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# AGILE CONTRACTS: LEARNINGS FROM AN AUTONOMOUS DRIVING SOURCING PROJECT

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### Recommended Citation

Gerster, Daniel and Dremel, Christian, (2019). "AGILE CONTRACTS: LEARNINGS FROM AN AUTONOMOUS DRIVING SOURCING PROJECT". In Proceedings of the 27th European Conference on Information Systems (ECIS), Stockholm & Uppsala, Sweden, June 8-14, 2019. ISBN 978-1-7336325-0-8 Research-in-Progress Papers.

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# AGILE CONTRACTS: LEARNINGS FROM AN AUTONOMOUS DRIVING SOURCING PROJECT

*Research in Progress*

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## **Abstract**

*New digital services and products rely heavily on digital technologies and need to be deployed in an ever-shorter timeframe in response to rapidly changing market demands. To address this challenge, more and more companies are applying agile practices to increase speed and flexibility. In consequence, companies review their sourcing strategies to shorten the duration of tenders for large-scale IT projects and to increase flexibility in contracting of IT services to cope with the anticipated consequences of digital transformation. This study aims at revealing how agile practices could help to reduce time-to-market and to increase contract flexibility. As the automotive industry is especially affected by the adoption of new digital technologies, this revelatory case study shows how a German car manufacturer increased agility in sourcing and contracting of an autonomous driving development platform. Agile practices turned out to be essential in dealing with technological novelty and hurdles, regulatory uncertainty, and frequently changing requirements. We contribute to the extant knowledge by providing practical recommendations on how to increase agility in sourcing and contracting of large-scale IT projects.*

*Keywords: IT sourcing, agile sourcing, agile contracts, autonomous driving.*

## 1 Introduction

New digital services and products rely heavily on digital technologies (Ross et al. 2016; Weill and Woerner 2015) and need to be deployed in an ever-shorter timeframe in response to rapidly changing market environments (D'Aveni et al. 2010; Overby et al. 2006). In consequence, more and more companies adopt agile practices to increase speed and flexibility (Gerster et al. 2019; Highsmith 2013). The adoption of agile practices has widespread implications on products, processes, technology, people, and structure that are just beginning to be understood (Gerster et al. 2018). The sourcing and contracting of IT services is especially affected by the need to increase speed and flexibility as frequently changing requirements are in conflict with strict and long-lasting contracts (Arbogast et al. 2012). In consequence, companies review their sourcing strategies to reflect agile delivery, reduce tender duration and to increase contract flexibility (Demirbas et al. 2018; Gewald and Schäfer 2017).

Against this backdrop, this study takes the sourcing and contracting of IT services as an example for a domain being especially affected by digital transformation. Extant research on sourcing and contracting of IT services deals primarily with large IT projects in a non-agile context (Gewald and Schäfer 2017), focuses on aspects of IT delivery or governance related to IT outsourcing (Dibbern et al. 2004; Lacity et al. 2009), aims at reducing contractual risks but does not look at project success or missed business opportunities (Arbogast et al. 2012), looks at specific aspects of agile contracting, or lacks practical advice on how the overall tender duration can be reduced (Pries-Heje and Pries-Heje 2014).

This study is motivated by the lack of knowledge and practical advice on how to increase agility in the sourcing and contracting of IT services in the context of large-scale IT projects and aims at addressing the research gap related to the need to extend the applicability of agile practices beyond software development (Conboy 2009). In particular, we aim at generating insights into how agility could be increased in sourcing and contracting of large-scale IT projects – in our case an IT platform for the development of autonomous driving capabilities – with the following research question: *How can agility be increased in sourcing and contracting of large-scale IT projects?*

To do so, we target the automotive industry as it is highly affected by technological innovations such as business analytics, electromobility or autonomous driving (Deloitte 2015; Dremel et al. 2018; Mocker and Fonstad 2017). Our case study setting with a German car manufacturer (OEM) includes technological novelty (i.e. autonomous driving and machine learning) and technical hurdles (i.e. analysing data volumes of up to 200 Petabyte) with frequently changing functional requirements or unclear regulatory requirements in combination with an ambitious timeline (i.e. begin of series production planned for 2021). With our exploratory research endeavour we aim at illuminating the far-reaching implications of adopting new digital technologies in context of an organization applying scaled agile practices and structures according to the framework LeSS (Larman and Vodde 2017).

## 2 Theoretical Background

This section introduces relevant extant literature. We address the disconnect between agile information systems development (ISD) and vendor management and examine how agile practices address issues of traditional software development and how they impact contracts and could reduce related risks.

