Cognitive computing for the hospitality industry

A research as regards to the implementation of cognitive computing in business processes

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Executive summary

Cognitive computing can be used on specific touchpoints between the hospitality company and its guests, which than can create a personalized experience for the guests. Creating guests' profiles and offering a better, faster and more personalized service. This enables to engage with the empowered guests in this fast-moving environment. Therefore, the aim of this research is to provide the hospitality industry with ways to use cognitive computing in business processes to create personalized experiences. This results in the following research question; *"What cognitive computing functionalities can be implemented in the business processes of a hospitality company to improve the guest's personalized experience?"*

To answer the following sub-questions a systematic literature search, two case studies and a survey are conducted.

1. *What cognitive computing functionalities are suitable for implementation in a business process of a hospitality company to improve personalized experience?*
2. *For what cognitive functionalities are guests willing to use a cognitive system?*

In more detail, a cognitive system is defined as a computer system which is modeled after the human brain, which learns through experience, makes decisions based on what it learns and has natural language processing capability, which enables to interact with humans in a natural way. Firstly, a cognitive system can integrate data from multiple heterogenous sources and big data. Secondly, the functionality of natural language processing can be implemented, hereby the cognitive system transforms human speech into machine-readable text, which enables to interact with human. Thirdly, the functionality of machine learning can be implemented to improve and correct its understanding. Now considering the outcome of the research and the results of the related case studies.

The results of the case studies for Resort Bad Boekelo and Landal Miggelenberg, are based on the functionalities and the applications of a cognitive system. First, the cognitive system can be used as a concierge system. Thereafter, a cognitive system can a create guest profile, it has the capability to check-in and checkout, and the it can be used in the residences. Most of the guests are willing to use a cognitive system during their stay, the reason has to do with the speed of the system or otherwise curiosity or the low-threshold the system has, it is always accessible. The respondents who do not want to use the cognitive system, prefer to get personal advice from an employee and do not consider a cognitive system as a necessity. Subsequently, guests use a cognitive system for information, the reservation, the personal data that can be checked quickly, the check-in and the checkout. Thereby, if hospitality companies offer a service which can provide a personalized experience based on behavior, preferences and previous experience the guests are willing to use this.

Concluding, it is recommended to make the cognitive system available to all guests, first as a concierge system. Based on the behavior, preferences and previous experience of the guest, the cognitive system can create a guest profile. Thereby, a cognitive system can be used for the check-in

and the checkout process. Lastly, it can be added in a hotel room or in the bungalow, to provide the guests with optimal service.

Cognitive computing is a new technology which offers the hospitality industry opportunities. It emphasizes the personal element of the communication with the guest, it creates guests' profiles to offer better, faster and personalized services. This enables the engagement between the empowered guests and the hospitality company in this fast-moving environment. Thereby, the cognitive is gathering new insights for the hospitality industry, which makes it possible to create unique experiences. It is recommended to do more in-depth research on this concept. Further research is needed to see if the cognitive system can be implemented in the business processes of the hospitality companies, what the exact costs are if this system is to be implemented and it need to be tested in practice.

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1. Introduction

In the first chapter, the problem indication of the research will be described. Thus, the goal, problem statement, the research question and sub-questions will be formulated. After that the theoretical and the practical relevance will be given. Lastly, the thesis outline will be presented.

1.1 Problem indication

The hospitality industry is still a growing business; between January and September 2016 destinations around the world welcomed 956 million international tourists. This is an increase of 4%, 34 million more than in the same period of 2015 (World Tourism Organization UNWTO, 2016). It can be said that the hospitality industry is the most resilient and fast-growing economy, but it is also very risky. Thereby, the competition in the hospitality industry is fierce and fast-moving (IBM Analytics, 2016). In the decision-making, the tourist is influenced by the social environment, marketing and current trends. This influence is exerted through channels such as the internet and social media (NRIT Media & CBS, 2016). Since June 2017, new regulations for 4G internet were introduced in Europe, which enable and simplifies the use of mobile internet (RTL Nieuws, 2017). Because the new regulations and the increase in available channels for planning travelling, guests are well-informed, empowered and have distinction. Edelman (2010) agrees with the fact that the explosion of technologies has contributed to the empowerment of guests. From any device, all over the world, guests can compare prices, services and other factors to find the best choice and create a unique experience based on their personal needs. Besides, when the consumers are not satisfied with their experience, they have more platforms to express their opinions on and express their frustrations.

Nowadays, the increasing complex interaction methods make it even more challenging to understand the needs and preferences of guests across diverse touchpoints. Touchpoints are the critical moments when customers interact with the organization and the companies' offerings on their way to purchase and after purchase (Rawson, Duncan, & Jones, 2013). During touchpoints, guests are accessible and more open for feedback. Touchpoints are visible with the business processes of hospitality companies, such as the reservation, check-in, information, and checkout. Guest that had a good guest experience tend to have higher trust, re-visit intention, and loyalty.

Thus, hospitality companies need to communicate correctly and at the most convenient moment of the guest to personalize (and optimize) the traveler's experience (IBM Analytics, 2016). According to IBM Analytics (2016) the hospitality industries can bridge the gap between untapped opportunities and current capabilities using cognitive analytics. Using cognitive computing on specific touchpoints of the guests within the business processes can create a personalized experience.

1.2 Scope

The scope of this research focuses on cognitive computing and the hospitality industry. Both cognitive computing and hospitality industry are broad terms, it is important to define the focus of the terms to get the most meaningful results for this research. Therefore, the focus lies on business processes for

hotel and bungalow parks and on how a cognitive system can build real-time dynamic profiles to gain personalized experiences. Such as recommending restaurants, attractions or directions, but also information, service during the stay and after the stay. The changes in the business processes in the guest service can help to increase guest satisfaction.

1.3 Problem statement

The aim of this research is to provide the hospitality industry with a business process model concerning the use of cognitive computing to create personalized experiences. The travel and hospitality industries are still growing. Hospitality companies face difficulties with empowered guests and insights in hidden data, that can be used for discovery, decision support and dialog. Cognitive computing can be a solution for the hospitality industry. This results in the following research question; *"What cognitive computing functionalities can be implemented in the business processes of a hospitality company to improve the guest's personalized experience?"*

To answer the main research question the following sub-questions needs to be answered;

1. *What cognitive computing functionalities are suitable for implementation in a business process of a hospitality company to improve personalized experience?*
2. *For what cognitive functionalities are guests willing to use a cognitive system?*

1.4 Theoretical and practical relevance

From a theoretical perspective, this study contributes to cognitive computing literature and to the hospitality industry literature. This study provides a business process model, that can be replicated in different settings and enhances current knowledge. The study of cognitive computing and how it can be applied in the hospitality industry provides new opportunities for literature.

The findings that this study provides can help companies to use cognitive computing in the hospitality industry. The use of cognitive computing makes it possible to create personalized experiences and gain a higher guest satisfaction. It can help the hospitality industry to use cognitive computing in the hotel and bungalow park to create personalized experience.

1.5 Thesis outline

This master thesis report is divided into six chapters. The first chapter, that is written above, is the introduction of this report. The introduction consists of a problem indication, problem statement, research questions, scope, theoretical and practical relevance and the thesis outline. Secondly, the theory of this report will be discussed. The theory is divided into different topics which are related to the research question and sub-questions. Furthermore, the third chapter, the methodology of this report is described. In the fourth chapter, the results of the research are written. After that the conclusion is written and the BPMN models are provided. Lastly, in the discussion, the limitations and need for further research are described.

2. Theory

The main concepts are described in this chapter. Concepts that are described include cognitive computing, applications of cognitive computing and performance business processes.

2.1 Systematic literature search

With a systematic literature search, the research starts with a research question. "On basis of which search queries are developed and outputs of searches are systematically selected -in or –out of what is needed" (Wijnhoven, 2014, p. 8). The four components of systematic literature search are (Wijnhoven, 2014, p. 8):

1. A clear research question and information needs definition;
2. Selection of literature databases before querying;
3. Defined search queries;
4. Systematic overviews and accounting of applied search strategies.

The research question is; *"What cognitive computing functionalities can be implemented in the business processes of a hospitality company to improve the guest's personalized experience?"*

The systematic literature search will provide an answer to the first sub-question;

- *What cognitive computing functionalities are suitable for implementation in a business process of a hospitality company to improve personalized experience?*

The scientific literature will be searched in scientific databases, like the library University of Twente (FINDUT), SCOPUS, Web of Science and Science direct. Google Scholar is used for searching less academic professional papers (Wijnhoven, 2014). Some information, like trends and development, are due to practical reasons searched by using other, not scientific, sources. The non-scientific data will be searched with the use of commercial search engines, like google.com. The systematic literature search will focus on the issue of cognitive computing within the tourism and the hospitality industry. The defined search queries are; Cognitive computing, Cognitive computing AND Hotels, Cognitive computing AND Hospitality industry, Cognitive computing AND Personalized experiences, Cognitive computing AND customer satisfaction, Personalized experience AND customer satisfaction, Trends AND Cognitive computing, Trends AND Hotels, Trends AND Hospitality industry, Service Blueprinting AND Hotels and BPMN model AND Hotels. For these results a systematic overview will be given in this theory chapter.

To subtract the relevant literature and data of all the data that is found in the systematic literature search, an analysis needs to be performed. The data from the systematic literature search needs to be recoded into information that can be used to find the relevant business processes of a hospitality company. This material can be used in the survey and case studies. Therefore, an operationalization on the different concepts will be presented. The operationalization of core concepts is to develop so called 'measurable instruments' (Verhoeven, 2007). These measurable instruments can be used to conduct the research.

2.2 Cognitive computing

The literature describes several things about cognitive computing. Wang, Kinsner and Zhang (2010) state that "cognitive computing is an emerging paradigm of intelligent computing methodologies and systems based on cognitive informatics that implements computational intelligence by autonomous inferences and perceptions mimicking the mechanisms of the brain" (p. 5). Modha et al. (2011) agree that "cognitive computing aims to develop a coherent, unified, universal mechanism inspired by the mind's capabilities" (p. 62). Cognitive computing can lead to new learning systems and to applications that will integrate and analyze data from many different sources (Modha, et al., 2011). "Cognitive computing can interact with humans in an innovative way, thus fostering collaboration among people and machines and the adoption of innovative decision strategies as well as personalized support systems for many fields of application" (Coccoli, Maresca, & Stanganelli, 2017, p. 2). Figure 2.1 shows the cognitive systems that act as knowledge creators (Coccoli, Maresca, & Stanganelli, 2017). This means that the users can interact with the cognitive system. Therefore, the users must give proper information to the cognitive system. When this is done in the right manner, the knowledge transfer will be a fundamental key for a successful business (Coccoli, Maresca, & Stanganelli, 2017). Noor (2015) combines everything that was mentioned before and appoints the following definition of cognitive computing; "cognitive computing refers to the development of computer systems modeled after the human brain, which has natural language processing capability, learn from experience, interact with humans in a natural way, and help in making decisions based on what it learns" (p. 76). Cognitive computing has six major characteristics (Noor, 2015), see Table 2.1.

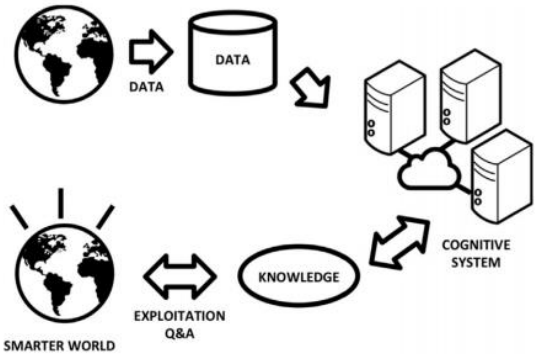

Figure 2.1 Cognitive systems act as knowledge creators (Coccoli, Maresca, & Stanganelli, 2017)

Table 2.1 Characteristics of cognitive computing

Information adept	According to Noor (2015) a cognitive system can integrate big data from multiple heterogeneous sources. Chen, Argentines and Weber (2016) agree that cognitive systems are specifically designed to integrate and analyze large datasets. A cognitive system can synthesize big data into ideas or answers (Noor, 2015). A cognitive system will not offer a definitive answer, in fact the system does not "know" the answer. The cognitive system is designed to weigh information and ideas from multiple heterogeneous sources, to reason and subsequently offer hypotheses for consideration (Kelly III, 2015).

Dynamic training and adaptive learning	Noor (2015) argues that by new information, analyses, users, interactions, contexts of inquiry or activity a cognitive system will learn and change. IBM Analytics (2016) agree that a cognitive system builds knowledge by learning. Travelers generate data if they interact with hotel chains, online travel agents, airlines, car rental agencies and other services, as well in a conversation with staff of a company and each other on social media. "Each piece of behavioral data, a click on a website, a high-value booking, a hotel search from a smartphone, reveals something about the traveler's behavior and preferences" (IBM Analytics, 2016, p. 2).
Probabilistic	A cognitive system discovers relevant patterns based on context (Noor, 2015). Kelly III (2015) states that this "system is designed to adapt and make sense of the complexity and unpredictability of unstructured information" (p. 5). Noor (2015) adds that a cognitive system enables anyone to discover new patterns to inform better decisions. Thereby, it predicts the probability of valuable connections and return answers based on learning and deep inferencing. A kind of machine-aided serendipity, which find unexpected patterns.
Highly integrated	All modules contribute to a central learning system and are affected by new data, interactions and each other's historical data (Noor, 2015). Kelly III (2015) argues that cognitive computing refers to systems that learn, reason and interact with humans in a natural way. Rather than being explicitly programmed, the systems learn and reason from the interactions with the humans and from their experiences with the environment.
Meaning-based	A cognitive system leverage language structure, semantics and relationships (Noor, 2015). This system can "read" text, "see" images and "hear" natural speech. The cognitive system first interprets and organize the information, then the system will offer explanations of the meaning, this is along with the rationale for the conclusions (Kelly III, 2015).

Highly interactive

According to Noor (2015) a cognitive system is "providing tools and interaction designs to facilitate advanced communications within the integrated system and incorporating stateful human-computer interactions, data analysis and visualizations" (p.77). Kelly III (2015) argues that a cognitive system creates deeper human engagement, which results in fully interactions with humans, based on the mode, form and quality each human prefers.

Based on the theory, described above, Figure 2.2 is created. Figure 2.2 shows the functionalities of cognitive computing. Firstly, a cognitive system can integrate big data from multiple heterogeneous sources. Big data generates large amounts of data from different heterogeneous sources. A cognitive system can compound the big data into ideas or answers. The term of big data is mainly used to describe enormous datasets. However, big data is a progressive innovation, which establishes methods of data processing on massive skills (Lugmayr, Stockleben, Scheib, & Mailaparampil, 2017). Khan and Vorley (2017) argue that big data is raw in nature and can be found everywhere. Big data summarizes technological developments of data storage and data processing. Big Data provide and value large amount of data coming from social networks, other information and communication technologies (Schermann, et al., 2014).

