and (business) partners via the public cloud.

⁴ Deloitte, "Drivers, Obstacles, Management – Cloud Computing Adaption in Germany 2015", 2015.

3. Cloud orchestration

Service orchestration refers to the combination of IT or cloud services from multiple system components, which can be IT resources (e.g., technologies such as OS, middleware) or other cloud services. A company needs to set up a governance unit for the arrangement, coordination, and management of cloud and dependent non-cloud IT resources (see Figure 5).

Fig. 5 – Service orchestration model

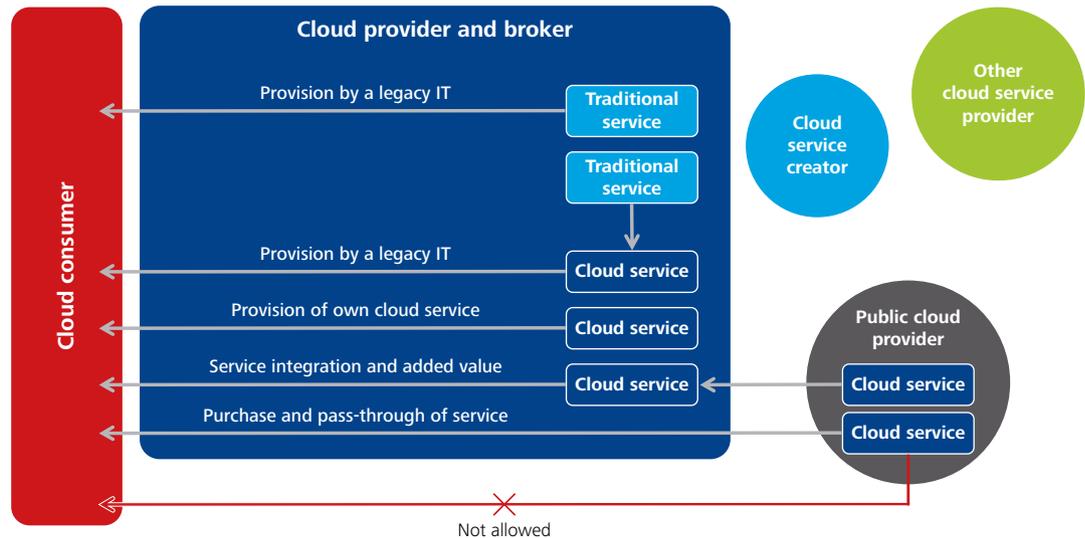


To build, offer, and maintain orchestrated cloud services, the IT department has to take the role of a central provider and broker (see Figure 6). No cloud service may be integrated into the corporate IT environment without the explicit involvement of the IT department. The company's management team must empower the IT department to:

- enforce cloud governance,
- set standards,
- evaluate and determine solutions for the cloud,
- remain responsible for architecture management, IT service management, supplier management, and compliance.

As a broker of cloud services, the IT department has to ensure strict adherence to compliance guidelines for all cloud services consumed by the company and its subdivisions.

Fig. 6 – IT department as a (cloud) provider and broker



As it appears to be one of the crucial factors⁵ for the enterprise and in order to ensure high security standards, the IT department has to implement compliance and cloud security best practices. Figure 7 shows the most important security areas to address risks associated with cloud computing.

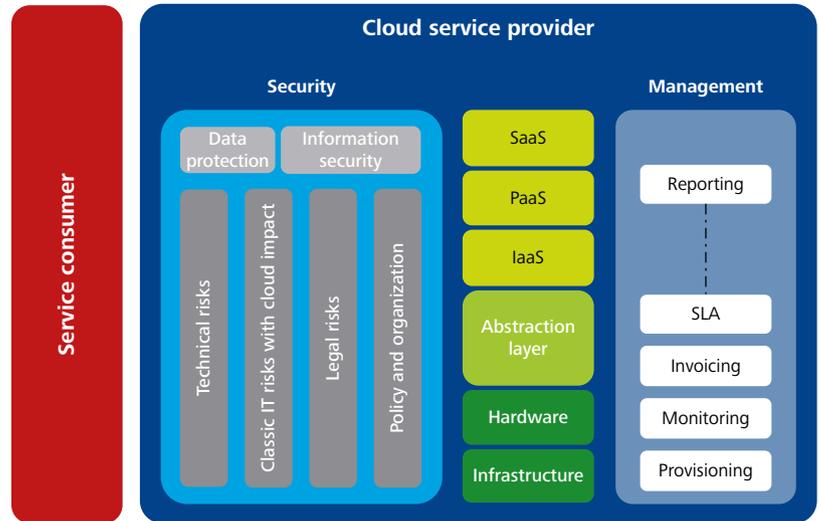
Policy and organizational risks consist of overarching risks (e.g., lock-in, loss of governance, and compliance challenges) and event-driven risks (e.g., supply chain failure, cloud service termination or malfunction).

Typical technical risks can be cases of confidentiality (e.g., loss of data), integrity (e.g., inconsistencies), and availability of data (e.g., loss of encryption keys).

Furthermore, there are legal risks such as changes in jurisdiction and national and supra-national laws to consider, for example the German Federal Data Protection Act (Bundesdatenschutzgesetz) and the General Data Protection Regulation (Datenschutz-Grundverordnung) at the EU level.

Common IT risks associated with cloud computing could be classified in confidentiality risks (e.g., backups lost or corrupted), integrity risks (e.g., modification of network traffic and certificates), and availability risks (e.g., insufficient network management and maintenance).

Fig. 7 – Manufacturing companies cloud security focus (NIST, BSI, ENISA)



⁵ Deloitte, "Drivers, Obstacles, Management – Cloud Computing Adaption in Germany 2015", 2015.

4. Conclusion

As manufacturers use and implement more and more cloud offerings, IT organizations need to have a clear vision for the cloud journey in order to realize future manufacturing business models as well as to maintain and further build up their competitive advantage.

Cloud strategy must ensure focus on gaining the maximum business value from the incorporation of cloud services into the enterprise environment.

IT departments must address the question of how to handle private and public clouds as well as how to integrate them into a hybrid cloud. They are encouraged to develop a comprehensive cloud strategy to ensure that the cloud activities support the business goals and focus on gaining the maximum business value from the incorporation of cloud services into the enterprise environment.

This white paper has highlighted strategic implications for manufacturing companies developing cloud services. With responsibility for the development and coordination of cloud services within the entire company, the IT department will provide the required private and public cloud services and ensure that compliance and security is adhered to across all cloud services to address end users' privacy concerns.

Manufacturing companies are currently at the stage in the cloud journey of developing private clouds while driving towards the hybrid. Cloud principles proposed by Deloitte will guide manufacturers through the definition of a cloud strategy for specific roles as a provider, consumer, and orchestrator.

Abbreviations

API – Application Programming Interface

BSI – Federal Office for Information Security in Germany

ENISA – European Union Agency for Network and Information Security

IoT – Internet of Things

NIST – National Institute of Standards and Technology

Your contacts

For more information

Jochen Fauser

Partner

Technology Advisory

Mobil: +49 (0)151 5800 1669

jfauser@deloitte.de

Timm Riesenberg

Senior Manager

Technology Advisory

Mobil +49 (0)151 5800 0235

triesenberg@deloitte.de

Timur C.-H. Tretner

Consultant

Technology Advisory

Mobil +49 (0)151 5800 1675

ttretner@deloitte.de

For more information please visit our website at www.deloitte.com/de

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