### 2.1 The disconnect between agile ISD and vendor management

Agile practices can be seen as a response to challenges resulting from the traditional way of software development according to "Plan-Build-Run" (Royce 1987) and the resulting separation between build and run (Rigby et al. 2016). Agile practices root in systems thinking and lean practices (Conboy 2009; Fitzgerald and Stol 2017). The Agile Manifesto is perceived as a practitioners' collection of best practices on agile ISD (Fowler and Highsmith 2001). Agile practices can be exemplarily characterized as follows: Formulation of value stories, removing complexity, shortening release cycles to incorporate customer feedback, and the estimation with story points to reduce effort estimation complexity (Conboy

2009; Rigby et al. 2016; Wang et al. 2012). Agile practices aim, for instance, at clean code, pair programming and immediate customer feedback, test-driven development, automated testing, continuous deployment (Fitzgerald and Stol 2017) and achieve their benefits through the synergistic combination of individual agile practices (Fitzgerald et al. 2006).

For reasons of focus we do not include details on the composition of agile teams or their daily practices in this study but refer to the wide body of extant knowledge: Good references on the essentials of agile teams and their structures are Kniberg (2012) and Gonçalves and Lopes (2014) explaining the setup of agile teams with the case of Spotify. Recker (2017), Przybilla (2018) or Wang (2012) present various insights into the applied daily practices of agile teams like stand-ups, planning poker to estimate development efforts with function points or retrospectives. Related to project management practices, McAvoy and Butler (2009) highlight the changing role of the project manager in agile ISD as a devil's advocate where teams are empowered to decision making.

The rich literature on IT sourcing is closely related to IT outsourcing which can be defined as "handing over the management of a function, assets, people, or activity to a third party for a specified cost, time and level of service" (Willcocks et al. 2015, p. 3). In consequence, IT outsourcing can be regarded as a specific form of IT sourcing. Topics of managing risks in IT contracts or governance and vendor management take a prominent take in the extant IT outsourcing literature (Lacity et al. 2009; Liang et al. 2016). Consequently, questions of how to reduce risks and uncertainty in the relationship between the client and the provider e.g. by a tight management with service level agreements (SLAs) or a strict provider governance play an important role from an IT outsourcing perspective (Wu et al. 2015).

While IT outsourcing was in the past largely motivated by optimization and cost efficiency (Lacity et al. 2009), its focus has shifted towards innovation while offshoring activities have declined in importance (Gewald and Schäfer 2017). The digitalization of business processes, cloud computing and cyber-security will have a similar disruptive potential in the upcoming years (Demirbas et al. 2018; IDG 2017). Consequently, companies are motivated to review their sourcing strategies to reflect the anticipated implications of digital transformation and to increase agility in IT sourcing (Demirbas et al. 2018).

## **2.2 Incomplete contracts**

Incomplete contracts are argued to explain various economic issues (Tirole 1999). Incomplete contracts are usually preceded by an invocation of transaction costs and one or several of the following three ingredients: Unforeseen contingencies, cost of writing contracts, or cost of enforcing contracts (Tirole 1999). Key ideas of the incomplete contracts literature are that contracts are incomplete by nature (Hart and Moore 1988; Hart and Moore 1999) and result from information asymmetries between seller and buyer and, thus, explain for a suboptimal level of sourcing (Tirole 1999).

Since it is not feasible to include all contingencies into contracts, information asymmetries between buyer and seller result (Hart and Moore 1988). Consequently, contracts need to find a way to handle uncertainty by assuring cost-efficiency and contract reliability. Agile contracts are perceived as one way to address contract uncertainties and to increase manageability (Arbogast et al. 2012; Opelt et al. 2013).

## **2.3 How agile practices address issues of traditional ISD**

Key issues inherent to traditional ISD are that developing complete functional specifications is usually (1) not economical since it requires considerable effort before implementation starts (Book et al. 2012); (2) not feasible since learnings of first iterations of feature development cannot be incorporated (Kim et al. 2016); and (3) not helpful since the client usually remains unable to express all requirements in sufficient complete and consistent detail up front (Kulak and Li 2017). As a result, in situations of frequent changes or unclear requirements endless re-negotiation of requirements may result when traditional approaches to ISD are applied (Pries-Heje and Pries-Heje 2014).

Contrary, agile practices can help to address some key issues of traditional ISD: (1) Simple design: The recognized lack of helpfulness of complete up-front specification of functional requirements has led to

the rise of agile software development methods such as Scrum (Schwaber and Beedle 2002) where voluminous specifications are replaced by lean specifications (Book et al. 2012). (2) Sprint planning focusing on business priorities: Sprints are planned according to business priorities as specified by the product owner as a representative for the client's priorities (Wang et al. 2012). (3) Small releases are deployed in short, iterative sprint cycles: By this approach, simple functionality is deployed quickly in sprint cycles of two to three weeks (Hekkala et al. 2017; Wang et al. 2012). Short sprint cycles ensure that new features can be deployed early, shipped iteratively, piece by piece (Austin and Devin 2009). Furthermore, changing requirements can be taken into account within a reasonably short timeframe (Ågerfalk et al. 2009). (4) Continuous testing and integration: New functionality will be tested and deployed instantaneously without waiting for big release bundles (Fitzgerald and Stol 2017). (5) Pair programming: Pair programming ensures a quality check already during coding as one developer codes and another checks quality (Fitzgerald and Stol 2017). (6) Self-organizing teams: Distributed leadership and decision making speed up decision making and ensure that required information is readily available (Hekkala et al. 2017). (7) Additional agile management practices: Daily stand-ups and retrospectives serve as supporting organizational culture as they facilitate team communication on sprint status and foster learning and continuous improvement (Hekkala et al. 2017; Recker et al. 2017).