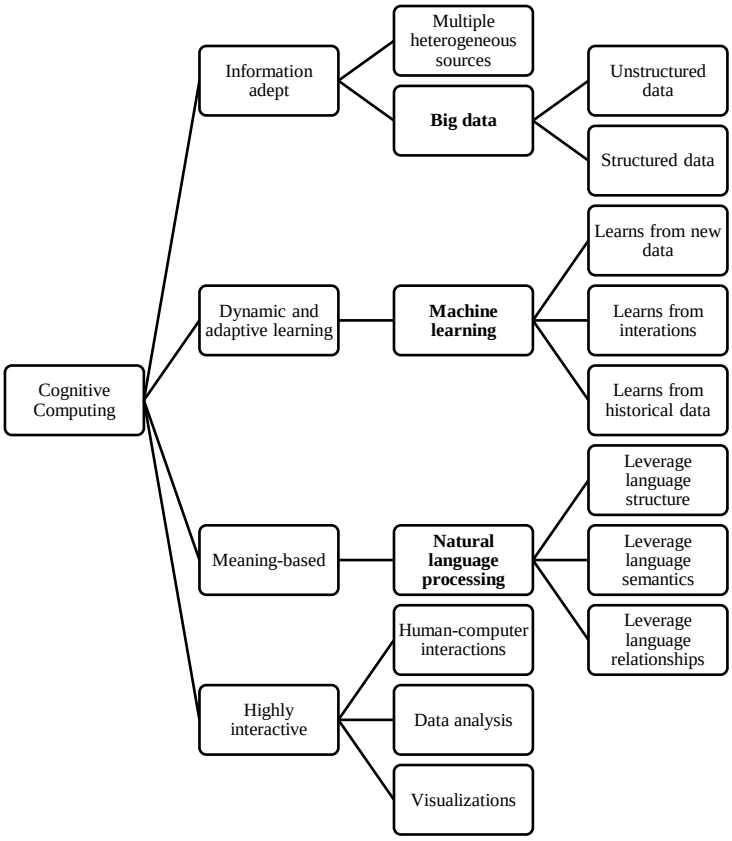

Figure 2.2 Functionalities of cognitive computing

Khan and Vorley (2017) point out that big data are "huge amounts of structured and unstructured data comprising billions of data points or observations, which can be accessed in real time and is characterized by its volume, velocity and variety" (p. 2). "Big data technologies describe a new generation of technologies and architectures, designed to economically extract value from very large volumes of a wide variety of data, by enabling the high-velocity capture, discovery, and/or analysis" (Moorthy, Baby, & Senthamaraiselvi, 2014, p. 415). With this definition, characteristics of

big data may be summarized as three Vs, i.e., Volume (great volume), Variety (various modalities), Velocity (rapid generation). The fourth V is Value (huge value, but very low density).

"Cognitive computing means enabling machines to learn and evolve through experience, reason with purpose and interact with humans in a more natural way" (Hartree Centre, 2017). Therefore, the second concept natural language processing is described. A tool for interaction in a more natural way is natural language processing. Zou, Kiviniemi and Jones (2017) suggest that natural language processing deals with interactions between computer- and human language. Natural language processing includes approaches that use computers to analyze, determine semantic similarity and it also translates between languages (Martinez, 2010). Natural language processing is overlapping in computational linguistics, artificial intelligence and computer science (Zou, Kiviniemi, & Jones, 2017). Processing natural language text involves more than only determining the meaning of paragraphs or isolated sentences. Relating new information to knowledge which already exists in memory is also included.

In a cognitive system, natural language processing works to accurately transform human speech into machine-readable text, analyzing the text's vocabulary and structure to extract meaning, generate a sensible response and reply in human-sounding voice (Roush, 2003). In this process, it is important that the computer can recognize the voice of the human. According to Metha and McLoud (2003) the voice recognition software consists of four core processes. These processes are spoken recognition of human speech, synthesis of human readable characters into speech, speaker identification and verification and comprehension. These five processes are referred to as speech recognition, speech synthesis, speaker identification and verification, and natural language understanding. By speech recognition the computer can translate a dictated word into type. By speech synthesis the computer can produce the phonemes, the user can listen to the computer and confirm or correct recognition of the spoken word. "By speaker identification and verification, the technology is dealing with the identity of the human. With speaker verification, technology is applied to authenticate a given human speaker against a database pool of enrolled candidates" (Mehta & McLoud, 2003, p. 180). By natural language understanding, the computer can understand the meaning of each word dictated or typed. A cognitive system can understand all four core processes of the voice recognition. This makes it possible for a cognitive system to interact with humans.

A cognitive system uses machine learning to improve and correct its understanding, this is done with training and use (Kelly III, 2015). Therefore, the concept of machine learning is described. According to Alpaydin (2011) machine learning computers are programmed to optimize a performance criterion, hereby the computer uses example data or experience. A computer learns to perform different tasks by studying a training set of examples, that is the idea behind machine learning (Louridas & Ebert, 2016). Vahdat, Oneto, Anguita, Funk and Rauterberg (2015) state that "machine learning is a field of research which develops and studies algorithms that can learn from and make predictions on data" (p. 14).

The algorithms of machine learning are classified into two learning algorithms; supervised and unsupervised (Alpaydin, 2011). Louridas and Ebert (2016) explain supervised learning and unsupervised learning as follows. By supervised learning the training set contains data and the correct output of the task with the data. Supervised learning contains classification algorithms, these classification algorithms learn the computer how to classify new data. There are also regression algorithms, these predict a value of an entity's attribute. Unsupervised learning contains data, but no solutions in the training set, the computer needs to find them by itself. Unsupervised learning uses clustering algorithms, these algorithms take the input of a dataset covering different dimensions and divide into clusters based on criteria. Besides there are dimensionality reeducation algorithms, which will project the data in fewer dimensions.

Based on changes in new information, user, task context or goal a cognitive computing system can constantly reevaluate. Before seeking the answer, a cognitive computing system needs to understand the question or context. Noor (2015) points out that a cognitive system offers multiple answers, which are weighted for confidence. Cognitive solutions can understand different texts in different types of data, like a structured database with scientific publications (Chen, Argentinis, & Weber, 2016). It can turn big data into smart data which results in useful knowledge. The users can interact with the system in a kind of continuing conversation. A cognitive computing system must be dynamic and the system needs to learn. Four layers of cognitive computing system can be identified (Noor, 2015, p. 77);

- Static and dynamic learning systems
- Data organization and interpretation
- Architecture / design of the system
- Core components

The Building blocks in a cognitive system are developed, novel hardware, programming languages, applications and simulators. Noor (2015) states that "the new hardware includes new electronic neuromorphic technology for processing sensory data, such as images and sound, and responding to changes in data in ways not specifically programmed" (p. 78). Over time the chip in the cognitive computing systems has been changed. In 2014, a new chip with one million neurons, 256 synapses, 5.4 billion transistors and an-chip network of 4.096 cores was built by IBM. These neurosynaptic cores operate parallel, integrate memory, computation and communicate. Different chips communicate with each other. "The neurosynaptic technology opens new computing frontiers for distributed sensor and supercomputing, and robotic applications" (Noor, 2015, p. 78).

According to Noor (2015) "a cognitive system is one that performs some of the functions of human cognition – learning, understanding, planning, deciding, communicating, problem solving, analyzing, synthesizing, and judging" (p.78). To adapt to changing situations, detect novelty, seek out data, and augment human cognition, some smart systems use "brute force" computation to perform

their tasks, others use machine (deep) learning. Humans exclusively use pattern recognition, natural language processing, complex communication, learning and other domains, but emerging cognitive systems are being equipped with broad abilities to also use this. According to Noor (2015) "the cognitive socio-technical systems are managed in a more holistic and intelligent way, using lean operational practices and cognitive technologies that can ultimately contribute to improving the reliability and responsiveness of customer service and the whole economics of the system" (p.78). Every industry and every enterprise will eventually be impacted by cognitive systems. Noor (2015) states that "they will significantly increase human productivity through assisting, advertising, and extending the capabilities of humans" (p.79).

There are different kinds of cognitive systems. First there are cognitive materials, "increasing interest has been shown in the development of cognitive materials concepts through integrated sensing and intelligence (sensorial material concepts), beyond self-healing materials" (Noor, 2015, p. 79). The goal is to develop a system that inform engineers how it feels, where it hurts and how the shape changed. Secondly, cognitive camera's, "a cognitive camera can understand and interact with the surroundings, intelligently analyze complex scenes, and interact with the users" (Noor, 2015, p. 79). In a wearable form, it can re-enforce the human vision. Thirdly, the cognitive robots, these include robustness, adaptability, deep learning and on-time decisions. "Further cognitive robots will be equipped with advanced perception, dexterity and manipulation to enable them to adapt to reason, act and perceive in changing, incompletely known, and unpredictable environments (Noor, 2015, p. 80). This is providing the robots capabilities, to serve as human assistance or companions. The fourth are the cognitive cars, according to Noor (2015) "cognitive cars are equipped with integrated sensors, camera's, GPS navigation system and radar devices that provide coordinates and information gathered on the road to other cars, equipped with the same car-to-car communications systems" (p.81). The goal of this technology is protecting the drivers, passengers and passers-bys. Lastly, the cognitive aircrafts / Unmanned Aerial Vehicles (UAVs), "cognitive UAVs make decisions that involve non-deterministic, stochastic, and emergent behavior" (Noor, 2015, p. 82). This behavior is not pre-planned and pre-programmed. It first will be used in by the military aircrafts.

The focus of this research lies on cognitive robots. In 2011, IBM built a cognitive computer system called Watson. Fulbright (2016) states that Watson is receiving clues in natural language and gives answers in natural spoken language. The answers given by Watson were the results of searching and deep reasoning about a lot of sources of information. IBM Analytics (2016) argue that the natural fit for a cognitive-based system is customer engagement. This cognitive-based system can interact better with humans than other programmable systems. "The cognitive system builds knowledge by learning from previous actions and information, and then uses the resulting knowledge base as an engine for discovery and decision support" (IBM Analytics, 2016, p. 2). This means that over time, these cognitive systems are providing a more personal insight, because cognitive systems continuously

learn and adapt the recommendations and findings as new information, actions and outcomes arrive (IBM Analytics, 2016).

Summarizing, cognitive computing is the development of computer systems modeled after the human brain. Cognitive computing systems learn from experience, make decisions based on what they learn and have natural language processing capability. This makes it possible to interact with humans in a natural way. Cognitive computing systems can combine unstructured big data with structured data from multiple heterogeneous sources.

2.3 Applications of cognitive computing

The functionalities of a cognitive computing system are described in the chapter 2.2. Based on this theory it is clear that these functionalities can be used in different applications. Table 2.2 illustrates which functionalities can be applied in the following four applications; concierge system, creating guest profile, check-in and checkout process and a cognitive system in the residence. As can been seen in Table 2.2 the applications of a concierge system, guest profile, check-in and checkout process and a cognitive system in residence use the functionalities of information adept, machine learning, natural language processing and interaction. During these applications the cognitive system constantly seeks for information in heterogenous sources and big data. Thereby, the cognitive system interacts with humans in a natural way by natural language processing. Due to the training and use in these applications the cognitive system is capable to use the functionality of machine learning.

Table 2.2 functionalities and applications of a cognitive computing system

Applications	**Functionalities**			
	Information adept	Machine learning	Natural language processing	Interaction
Concierge system	✓	✓	✓	✓
Guest profile	✓	✓	✓	✓
Check-in and checkout	✓	✓	✓	✓
Cognitive system in residence	✓	✓	✓	✓

2.3.1 Case study of cognitive computing: IBM Watson in the hotel industry

In the following case study the applications of the cognitive system as a concierge system and in the residence are described. These two applications use the following functionalities; information adept, machine learning, natural language processing and interaction. IBM Watson did a case study in a hotel, whereby the hotel creates a cognitive concierge to engage guests and gain insights. The goals of this study were personalizing the experience and improve guest service. Today, hotels are trying to make irresistible and memorable experience for the guests, that is increasingly tailored to their needs.

Hilton Worldwide and IBM collaborate with the pilot “Connie”, this is the first Watson robot in the hospitality industry. In this collaboration, WayBlazer participates. WayBlazer is the first cognitive travel recommendation engine, using IBM Watson and cognitive computing technology. Rob High (2016) states "this project with Hilton and WayBlazer represents an important shift in human-machine interaction, enabled by the embodiment of Watson's cognitive computing." Connie is

the concierge of the hotel, it can inform guests about local tourist attractions, dining recommendations and hotel features and amenities (IBM, 2016). Hilton (2016) adds that Connie works side by side with the team, Connie assists with guest requests, empowers travelers with more information to help them with planning the trips and personalizes the guest experience. Jonathan Wilson (2016) said that "Hilton focused on reimagining the entire travel experience to make it smarter, easier and more enjoyable for guests."

Connie learns to interact with guests and to respond friendly and informative to their questions. To greet guests upon arrival and answer questions about hotel amenities, services and hours of operations is enabled by a combination of Watson API's, including dialogue, speech to text, text to speech and natural language classifier. Through senses, learning and experience, Watson can understand the world in the same way that humans understand the world. WayBlazer analyze cues and triggers from the travelers search to personalize for the individual traveler. Using WayBlazer's extensive travel domain knowledge, it is possible to suggest local attractions in the area of the hotel or city (IBM, 2016). Felix Laboy (2016) state that "WayBlazer is excited to bring Watson's cognitive computing capabilities directly to the traveler to improve the in-destination experience" and "WayBlazer believes providing personalized and relevant insights and recommendations, specifically through a new form factor such as a robot, can transform brand engagement and loyalty at the Hilton."

According to Hilton (2016) the more guests are interacting with the system, the more Connie learns, adapts and improves its recommendations. Thereby, the questions asked and answers that Connie gave are saved and this enables the hotel to improve the guests experience before, during and after the stay. Rob High (2016) states that "Watson helps Connie understand and respond naturally to the needs and interests of Hilton's guests, which is an experience that is particularly powerful in a hospitality setting, where it can lead to deeper guest engagement."

IBM also created an in-room concierge, this is delivering new levels of experience and simplicity to hospitality industries. IBM cognitive technologies are implemented in sound bars and alarm clocks, which makes it possible for consumers to interact with using natural language. These questions are sent to the Watson cloud (Harman, 2017). Kevin Morrison (2017) states that "We're solving a very distinct problem in hotel, hospital and conference rooms, where people experience unfamiliar environments yet need to perform very simple tasks, such as changing room temperature, adjusting the lighting, opening the blinds, initiating conference calls or launching a presentation." These voice-enabled cognitive rooms make an intuitive experience for travelers. Thereby, "these voice-enabled cognitive rooms also function as an in-room concierge that can answer general questions or site-specific questions developed by the facility and featuring custom answers created by staff" (Harman, 2017). Questions that a guest could ask can be "What time is checkout? "or "Where is the gym?". As well users can use Watson for service requests, including amenity replenishments, restaurant reservations, late checkout, room service, shuttle service and more.

In the case study a cognitive computing system has been implemented in the service processes of a company. Improving the guest experience by personalization and increasing the guests' satisfaction. Therefore, the concepts of service processes, personalized experience and customer satisfaction are described below.

2.4 Performance business processes

A process can be defined as the organization of activities with an explicit beginning and ending, which is deliberately focusing on the creation of a service for the (internal) customer. Processes are related to each other, the output of a process functions as the input for another process (Kleijn & Rorink, 2012). Davenpoort (2005) confirms this statement as he defines a business process as "simply how an organization works – the set of activities it pursues to accomplish a particular objective for a particular customer, either internal or external" (p. 102). According to Milton and Johnson (2012) service blueprinting is mostly used to represent service processes. "The customer-focused perspective of service blueprinting is very useful in understanding the critical touchpoints driving service satisfaction" (Milton & Johnson, 2012, p. 618).

