Analytics Use Cases for Mass Customization – A Process-based Approach for Systematic Discovery

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Abstract

Nowadays, mass customization (MC) is shaped by the application of digital technologies like computer-aided design, computer aided manufacturing, and distribution planning. Within a MC process, various data is created, which can be used to gain knowledge about past and future business activities by means of modern data analytics methods. The paper at hand applies design science research and presents a process-based approach for identifying potential analytics use cases for MC. For this purpose, a generic MC process is derived from previous literature and a systematic analysis is carried out using the work systems method. The resulting artifact offers a differentiated view on customers, products, activities, participants, technologies, and information as well as on the information flows within the MC process. It enables manufacturers to identify valuable opportunities for analytics and to optimize current MC processes. Furthermore, it can be used to develop a systematic process for the discovery and evaluation of analytics use cases and novel business models in the future.

1. Introduction

The role of data for the design, manufacturing, and distribution of products is becoming increasingly important in today's digital age. By means of business analytics (BA), data related to products, stakeholders, or processes can be analyzed to gain valuable information and insights, supporting among others decision support, efficient process design, or product improvement [45]. In the context of this paper, BA is considered as a set of advanced analytical methods and techniques that are used to answer questions arising in the context of value creation processes [42]. The capability of organizations to recognize the value of data and to apply BA in a purposeful manner constitutes a key success factor in global competition, which is characterized by shorter product life cycles and saturation effects. However, various obstacles hinder exploiting the full potential of BA in the manufacturing sector. Organizations are aware of the relevance of BA, but often would need guidance where and how to start, since the potential application scenarios in complex value creation processes are virtually unlimited [26].

The manufacturing concept of mass customization (MC) faces such challenges related to applying BA, too. Customers attach more and more importance to individualization, resulting in an increasing heterogeneity of their needs. MC represents a popular competitive approach to meet these individualization requirements [43]. MC can be defined as a "production strategy focused on the broad provision of personalized products and services, mostly through modularized product/service design, flexible processes, and integration between supply chain members" [14:1]. The application of MC is a complex and data-intensive challenge for organizations. On the one hand, a large amount of data is needed to illustrate the solution space, covering all possible product specifications that can be manufactured on customer request. On the other hand, the interaction with the customer in the value creation process generates behavioral data that can be used by organizations to meet future customer requirements more precisely.

In order to reduce the complexity of MC, previous literature provides guidance, such as various systematization approaches [e.g. 6] and elaboration of critical success factors [e.g. 7]. So far, very few contributions address the application of BA in detail in order to enable companies for MC [3]. Our approach aims at filling this research gap and therefore intends to answer the following research question: How can analytics use cases (AUC) for MC processes be systematically derived?

We address this question by applying the work system method (WSM) [2], an approach that is suited

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to analyze systems producing products or services for customers. With the help of the WSM we can identify use cases for analytics in MC in a well-defined and systematic way. For this purpose, the WSM is slightly adapted and applied to MC processes and their stages. Although the paper at hand focuses on AUC for the MC context, our approach can also be used in other scenarios, if the phenomenon for which AUC should be discovered can be well described by a process and its stages.

The remainder of the paper is organized as follows. An overview of related research fields, namely MC, BA in general and BA for MC as well as the WSM is provided in the second section. The third section presents the research approach in detail and our adaptation of the WSM for the intended systematic use case identification. Afterwards, a generic MC process is derived from previous literature, to which the modified WSM is then applied. How the resulting artifacts (so-called work system snapshots - WSS) have been used in a workshop setting to identify AUC, is described in Section 4. Subsequently, the results and observations of this workshop are presented and evaluated. We conclude the paper with a summary, limitations, and outlook to future work.

2. Foundations and state-of-the-art

In this section, we present the underpinning foundations in the fields of BA and MC. Furthermore, the state-of-the-art regarding the role of BA in MC is discussed and the WSM as the underlying research methodology is introduced.