Applying these agile practices to ISD has three implications: First, time-to-market for critical features can be reduced as features with high business impact can be prioritized by the product owner (Ågerfalk et al. 2009). Second, product quality can be increased due to early and automated testing, incorporated quality checks due to pair programming, communication and mutual feedback (Fitzgerald and Stol 2017). Third, flexibility for deployment of changing features can be increased due to short, iterative sprint cycles and lean requirements specification (Coram and Bohner 2005).

An agile and iterative approach to ISD can therefore – by design – decrease risk and uncertainty and can protect clients from things they may not know (Arbogast et al. 2012). Furthermore, an agile approach limits both the scope of the deliverable and extent of the payment and allows for inevitable change, and focuses negotiations on the neglected area of delivery (Arbogast et al. 2012).

## **2.4 The impact of agile practices on contracts and related risks**

Incorporating agile practices into IT contracts significantly impacts both, fixed price and time and material (T&M) contracts as large and precisely specified contract volumes will be replaced by modules sourced in small and iterative packages (Opelt et al. 2013). Consequently, specific challenges occur for both, fixed price and T&M contracts: Related to fixed-price contracts, challenges exist regarding contract negotiation caused by lean requirements specifications: The overall project scope is defined only high level causing difficulties in finding an agreement of whether the requirements are fulfilled or not (Opelt et al. 2013). Furthermore, project scope and solutions materialize only gradually and prototyping implies performing a considerable amount of work that does not make it into the final project (Book et al. 2012) making it difficult to reach a fixed-price agreement in an agile setting (Opelt et al. 2013).

Similarly, T&M contracts face challenges regarding agile practices reflected in contracts as well: While T&M contracts seem fairer at first sight as the payment corresponds exactly to the delivered work, they incentivize the provider to increase the development effort and neglect quality control (Book et al. 2012). As a result, implementation risks are fully with the client (Pries-Heje and Pries-Heje 2014).

To summarize, closing contracts is a challenging undertaking especially in the context of technological novelty and uncertainty like software development (Opelt et al. 2013). Most importantly, successful contracts result from relationships that rely on trust, collaboration, and transparency (Arbogast et al. 2012). Agile contracts acknowledge the fact that all contracts are incomplete, thus setting up mutually agreed-upon frameworks that explicitly address the management of contingencies (Arbogast et al. 2012).

### 3 Research Approach and Case Study Context

#### 3.1 Research approach

This study applies an inductive qualitative research approach due to the novelty of the need to increase agility in IT sourcing and contracting exemplarily shown in the context of autonomous driving. Therefore, we conduct a revelatory single case study (Yin 2009) because of the lack of related extant knowledge and to get rich, in-depth empirical insights. This case study is revelatory for two reasons: First, this case study provides access a phenomenon of interest that has been largely inaccessible to previous research due to topic novelty (i.e. sourcing of a technological innovation facing unclear or frequently changing requirements). Second, researchers have usually limited exposure to companies applying agile practices to IT sourcing and contracting as this is a rather new and rare instance. In consequence, we opt for a revelatory case study design to maximize the chances of credible novelty (Langley and Abdallah 2011).

To obtain in-depth qualitative data, exploratory interviews with managers, experts, and sourcing advisors involved in the project were conducted as primary source for data collection. Initial interviews were conducted between September and November 2018 in either English or German based on a semi-structured interview guideline following the recommendations of Schultze and Avital (2011) and Strauss and Corbin (1990) to ground the interviews in the participants' own experiences and to allow the theory to emerge from data. The remaining interviews will be conducted in spring 2019.

Questions were formulated mainly open-end to allow the interviewees the possibility to explore their experience and views in detail (Strauss and Corbin 1990; Yin 2009). Follow-up questions were formulated for further clarification purposes. Each interview had a duration of approximately 50-75 minutes and was carried out personally in face-to-face meetings. The interview results were documented in detail in form of interview notes and, if permitted, in form of recorded interviews. The interviews were coded and reviewed for consistency and completeness by another researcher that has not participated at the interviews. Table 1 provides an overview of the already conducted and planned case interviews.