Shostack developed service blueprinting in the 1980s and it is further analyzed by Kingman-Brundage (Milton & Johnson, 2012). Service blueprinting is commonly used by service providers to design and manage service processes (Kostopoulos, Gounaris, & Boukis, 2012). Shostack (1984) argues that blueprinting a service involves issues, like identifying processes, isolating failure points, establishing a time frame, and analyzing profitability. A service blueprint does not show the viewpoint of the organization, but of the viewpoint of the customer. Milton and Johnson (2012) state that "key features of service blueprints are customer actions, specifically interactions with individuals in the firm and/or technology (e.g. websites) and the physical evidence that is perceived by the customer during the various stages of service delivery" (p. 608). The consistent reproduction to realize the full design of the process is a crucial aspect of service blueprinting. The service blueprint makes it possible for all entities in an organization to visualize the entire service process as well as the underling business processes.

"Blueprinting focuses on service design which must have clarity of outcomes and processes involving the customer and a clear understanding of how experience builds via touchpoints with the firm" (Milton & Johnson, 2012, p. 609). In a service blueprint, customer actions are central along with visible and invisible contact employee actions and support processes. A key element in the customer's evaluation of service quality is the physical evidence which plays an important role.

According to Bitner, Ostrom and Morgan (2008) there are five components of which typical service blueprinting consists. These components are customer actions, onstage/visible contact employee actions, backstage/invisible contact employee actions, support processes, and physical evidence. These five components are visible in Figure 2.3. Amongst these five components are different concepts. The different concepts of a service blueprinting are described in Table 2.3.

Table 2.3 Core concepts in service blueprinting (Milton & Johnson, 2012, p. 609)

Action	Actions that customers, front-stage personnel, back-stage personnel, and support staff perform in a service
Action flow	Sequencing of actions
Line of visibility	Interface between customers and front-stage personnel
Line of internal interaction	Interface between front-stage and back-stage personnel
Line of implementation	Interface between back-stage and support personnel
Communications flow	Flow of communication between any participants in the service
Actor categories	Customers, front-stage personnel, back-stage personnel, support/ implementation personnel
Physical evidence	Anything seen by the customer in the process of the service delivery

The strengths of service blueprinting are the versatility and flexibility. An important weak point of service blueprinting is that it can be used in different ways. There is no outline or rules in place on how to interpret the service blueprinting (Bitner, Ostrom, & Morgan, 2008).

Figure 2.3 shows the actions of the guests in a hotel. More specifically the actions that guests do that involves employees. In addition, these actions are classified as moments of truth as well as other actions that guests engage in as part of the service delivery process. The service blueprint captures the entire guest service experience. The onstage actions, backstage actions and the support processes are affecting the guest service experience of a hotel guest. Onstage actions are performed by the front desk employees, concierge and the employees who deliver the room service. Backstage actions with employees involve the reservation, taking the bags to the room and taking the orders. The support systems are the reservation system, the registrations systems and preparing the food and beverages. Hotels have physical evidence that if the guests are exposed to that, it can impact their perception of quality. This service blueprinting can be implemented in all hospitality companies with guests which have an overnight stay.

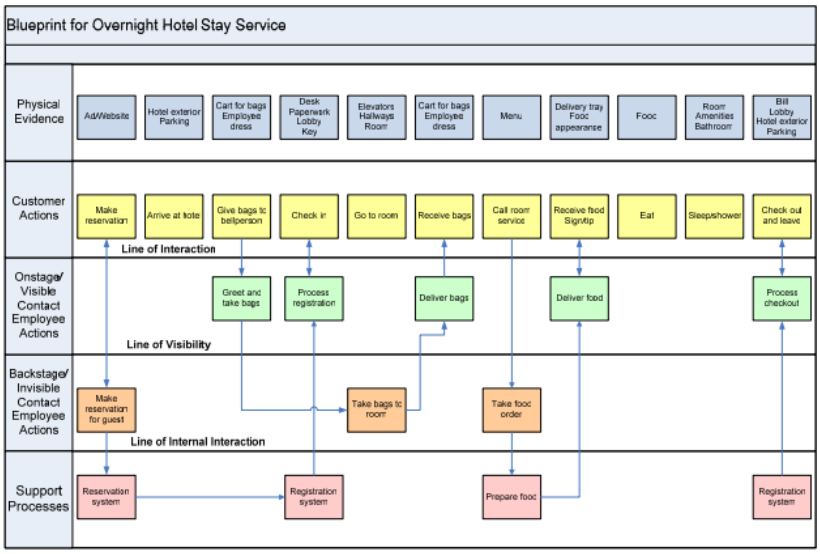

Figure 2.3 Blueprint hotel (Bitner, Ostrom, & Morgan, 2008)

2.4.1 Personalized experience

Information overload arises through the development of internet technology and it's continuously changing environment which resulted in an expansion of information (Chen, Goa, Zhu, Tian, & Yang, 2017). Jiang, Yin, Wang and Yu (2013) argue that tagging is piercing in on photo sharing websites. "By adding extra information to the photos with textual tags, comments, and even voice tags, tagging makes these photos more easily to be indexed, searched, interpreted and shared" (Jiang, Yin, Wang, & Yu , 2013, p. 17). All the photos with the contextual information consist of a valuable database which is free as well. Shen, Deng and Gao (2016) suggest that nowadays during travelling, travelers take photos, write comments and make scores about their travel experience. Travelers are generating data at an enormous rate when they interact with online travel agents, hotel chains, airlines, car rental agencies and specialized suppliers (IBM Analytics, 2016). This is done when the travelers interact with companies, but also when they talk to other travelers, for example on social media.

Travelers upload this, so called, heterogeneous information, which can be considered as their travel preferences and experiences, called collective intelligence (Shen, Deng, & Gao, 2016). Every single piece of behavioral data; a click on a website, a high-value booking, a hotel search from a smartphone says something about the behavior and preferences of the traveler (IBM Analytics, 2016). "Moreover, considering massive travel information, an intelligent website or system should take advantage of collective intelligence for content-based personalized attraction recommendation. Therefore, it is more desirable to mine knowledge from heterogeneous collective intelligence and combine personalization in the coming intelligent travel recommendation system" (Shen, Deng, & Gao, 2016, p. 789).

"A recommender system is defined as the system which recommends an appropriate product or service to certain customers according to customer's need" (Shih, Yen, Lin, & Shih, 2011, p. 15345). Montaner, Lopéz and Lluís De La Rosa (2003) argue that personalized search engines, intelligent software agents, and recommender systems are supportive during the searching, sorting, classifying and filtering of information, these systems are accepted by the users. "The combination of modelling particular user preferences, building content models and modeling social patterns in intelligent agents seems to be an ideal solution" (Montaner, López, & Lluís De La Rosa, 2003, p. 326). The recommender system uses different methods to provide travelers with a personalized experience. Shih, Yen, Lin and Shih (2011) deliberate on three general types of recommender systems, which are the content-based approach, the collaborative filtering approach and the hybrid filtering approach. The content-based filtering approach makes predictions by analyzing the user's pervious preferences, which can be indicators for the future behavior. The most popular method that is used in recommender systems is collaborative filtering. "Collaborative filtering is a method for calculating the expected user preferences for a product, using evaluation by, or the preferences of, other users who have experienced the product" (Shih, Yen, Lin, & Shih, 2011, p. 15346). By hybrid recommender systems two or more recommendation techniques are combined to improve the performance level. The collaborative

filtering technique is mostly combined with another technique. In recent years recommender systems have become more popular in the travel industry. For instance, when travelers want to visit popular attractions, but are unfamiliar with the attractions travel recommendations can assist the travelers. Travel attraction recommendation identifies the travelers' preferences and shows the traveler the most popular and suitable attractions. In that way, the travel attraction recommendation is used in planning the trip for travelers (Shen, Deng, & Gao, 2016). Figure 2.4 illustrates the operationalization of the concept personalized experience.

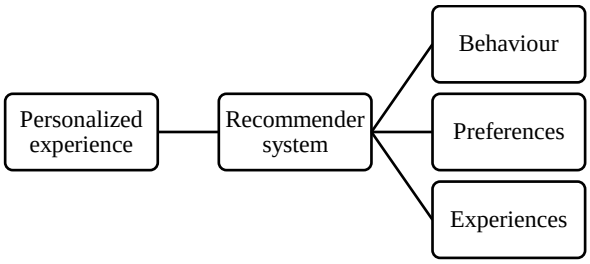

Figure 2.4 Operationalization personalized experience

2.4.2 Customer satisfaction

Customer satisfaction can be defined in different ways. Flott (2002) defines customer satisfaction as "a state of mind that customers have about their expectations over the lifetime of a product or service" (p. 59). According to Bolton and Drew (1991) customer satisfaction is based on the prior expectations and the actual performance. It can be characterized after a purchase or service to the surprise of the customer. Chen and Tsai (2008) agree with the above stated definition, their view on the matter is that "customer satisfaction is the evaluation output of a customer's comparison of expected performance with perceived actual performance" (p. 1168).

To gain a better understanding of the term 'customer satisfaction', the terms expectation and actual performance will be described as well. To get customer satisfaction, customers' expectations need to be consistent with the actual performance. De Vries jr. and van Helsdingen (2009) argue that expectations are based on certain requirements, these requirements are based on personal norms, values, wishes, needs and external circumstances.

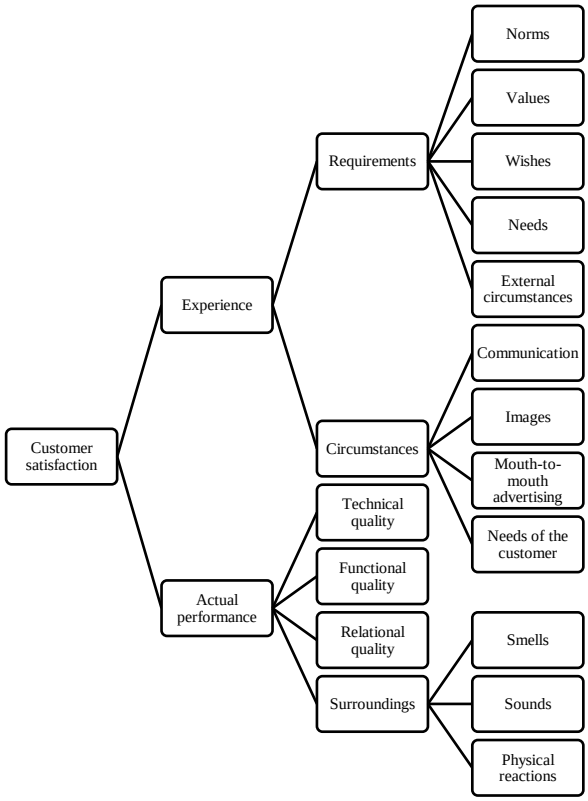

Figure 2.5 Operationalization customer satisfaction

For that reason, expectations can be influenced through different circumstances, such as communication, image, mouth-to-mouth advertising and the needs of the customer. The experienced quality is influenced by the technical quality (what), the functional quality (how) and the relational quality (who). Bruner (2011) adds that expectations are based on advanced pictures and words, the actual performance is affected by smells, sounds and physical reactions. Figure 2.5 visualizes the operationalization of the concept customer satisfaction.

Customer satisfaction evidently has a direct influence on a customers' behavioral intentions or loyalty (Chen & Tsai, 2008). McLean and Wilson (2016) agree that a positive customer experience can be identified by satisfaction, trust, re-visit intention, re-purchase intention and loyalty, see Figure 2.6. Whyte (2002) cites "loyalty enables firms to direct their efforts into investing resources in retaining those customers who have the potential to be lifelong customers" (p. 19). Towards a product or brand, customer loyalty is generally conceptualized as attitudinal and behavioral. The difference between these two is that attitudinal loyalty refers to the preference and favorable attitude towards the product or brand while behavioral loyalty is referring to repeating a purchase (Sato, Kim, Buning, & Harada, 2016).

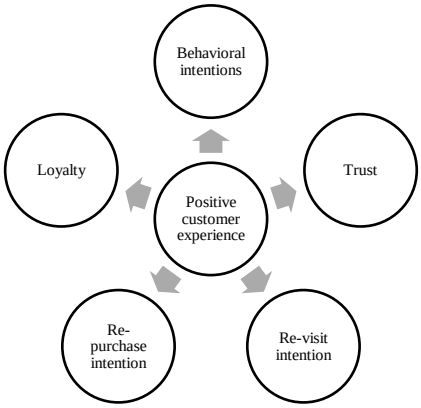

Figure 2.6 Results customer satisfaction

3. Methodology

In this chapter, the employed research design will be described.

3.1 Data collection

The decision has been made to use; systematic literature search, case studies and a survey to collect the required data. The term systematic literature search is elaborated upon in chapter two, the other two data collection methods are described below.

3.1.1 Case study

A case study is a qualitative research method (Verhoeven, 2007). This involves an intensive study of a single case where, at least in part, the purpose of the study is to focus on certain larger cases. Case study research may incorporate several cases (Gerring, 2007). According to Verhoeven (2007) case studies have a broad application, the case studies are mainly applied in organizational and policy research. In an organization a problem analysis is conducted and subsequently there will be a proposal for change or renewal.

In this research, two case studies are performed for both a hotel and a bungalow park. These two companies provide information about their businesses, but also information about the guests' actions in the hotel and on the bungalow park. This may be in the form of a service blueprint, a BPMN

model or in a written text. The hotel and the bungalow park fulfill the following criteria: being part of a chain and located in the Netherlands. The criteria in regards to a hotel/bungalow park chain are set, since it may/can also be applied to other organizations within the chain. The other criteria, location (the Netherlands), has been chosen, because of the accessibility of the research.

First, general information about the hotel and the bungalow park will be written, such as the chain, core values, facilities, room/bungalow specifications and the surroundings. After that the business processes will be visualized and defined. Based on the current business processes a cognitive system will be implemented and visualized. Recommendations for each company will be written. Consequently, the information and the business processes in the case studies of the hotel and the bungalow park will be analyzed.

3.1.2 Survey

A survey is a quantitative research, hereby the researcher collects numerical data. The data will be entered into a database, which allows analysis through use of statistical techniques (Verhoeven, 2007). According to Verhoeven (2007) a survey is the most common method to measure the opinions, attitude and knowledge of a large group of people. This method is mainly used to answer descriptive and explanatory questions and is applied in market research, policy research, communication research and general opinion research. A survey research is a structured data collection method, this means that the question has been established in advance and the surveyed can choose an answer out of a small group of answer options.

There are different types of surveys used in research; written surveys, telephone surveys, face to face surveys and internet surveys. In this research, the decision had been made to use an internet survey. Saunders, Lewis and Hornhill (2004) suggest that the response rate, validity and reliability can be optimized by:

- Set up individual questions
- A clear layout
- A clear explanation of the purpose of the questionnaire
- A trial questionnaire first
- Plan and execute the administration

People who participate in a survey are called respondents. The sample for the survey is randomly selected. The reason for this is that every person in the population has an equal chance to participate in the research (Verhoeven, 2007). If the sample is aselect and this group has the right important features of the population, then it is a representative research. The bigger the sample, the better the reflection of the population, then the conclusion out of the analysis can be generalized to the population. The population for this research consists out of the people who have been in a hotel and/or bungalow park before, this can be for business or for leisure purposes. According to the rule of thumb, the sample size

need to be at least 100 to achieve a power level of 0.80 at the significance level of 0.05%. If the sample size increases, the power also increases (Henseler, 2016).