In the light of the digitalization of business models and processes and the resulting growth of data volume, the ability to efficiently deal with large and complex data sets has become a strategic success factor for companies [7]. BA constitutes an adequate way to leverage the collected data. By using BA, data is analyzed using mathematical and statistical methods for the acquisition of knowledge about past and future business activities [5]. Current research suggests various frameworks, which reflect different characteristics of BA. A widespread approach, focusing on the intended BA usage, is the differentiation by Davenport [8] that distinguishes descriptive data analysis (What has happened?), predictive analysis (What will happen in the future?), and prescriptive analysis (What can we do to make something happen?). A more technology-oriented systematization is provided by Chen et al [5], who present different BA method classes, namely (big) data analytics, text analytics, web analytics, network analytics, and mobile analytics.

With regard to the manufacturing industry, there are several process-oriented approaches that discuss the use of BA along the supply chain. For example, Trkman et al [42] investigate the impact of BA in the areas of plan, source, make, and deliver. Such systematization approaches can be used as starting points for the derivation of AUC for MC. All these systematization approaches can be used as starting points for the derivation of AUC for MC. However, there is a lack of an integrated approach that provides a holistic view of complex phenomena such as MC and thus includes all relevant BA usage aspects (e.g. technologies, stakeholders and activities) for MC.

MC constitutes a hybrid strategy combining Porter's generic strategies of differentiation and cost leadership [34] by producing goods and services for the mass market, whereby the products meet the needs of each individual customer [36]. This is realized by a co-design process, in which the customer individually designs a product by choosing pre-designed options defined by the manufacturer. Limiting the customization options for the customer enables the manufacturer to apply economies of scale to the production process. From the early nineties until the early 2000s the discussion mainly revolved around two major topics. Several authors describe success factors for MC companies, concerning technology, processes, and the products [16, 24, 48]. Other contributions present a schema to classify the different ways in which a company can deploy a MC strategy [12, 22, 25, 32, 33, 41]. Such classification approaches aim to systematize the diffuse and complex phenomenon MC and to provide a common framework by distinguishing various MC forms.

For our purposes, the popular approach of [32] appears to be suited best, as it encompasses all variants of MC between pure customized production and pure mass production, depending on the role of the customer in a MC process. It addresses the MC process from start to finish and differentiates the variants using the so-called customer decoupling point. This point divides a MC process into two parts – the pure prefabrication without customer involvement and all activities subsequent to the customer integration into the value creation, i.e. from when in the MC process the individual customer has a say. The authors distinguish five MC archetypes according to the customer decoupling point and the degree of customer participation in the value creation: engineer-to-order (ETO) as the customer co-design of products or services, made-to-order (MTO) as the manufacturing of customized products including component manufacturing, assemble-to-order (ATO) as the assembly of products or services from standardized components, bundle-to-order (BTO) as the bundling of existing products or services to customer-specific products, and match- respectively locate-to-order (MCHTO, LTO) as the selection of existing standard products or services according to customer requirements [32].

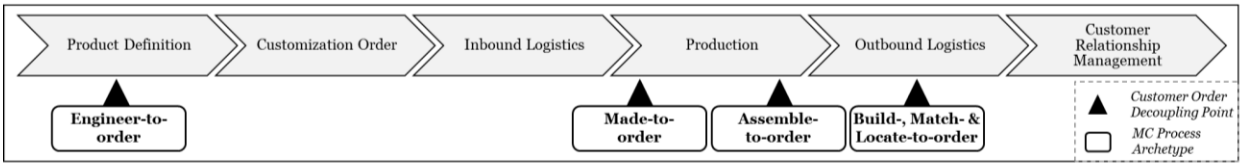

Figure 1. The generic MC process and MC archetypes

Out of these archetypes MTO appears to be the one being discussed the most by researchers, probably because it represents the common compromise between individual and mass production. Figure 1 shows the generic MC process with the stages Product Definition, Customization Order, Inbound Logistics, Production, Outbound Logistics, and Customer Relationship Management and the different MC archetypes with regard to the respective position of the customer order decoupling point. We have derived the generic MC process from the consolidated results of an extensive literature review, such as of [27, 32, 38]. Although various classification systems for MC archetypes exist, there are so far no generally valid definitions of the processes and their activities within the respective archetypes. This gap is addressed with the paper at hand in order to derive AUC from a solid process base.

