Bibliography

Audi Espana. Driving out of a parking space parallel to the roadside. URL https://www.youtube.com/watch?v=G3oOOobjPlc. Accessed: 02.03.17.

M. Bertoncello and D. Wee. Ten ways autonomous driving could redefine the automotive world, jun 2015. URL http://www.mckinsey.com/industries/automotive-and-assembly/our-insights/ten-ways-autonomous-driving-could-redefine-the-automotive-world. Accessed: 06.03.17.

A. Braun and S. Katsev. Autonomous parallel parking, apr 2004. URL http://slidegur.com/doc/3930571/autonomous-parallel-parking-alex-braun-and-sergey-katsev. Accessed: 04.03.17.

Daimler AG. Daimler and bosch automate parking: Mercedes with built in valet, sep 2015. URL http://media.daimler.com/marsMediaSite/en/instance/ko/Daimler-and-Bosch-automate-parking-Mercedes-with-built-in-va.xhtml?oid=9919967. Accessed: 06.03.17.

Daimler AG. Mercedes-benz techcenter: Parking pilot, 2016. URL http://techcenter.mercedes-benz.com/en/parking-pilot/detail.html. Accessed: 05.03.17.

R. Doloczki and D. K. Gaubitz. Rc-car automatisiertes ausparken, 2015. URL http://www.mechatroniktechniker-nuernberg.de/projektarbeiten-2014-2015/rccar?showall=\&limitstart. Accessed: 04.03.17.

Lincoln Motor Company. Active park assist with park out assist, may 2014. URL https://www.youtube.com/watch?v=G3oO0objPlc. Accessed: 02.03.17.

Robert Bosch GmbH. Parking assistance systems, sep 2013a. URL http://www.bosch-presse.de/pressportal/de/en/parking-assistance-systems-42313.html. Accessed: 01.03.17.

Robert Bosch GmbH. Fully automated parking, sep 2013b. URL http://www.bosch.com/en/com/boschglobal/automated_driving/technology_for_greater_safety/pagination_1.html. Accessed: 01.03.17.

Robert Bosch GmbH. Accident-free parking: Bosch home zone park assist technology makes anyone a parking expert, jun 2016. URL http://us.bosch-press.com/tbwebdb/bosch-usa/en-US/PressText.cfm?CFID=60601650\&CFTOKEN=23b02ff4f9992373-1108C7B6-E03B-C6E5-077B127D808AAA01\&Search=1\&id=726. Accessed: 04.03.17.

Statistica Inc. Global adas unit shipments in 2012 and 2020 (in millions). URL https://www.statista.com/statistics/429190/global-shipments-of-advanced-driver-assistance-systems/. Accessed: 06.03.17.

Tesla Inc. Summon improvements, 2016. URL https://www.tesla.com/sites/default/files/Model_S_release_notes_7_1_1_us_cn.pdf. Accessed: 02.03.17.

Volvo Cars Support. Parking with active parking assistance, 2016. URL http://support.volvocars.com/uk/cars/Pages/owners-manual.aspx?mc=v526\&my=2016\&sw=15w46\&article=0de24dc68976be2bc0a801513c7e085c. Accessed: 28.02.17.

D. West and T. Grant. Agile development: Mainstream adoption has changed agility. *Application Development & Program Management*

Professional, jan 2010. URL `http://programmedevelopment.com/public/uploads/files/forrester_agile_development_mainstream_adoption_has_changed_agility.pdf`.

Master Course
Distributed Computing Systems
Engineering

Workshop EE5503 :
TopicOfAssignment

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Contents

List of Abbreviations

ADAS	Advanced Driver Assistance Systems

Chapter 1

Aims, Objectives and expected Outcome

Author: Hans
Contributor(s): Wurst

Chapter 2

Project Plan

Author: Hans
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Chapter 3

Project Management

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Chapter 4

Resource Allocation

Author: Hans
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Chapter 5

Risk Analysis

Author: Simon Schneider
Contributor(s):

Risk analysis is a process which enables the analysis of risks, associated within a project. A Risk can be generally defined as the probability of something going wrong, and the negative consequences if it does. However, it is hard to find all the risks, which can occur, in a project. At first it should be recognised that a risks exists as a consequence of uncertainty. For this reason the risk analysis process will help to identify potential problems that may occur. Such a risk analysis can be useful in several situations:

- To help to anticipate and neutralise possible problems when planning projects.
- To decide wether to continue with the project or not.
- To improve safety and manage potential risks in the workplace.

5.1 Identifying the Risks

As one of the first steps in Risk Analysis it is to identify the existing and possible problems occur. Some of these areas and threats, which might have an impact on this project, are listet below:

- Project Members - Illness, injury, or another reason leading to a loss of a project member.
- Operational Delays in deliveries.
- Reputational Loss of customer or employee confidence.
- Project Taking too long on concluding key tasks, or experiencing issues with product or service quality, Goal not achieved.
- Financial Budget exhausted, Business failure or non-availability of funding.