The survey is based on theory of the different concepts; cognitive computing, business processes personalized experience and guest satisfaction. The objective of the survey is to map the need for a cognitive system considering the guests, who are a valuable indicator in regards to the implementation a cognitive system and how these respondents want to use the cognitive system. Therefore, the survey provides an answer on the second sub-question;

- *For what cognitive functionalities are guests willing to use a cognitive system?*

The survey consists of 43 questions, made in the Qualtrics online survey tool. The survey will be distributed through social media (Facebook and LinkedIn) and thereby an anonymous link will be send to others, which do not possess a social media account. In total, the survey will be online for twelve days (29-06-2017 until 10-07-2017), then all the answers need to be collected.

To analyze the results of the survey, the data in the Qualtrics online survey tool, will be exported to SPSS. In SPSS, first frequencies tables will be created from the data set. Because there are multiple response questions in the survey, these multiple response questions need to be defined in variable sets, which then can be used as a frequency table.

Through the use of relevant literature, case studies, opinions of the people in combination with creative thinking a Business Process Modeling Notation (BPMN) model can be designed. BPMN is internationally used to indicate processes. The BPMN model is understandable by all users, the business users that create initial drafts, implement technology that will perform, will manage and monitor the processes. This makes it possible for every employee to understand the processes in their job. The business processes of hospitality companies with a cognitive system are visualized with (BPMN), more details about the BPMN model can be found in appendix I. Hereby the cognitive system can replace some actions of the employees. To create the BPMN models the software of Bizagi Modeler will be used.

4. Results

4.1 Case study: Resort Bad Boekelo

This case study concerns Resort Bad Boekelo. During this case study, the business processes of the hotel will be visualized. This visualization will be analyzed and used for the creation of the BPMN model.

4.1.1 About Resort Bad Boekelo

Resort Bad Boekelo is part of Hotels by Sheetz. Hotels by Sheetz was founded as a commercial, sales and marketing partnership in 2015. The strengths are bundled to a progressive label where hospitality has a high priority. Hotels by Sheetz stands for hospitality in the coastal, city or rural areas. The following hotels are part of the label:

- Grand Hotel Ter Duin Burgh-Haamstede
- Resort Bad Boekelo
- Hotel Oosterhout
- Luxury Boutique Hotel Venti (Kuşadası)

Grand Hotel Ter Duin Burgh-Haamstede, Resort Bad Boekelo and Hotel Oosterhout are in the Netherlands and Luxury Boutique Hotel Venti is based in Turkey. Management in combination with the experience in the hospitality industry guarantees great results. Under the guidance of Operations Director Sylvester Ponsen, the hotels will present themselves as a group as well as individual entities on the market (Sheetz, 2015).

The hotel is located in the east of the province Overijssel, the town is called Boekelo. The pastoral and wooded surroundings give the four-star hotel an idyllic setting. Resort Bad Boekelo has different room types: apartments (classic room, located on the first floor, terrace or balcony and has two single beds), classic room (located on the first floor, terrace or balcony and has two single beds), comfort room (modern room with a terrace or balcony and has two single beds) and suite (spacious suite with separated bed- and living room and has two single beds). The hotel offers the following facilities, see Table 4.1:

Table 4.1 Facilities Resort Bad Boekelo

❖ Free WIFI	❖ Meeting location
❖ Restaurant	❖ Indoor swimming pool
❖ Café/bar	❖ Turkish steam bath
❖ Breakfast service	❖ Sauna
❖ Tanning bed	❖ Beauty centrum
❖ Pool for children	❖ Laundromat
❖ Bowling alley	❖ Playground
❖ Pool table	❖ Bicycle
❖ Outdoor tennis court	❖ Recreation program during school holidays
❖ Table tennis	❖ Free parking

In total Resort Bad Boekelo has 144 accommodations (78 units and 66 hotel rooms). Furthermore, the reception desk is open 24 hours, seven days a week. These facilities enable the resort to also be used for other events such as business meetings or training. There are different teambuilding activities in the area. The available activities contribute to the establishment of a good team spirit, for example, forest wave, escape from the Escape room, a GPS trip or the dog mirror. The hotel is offering the following arrangements, three-day test arrangement Twente, three-day cycle package royal salt, two days golf arrangement, stress relief arrangement, and cycle arrangement Twente travel fairs.

4.1.2 Processes in Resort Bad Boekelo

The processes in Resort Bad Boekelo are visualized in Figure 4.1. The guests make a booking via the website or they call the reception. Backstage an employee makes the reservation in the reservation system. As soon as the reservation is made, the guests will receive a confirmation email from the Oaky system. The hotel is already using the Oaky system, before, during and after the stay. This system asks the guests to fill in their preferences before the stay, their preference in activities, room features and additional requirements stated by the guests. After the check-in, the system asks for feedback regarding their first impression of the hotel. The system also asks the guests if they have additional preferences or requests. After the stay the system asks for feedback. Oaky is the commission-free and personalized upsell platform for hotels to maximize profit and enhance the guest experience (Oaky, 2017). It works as followed, the guest receives a personal invitation with special deals by email, for instance room upgrades, pre-purchases or bicycles for rent. At the check-in, the guest receives for example bike tours and the keys for the upgraded suite. In the course of this process, the guest can provide feedback with the app. By using Oaky, the guest has been able to customize his stay before arrival and share the experience during the stay (Okay, 2017). Thus, the Oaky system is helping the hotel to make personalized experiences. The guest can give their preferences for their stay and the activities that they would like to do (de Waal, 2017). The guests arrive at the hotel, park their car and will be greeted by one of the employees. At the check-in, the employee will process the registration of the guest. When the check-in is done the guests are able to go to their room. After that the guest will receive an email from the Oaky system, the guest can give feedback about the check-in and can give additional wishes for the stay in the hotel.

During the stay the guests participate different activities, like wellness (is outsourced), but also do some activities outside the establishment of Resort Bad Boekelo. Because Resort Bad Boekelo is a four-star hotel, they do not have a concierge to go to for information or activities offered in the neighborhood. Therefore, the employees of the reception desk need to provide the information or answer the questions or help with a booking. Guests can order food by room service or they can go to the restaurant in the hotel. Employees will take the order, backstage the order will be prepared and the employees will serve the order in the restaurant or deliver it at the room. When the stay is over the guests will checkout at the reception desk. The employee enquires about the stay, makes everything in order in the registration system and says goodbye to the guests. After the stay the guests will receive an email which concerns the experience during their stay, hereby the hotel asks for feedback to improve their service in the hotel. The hotel is interested in new technologies (de Waal, 2017), which they believe is an addition to the guests' personal experience.

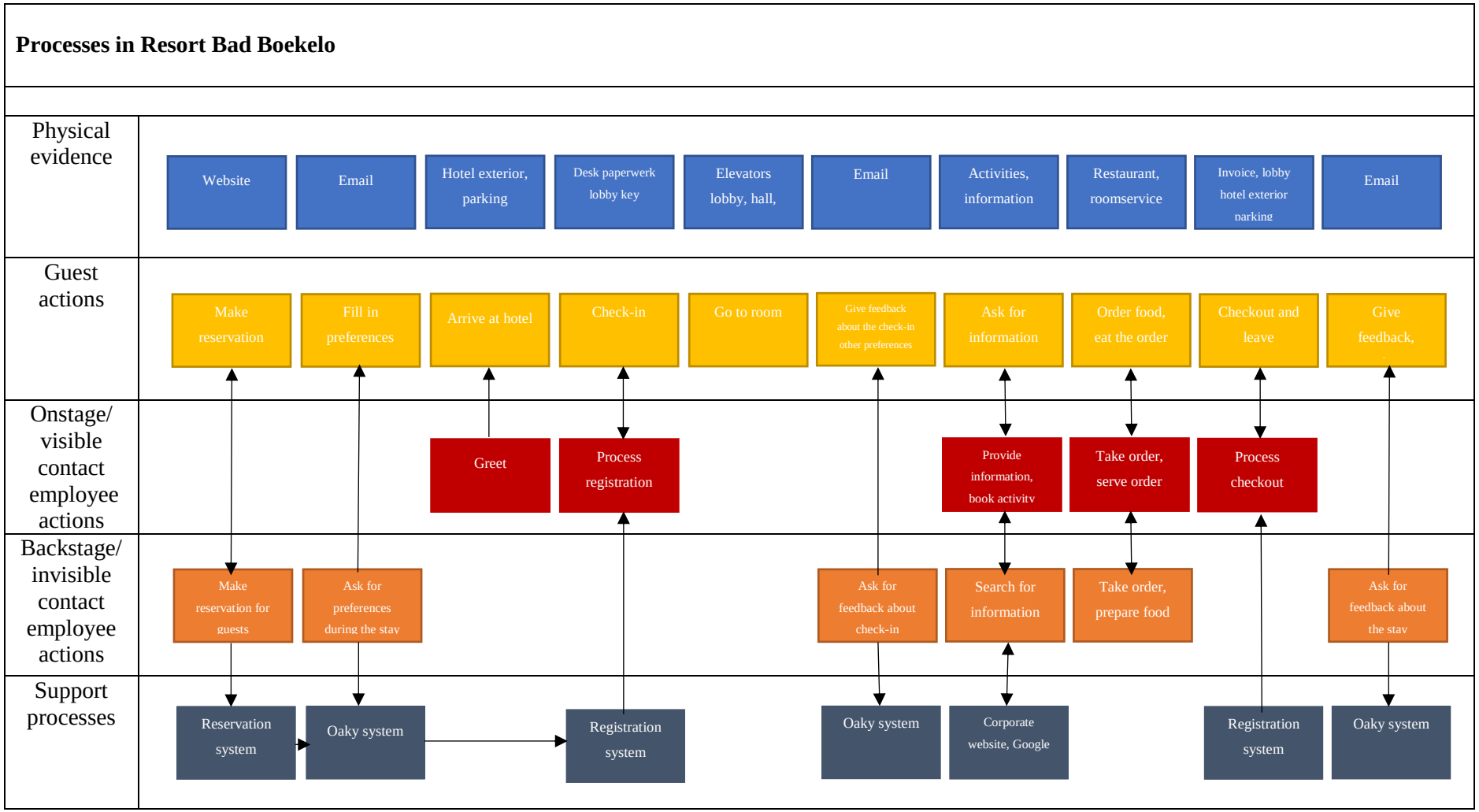

Figure 4.1 Visualization processes Resort Bad Boekelo

4.1.3 Recommendations for Resort Bad Boekelo

As can be seen in the visualization of the business processes there is a high level of guest activity. For example, making the reservation, filling in preferences, arriving at the hotel, checking in, going to room, giving feedback about check-in and giving further preferences, during the stay they can ask for information for activities or the guests have breakfast, lunch or dinner in the restaurant or order it. At the end of the stay the guest will checkout and they are given the option to leave feedback and/or a review about their experience during their stay. The cognitive system can be used in the different business processes at the different touchpoints. Figure 4.2 illustrates the business processes of Resort Bad Boekelo where the cognitive system is implemented. The green blocks include the concierge system and the grey blocks involves the additional implementation of the cognitive system in the business process. First a cognitive system can be used as a support system, but when guests are familiar with the system it can be fully implemented within the business processes, see Figure 4.2.

The recommendation for Hotel Resort Bad Boekelo is to first implement the cognitive system as a concierge during the stay. At this moment, the hotel has no concierge, implementing this system might be a good solution to cover this gap. The hotel is open to improvements regarding innovation, especially on the point of giving information to the guests. The benefits of using a concierge system for the hotel is that the guests can ask their questions and quickly receive an answer. During the stay, the cognitive system can be implemented in the business processes by the guest touchpoint with the organization asking for information. A cognitive system can provide the guest with information about the hotel, amenities, but also about the activities or the surroundings. If the guests ask for a restaurant which is specialized in fish, the cognitive system will give the name and the route to the restaurant. A cognitive system derives data from different heterogeneous sources, such as Google and TripAdvisor, this makes it possible to provide valuable information to the guests. The cognitive system continuously improves due to the fact that it can interact with humans in a natural way and it learns from the different interactions.

Using a cognitive system as a concierge system in the service processes of the hotel, is the first step. Hereby, the hotel as well as guests become familiar with a cognitive system. Out of the theory, it stands out that the cognitive system is able to be implemented in other business processes. It can create a guest profile, it can support the check-in and checkout process and it can be implemented in the hotel room to offer guest services. These recommendations are described below.

Firstly, it is recommended to use a cognitive system to generate data of the guests. During the reservation the guests can provide some personal information and preferences to the cognitive system. Hereby, a cognitive system can create a personal guest profile, with their personal data, preferences and previous experiences. When the guests arrive at the hotel, the cognitive system can greet the guests, the reason for this is that the cognitive system is able to transform human speech into machine-readable text, analyzing the text's vocabulary and structure to extract meaning. After the stay a cognitive system can be implemented as tool in offering after service. Hereby, the cognitive system

asks the guests for feedback. The provided feedback will be stored in the guests' profile. When the guests visit the hotel again the guests' profile can be consulted, including their previous experience to create new unique experiences.

Secondly, it is recommended to use a cognitive system for the check-in procedure. Here, it is important that the hotel also use the cognitive system before the stay. Because guests need to provide personal information for the check-in procedure. When the guests arrive in the lobby of the hotel, they can provide the cognitive system with some accurate information, such as name, so that the cognitive system can check the guests' profile. After the cognitive system has checked the details, it can check-in the guests. If a cognitive system is able to check-in guests it is also possible for the cognitive system to check out the guests. The checkout in a hotel, is simple handling for the employees, a cognitive system can do business process. It can be possible that the system just asks for the checkout and then everything is arranged, because the payment details are mostly done with the reservation or at the check-in.

Lastly, the cognitive system can be implemented in the hotel room. The cognitive system can be placed for example in the alarm clock. Because the cognitive system has natural language processing, the cognitive system is capable to interact with the guests in a natural way in the hotel room. In a voice-enabled cognitive room, guests can ask for services, such as late checkout, room service, amenity replenishments, restaurant reservations, shuttle service and more. The cognitive system will provide the guests with answers to their questions. Thereby, the cognitive system performs very simple tasks, such as a wakeup call, changing room temperature and adjusting the lighting.

Summarizing, a cognitive system can, through the use of the different touchpoints, identify the guests as individuals, this makes it possible to build a more dynamic profile. With this personalization, the hotel is able to offer a personalized vacation along with the desired activities, food and service. The added value of a cognitive system for the hotel is that the guest is provided with all the personal needs and preferences without having to wait for the availability of the employees at that moment in time. A critical point is that some guests do not want to provide personal data, preferences and previous experiences, because of the privacy reasons. Then the cognitive system cannot create a guest profile and is not able to give personalized options. In this case, it can be that the guests prefer an employee over a cognitive system for the check-in, information and checkout, therefore, the cognitive system needs to cooperate in accordance with the employee.