Moving on to the BA perspective in the MC context, the literature review of [14] discusses several applications for BA in MC. Some provide support for customers during the design of products and some cluster customers based on their preferences. It is however notable that these applications are solely assigned to the order elicitation process involving the customer. Although the authors state that customer integration in multiple MC process stages is supported by information technologies, they discuss AUC for early process stages only. This view neglects the potential benefits of BA across the whole MC process.

[18] and [20] focus on the role of information systems (IS) like product configurators as tools for data elicitation. Based on the clickstreams and the configurations created by the customer, it is possible to generate customer profiles that can help to shape customer preferences and to detect trends, delivering insights on future sales. Wahlster [44] discusses how BA approaches in MC can optimize the supply chain and the production process through means of logistics. A more recent, but rather different approach to connect BA and MC is offered by [30]. The authors develop a process for mass customized analytics services for small- and medium-sized enterprises (SME) in manufacturing.

Our literature review has shown that the value of BA in MC is recognized and analytical methods are applied in the context of MC, however there appears to be a lack of approaches, which address BA in MC in a holistic way. Most literature focuses on using BA in separate IS like a product configurator or a product lifecycle management system or on analyzing specific kinds of data, resulting in a limited focus. However, organizations need guidance and techniques, enabling them to discover AUC in a systematic way for the whole MC process and based on their current situation, available data and resources.

An approach to expand on available data and resources is the WSM – a system analysis method to understand and analyze work systems in business. Work systems can be understood as sociotechnical systems where humans perform business processes by using resources like information and technology to create products or services [1]. The WSM was developed to understand and analyze a work system at any level of detail appropriate to its purpose.

Table 1. Elements of the WSM [2]

Processes & activities	Occur in a work system to provide products/services to its customers.
Participants	Persons, who perform the activities in the work system.
Information	Used and created within a work system and used by processes and activities.
Technology	Hard- and software that is used by participants or automated agents.
Products or services	Information, physical things, or actions produced by the work system.
Customers	Receive the work systems products or services.
Environment	External factors in which a work system operates.
Infrastructure	Shared resources, which are used by the work system, but managed externally.
Strategies	Company strategies at different levels which are relevant to the work system.

The WSM differentiates nine different elements in a work system: processes and activities, participants, information, technologies, customers, and products/services as well as the surrounding elements environment, infrastructure, and strategies. Table 1 presents a short description of these elements [2].

The paper at hand uses the WSM as the basis for a process oriented systematization approach to reduce the complexity of MC. This approach is generic and helps to identify AUC in complex topics – in our case MC.

3. Research approach

We follow the design science research (DSR) paradigm [23] as the underlying research method. DSR is in particular suitable for our problem as it specifically addresses the construction of socio-technical models for the IS domain [6]. Table 2 describes our approach aligned to the DSR process as introduced by Peffers et al. [31].

Table 2. Design science research process following Peffers et al. [31]

DSR stage	Our approach
Problem iden-tification & motivation	MC process data provides opportunities for analytics use cases. Approach for a systematic discovery of AUC in the context of MC does not exist.
Objectives of a solution	Creating an approach to enable companies to identify AUC in an MC process.
Design & development	Adapt the WSM (by extending the WSS Template). Design a generic MC process based on a literature review of MC processes. Elaborate process activities for the MC archetype MTO. Apply WSM to create MTO WSS for each MTO process stage.
Demonstration	Participants use MTO WSS in a workshop to discover AUC in the MC process.
Evaluation	Various forms of feedback from the workshop is used to evaluate the artifact.
Communication	Results will be presented at scientific conferences and will be used in the context of research and industry projects.

In the first step of the design stage, a generally valid MC process is created by means of a literature review. It is briefly mentioned in the Section 2 and will be described in detail in Section 4. This process can then be further elaborated for different MC archetypes. We break the process stages of the MC archetype MTO down into the process activities within the stages. The MTO archetype was chosen since it represents a middle ground between individual and mass production because it uses both standardized and individualized components to manufacture customized products as explained in Section 2. In order to elaborate on the numerous aspects of the complex MC archetype MTO systematically, the WSM is adapted by modifying the Work System Snapshot template. The WSS template is part of the WSM by Alter [2] and is represented by a table summarizing a particular work system with regard to the six central elements customers, products/services, processes and activities, participants, information, and technologies [2].