5.2 Estimate Risks

After some of the possible threats has been faced, the risk can be calculated with both the likelihood of these threats being realised, and their possible impact. One way of doing this is to make a estimation of the probability that this threat occurrs multiplied by the amount it will cost. This leads to the following equation which quantifies the risk:

$$Risk = ProbabilityofOccurance \cdot Cost \tag{5.1}$$

Additionally there are two possible kinds of processes:

- The total value of a risk of a series of processes that are executed successively can be calculated as follows:

$$R_{Total} = R_n \cdot R_{n+1} \tag{5.2}$$

- The total value of a risk of parallel processes that are executed concurrent can be calculated as follows:

$$R_{Total} = 1 - (1 - R_n) \cdot (1 - R_{n+1}) \tag{5.3}$$

impact chart machen bzw zuerst unsre threats schaetzen und dann einfach mal das risiko berechnen

Low impact/low probability Risks in the bottom left corner are low level, and you can often ignore them. Low impact/high probability Risks in the top left corner are of moderate importance if these things happen, you can cope with them and move on. However, you should try to reduce the likelihood that they'll occur. High impact/low probability Risks in the bottom right corner are of high importance if they do occur, but they're very unlikely to happen. For these, however, you should do what you can to reduce the impact they'll have if they do occur, and you should have contingency plans Add to My Personal Learning Plan in place just in case they do. High impact/high probability Risks towards the top right corner are of critical importance. These are your top priorities, and are risks that you must pay close attention to.

Chapter 6

Market Analysis

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Contributor(s): Wurst

An important step in the development of a new product is to analyse the market. This analysis not only includes the identification of competitors and their offered technologies, but also the investigation of the demand on the product to develop and its future progression.

The subsequent analysis is done in an indirect way so that the presented information is retrieved by querying the internet and putting altogether the relevant information.

6.1 Current Systems implemented in today's Cars

There are only a few systems available that help the driver in leaving a parking space. These systems exhibit a huge variety of autonomy. The manufacturers Volvo, Audi and Lincoln sheet park assistance systems that take control over the steering wheel when leaving a parking lot (see Volvo Cars Support [2016], Lincoln Motor Company [2014] and Audi Espana). While the steering is done autonomously, the driver has to manually operate the pedals. This kind of systems is mostly restricted to parallel parking.

Mercedes-Benz offers a more autonomous, but also more restricted way of assisted parking. The Mercedes Benz Parking Pilot is able to park and leave

the parking site autonomously. The quitting of the parking site is restricted to those scenarios in which the Parking Pilot was also used to park the car (see Daimler AG [2016]).

Tesla offers the Summon functionality implemented in its Model S and Model X. It allows a driver to leave its car and park as well as retrieve it autonomously. This feature is restricted to perpendicular parking only (see Tesla Inc. [2016]).

6.2 Current Systems available from Suppliers

The development of systems assisting a driver in parking and leaving a parking lot can be illustrated by the evolution of the products originating from Robert Bosch GmbH. While the early systems act as it was described for the manufacturers Volvo, Audi and Bosch (see Robert Bosch GmbH [2013a]), the current systems are now able to drive itself into and back out of a parking site autonomously (see Robert Bosch GmbH [2013b]). Another future application of park assistants is the Bosch Home Zone Park Assist. It enables a driver to train its car for certain parking situations (see Robert Bosch GmbH [2016]). The car records a route that is driven and it is able to reproduce it even if the starting point of the route to drive and the one of the recorded route is slightly different. On its trained way, the car is able to detect impediments and to react to them.

6.3 Scientific Projects

There exist several projects that target on the functionality of autonomously parking to and leaving from a parking lot. While the work of Katsev and Braun (see Braun and Katsev [2004]) that already started in 2004 seems not to have reached the point where leaving a parking lot is implemented since no further resources can be found on that project, Roland Doloczki and Don Kevin Gaubitz produced a working prototype of RC-Car that autonomously leaves a parking space (see Doloczki and Gaubitz [2015]). To achieve their

goal, Doloczki and Gaubitz use ultrasonic and infrared sensors to sense the environment around parked vehicle.

6.4 Development of the market

It is obvious that the demand on systems that perform certain manoeuvres autonomously will increase with the success of autonomous cars. But also in the meantime till these cars make the breakthrough, there might be an increased need for Advanced Driver Assistance Systems (ADAS) like parking assistants. Following McKinsey Inc., there will be three eras in the revolution of self-driving cars (see Bertoncello and Wee [2015]). The first era, starting from now and lasting till the late 2020s, is characterised by the first autonomous vehicles being produced and their impact on established car manufacturers. McKinsey states that the premium makers will take an incremental approach to autonomous vehicles by implementing more sophisticated ADAS. This assumption is supported by Statista, assuming that the shipment of ADAS units will increase by more than 500% in the time from 2012 to 2020 (see Statistica Inc.).