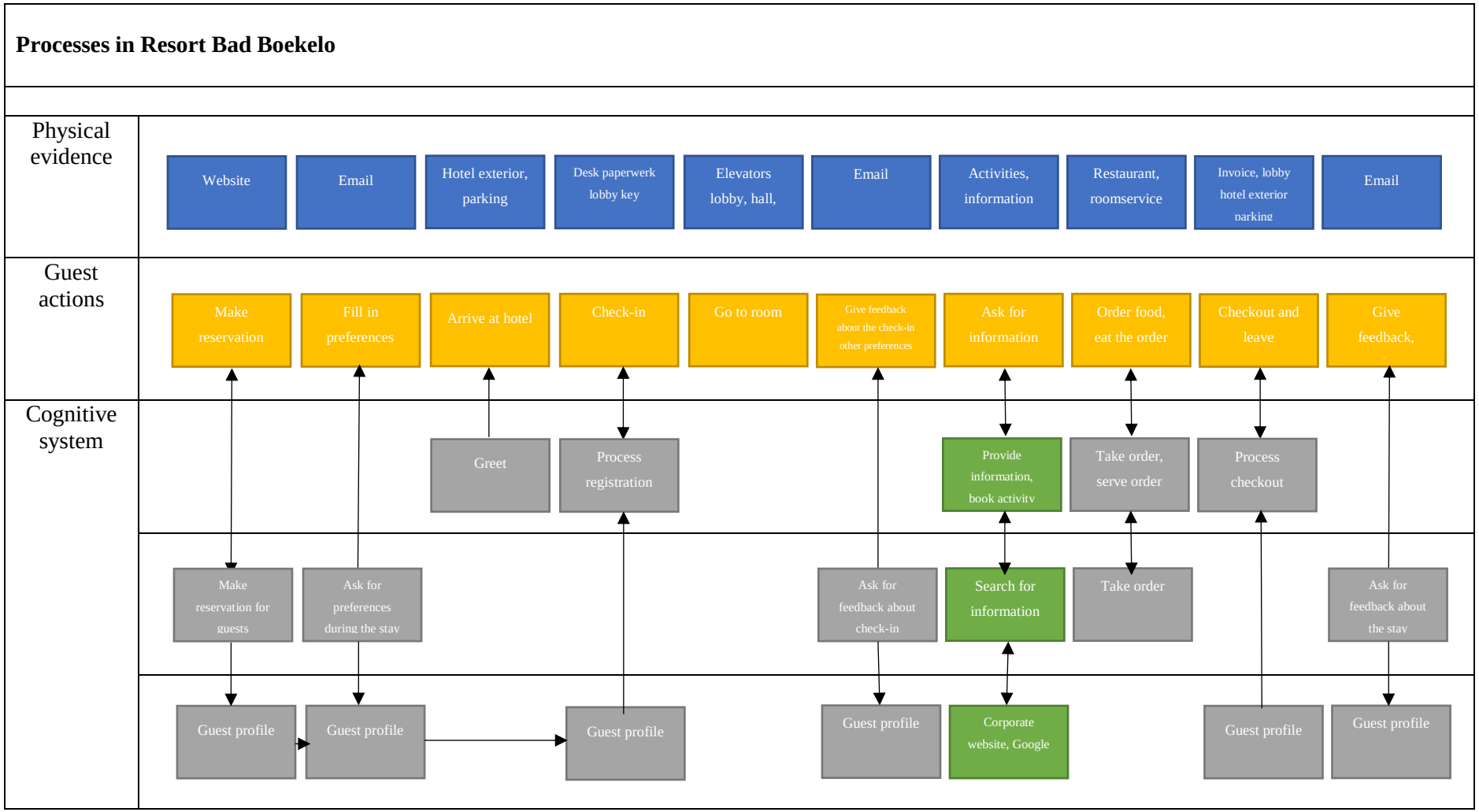

Figure 4.2 Cognitive computing applications in the business processes of Resort Bad Boekelo

4.2 Case study: Landal Miggelenberg

This case study is about Landal Miggelenberg. During this case study, the business processes of the bungalow park will be visualized. This visualization will be analyzed and used for the creation of the BPMN model.

4.2.1 About Landal Miggelenberg

Landal Miggelenberg is part of the chain Landal GreenParks. Landal GreenParks is a dynamic organization, which is market leader in management and rental of bungalow parks. The chain has around 80 bungalow parks, with approximately 13.700 bungalows. The organization distinguishes itself from other providers due to the open character of the parks. The concepts of rest, space and nature are the most important characteristics that belong to it (Landal GreenParks, 2017). Landal GreenParks is part of the Wyndham Destination Network, one of the business parts of Wyndham Worldwide. Landal Miggelenberg (Landal GreenParks, 2017) is located in Hoenderloo, The Netherlands. The park is surrounded by hills and woods. From the bungalow, the guests can step into the nature, for a walk in the wood. The park has 270 detached bungalows, these are divided into different types. These different types are; double bungalow luxe, 4-person bungalow, 4-person bungalow tree house, 4-person bungalow comfort (different variants), 4-person bungalow luxe, 6-person bungalow comfort (different variants), 6-person bungalow luxe, 6-person child bungalow comfort, 8-person bungalow comfort, 8-person bungalow luxe, 10-person bungalow luxe, 12-person bungalow luxe and 18-person reunion bungalow comfort. Landal Miggelenberg has a lot of facilities on the park, which makes it possible to spend the entire vacation on the park itself. Landal Miggelenberg is offers the following facilities, see Table 4.2:

Table 4.2 Facilities Landal Miggelenberg

❖ Patio	❖ Bowling alleys
❖ Brasserie Miggelenberg	❖ Midget golf
❖ Take Away	❖ Pool ticket
❖ (Online) park shop	❖ Play/sport field
❖ Swimming pool	❖ Table tennis
❖ Interactive wall	❖ Avonturenhof
❖ Fun & entertainment program	❖ Water Playground
❖ Air hockey	❖ Beauty and Wellness
❖ Bikes & more	❖ Surrounding attractions
❖ Archery course	❖ Walking and Cycling

The park offers different arrangements like shopping package small and large, gourmet package, half board package, breakfast package, out & home package, out-of-dinner package, family fun arrangement, walking with the forest guard, fresh nose arrangement, bike package, child arrangement. All these arrangements are accessible to all the guests. Since spring 2017 Landal Miggelenberg has

been cooperating with different holiday parks and attractions in the surroundings. Together they offer a service to bring the guests with the VisitVeluwe Express to attractions in the area. These attractions are the Apenheul, Julianatoren, Paleis Het Loo, Klimbos Veluwe and the city center of Apeldoorn. The guests can also buy a combination ticket for the three attractions. The guests are able to buy their tickets online or at the reception of Landal Miggelenberg for the bus as well as the entrance tickets for the attraction at a reduced price. Besides, the VisitVeluwe Express as an estimated travel time of 20 minutes from Hoenderloo to Apeldoorn. This bus line is available during the high season, namely the 15th of April until the 24th of September. The bus departs daily with six rides in the morning and afternoon, departing every 30 minutes. The guests can enter the bus at the bus stop located in front of Landal Miggelenberg and get of at the entrance of the attraction or in the city center of Apeldoorn (VisitVeluwe Express, 2017).

4.2.2 Processes in Landal Miggelenberg

The processes of Landal Miggelenberg are visualized in Figure 4.3. When the guests have chosen to go to Landal Miggelenberg they make a reservation on the website or call the reception desk. As followed, the guests are able to enter their preferences, such as arrival date and departure date, how many people, type of bungalow and arrangements. The employee of the reception makes the reservation in the reservation system and confirms the reservation with the guests. Before the guests arrive, they receive an email containing information about their arrival, of the park and the available activities in the neighborhood. Thereby, they also receive a personalized magazine. A couple days upon arrival the guests will receive special offers. On the arrival date, the guests arrive at the park, there are a lot of parking places where the guests can park their car, while they are checking in. The reception employee welcomes the guests upon arrival. During the check-in, the reception employee is checking the data of the guests and provides the guests with information about the amenities and facilities of the park. The reception employee gives instructions and directions which guide the guests to the right bungalow. During the stay guests can book different arrangements of the park or use the different facilities to do some activities like cycling or bowling. The reception employees provide the guests with information, materials and book an arrangement or activity. But Landal Miggelenberg is able to buy tickets for attractions in the area and for the VisitVeluwe Express for their guests, they have agreements with these attractions which enables discounted prices. The guests can ask information about these attractions by the reception, the reception provides information and buy the tickets for the guests in the system. Landal Miggelenberg has a park shop, where the guests can buy their groceries during the stay. If the guests want to drink or eat something, they can go to the Patio, Brasserie or the Take Away, the employees take the order, prepare the order and serve the order. When the stay is over the guests check out at the reception desk, they hand in their key, the employee checks if everything is alright in the system and ask about their stay. Sometimes guests want to book their next stay directly at the reception. After the stay the guests receive an email with a survey about the stay, the data collected through the email is registered in the system.

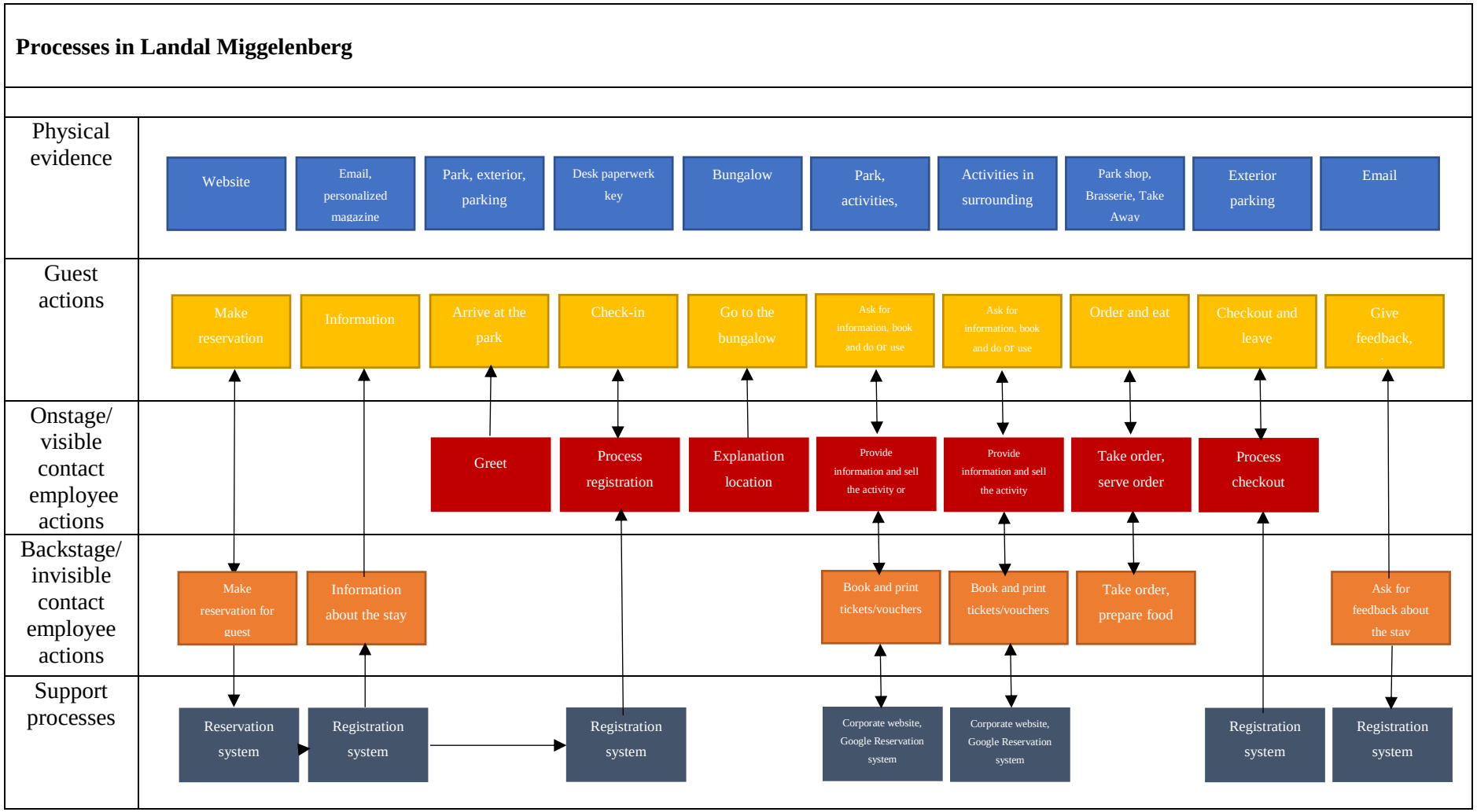

Figure 4.3 Visualization processes Landal Miggelenberg

4.2.3 Recommendations for Landal Miggelenberg

As can be seen in the visualization of the processes, there are a lot of processes, which are related with guests' actions, like make reservation, information about the stay, arriving at the park, checking in, go to the bungalow, asking for information about arrangements and activities, order and eat food, checkout and leave and providing feedback about their stay. During these touchpoints guests have contact with the employees of the company. Some of these guests' actions which are in contact with the employees can be replaced or support by the cognitive system. For Landal Miggelenberg it can be interesting to look how a cognitive system can be implemented in the processes. Figure 4.4 visualizes the business processes of Landal Miggelenberg where the cognitive system is implemented. The green blocks include the concierge system and the grey blocks involves the additional implementation of the cognitive system in the business process. First a cognitive system can be used as a support system, but when guests are familiar with the system it can be fully utilized, see Figure 4.4.

Firstly, it is recommended for Landal Miggelenberg to introduce a cognitive system as a concierge. During the stay the guests have the option to participate in various activities on the park, but also outside of the park. Landal Miggelenberg offers a lot of arrangements, activities and facilities. At this moment, the guests need to go to the reception desk for information, sometimes this results in waiting a while to speak to one of the employees. The waiting time for the guests should decrease if the company would implement a cognitive system. A cognitive system can synthesize big data into ideas or answers. This means if the guests inquire about an activity, the cognitive system will provide them with personalized recommendations. It stands out that a cognitive system will learn and change through new information, analyses, users, interactions, contexts of inquiry or activity. If the guests want to buy some tickets for the activities, the employees can book that for them, but the cognitive system is also able to book tickets. The cognitive system can also give information about the restaurants on the park, such as the Patio, Brasserie and the Take Away, but also the restaurants in the neighborhood. To offer the guests more comfort a possibility could be to reserve a table in one of the park restaurants. The same counts for the arrangements, information and booking can be done by the cognitive system.

Using a cognitive system as a concierge is the first step in implementing the cognitive system in the business processes. The functionalities, such as natural language processing and machine learning, of a cognitive system make it possible to use a cognitive system in multiple business processes. Consequently, a cognitive system can a create guest profile, it has the capability to check-in and checkout, and the it can be used in the bungalow. These processes by the cognitive system are described below.

A cognitive system can generate data from multiple sources. Therefore, the cognitive system can be used to create a guest profile. If the guest makes a reservation, the guests can provide their personal data, preferences and interests. In the confirmation email the cognitive system can provide some recommendations of attractions in the surrounding, like restaurants and museums, which can be

interesting for the guests. During the stay the guests can ask for personalized information, because the system knows already the data of the guests, their preferences and their interests. The previous experiences, preferences and the provided feedback will be stored in the guest profile, when the guest visit the park again, the details are known.

Secondly, the cognitive system can be implemented for the process of the check-in and the checkout. Upon arrival, the guests will check-in at the reception, but the reception can be supported by the cognitive system. The cognitive system checks the data of the guests, explains the rules, the route to the bungalow and provides the guests with the key for the bungalow. This is because cognitive computing enables machines to learn and evolve through experience, reason with purpose and interact with humans in a more natural way. Natural language processing works by transforming human speech into machine-readable text, analyzing, generating a sensible response and replying in human-sounding voice. The checkout can be done, by an employee, but also by the cognitive system, because everything is already arranged by the check-in.

Lastly, to provide more extensive service to the guests, the company has the possibility to use cognitive systems that are available in the bungalows. The cognitive system can be placed for example in a stereo bar. These voice-enabled cognitive rooms function as an in-room concierge that can answer general questions or site-specific questions. For example, amenity replenishments, restaurant reservations, and about the activities in the surrounding. But it can also be used to perform simple tasks, such as changing the room temperature, adjusting the lighting, and opening the blinds.