In order to highlight the data and its flow within and especially between the individual process stages, the information component of the WSS template is broken down in more detail. Instead of displaying only general information that is created or used in the examined stage or its activities [2], data is now differentiated according to its origin and use. Splitting the information component of the WSS template allows for a differentiation where data is used/analyzed and the related data flows: data that is used purely within a stage, data that is used for activities within the WS but originates from another stage, and data that originates in the WS but is used in another stage. This modification does not affect the original purpose of the WSS template, it shifts its focus on the information component instead.

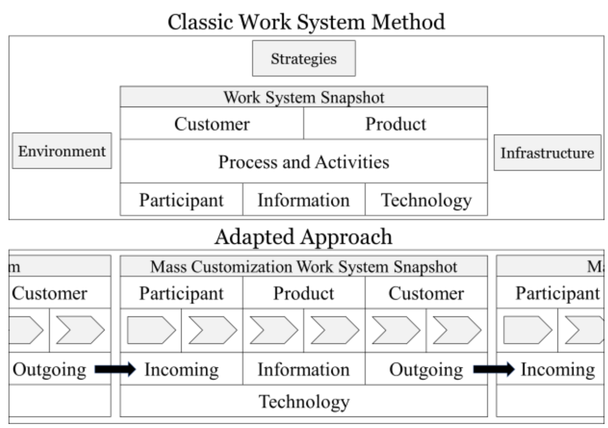

Figure 2. Standard WSS and adapted WSS

The classic WSM with its nine elements, a standard WSS template and our refinement of the WSS template are shown in Figure 2.

Afterwards, the adapted WSM is applied to the literature-based process of the MTO archetype, here exemplarily to the first stage called Product Definition. This stage is particularly relevant for MC and differs from the product definition of other value creation processes in that a configurable product with its standardized and customizable components is designed. The application of the WSM allows a detailed and differentiated consideration of the

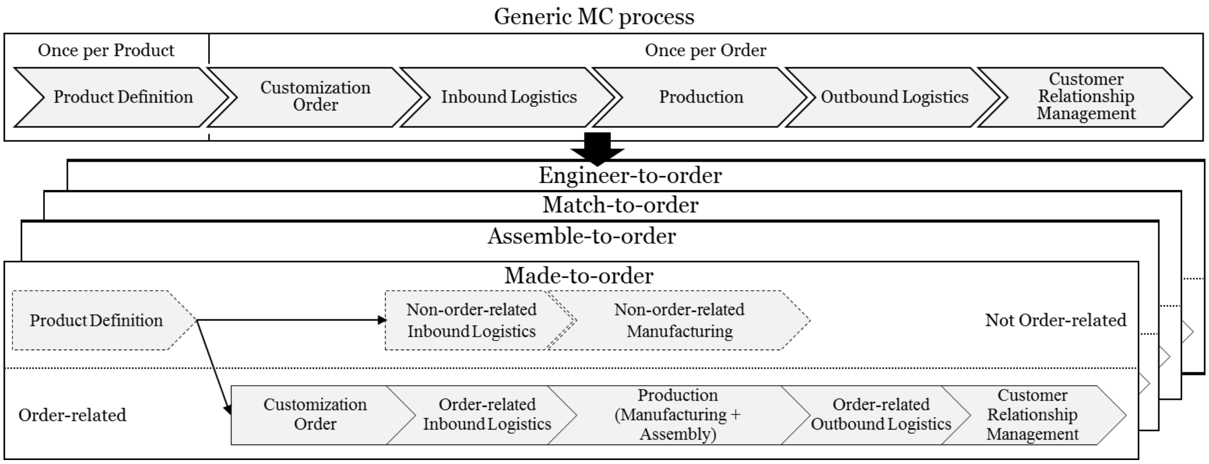

Figure 3. The MTO archetype-specific process and its stages

components of this process stage and results in a concrete WSS containing MTO-specific activities, participants, information, technologies, customers, and products/services. The resulting WSS is described in detail in Section 4.2. It forms the basis for the identification of potential AUC. The suitability of breaking down a work system in its components for discovering AUC has been examined in a workshop using the focus group approach. The identified AUC and the feedback of the workshop participants have then been used for an evaluation of the approach.