Organization/ department	Interviewees	Status
Car development (business unit)	Executive sponsor/ Manager; Team leads; Experts	3 conducted; 5 in planning
Corporate IT (IT department)	Manager; Experts	1 conducted; 3 in planning
Purchasing (incl. legal and cost engineering)	Team lead; Sourcing and cost experts; Sourcing legal advisor	In planning (3 interviews)
Consulting (external sourcing advisors)	Consultants, Project Manager	2 conducted; 3 in planning

Table 1. Overview of conducted and planned case study interviews.

#### 3.2 Case study context: Current state and sourcing challenges

This case study takes the sourcing and contracting of an autonomous driving development platform at a leading OEM as an example to examine the implications of applying agile practices to IT sourcing and contracting. The OEM seeks to develop own autonomous driving capabilities related to high and full autonomous driving (level 4 and 5) according to SAE's definition (Herrmann et al. 2018; SAE 2018) with intended deployment in serial production in 2021. The development platform will be used for programming, simulating and testing of the autonomous driving code to be deployed in cars.

Contrary to traditional large-scale IT projects, three aspects of this case study are especially noteworthy: First, despite of its strong technology focus, the lead for specification, selection, and implementation of the autonomous driving development platform is with OEM's car development unit. Consequently, resources from corporate IT contributed with subject-matter expertise in an advisory role only. Second,

the corresponding business unit for car development consists currently of approx. 900 employees and is organized according to the scaled agile framework LeSS (Larman and Vodde 2017). Third, the OEM engages for the development of autonomous driving capabilities in partnerships with other car manufacturers and original equipment suppliers (OES) with split responsibilities for features. This setting creates specific challenges as technical compatibility needs to be ensured between cooperation partners.

In consequence, the following challenges resulted highlighting the necessity to deviate from traditional approaches to IT sourcing and contracting: (1) An ambitious timeline as the autonomous driving development platform needs to be available in spring 2019 to secure start of serial production in 2021; (2) technological novelty as neither the OEM, nor providers had previous experience in establishing an autonomous driving development platform of this scale and scope; (3) technical hurdles due to exceptionally high data volumes caused by high and full autonomous driving, i.e. 200 PB of data storage; (4) unclear or not fully specified legal framework for operations of autonomous driving systems in the intended markets – Europe, Japan, and the US; (5) unclear or frequently changing requirements due to the novelty of autonomous driving; (6) multi-partner setting with other car manufacturers and OES involved; (7) resulting contractual challenges like a not fully specified scope, unclear quantities as for instance the maximum number of users cannot be predicted due to the multi-partnering approach.

## 4 Preliminary Results

Preliminary results are derived from initially conducted interviews and are related to increasing agility during the tender and in the resulting contract. In line with Kulak and Li (2017) and Opelt et al. (2013), we observed that agility could play an important role in reducing overall tender duration and contractual uncertainty. The latter is especially important when digital technologies involve technological novelty.

Increasing agility in IT sourcing mainly targets at reducing overall tender duration. A backwards calculation revealed that the autonomous driving development platform would need to be up running in March 2019 to ensure start of serial production in 2021. To achieve this ambitious goal, contract signature had to take place in November 2018. Consequently, a time frame of roughly nine months for defining the tender scope including volumes, services, functionality, technical concepts and for vendor selection including contract negotiation resulted. The high-level tender timeline is displayed in Figure 1.

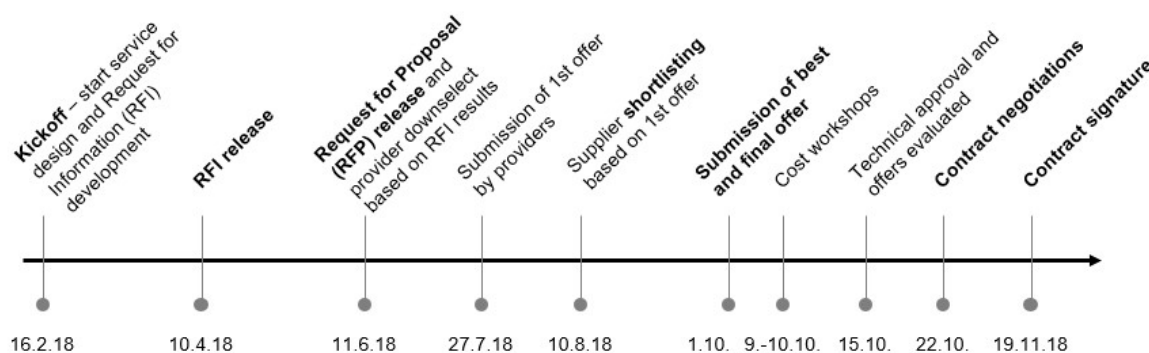


Figure 1. Timeline for the tender of the autonomous driving development platform.

