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ICT in Business

Data Driven Enterprise Architecture

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MASTER'S THESIS

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Abstract

Data nowadays is generated, shared and stored digitally by many different devices and digital networks. So far, most data are not analysed for information, thereby foregoing the opportunity to create new products, identify new market niches or craft better strategies. Organisations become aware that data are crucial to everything they do, from understanding customers to developing a product and setting a direction. Organisations start to realise that data are strategic assets as part of what is known as a data driven strategy. This implies cultivating a mindset throughout the business to continually make use of data analytics in making business decisions.

How can an organisation optimally benefit from the information age while pursuing a data driven strategy? Many organisations that want to realise the potential of data have a need for a framework or reference enterprise architecture to execute a data driven strategy. The focus of this study is on designing a generic reference enterprise architecture for a data driven strategy and identify the (potential) business value.

A thorough literature study and interviews with experts on data provided the insight to create a generic enterprise architecture for organisations with a data driven strategy. The people selected for the interviews ranged from business intelligence experts, information managers, enterprise architects and data consultants from different organisations. The literature and interview transcripts were examined to find recurring and consistent topics to serve as generic characteristics or components for a data driven enterprise architecture. Besides identifying these generic items, the interviews also revealed challenges for executing a data driven strategy. The resulting enterprise architecture shows the relationships between data relevant factors by means of architectural drawings and descriptions. The resulting enterprise architecture also describes principles on how to arrange processes and departments for an optimal usage of data within a data driven strategy.

The TMG organisation was used as a practical case to verify the model. TMG as an organisation is shifting from a traditional business-oriented strategy to a data driven strategy and recognises the need to redesign their enterprise architecture. For this research, a survey was held to see which challenges identified in aforementioned interview study are also present at TMG's current situation. The generic enterprise architecture model was applied at TMG to demonstrate its applicability on a specific organisation. Surveys among TMG data experts were used to validate the model adoption at TMG. The data experts of TMG also confirmed that the aforementioned challenges were present at TMG. The survey showed that experts rate the ability of the enterprise architecture model to solve practical challenges with a 7.5 on a scale from 1 to 10 and with 6.5 for its contribution to solving data governance challenges. A second survey was held to see which data driven capabilities were enabled by the enterprise architecture model. The survey showed that both data driven content and marketing would benefit from the use of the model, indicating the potential of a data driven strategy for TMG.

The case showed that the model is a generic tool for setting up an enterprise architecture for a data driven strategy. It contributes in guiding and enabling data driven capabilities for organisations. The model makes use of setting data as the central asset of the organisation which forces the organisation to operate data-minded and seeing data as the central core. The model contributes in overcoming common challenges for data driven strategies which help to keep data maintainable and valuable throughout the organisation.

The study revealed that it was possible to create and apply a generic data driven enterprise architecture through architectural drawings and descriptions. The model gives guidelines and forecasts the potential of data. It also enables data driven capabilities by streamlining data throughout the organisation while keeping data valuable and maintainable.

Conclusions

By means of a literature study and interviews with data experts, a model enterprise architecture for data driven strategies was created. This model was evaluated for the case of TMG, addressing the following research questions:

How can an enterprise architecture be adapted for a data driven strategy to add potential for such a strategy?

An enterprise architecture translates a given strategy of an organisation into a consistent design. This research showed that by rearranging an organisation to a data driven organisation it could adapt a data driven strategy and enable data driven capabilities. Data governance should be implemented to protect and guide the data driven strategy principles and vision throughout the organisation. By becoming data oriented and combining all the data throughout the organisation, it provides new insights into data. Master data management helps in keeping the data valuable throughout the organisation and is a key asset for an enterprise architecture to protect the potential of data. Assigning data as a core asset of the enterprise architecture leads to enabling of data driven capabilities. The model that was developed in this research shows that besides new insights, also new possibilities arise that increase the potential of a data driven strategy. This can be done by applying data mining and sophisticated data analyses which lead to better predictions and insights. These predictions and insights can be used to increase an organisation's profit, quality improvements or efficiency improvements. The model has proved that it is possible for an enterprise architecture to adapt to a data driven strategy and add potential to the data driven strategy. The model is generically applicable to different organisations but does require some tweaking to the specific situation.

1. *What is a data driven strategy?*

From the literature study and interviews, it became clear that a set of characteristics can define a data driven strategy. These generic data driven characteristics can be summarised as follows.