Different approaches are applicable for the elaboration of AUC. We have merged two models, the (1) Business Model Canvas (BMC) [28] and the (2) CRISP-DM [40], allowing us to represent all information elements required in our context. While the BMC (1) represents the business view of an AUC and illuminates individual components of business models, the CRISP-DM covers the major aspects of an analytics process. Table 3 shows the six elements we have derived from the models in order to specify the AUC structure.

Table 3. AUC elements

AUC element	BMC element	CRISP-DM stage
Customer	Customer segment	Business understanding
Business question	Value proposition	Business understanding
Activity	Key activity	Deployment
Data	Key resources	Data understanding
Analytics method	Key activity	Data preparation, modeling
Evaluation	-	Evaluation

4. AUC discovery by applying the WSM

4.1 Application of the WSM to a generic MC MTO process

The systematic discovery of MC related AUC leads to better results if it is based on a process that considers the underlying MC archetype. Therefore, we present in the following how we have derived the MTO process, serving as an example for such MC archetype specific processes.

The upper part of Figure 3 shows the generic MC process as already introduced in Section 2. It can be separated into two segments: the initial definition of the product, which is executed only once per product and the individualization and ordering of the product by a customer, which is repeated for each individual order. In the first stage the manufacturer conducts market research activities in order to identify the prospective customer needs [47]. These needs are translated into product requirements [35], which in turn are used to design a modular product family and platform [29]. Further market research is conducted with regard to the product prototype, before the product, the supply chain, the production processes, and the product configurator are defined and developed [13]. The second process segment starts with the individualization stage, where the customer uses a web-based configurator to browse basic configurations [35], individualizes a product to his/her specific requirements [36] and orders it (thereby initiating the manufacturing process). In the procurement stage, the manufacturer deals with the acquisition of the necessary components at the best possible conditions. The product is produced in the production stage, before it is distributed to the individual customer. Afterwards, the customer relationship management aims to expand the relationship with the customer during the product usage.

The lower part of Figure 3 shows the adapted generic MC process for the MC archetype MTO. MTO and the other MC archetype processes can be derived from the generic MC process by analyzing the order-related and not order-related activities within the process stages. The process in now divided into two lanes. The stages in the upper lane are not tied to a specific order, whereas the stages in the lower lane are.

Made-to-order products include both, customized components as well as standardized components. The customer decoupling point is located in the production activity, as customers are able to customize the production of their individual product with their order.

cf. Figure 4). We filled out the adapted WSS template for each stage, resulting in six snapshots, which enrich the process activities with regard to the WSM components. In the following, we present and discuss one snapshot exemplarily in detail. In our case, the population of the WSS was based on MC process literature. However, it is also possible to conduct this step in practice with regard to a specific organizational context. In such a case, the process that is used as a starting point and the subsequent population of the snapshots might be based on organizational processes and assets.

Figure 5 presents the WSS for the MTO process stage "product definition". The activities of that stage constitute the (sub-)process in the snapshot. The arrows (→) in the information cells indicate the stage from where the information comes from or into which stage it flows.

Once per Product	Once per Order				
Product Definition	Customization Order	Inbound Logistics	Production	Outbound Logistics	Customer Relationship Management
1. Market research 2. Customer needs translation 3. Develop product family / platform 4. Evaluation & validation 5. Product definition	1. Determine customer status 2. Collect customer data 3. Search product database/ standard configurations 4. Provide recommendations 5. Individual product configuration from modular components 6. Validation 7. Display price and visualization 8. Send order 9. Distribute bill of material	1. Determine ordering needs 2. Select suppliers 3. Transfer data (Order) 4. Perform order monitoring 5. Goods receipt 6. Auditing 7. Settle payment	1. Plan manufacturing 2. Bring upstream products out of stock 3. Manufacturing and assembly 4. Perform quality assurance	1. Relocation 2. Perform quality assurance 3. Ship goods 4. Perform billing 5. Incoming payments	1. Management of new customers 2. Customer satisfaction management 3. Complaint management 4. Cancellation prevention

Figure 4. MTO archetype-specific process activities

For the paper at hand the MC process adapted for the production concept MTO shall be used as a sample and as the base for discovering potentials of BA (in the form of AUC). Based on the process in Figure 3 further literature was reviewed and an additional, MTO specific layer of activities was added to the process stages to prepare the application of WSM. These activities mentioned by [4, 11, 13, 15, 21, 29, 37, 47] can be seen in Figure 4. Our literature review for the identification of the activities has revealed that the customization order stage is discussed in detail in previous contributions.