The following measures have been identified to increase agility in sourcing of the autonomous driving development platform aiming at reducing the tender duration:

(1) Focus on business outcomes ("value stories") without specifying the means of realization. To achieve this, desired business functionalities were defined only high-level as desired outcomes, but details of the realization were left completely up to the provider. This approach follows the agile practice of focusing on business outcomes and to create freedom for the implementation teams to decide about the realization (Fowler and Highsmith 2001; Kulak and Li 2017). This approach significantly differs from traditional

ISD using comprehensive statements of work often also specifying details and related technologies for realization of the desired functionalities. Examples for business services include the collection of camera, lidar, and sensor data of test drives, the ingestion of collected test data to the centralized platform, or the simulation of the autonomous driving code based on new sensor set-ups. The freedom of providers to decide on details of realization is perceived as lever to shorten tender duration as providers are free to select technologies of their choice (Opelt et al. 2013).

(2) A lean requirements specification describing features only high-level was applied for three reasons: First, to shorten the duration for requirements specification, second, to create freedom for providers on services provisioning, and third to include providers in the solution design at an early stage to leverage their ideas and creativity addressing technical challenges. Only platform key volumes like storage volume or computation time for specific operations were specified. This approach follows the recommendations of the Agile Manifesto that best architectures and requirements designs emerge from self-organizing teams (Fowler and Highsmith 2001) and reduces overall tender duration (Arbogast et al. 2012).

(3) A service catalogue has been used to describe business services in a structured, standardized and comprehensive way. A service catalogue describes required services in a formal structure and links them with service levels and quantities (Arcilla et al. 2013; Mendes and da Silva 2010). The service catalogue turned out to be especially beneficial in reducing tender duration: Providers submitted the service catalogue complemented with prices for requested services and quantities along with provider-specific assumptions. Provider-specific assumptions were then reviewed in so called "walk-through-sessions". The documentation of accepted changes in the separate document stating provider-specific assumptions became part of the contract. This process ensures that the original contract text remains unchanged. Contrary, changes in contract texts are usually time-consuming as they need to be aligned and approved by each party. Consequently, the tender duration could be significantly reduced.

(4) As part of the Request for Proposal (RFP), a detailed discussion between the client and potential providers on the intended solution took place in workshops. This procedure ensured that the provider could gain a profound understanding of the requested functionality and gave the client the possibility to get familiar with the technical solution proposed by the provider and to, thus, reduce inherent uncertainty before contract signature. Consequently, solution design was similar to agile sprints where solution design takes place in iterative cycles immediately incorporating client feedback (Kim et al. 2016).

To conduct a profound vendor selection and to increase confidentiality in the future provider, the following measures were taken: A Request for Information (RFI) has been initially launched to conduct a provider pre-screening and qualification. Despite of consuming almost two months of the available tender duration, the RFI was perceived as very valuable for the following reasons: (a) the ability to address a potentially wider range of providers with the possibility for a vendor pre-qualification; (b) to launch the RFI at an earlier point in time as – contrary to the RFP – not all requirements needed to be defined; (c) to incorporate learnings on smart solutions made during the RFI into the subsequent RFP; and (d) to give providers the possibility to understand the client's requirements and tender scope at an earlier stage.

Contract flexibility was highly important while at the same time a fix-price was intended to achieve cost-reliability. We observed the following two key measures to increase contract flexibility:

(1) Only initial quantities for the first quarter after contract signature were specified: All remaining quantities for the remaining contract duration would be specified during the course by an "investment board", a monthly meeting of client and provider representatives. The investment board is intended to review system utilization in the previous month and would adapt future quantities within a quarter's lead-time. This approach aims at ensuring maximum flexibility regarding ramp-up of computing power or storage, and other systems key parameters. Simultaneously, the provider has enough time to provide requested capacities. To ensure that deployed capacities will not be cancelled by the client before the usual lifetime, the parties agreed that quantity flexibility was limited with respect to two conditions: First, a ramp-down of already deployed capacities would be reimbursed by the client with the anticipated cost for the remaining contract lifetime of the respective component. Second, the ramp-up of capacities would be limited to a maximum of 20% exceeding the already deployed capacity to ensure that the



ordered capacity increase can be feasibly deployed without within a quarter's time frame. In case of disputes, an agreed governance with defined escalation mechanisms would apply.

(2) To significantly speed up requirements specification for application development services, only a rough indication of the required skills and related quantities was given during the tender: To secure resources availability, the client committed on quantities for application development according to so-called 'T-Shirt-sizes'. T-Shirt sizes ranked from S to XL describing an average person day effort for feature development ranging from T-shirt size XS (equalling one person day) to XL (equalling 21 person days). Furthermore, the client specified the shoring mix for each ordered T-Shirt size to allow planning of regional availability of application development resources as requested.