A data driven strategy is a strategy that is data oriented. In a data driven strategy, decisions within an organisation are based on data, the so-called data driven decision making. Being data driven is the art and ability to leverage all business assets to exercise judgment in the decision making process. Using data to make decisions drives both data and process transparency across the organisation. It encourages people to think in terms of realistic data and evidence presented by data. Using specific key performance indicators or metrics allow organisations to define issues associated with underlying data or business processes more accurately. Data driven companies define processes that support key performance indicators fundamental to their business, and they communicate these metrics to staff. Data is integrated by a well-organized process of acquisition, delivery and support of data across the whole organisation. Finally, a data drive culture ensures that data is recent and relevant, and data is visible and accessible.

2. *What is the impact of a data driven strategy on the enterprise architecture?*

The next step in this research was to identify the components that are needed in an enterprise architecture to support the data driven characteristics. The focus was to see how the data driven characteristics can be captured in a data driven enterprise architecture. The components and the relationships between the components were identified in the interviews and literature study and used to create an enterprise architecture model.

The main impact of a data driven strategy on an enterprise architecture is that there is a data layer instead of an application layer. The research showed that a data driven strategy has an impact on all levels of the enterprise architecture. The model in this research shows that to adopt a data driven strategy, an organisation needs to change and adapt their setting, culture, processes and departments to this data driven strategy. The model showed a change in all the layers of an enterprise architecture, including the business roles/functions, processes, data assets/applications and technical infrastructure. Generic patterns within a data driven enterprise architecture were found in the way data is interpreted and in the principles for integrating data in the entire organisation. This way, the enterprise architecture becomes data oriented so that the data value is protected and optimally used for data driven purposes.

3. *How to capture a data driven strategy in an enterprise architecture?*

The interviews and literature study resulted in a set of generic characteristics of a data driven strategy. Examining these characteristics led to generic components for an enterprise architecture. These components have been used to create a component dictionary. Based on these generic components, a set of architectural viewpoints has been created. These viewpoints serve as a set of templates for a data driven enterprise architecture. These templates show that it is possible to capture a data driven strategy in an enterprise architecture with reusable architectural drawings.

By targeting common challenges and issues identified in the interviews, the model could foresee and offer solutions in the enterprise architecture. The changing requirements of the business were captured by guaranteeing a continuous data delivery which is translated in the model.

The TMG case showed that it is possible to capture a data driven strategy and that it contributes both in offering a solution to challenges and enabling data driven capabilities. The model also contributes to implementing data governance principles, but the enterprise architectural design should be supported by additional frameworks or documentation to satisfy data governance principles.

4. *What is the added value of an adapted enterprise architecture for a data driven strategy?*

The adoption of a data driven strategy in the enterprise architecture of TMG showed that it enables new data driven capabilities. Examining the case by applying the data driven enterprise architecture viewpoints to the enterprise architecture of TMG showed known challenges and issues identified by the interviewers. Surveys among the TMG employees with data related backgrounds verified the results. These surveys showed the contribution of the model to solving the challenges and issues, and enabling new capabilities.

The TMG case showed that the model could be applied for data driven decision making on an enterprise-wide level. This enables data driven content and marketing. Next to data driven capabilities

it was a further improvement of applying efficiency and automation of business processes. The added value is to be found in cost reduction, tools/departments consolidation, efficient processes, advanced and automated data analyses and continues improving data adaption. These developments open the door to enable new business models for products and services. The enterprise architecture enables data driven in a way that data is continues evaluated and adapted in the organisation. On the long term, it will lead to improvement in data analyses, data predictions and data prescriptions.

Discussion

The thesis research used interviews and literature to develop an enterprise architectural model. Data driven is continuously developing and so insights and best practices will be refining over the course of time. A selected group of data experts of different organisations were involved in this research. The outcome of the thesis was evaluated with data experts of TMG. One specific case at TMG was used in this research as a practical example. The model can be further improved by going into deeper analyses of the gained results. A first insight into the evaluation teaches us that future research on the model for data governance has high business value for organisations. Applying more cases should further improve the model and evaluate the results. The model is generically applicable and has been only theoretically applied. Practical Proof of concepts could lead to new insights to strengthen the model. As the technology progresses, AI driven is showing up as the successor of data driven. AI-Driven is where AI decisions maker replaces the human decision makers. Decisions are then executed through machine learning algorithms. It should be interesting to research AI driven and what resemblance it has with data driven.