One of the buzz word regarding future driver assistance systems is Valet Parking which means that a car parks itself after the driver has left it and that the car can be retrieved from its parking position without active control of the driver. Therefore, Valet Parking needs the possibility of a car autonomously leaving its parking site. A research project targeting on Valet Parking was announced by Daimler, Bosch and Car2go in the year 2015 (see Daimler AG [2015]).

6.5 Conclusion

It has been worked out that the systems that are implemented in todays cars are less sophisticated than the system that is planned to develop. Additionally, the increasing need for ADAS like park assistants has been exposed. However, there are other scientific projects that aim on the same

kind of system and that have to be overcome by additional functionality or improved safety and reliability. The major competitor in this sector will be the Robert Bosch GmbH that already demonstrated its product with a real vehicle and that is working together with a lot of important car manufacturers like Daimler or Audi.

Chapter 7

Tasks and Work Plan

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Chapter 8

Process Flow, Critical Path Identification and Predictive Models

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Chapter 9

Customer Reports and Analysis

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Giving the customer the possibility to participate in the development of a product by providing him transparency regarding the overall progress and by implementing its feedback is one of the most important success factors. Especially if the final results of the collaboration are not explicitly clear or if the project is some kind of research work, it is of highest importance to gather the customers feedback continuously. The gained feedback serves as an input in adapting the product or even the whole process of development.

Especially in the area of software development, the need for constant interaction between a manufacturer and its customer is widely acknowledged. This fact can be demonstrated by the adoption of agile methods (see figure 9.1). These methods, like XP, Scrum and FDD, offer the possibility of high transparency, short feedback-cycles and increased flexibility regarding changes in the requirements or in the market - characteristics that proved themselves good and that are strongly wanted by the manufacturers adopting agile methods (see figure 9.2).

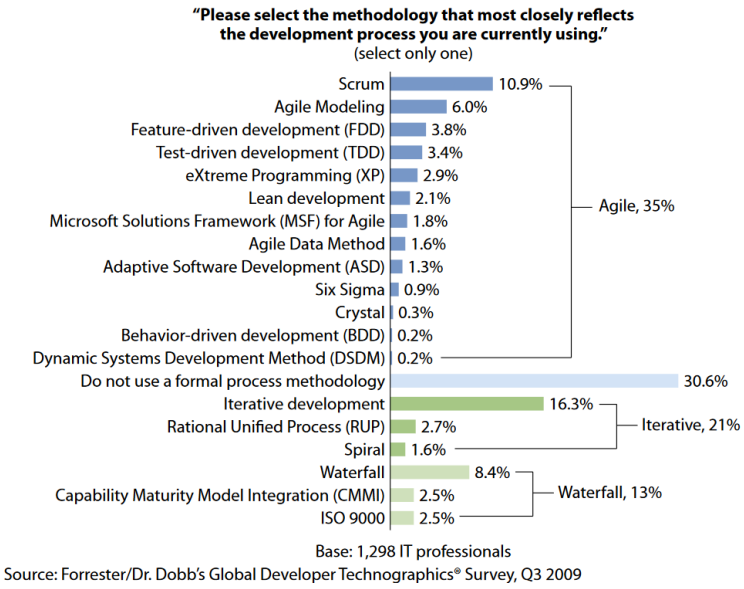

Figure 9.1: Adoption of agile Methods in Software Development (West and Grant [2010])

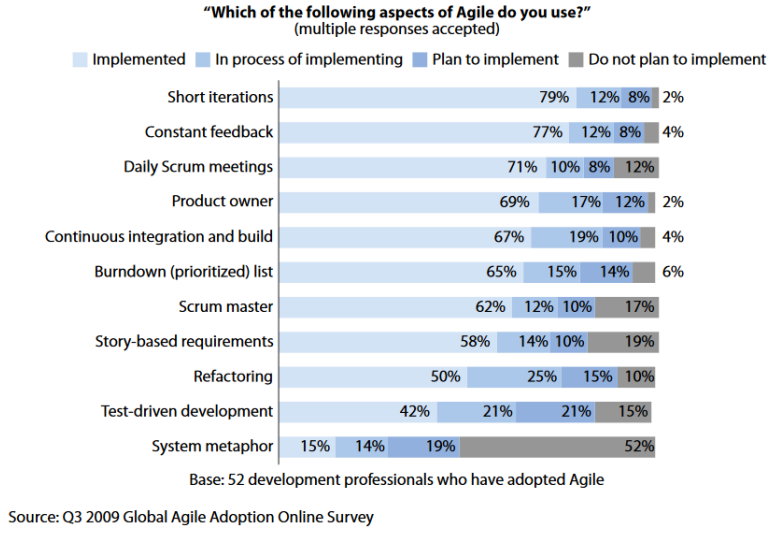

Figure 9.2: Adoption of agile Methods in Software Development (West and Grant [2010])