Summarizing, a cognitive system sees the guests as individuals, this makes it possible to build a more dynamic profile and providing personalization. The bungalow park can provide a personalized vacation, with the right activities, arrangements food and service. A critical point is that guests do not want to share personal data, because of their privacy. A cognitive system is not able to help these guests and therefore, the cognitive system can function as a support system for the employees.

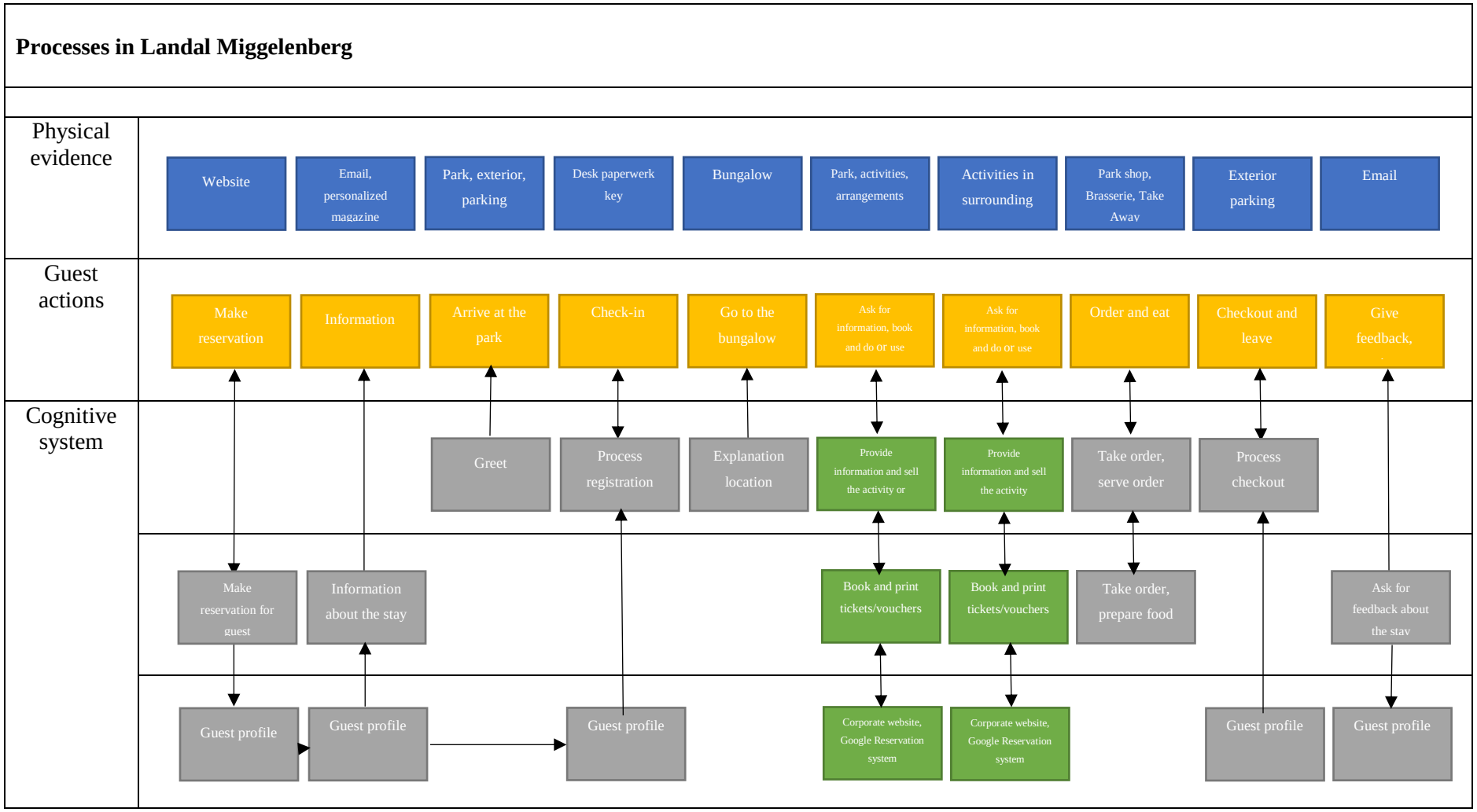

Figure 4.4 Cognitive computing applications in the business processes of Landal Miggelenberg

4.3 Results survey

In this part of the results chapter, the results of the survey will be given. The survey is conducted with the goal to find out if guests are willing to use the cognitive computing system. If so, what kind of information do the guests acquire and in which manner do they want to use the cognitive computing system. With the survey the second sub-question is answered;

- *For what cognitive functionalities are guests willing to use a cognitive system?*

Furthermore, the results are divided in different parts; population, personalized experience, use of a cognitive computing system and hotel and/or bungalow park.

Population

In total 118 people filled in the survey, four surveys are missing values. In total 27.2% of the respondents are male and 72.8% of the respondents are female. Most of the respondents are between 18 – 24 years (39.5%), 25 – 34 years (23.7%) and 45 – 54 years (15.8%). The gender, in combination with the age and education level is shown below. 97.4% of the respondents are living in the Netherlands, 0.9% is living in Germany, United Kingdom and Australia.

Figure 4.5 indicates the degree to which the guests are familiar with SIRI or Chat box and a cognitive system. In total 37.3% of the respondents are familiar with a cognitive system, the other 62.7% did not know about the existence of a cognitive system. For these respondents, there was an extra text block with a clear explanation of a cognitive system. On the other hand, the respondents are more familiar with a speech computer like Siri and a chat box, 80.9% knows these systems and 19.1% do not know these systems.

Summarizing, a lot of respondents are familiar with (80.9%) speech recognition computers and approximately a third of the respondents are familiar with a cognitive system. This shows that the cognitive system for most of the respondents is a new system.

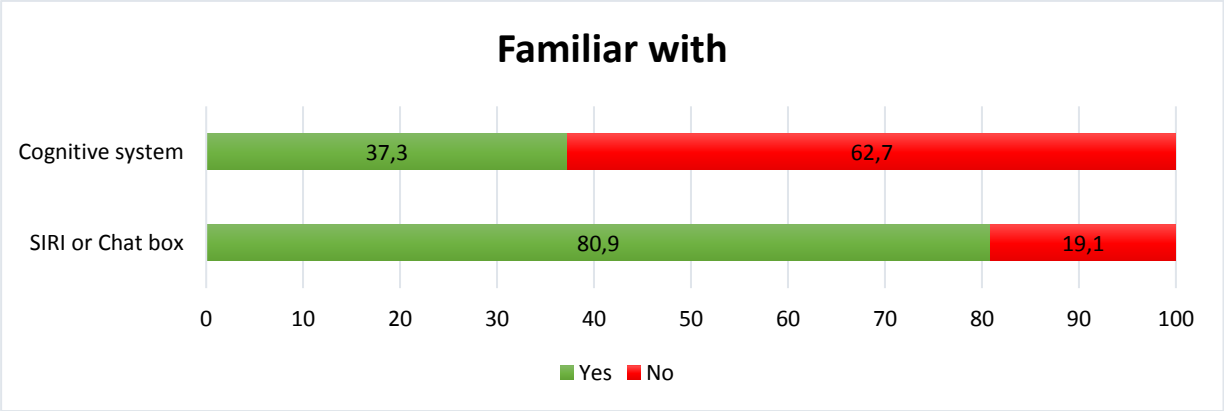

Figure 4.5 Respondents familiar with cognitive system and SIRI or chat box

Personalized experience

Noticeable is if hospitality companies (hotels and bungalow parks) offer a service which can provide the guest a personal experience based on their behavior, preferences and previous experience that 17.3% totally agrees, 43.6% agrees, 23.6% is neutral, 14.5% disagrees and 0.9% totally disagrees, see Figure 4.6. The respondents want to be provided with a personalized advice about restaurants, sightseeing and a day out, but depends on where they are and what they want to do.

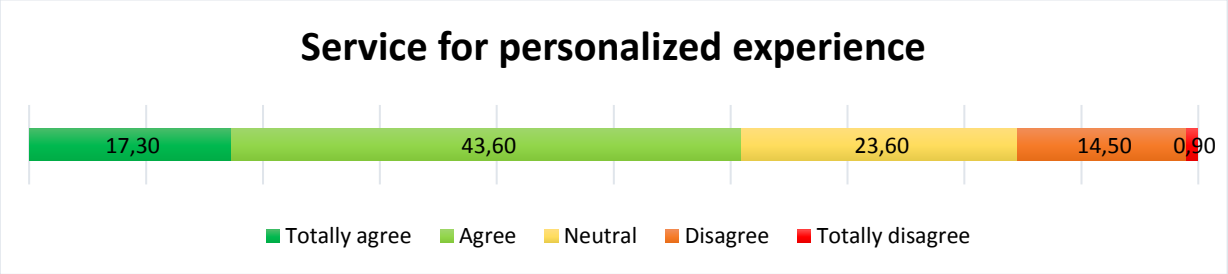

Figure 4.6 Service for personalized experience

Summarizing, 60.9% of the respondents are willing to use and 23.6% is neutral about the use of a service which can provide the guest a personal experience based on their behavior, preferences and previous experience. This shows that the respondents are admissible for innovation in the hospitality industry.

Use of a cognitive computing system

As can be seen in Figure 4.7 the respondents were most divided about the question "It seems fun to me

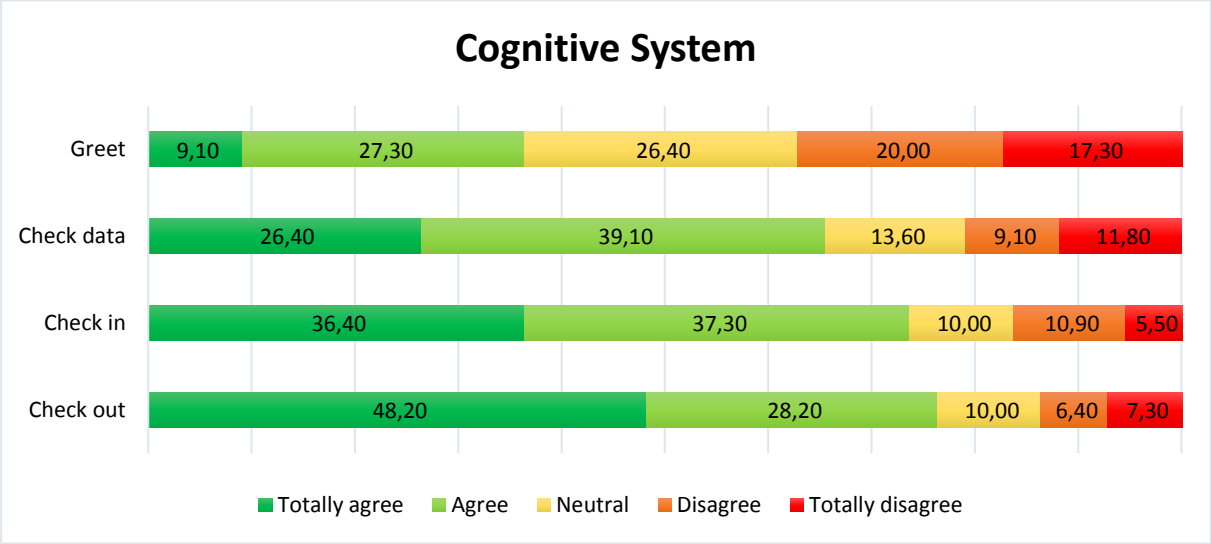

Figure 4.7 Cognitive system

to be greeted by a cognitive system". The results show that 36.3% of the respondents agree and 37.3% of the respondents disagree. Another thing, that the respondents think is important is the communication and the extent of contact with the employees, so when you replace the employee by a cognitive system, some respondents will dislike this. Most of the respondents think that it is useful

when a cognitive system is checking their personal data with a passport or guest card. The results show that 65.5% of all respondents agree and only 20.9% disagrees with this. The respondents are relatively positive about the check-in by a cognitive system, at least 73.7% agrees with this statement. The respondents would prefer a cognitive system that enables a fast check-out, 76.4% of the respondents agrees with this statement, only 13.7% of the respondents disagrees. Waiting time is an important indicator for their degree of satisfaction, so when this can be decreased by a cognitive system, the guests' satisfaction will increase.

It stands out that that most respondents are willing to use a cognitive system during the stay with the aim of obtaining information. The results in Figure 4.8 shows that 27.3% totally agrees, 42,7% agrees, 17.3% is neutral, 7.3% disagrees and 5.5% totally disagrees.

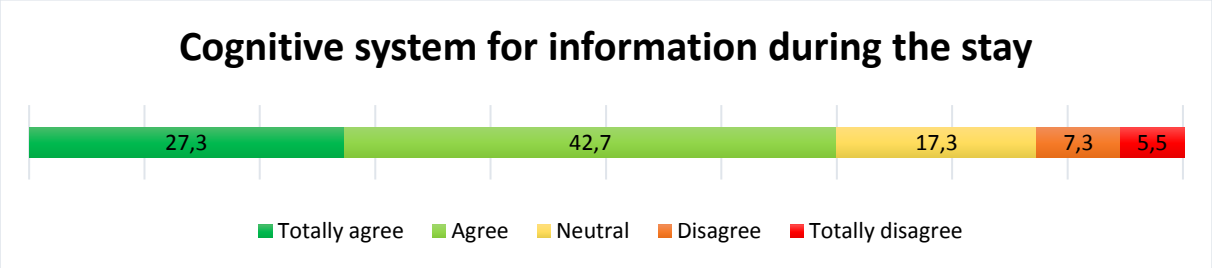

Figure 4.8 Cognitive system for information during the stay

The respondents who filled in totally agree, agree and neutral filled in a follow up question, with what kind of information they want form a cognitive system. Information about opening hours, sights and public transport were mostly chosen.

The respondents want to use a cognitive system in the hotel room or bungalow. The results in Figure 4.9 show that 14.7% totally agrees, 37.6% agrees, 25.7% is neutral, 7.3% disagrees and 12.5% totally disagrees.

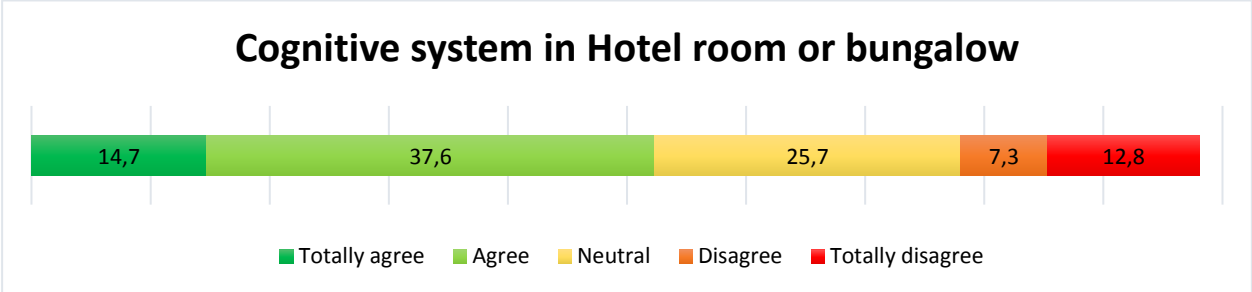

Figure 4.9 Cognitive system in hotel or bungalow

The respondents who filled in totally agree, agree and neutral filled in a follow up question, to indicate the usage purpose of the cognitive system. The majority of the respondents would use such a system for the reservation in restaurants, and/or booking activities in the neighborhood.