4.2 Population of the WSS templates

To continue the running example in the paper at hand and to illustrate the underlying methodology, we applied the WSM to all stages of the detailed MTO process (product definition, customization order, etc.;

In the product definition stage, the marketing department conducts surveys of potential customers in order to collect requirements for products that the technical product development department will later implement [13, 15, 37, 47]. In addition to the actual products, a website with a configurator is also created, which serves as a sales platform for the product [17].

The activities of the potential design are carried out in alignment with the company strategy, which is therefore incorporated into the sub-process as detailed information [2]. In addition to this, current customers feedback, stored in the CRM system, flows into the development [37]. Within the product definition stage, the company collects information by means of market research, especially with regard to relevant customer segments and the related customer needs [15]. During the product development, these needs are translated into technical product requirements, product prototypes, and a product platform. A technical feasibility check is carried out before the product is introduced [29]. Numerous systems and tools are used within this process stage: web analytics and survey tools for collecting customer requirements, CASE tools

Work System Snapshot "Product Definition"		
Participant	**Product**	**Customer**
• Technical product engineers • Marketing / sales (market research) • Potential customers	• Product prototypes • Website • Configurator	• Company • Shareholder • Customer

Process				
Market research	Customer needs translation	Product family & platform	Evaluation & validation	Product definition

Information		
Incoming	**Within**	**Outgoing**
• Business strategy (→ Company) • Customer feedback from CRM system (→ CRM)	• Customer segments • Customer needs • Technical product requirements • Product platform • Validation	• Product specification (→ Customization Order) • Master production schedule for standard components & process plans (→ Production) • Supply chain planning (→ Inbound Logistics)

Technology	
• Web analytics • Survey tools • CASE tools	• Product data management (PDM) • CAD systems • CAM for master production schedule

Figure 5. WSS for MTO process stage "product definition"

for developing the website and configurator, CAD systems for developing the product, a computer-aided manufacturing system (CAM) for planning subsequent production, and product data management for collecting and managing data about the product [19, 46]. The result of the sub-process "product definition" is a product specification including general modules and components as well as linking rules and valid standard configurations [9]. In addition to the product specification, a supply chain plan is prepared, spanning a supplier network in which suppliers are identified and contacted [39]. Finally, production plans for automated production and assembly are created, which can be easily executed for individual customer orders.

5. Demonstration and evaluation

5.1 Demonstration in a workshop setting

For demonstration purposes, the completed WSS were used in a workshop setting to discover AUC for the MTO archetype. Eight participants from Chemnitz University of Technology attended. Two participants were students with a Bachelor's degree, three had a Master's degree and three participants had a doctorate.

The participants received a brief introduction to the overall MC process, the WSM, and to the creativity technique that should be applied to the given WSS. They provided background information about their knowledge and some other facts in a first questionnaire. Then the participants were randomly divided into two groups. One group was given the WSS product definition, the other group the WSS customization order. Both groups were given the task of discovering AUC based on the respective WSS. Each group had the opportunity to evaluate the identified AUC of the other group at the end.

After completing a second questionnaire, a short discussion helped to gather further feedback. This discussion was conducted using the focus group approach [10], i.e. the researcher took on a moderating function in the discussion. The workshop lasted a total of 90 minutes.

5.2 Evaluation

5.2.1 Participants feedback. Various types of feedback from workshop participants were collected during the workshop. In the questionnaires, closed and open questions were asked to collect quantitative and qualitative feedback regarding the level of knowledge about the subject, the level of difficulty of the WSS and the derivation of AUC, as well as the perceived benefit of the approach for this purpose. In addition to these questions, the identified AUC themselves were considered for a content assessment.

The participants provided differentiated comments on the completed WSS and the derivation of the AUC. The comments about the WSS referred to some WSS elements and suggested to even further break them down. The participants also noted that more concrete instructions for identifying the AUC might be helpful.