Cost-efficiency is intended to be achieved with the following two measures: First, aiming at a fixed price agreement despite of flexible scope in an agile setting: A fixed price has been agreed based on the scope and quantities as specified in the service catalogue. This procedure ensured that the provider had no incentive to increase the scope without receiving additional payment. Second, cost-efficiency has been achieved by focusing SLAs on business process impact, e.g. interruption of business processes and not the availability of single system components. This approach ensured that only SLAs of relevance for business impact were negotiated which in turn facilitated a swift contract negotiation of SLAs.

## **5 Future Research and Conclusion**

Companies increasingly adopt agile practices to foster innovation and performance in rapidly changing market environments (Sambamurthy et al. 2003). While agile practices are widespread at startups or born digital companies like Amazon or Google (Tumbas et al. 2017), traditional companies started to adopt agile practices just recently (Gerster et al. 2018).

This study aims at revealing the implications and potential benefits of applying agile practices to the sourcing and contracting of large-scale IT projects. Accordingly, our research is motivated by the lack of empirical evidence on how agility can be increased in the sourcing and contracting of IT services by referring to a revelatory case study with an OEM in the context of autonomous driving. We contribute to the rich body of knowledge on IT sourcing and contracting with examples on how to reduce the duration of large-scale IT tenders and to increase the flexibility at IT contracts. This case study provides insights into how contract uncertainty could be reduced by applying agile practices to contracts.

This study has the following limitations: This case of a leading OEM in the context of autonomous driving might not be transferrable to companies of other industries or size classes. Specifically, prestige projects involving technological innovation increase the likelihood that a provider engages in new or uncommon contract types. Furthermore, due to topic novelty, only the time frame related to the platform sourcing could have been considered. A longitudinal study of how the agile principles formulated in the contract would come into live after contract start seems to be especially worthwhile.

Our future research will cover the following aspects: First, we intend to conduct the remaining planned interviews as outlined to get a more diverse view on how to increase agility in IT sourcing and contracting. Second, we aim to understand which measures have been taken to shorten the sourcing project's overall tender duration and which implications derived. Third, we intend to examine which measures were designed to increase contract agility. Finally, we intend to conduct a longitudinal observation to examine how the selected agile contract elements work in practice and to which extent contract flexibility could be increased.

Despite of the novelty of the content and the significant challenges imposed by the adoption of agile practices to IT sourcing and contracting, agility seem to be more than a short-term, transitory trend and is likely to play an important role as companies seek to increase speed and flexibility in response to rapidly changing market environments. It remains striking to learn how agility can be increased in sourcing and contracting of large-scale IT projects.