Figure 4.10 shows the willingness of the guests for the use of a cognitive system. It is notable that respondents are willing to use a cognitive system during their stay. It stands out that 63.9% of the respondents is willing to use a cognitive system, only 12.9% of the respondents will not use the system.

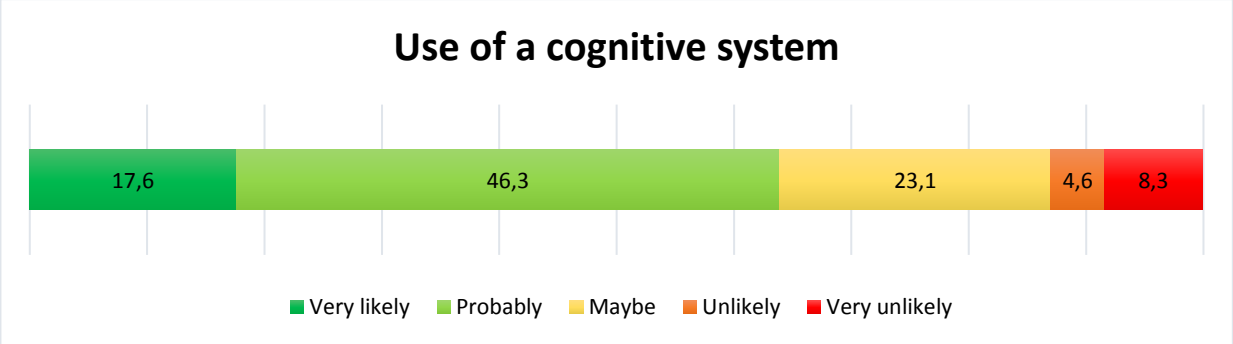

Figure 4.10 Use of cognitive system

The main reason why the respondents want to use a cognitive system is to do with the speed of the system or otherwise curiosity or the low-threshold the system has, it is always accessible. Most of respondents who are hesitant, first prefer advice of the employee, but they favor the speed of the cognitive system. Another reason is the use of their personal data. The respondents who do not want to use the cognitive system, prefer to get personal advice from an employee and do not consider a cognitive system as a necessity.

In summary, the results show that the respondents want to use a cognitive system in a hotel or bungalow park, to check their data, during the check-in process and by the checkout process. It is notable that 70% of the respondents will use a cognitive system for information and 52.3% want to use a cognitive system in their residence. This information is normally given by the employees and that can be replaced or supported by a cognitive system. Thereby, 63.9% wants to use a cognitive system during the stay, the most important reasons for this are the speed and otherwise the curiosity and the low-threshold of the system, its continuing accessibility.

Hotel and/or Bungalow Park

In the results, there can be seen that most of the respondents, 86.1%, will use the cognitive system in a hotel or bungalow park. The other 13.9% will not use a cognitive system. As presented in Figure 4.11 the 86.1% is divided in 24.1% only in a hotel, 3.7% in a bungalow park and 58.3% in both hotel and bungalow park.

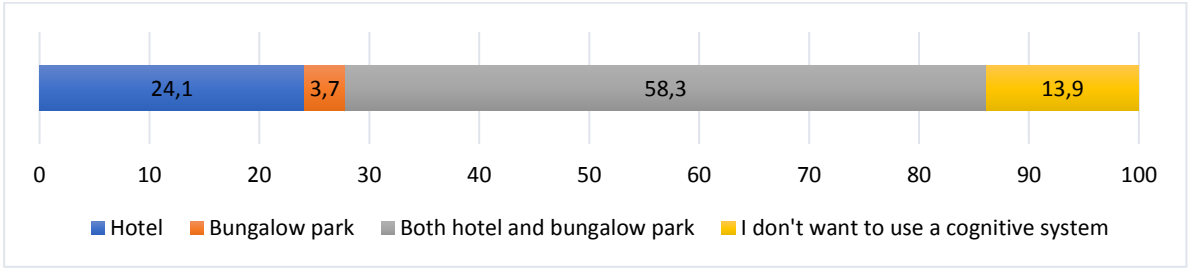

Figure 4.11 Use a cognitive system in hotel and/or bungalow park

When the respondents chose solely for a hotel, most of the respondents visit the hotel for holiday, only 3.4% stays in a hotel for business purposes. They visit the hotel with their partner, family or their friends. Besides, 60% of the respondents seek information through a search engine before they visit a hotel or otherwise namely the lonely planet and brochure. These respondents find hotel amenities and the sights seeing the most important information. The most important indicators for the satisfaction in a hotel is the surroundings, contact with the employees and waiting time. 76.9% would book the same hotel if they are satisfied with the service and 23.1% would maybe book the same hotel.

When the respondents choose a bungalow park, the respondents visit a bungalow park with their partner, family and friends and relatives. They search for information with the use of a search engine and the bungalow park website or otherwise, namely a folder. The respondents perceive information about days out and the available facilities of the bungalow park the most interesting. The important indicators of satisfaction are the surroundings, communication and the extent of contact with employees and the in-/exterior of the bungalow park. All the respondents would book a repeat visit to the bungalow park or chain if they are satisfied.

When the respondents chose for both hotel and bungalow park, the results are as followed. Most of the respondents are staying at a hotel for holiday/leisure, 5.9% stays at a hotel for work and holiday purposes. Again, they stay at a hotel with their partner, family and friends and relatives. Furthermore, 50% acquires the information through the use of a search engine, 32.1% uses the hotel site, 16.1% uses the site of the destination and otherwise, namely reception and brochures of the hotel. They think sights, hotel amenities, restaurants, day out and otherwise, namely reviews are most interesting. Important indicators for their satisfaction is communication and the extent of contact with employees, waiting time, surroundings and otherwise, namely hygiene, quality of the bed, ambiance and professionality and facilities (pools, sauna etc.). In addition, 74.2% will book a repeat visit when they are satisfied, 6.4% will not visit it again. These respondents visit a bungalow park with family, friends and relatives, a partner and a group. Moreover, 46.6% acquires the information with the use of a search engine, 38.1% uses the bungalow park website, 14.4% uses the site of the destination and otherwise namely the brochure. Most interesting is information about the facilities of the bungalow park, sights, restaurants, day out and otherwise, namely reviews and interior of the bungalow. The important indicators of satisfaction are the communication and the extent of contact with employees, the in-/exterior, the surrounding of the bungalow park and otherwise, namely the facilities of the bungalow (pool), equipment of the bungalow and hygiene. 74.2% will visit a bungalow park or the chain again when they are satisfied, 4.8% will not visit it again.

Concluding, most of the respondents are visiting a hotel or bungalow park with family, friends and relatives and their partner. It is important to have information about the facilities of the hotel or bungalow park, sights and day out. A cognitive system can provide the guests with this information. Overall the results show that most of the respondents are admissible for the innovation and that they

are willing to use the cognitive system during the stay. The respondents which are not willing to use a cognitive system, preferably have personal advice from an employee and think it is not necessary to use a cognitive system during the stay.

5. Conclusion

In this chapter, the research question is answered, before answering the research questions the sub-questions are answered with the information derived from the theory, the case study and the survey. After that the recommendations are written.

What cognitive computing functionalities are suitable for implementation in a business process of a hospitality company to improve personalized experience?

Cognitive computing is the development of computer systems modeled after the human brain, which learns from experience, makes decisions based on what it learns, has natural language processing capability, which makes it possible to interact with humans in a natural way. Thereby, the following characteristics of a cognitive system can be used in a hospitality company, such as information adept, dynamic and adaptive learning, meaning based and highly interactive. These different kinds of characteristics have functionalities which can be used in a hospitality company. Firstly, a cognitive system can integrate data from multiple heterogenous sources and big data. Together with the human-computer interaction the system can provide a personal advice to the guests. The guests ask a question to the cognitive system, the cognitive system explores available information, analyzes this information and provides the guest with a suitable advice. Secondly, the functionality of natural language processing can be implemented. In a cognitive system, natural language processing works as accurately transforming human speech into machine-readable text, analyzing the text's vocabulary and structure to extract meaning, generating a sensible response and replying in human-sounding voice. This makes it possible to interact naturally with the human. Thirdly, the functionality of machine learning can be implemented. A cognitive system is using machine learning to improve and correct its understanding. These functionalities can be used in the applications, these applications make it possible to create a personalized experience.

For what cognitive functionalities are guests willing to use a cognitive system?

The survey has shown that, when hospitality companies offer a service which can provide a personalized experience based on behavior, preferences and previous experience most of the respondents are willing to use this. Therefore, the results show that 17.6% of the respondents is very likely to use a cognitive system during their stay and 46.3% of the respondents want to use a cognitive system during their stay. The reason why the respondents want to use a cognitive system is the speed, the low-threshold that the system has, and the (high) accessibility. Also, the respondents are curious, because of the newness of the system. These results show that respondents are admissible for an

innovation in the hospitality industry. The opinions of the respondents are divided about the function of being welcomes by the cognitive system, the reason for this is the communication and the extent of contact with the employees. On the other hand, the respondents would like to use the functions of a cognitive system for the data that can be checked quickly, for example during the check-in and the checkout. An important indicator for satisfaction is the waiting time, the cognitive system can decrease this and consequently the guest's satisfaction will increase. The respondents are willing to use the cognitive system in the process of obtaining information during their stay, for example about the company amenities, but also for additional information about activities in the neighborhood or reserving services. In addition, results show that the respondents are not only willing to use a cognitive system in the public area (reception) of a company, but also in the residence. The results also show that the respondents are willing to use a cognitive system in both a hotel and a bungalow park.

"What cognitive computing functionalities can be implemented in the business processes of a hospitality company to improve the guest's personalized experience?"

Cognitive computing is the development of computer systems modeled after the human brain. These systems learn through experience, learning and improving through the collection of new information, analyses, users, interactions, contexts of inquiry or activity. The system makes decisions based on what it learns, which is the functionality of machine learning. Cognitive computers can integrate big data from heterogeneous sources. Guests generate data with a company when they interact with hotel chains, bungalow parks, online travel agents, as well as in a conservation, but also on social media. Each piece of behavioral data says something about the guest preferences and behavior, like clicks on the website, a high value booking and an accommodation search from a smartphone. A cognitive system finds relevant patterns based on the context. The system can enhance human engagement, which makes it possible to interact with humans in a natural way, which results in full interactions with humans. A cognitive system can read text, see images and hear natural speech. The system has natural language processing capability, it receives text in natural language and gives answers in natural spoken language.

With cognitive computing system the hospitality companies can bridge the gap between untapped opportunities and current capabilities. Using cognitive computing during specific touchpoints can contribute to the personalized experience for the guests. Cognitive computing can take advantage of collective intelligence for content-based personalized attraction recommendation. Therefore, it needs to derive knowledge from heterogeneous collective intelligence and combine personalization. The guests become more satisfied about the service, this is the output of a guests' comparison between the expected performance and the actual performance. The guests' satisfaction has a direct influence on the guests' behavior and loyalty. A cognitive system can improve the guest's satisfaction, by offering speed, comprehensive advice, better service and personal advice. When guests are satisfied about the service of a company, they will most likely book with the same company again.

But the companies need to keep in mind that there are guests who prefer personal advice from an employee and that these guests do not believe that a cognitive system is necessary.

Cognitive computing is a new technology which offers the hospitality industry opportunities. It emphasizes the personal element of the communication with the guest, it creates guests' profiles to offer better, faster and personalized services. This enables the engagement between the empowered guest and the hospitality company in this fast-moving environment. Thereby, the cognitive is gathering new insights for the hospitality industry, which makes it possible to create unique experiences.

5.1 Recommendations

A cognitive system can be implemented in the business processes of the company. Based on the theory, two case studies and the survey, a BPMN model with a cognitive computing system implemented in the business processes is created. It is recommended to implement the cognitive computing system step by step. The implementation has a big influence on the business processes of the hospitality company. To make the cognitive system available for all the guests, it is recommended to first place a cognitive system in a public area, where everybody can access the system. It can function as a substitute of a concierge. First, the cognitive system needs to work next to an employee, it cooperates with the employees to provide the guests with information. This information is personalized, based on their behavior, preferences and previous experience, this can be added to the guest profile. After a while when guests are used to the new concierge, it can work unaccompanied. Figure 5.1, visualizes the touchpoints during the stay. During the stay guests can use the cognitive computing systems, as a concierge. Hereby, the cognitive system assists guests with requests, empowers guests with more information to help planning their trips and personalize the guest experience. The cognitive system provides the guests with information about the company, sights, activities and restaurants. A cognitive system can plan the entire holiday or trip based on the preferences and personal data. The cognitive system is interactive with the guests, user friendly and answers their questions. The next step in the implementation is to use a cognitive system for the check-in and the checkout process. Figure 5.2, visualizes the reservation and check-in. When the guests make a reservation, the system asks for some personal data and preferences of the guests, to create a dynamic guest profile. Upon arrival, the cognitive system greets the guests or the employee at the reception desk. At the check-in, the cognitive system will support the employees, the guests can choose if they want a quick check-in by the cognitive system or go the reception desk for a more interactive or communicative approach through the employees. The cognitive system already provides some suggestions for activities during the stay, this is based on their guest profile. This contributes to an added value for the company. Figure 5.3, shows the checkout process. During the checkout, the cognitive system will also support the employees, the guests can choose if they want a quick checkout by the cognitive system or go to the reception desk to do the payment and provide feedback. Lastly,

when the technology is working satisfactory, it can be added in a hotel room or in the bungalow, to offer the guest optimal service. Figure 5.4, shows the use of the cognitive system in the residence. The cognitive system is placed in a sound bar or alarm clock and can use natural language processing. The voice-enabled cognitive rooms also function as an in-room concierge that can answer general questions or site-specific questions, for example the guests can ask for service requests, including amenity replenishments, restaurant reservations, late checkout, room service, shuttle service and more. By doing so, the cognitive system can perform simple tasks, such as changing the room temperature, adjusting the lighting, and opening the blinds.