5.2.2 Evaluation of the AUC. Table 4 contains extracts of the use cases developed by one group in the workshop. All content has been translated into English by the authors. The table shows two of eight AUC identified by this group of participants. The first AUC is defined by the question, "What do our customers want?". As a customer of this question, the company itself was identified and "customer needs translation" was defined as the process activity. To provide an answer to the question, "customer needs" and "forums, blogs, etc." were named as data sources, while "text mining" and "web analytics" were specified as the analytics method. This use case was considered as to have a high economic potential by the participants of the other group.

Table 4. Identified AUC of the WSS product definition

AUC elements	Analytics Use Cases	
WSS	Product Definition	
Customer	Company	Company Customer
Business Question	What do our customers want?	Which new features does our product need?
Activity	Customer needs translation	Market research
Data	Customer needs Forums, blogs, etc.	Social media Customer data (CRM) Competitor information
Analytics method	Text mining Web analytics	Web analytics Sentiment analysis Survey tools
Evaluation	Green (high economic potential)	Green (high economic potential)

The participants discovered a second use case in the identification of new product features to be introduced by using "web analytics, sentiment analysis and survey tools" in "social media, customer data from the CRM system, and competitor information" within the process activity "market research" for the "company or the end customers". The other group also judged this use case as presumably lucrative.

5.2.3 Extended evaluation. The authors are currently applying the approach in a research project to further evaluate the suitability of the WSM for the identification of AUC. In this project a network of companies is examined, which implements MC in the variant ETO. The aim of the application of the WSM is to identify AUC for which a dedicated analysis system is then developed. Instead of using the generally valid MC process as a basis for the WSM, the process actually taking place in the companies with all its components is first recorded and analyzed with the WSM. Subsequently, this will be used as a basis for workshops. Preliminary findings show that even the generically populated WSS help companies to understand their own value creation more thoroughly. At the time of writing this paper, however, the workshops are still carried out, so there is currently no conclusive data available.

6. Conclusion

The paper at hand presents a generic MC process and the modified WSM, which is exemplarily applied to a MC process stage in order to create Work System Snapshots. The resulting snapshots act as a foundation for the discovery of AUC in the MC value creation process. The research contribution of this paper is therefore a holistic overview of the MC value creation process with special emphasis on information flows between and within the process stages. It enables manufacturers to identify AUC and to optimize their current approach by leveraging the possibilities of BA. The generic MC process and the conceptual frameworks were empirically evaluated using an academic focus group in the context of a workshop and expert interviews with positive feedback.

The presented approach of applying the WSM to a MTO MC process was based on literature, while the AUC were discovered using a workshop setting. On the one hand, this approach provides generally valid scientific findings that are based on the literature. On the other hand, it allows the identification of specific AUC by involving the relevant stakeholders of an organization. Alternatively, both the process and the AUC could be derived from the literature, which would provide a higher generality at the expense of specificity. Similarly, both the process and the identification of the AUC could be examined in a specific organizational setting, which would increase specificity but, reduce the general validity. The results of the demonstration and evaluation suggest that the approach is not limited to a specific process and can thus be applied to processes of other domains than MC.

Although the paper at hand indicates that the WSM is applicable to the domain of MC processes in order to identify AUC, it has some shortcomings. At the current development stage, it lacks a proper method for a systematic discovery of use cases based on the adapted WSS. Such a method would require a certain degree of knowledge in the field of analytics which is rather obvious as some analytics knowledge is needed in general to identify AUC. Using the WSM to derive AUC is a rather costly, requiring certain efforts to work out the organizational processes in detail, especially when the process maturity is not that advanced. As an alternative for a more lightweight approach, an application of the WSM to a generic MC process is possible, however the identified use cases will not be very specific to the situation and assets of the company in question.

The developed artifacts can be used to design a systematic process for the discovery and evaluation of

BA opportunities in the future. As a next step, the evaluation of the artefacts should be continued by additional workshops, especially with established MC manufacturers in order to increase the quality of the approach further. It is already planned to use the results of this paper in a research project, where AUC for the application of BA in the textile industry are going to be discovered.

Aside from the application in the specific research project, it is planned to extend the approach to a structured method. This method could include various creativity techniques for the AUC discovery based on the WSS. The methods could be chosen depending on the involved stakeholders and the context.

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