## References

- Ågerfalk, P. J., Fitzgerald, B., and Slaughter, S. A. (2009). "Introduction to the Special Issue—Flexible and Distributed Information Systems Development: State of the Art and Research Challenges," *Information Systems Research* 20 (3), 317-328.
- Arbogast, T., Larman, C., and Vodde, B. (2012). "Agile Contracts Primer". URL: [http://www.agilecontracts.org/agile\\_contracts\\_primer.pdf](http://www.agilecontracts.org/agile_contracts_primer.pdf) (visited on 10/16/2018).
- Arcilla, M., Calvo-Manzano, J. A., and San Feliu, T. (2013). "Building an IT Service Catalog in a Small Company as the Main Input for the IT Financial Management," *Computer Standards & Interfaces* 36 (1), 42-53.
- Austin, R. D., and Devin, L. (2009). "Research Commentary—Weighing the Benefits and Costs of Flexibility in Making Software: Toward a Contingency Theory of the Determinants of Development Process Design," *Information Systems Research* 20 (3), 462-477.
- Book, M., Gruhn, V., and Striemer, R. (2012). "Advantage: A Fair Pricing Model for Agile Software Development Contracting," Berlin, Heidelberg: Springer Berlin Heidelberg, 193-200.
- Conboy, K. (2009). "Agility from First Principles: Reconstructing the Concept of Agility in Information Systems Development," *Information Systems Research* 20 (3), 329-354.
- Coram, M., and Bohner, S. (2005). "The Impact of Agile Methods on Software Project Management," *Engineering of Computer-Based Systems, 2005. ECBS'05*. In: *Proceedings of the 12th IEEE International Conference and Workshops on the: IEEE*, 363-370.
- D'Aveni, R. A., Dagnino, G. B., and Smith, K. G. (2010). "The Age of Temporary Advantage," *Strategic Management Journal* 31 (13), 1371-1385.
- Deloitte. (2015). "Big Data and Analytics in the Automotive Industry. Automotive Analytics Thought Piece." URL: <https://www2.deloitte.com/content/dam/Deloitte/uk/Documents/manufacturing/deloitte-uk-automotive-analytics.pdf> (visited on 11/27/2018).
- Demirbas, U., Gewalt, H., and Moos, B. (2018). "The Impact of Digital Transformation on Sourcing Strategies in the Financial Services Sector: Evolution or Revolution?," In: *Proceedings of the Twenty-fourth Americas Conference on Information Systems*, New Orleans, USA.
- Dibbern, J., Goles, T., Hirschheim, R., and Jayatilaka, B. (2004). "Information Systems Outsourcing: A Survey and Analysis of the Literature," *ACM SIGMIS Database: The DATA BASE for Advances in Information Systems* 35 (4), 6-102.
- Dremel, C., Herterich, M. M., Wulf, J., and Vom Brocke, J. (2018). "Actualizing Big Data Analytics Affordances: A Revelatory Case Study," *Information & Management*.
- Fitzgerald, B., Hartnett, G., and Conboy, K. (2006). "Customising Agile Methods to Software Practices at Intel Shannon," *European Journal of Information Systems* 15 (2), 200-213.
- Fitzgerald, B., and Stol, K.-J. (2017). "Continuous Software Engineering: A Roadmap and Agenda," *Journal of Systems & Software* (123), 176-189.
- Fowler, M., and Highsmith, J. A. (2001). "The Agile Manifesto," *Software Development* (9:8), 28-35.
- Gerster, D., Dremel, C., and Kelker, P. (2018). "“Agile Meets Non-Agile”: Implications of Adopting Agile Practices at Enterprises," In: *Proceedings of the Twenty-fourth Americas Conference on Information Systems*, New Orleans, USA.
- Gerster, D., Dremel, C., and Kelker, P. (2019). "How Enterprises Adopt Agile Structures: A Multiple-Case Study," In: *Proceedings of the 52nd Hawaii International Conference on System Sciences*.
- Gewald, H., and Schäfer, L. (2017). "Quo Vadis Outsourcing? A View from Practice," *Journal of Global Operations and Strategic Sourcing* 10 (1), 2-17.
- Gonçalves, E., and Lopes, E. (2014). "Implementing Scrum as an IT Project Management Agile Methodology in a Large Scale Institution," In: *Proceedings of the European Conference on Research Methodology for Business and Management Studies: Academic Conferences International Limited*, 461-470.
- Hart, O., and Moore, J. (1988). "Incomplete Contracts and Renegotiation," *Econometrica: Journal of the Econometric Society* 56 (4), 755-785.

- Hart, O., and Moore, J. (1999). "Foundations of Incomplete Contracts," *The Review of Economic Studies* 66 (1), 115-138.
- Hekkala, R., Stein, M.-K., Rossi, M., and Smolander, K. (2017). "Challenges in Transitioning to an Agile Way of Working," In: *Proceedings of the 50th Hawaii International Conference on System Sciences*, Hawaii, USA, 5869-5878.
- Herrmann, A., Brenner, W., and Stadler, R. (2018). "Autonomous Driving: How the Driverless Revolution Will Change the World." Emerald Publishing Limited.
- Highsmith, J. A. (2013). "Adaptive Leadership - Accelerating Enterprise Agility." URL: <https://assets.thoughtworks.com/articles/adaptive-leadership-accelerating-enterprise-agility-jim-highsmith-thoughtworks.pdf> (visited on 10/16/2018)
- IDG. (2017). "Studie Sourcing 2017.," URL: [https://shop.computerwoche.de/fileserver/files/1715/208364044222138/idg\\_studie2017\\_4\\_sourcing\\_web\\_leseprobe.pdf](https://shop.computerwoche.de/fileserver/files/1715/208364044222138/idg_studie2017_4_sourcing_web_leseprobe.pdf) (visited on 10/22/2018).
- Kim, G., Debois, P., Willis, J., and Humble, J. (2016). *The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations*. IT Revolution.
- Kniberg, H. I., Anders. (2012). "Scaling Agile @ Spotify with Tribes, Squads, Chapters & Guilds." URL: <https://creativeheldstab.com/wp-content/uploads/2014/09/scaling-agile-spotify-11.pdf> (visited on 10/16/2018).
- Kulak, D., and Li, H. (2017). "The Journey to Enterprise Agility: Systems Thinking and Organizational Legacy." Springer.
- Lacity, M. C., Khan, S. A., and Willcocks, L. P. (2009). "A Review of the IT Outsourcing Literature: Insights for Practice," *The Journal of Strategic Information Systems* 18 (3), 130-146.
- Langley, A., and Abdallah, C. (2011). "Templates and Turns in Qualitative Studies of Strategy and Management," in *Building Methodological Bridges*. Emerald Group Publishing Limited, 201-235.
- Larman, C., and Vodde, B. (2017). "Less.Works." URL: <https://less.works/less/framework/index.html> (visited on 04/19/2018).
- Liang, H., Wang, J.-J., Xue, Y., and Cui, X. (2016). "IT Outsourcing Research from 1992 to 2013: A Literature Review Based on Main Path Analysis," *Information & Management* 53 (2), 227-251.
- McAvoy, J., and Butler, T. (2009). "The Role of Project Management in Ineffective Decision Making within Agile Software Development Projects," *European Journal of Information Systems* 18 (4), 372-383.
- Mendes, C., and da Silva, M. M. (2010). "Implementing the Service Catalogue Management," In: *Proceedings of the 2010 Seventh International Conference on the Quality of Information and Communications Technology*: IEEE, 159-164.
- Mocker, M., and Fonstad, N. (2017). "Driving Digitization at Audi," In: *Proceedings of the Thirty Eighth International Conference on Information Systems (ICIS)*, Seoul, Korea.
- Opelt, A., Gloger, B., Pfarl, W., and Mittermayr, R. (2013). *Agile Contracts: Creating and Managing Successful Projects with Scrum*. John Wiley & Sons.
- Overby, E., Bharadwaj, A., and Sambamurthy, V. (2006). "Enterprise Agility and the Enabling Role of Information Technology," *European Journal of Information Systems* 15 (2), 120-131.
- Pries-Heje, L., and Pries-Heje, J. (2014). "Agile Contracts: Designing an Agile Team Selection Guideline," *Information Systems Research Seminar in Scandinavia*, 34-49.
- Przybilla, L., Wiesche, M., and Krcmar, H. (2018). "The Influence of Agile Practices on Performance in Software Engineering Teams: A Subgroup Perspective," In: *Proceedings of the 2018 ACM SIGMIS Conference on Computers and People Research*: ACM, 33-40.
- Recker, J., Holten, R., Hummel, M., and Rosenkranz, C. (2017). "How Agile Practices Impact Customer Responsiveness and Development Success: A Field Study," *Project Management Journal* 48 (2), 99-121.
- Rigby, D. K., Sutherland, J., and Takeuchi, H. (2016). "Embracing Agile," *Harvard Business Review* 94 (5), p. 40.
- Ross, J. W., Sebastian, I., Beath, C., Mocker, M., Moloney, K., and Fonstad, N. (2016). "Designing and Executing Digital Strategies," In: *Proceedings of the Thirty Seventh International Conference on Information Systems*, Dublin, Ireland.