9.1 Determining the Modalities of Collaboration

To embed a process that as well satisfies the customer as it provides the manufacturer the possibility to get as much useful input and feedback as possible, the modalities of collaboration are negotiated as a first step. The salient points in this negotiation are:

- Who is the customer's specialist contact person and how should the communication with him/her take place?
- Who is the customer's technical contact person and how should the communication with him/her take place?
- In which way will the customer contact our company if necessary=
- What are the customers preferences regarding the reports on the projects progress?

While some of these points like the contact information of a certain person in charge are only of informational kind, other points like the desired way of communication are of high importance. Since there are certain preferences in our company regarding the length of the iterations and the way how the communication should take place, the CORE value of the customers answers in respect of our companys preferences is calculated.

Chapter 10

Product Development and Production Life Cycle Analysis

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Chapter 11

Facilitation and Monitoring of the Process

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Chapter 12

Conclusions

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Bibliography

Audi Espana. Driving out of a parking space parallel to the roadside. URL https://www.youtube.com/watch?v=G3oO0objPlc. Accessed: 02.03.17.

M. Bertoncello and D. Wee. Ten ways autonomous driving could redefine the automotive world, jun 2015. URL http://www.mckinsey.com/industries/automotive-and-assembly/our-insights/ten-ways-autonomous-driving-could-redefine-the-automotive-world. Accessed: 06.03.17.

A. Braun and S. Katsev. Autonomous parallel parking, apr 2004. URL http://slidegur.com/doc/3930571/autonomous-parallel-parking-alex-braun-and-sergey-katsev. Accessed: 04.03.17.

Daimler AG. Daimler and bosch automate parking: Mercedes with built in valet, sep 2015. URL http://media.daimler.com/marsMediaSite/en/instance/ko/Daimler-and-Bosch-automate-parking-Mercedes-with-built-in-va.xhtml?oid=9919967. Accessed: 06.03.17.

Daimler AG. Mercedes-benz techcenter: Parking pilot, 2016. URL http://techcenter.mercedes-benz.com/en/parking-pilot/detail.html. Accessed: 05.03.17.

R. Doloczki and D. K. Gaubitz. Rc-car automatisiertes ausparken, 2015. URL http://www.mechatroniktechniker-nuernberg.de/projektarbeiten-2014-2015/rccar?showall=\&limitstart. Accessed: 04.03.17.

Lincoln Motor Company. Active park assist with park out assist, may 2014. URL https://www.youtube.com/watch?v=G3oO0objPlc. Accessed: 02.03.17.

Robert Bosch GmbH. Parking assistance systems, sep 2013a. URL http://www.bosch-presse.de/pressportal/de/en/parking-assistance-systems-42313.html. Accessed: 01.03.17.

Robert Bosch GmbH. Fully automated parking, sep 2013b. URL http://www.bosch.com/en/com/boschglobal/automated_driving/technology_for_greater_safety/pagination_1.html. Accessed: 01.03.17.

Robert Bosch GmbH. Accident-free parking: Bosch home zone park assist technology makes anyone a parking expert, jun 2016. URL http://us.bosch-press.com/tbwebdb/bosch-usa/en-US/PressText.cfm?CFID=60601650\&CFTOKEN=23b02ff4f9992373-1108C7B6-E03B-C6E5-077B127D808AAA01\&Search=1\&id=726. Accessed: 04.03.17.

Statistica Inc. Global adas unit shipments in 2012 and 2020 (in millions). URL https://www.statista.com/statistics/429190/global-shipments-of-advanced-driver-assistance-systems/. Accessed: 06.03.17.

Tesla Inc. Summon improvements, 2016. URL https://www.tesla.com/sites/default/files/Model_S_release_notes_7_1_1_us_cn.pdf. Accessed: 02.03.17.

Volvo Cars Support. Parking with active parking assistance, 2016. URL http://support.volvocars.com/uk/cars/Pages/owners-manual.aspx?mc=v526\&my=2016\&sw=15w46\&article=0de24dc68976be2bc0a801513c7e085c. Accessed: 28.02.17.

D. West and T. Grant. Agile development: Mainstream adoption has changed agility. *Application Development & Program Management*

Professional, jan 2010. URL `http://programmedevelopment.com/public/uploads/files/forrester_agile_development_mainstream_adoption_has_changed_agility.pdf`.