- Royce, W. W. (1987). "Managing the Development of Large Software Systems: Concepts and Techniques," In: *Proceedings of the 9th international conference on Software Engineering*, Monterey (CA), USA: IEEE Computer Society Press, 328-338.
- SAE. (2018). "Taxonomy and Definitions for Terms Related to on-Road Motor Vehicle Automated Driving Systems." URL: [https://www.sae.org/standards/content/j3016\\_201401/](https://www.sae.org/standards/content/j3016_201401/) (visited on 10/28/2018).
- Sambamurthy, V., Bharadwaj, A., and Grover, V. (2003). "Shaping Agility through Digital Options: Reconceptualizing the Role of Information Technology in Contemporary Firms," *MIS Quarterly* 27 (2), 237-263.
- Schultze, U., and Avital, M. (2011). "Designing Interviews to Generate Rich Data for Information Systems Research," *Information and Organization* 21 (1), 1-16.
- Schwaber, K., and Beedle, M. (2002). *Agile Software Development with Scrum*. Prentice Hall Upper Saddle River.
- Strauss, A., and Corbin, J. (1990). *Basics of Qualitative Research*. Newbury Park, CA: Sage.
- Tirole, J. 1999. "Incomplete Contracts: Where Do We Stand?," *Econometrica* 67 (4), 741-781.
- Tumbas, S., Berente, N., and vom Brocke, J. (2017). "Born Digital: Growth Trajectories of Entrepreneurial Organizations Spanning Institutional Fields," In: *Proceedings of the Thirty Eighth International Conference on Information Systems*. Seoul, Korea.
- Wang, X., Conboy, K., and Pikkarainen, M. (2012). "Assimilation of Agile Practices in Use," *Information Systems Journal* 22 (6), 435-455.
- Weill, P., and Woerner, S. L. (2015). "Thriving in an Increasingly Digital Ecosystem," *MIT Sloan Management Review* 56 (4), 27-34.
- Willcocks, L., Oshri, I., and Rottman, J. (2015). "Foreword to MISQEs Special Theme Book on Outsourcing," *MIS Quarterly Executive Special Theme Book on Outsourcing*, 3-5.
- Wu, S. P.-J., Straub, D. W., and Liang, T.-P. (2015). "How Information Technology Governance Mechanisms and Strategic Alignment Influence Organizational Performance: Insights from a Matched Survey of Business and IT Managers," *MIS Quarterly* 39 (2), 497-518.
- Yin, R. K. (2009). *Case Study Research - Design and Methods*. Sage.