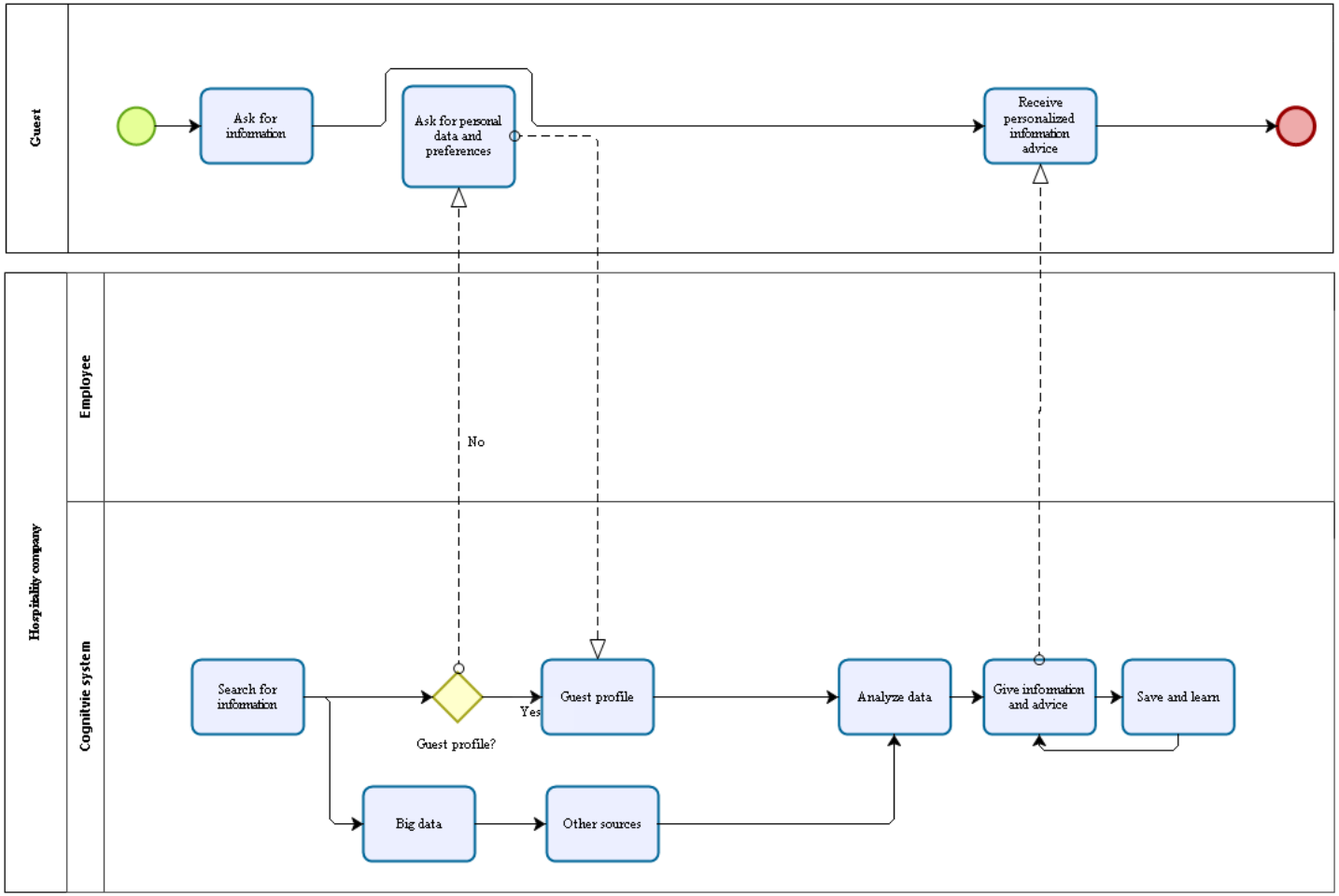

Figure 5.1 During the stay with a cognitive system

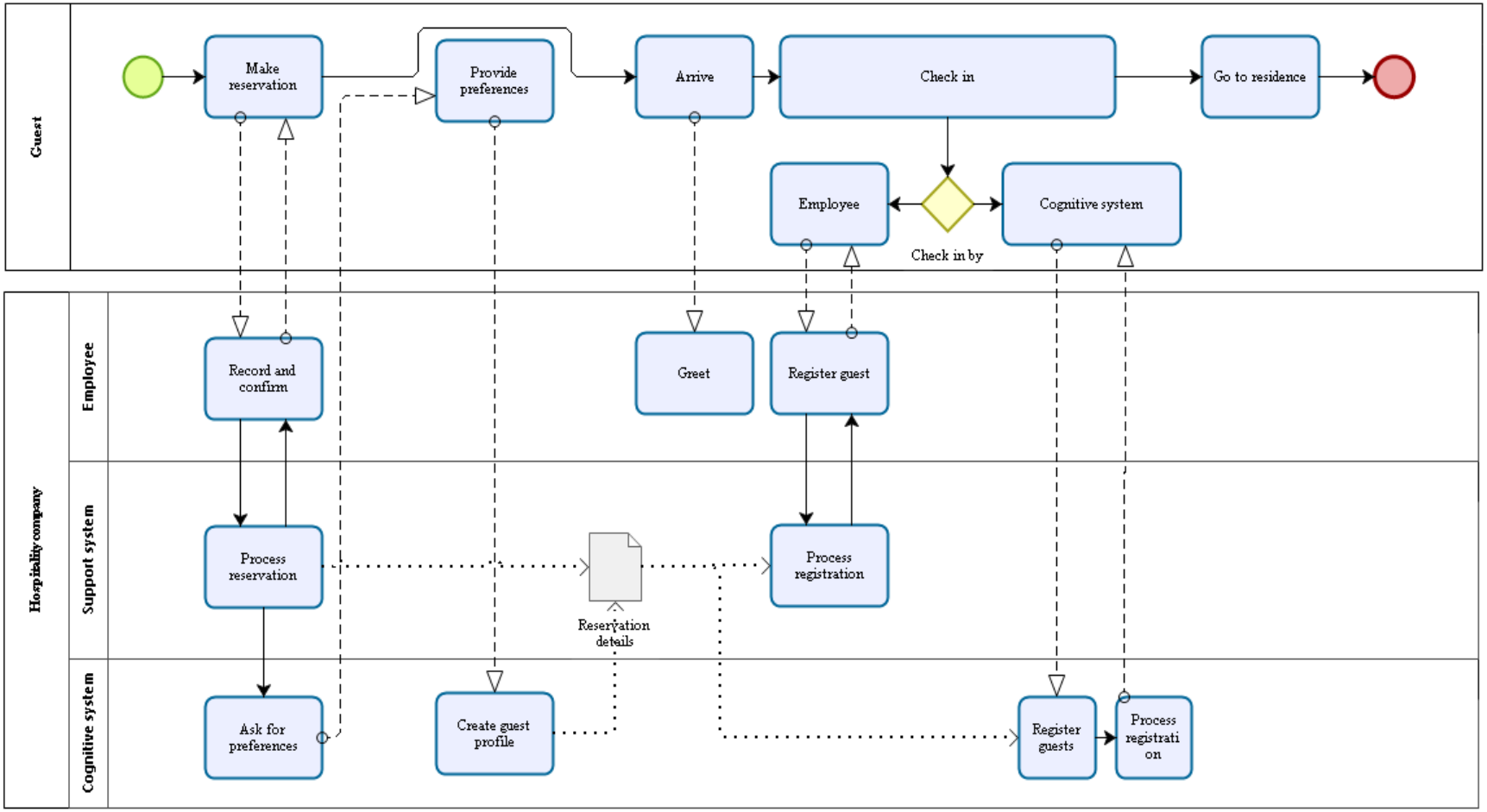

Figure 5.2 Reservation and check-in with a cognitive system

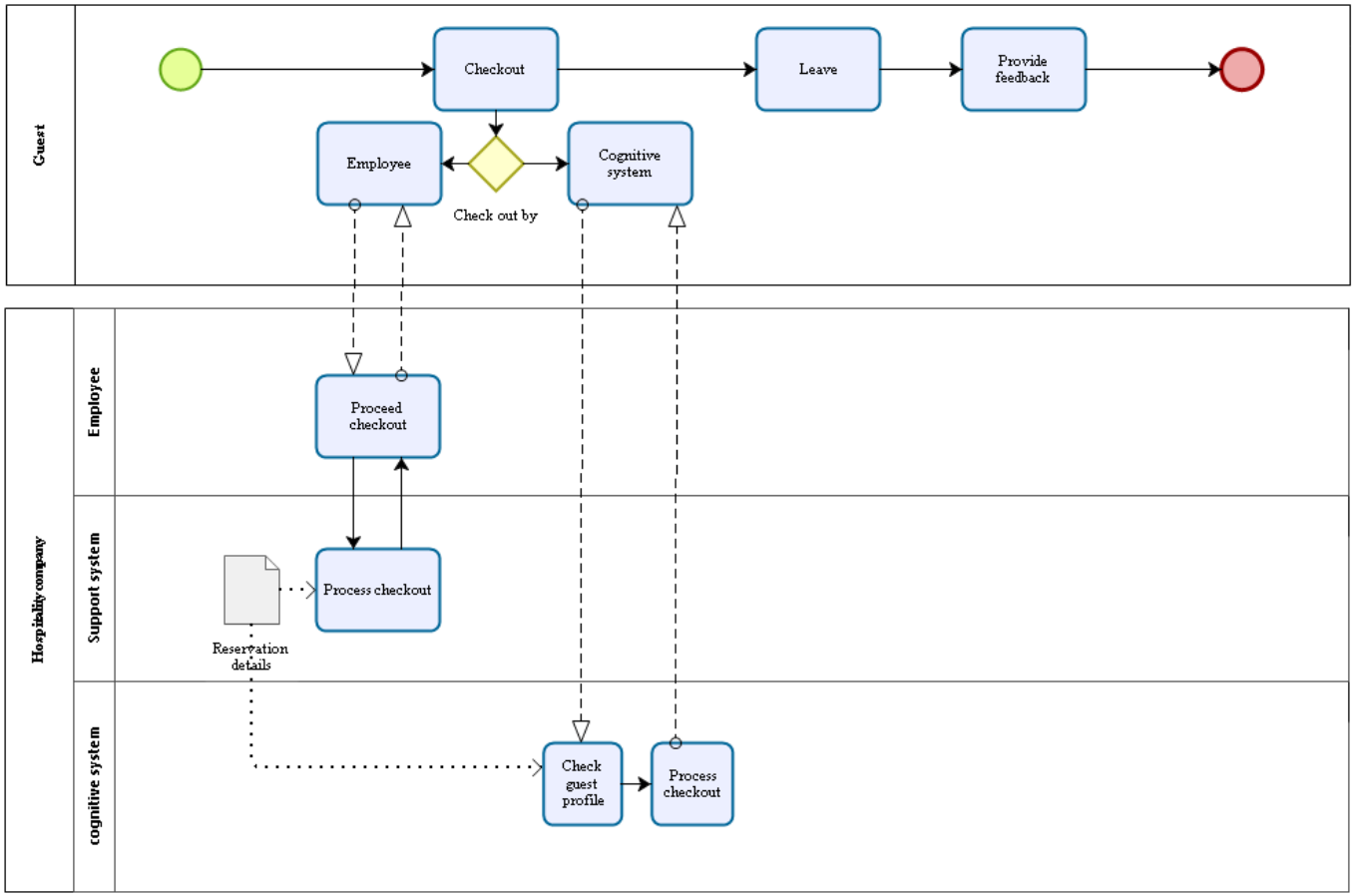

Figure 5.3 Checkout with a cognitive system

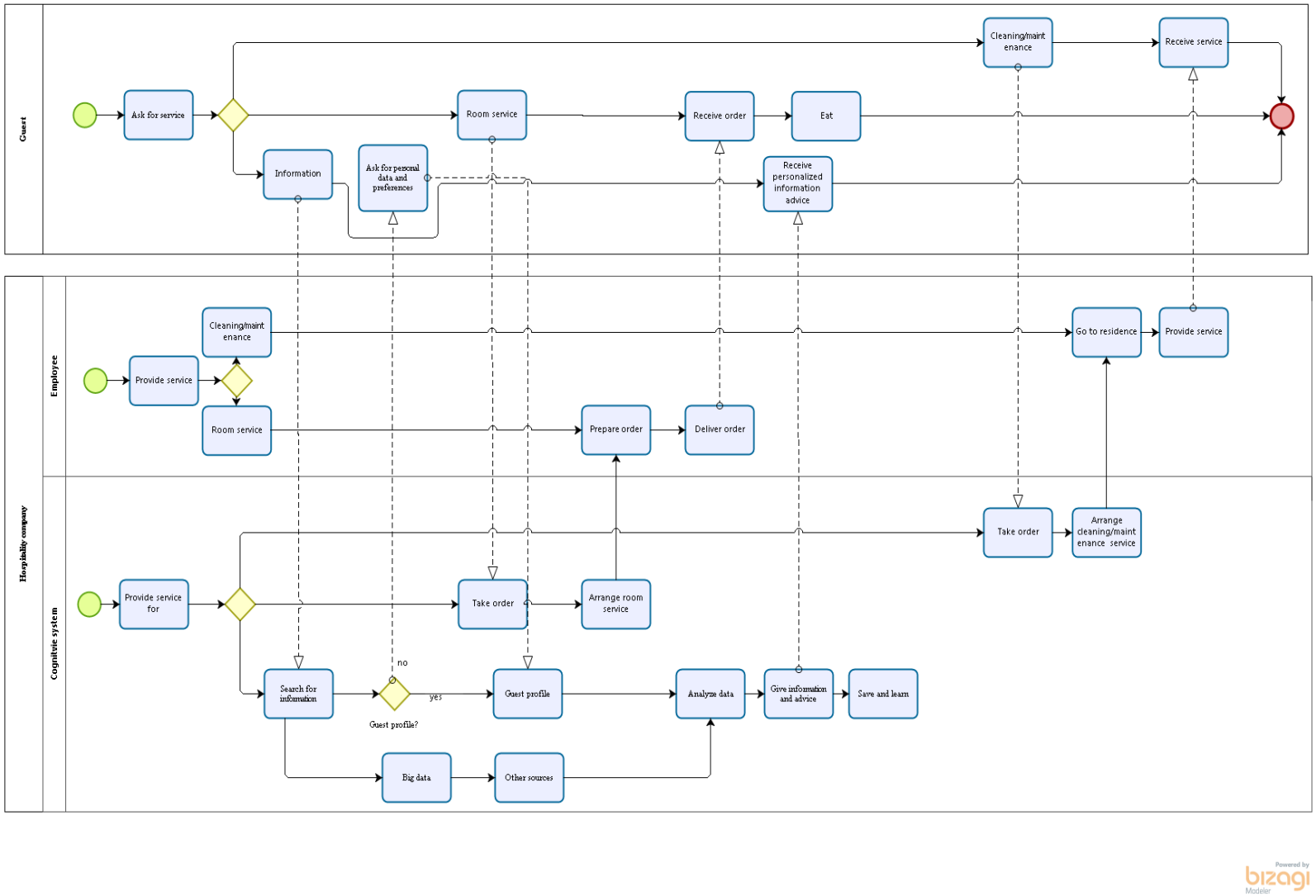

Figure 5.4 Cognitive system in residence

6. Discussion

In this research, the use of a cognitive system in the business processes of hospitality companies has been conducted. Out of the theory it is clear that a cognitive system can be very useful in the hospitality industry to gain personalized experiences. On the other hand, there are more channels available for planning a journey, from any device guests can search for information, this is also due to the development of 4G. Guests can plan their trip, compare prices, services, and other things to find the best choice for a unique experience. These developments in the technology resulted in a more than ever empowered guest. For that reason, the question of the added value of cognitive computing in the hospitality industry arises. An added value of cognitive computing is the ability to combine unstructured big data with structured data from multiple heterogeneous sources. Cognitive computing is defined as the development of computer systems modeled after the human brain, which learns from experiences, makes decisions based on what it has learned, has natural language processing capability, which makes it possible to interact with humans in a natural way. It can function as a travel buddy. A cognitive system can give new insights, because the system will generate data. This data can be used for research, but also for the hospitality companies. These hospitality companies will discover the preferences of the guests and with these preferences, they are able to create a unique experience.

6.1 Limitations

Regarding the knowledge in this research it cannot be determined if the suggested BPMN model will be usable for all companies in the industry. A limitation is that there is literature available about cognitive systems, but barely about the practical implementation of the system, this is due to the complexity and the recent arise of the topic. Another limitation is that the research is theoretical, the cognitive system is not tested in the different business processes. Because of this, it is unsure if the cognitive system can be implemented. The reader should keep in mind that the study is based on existing literature, two case studies and a survey. This is limits the findings; therefore, it is recommended to do further research on this concept.

6.2 Further research

Reflecting on this research, this research provides the definition, the functionalities and the applications of a cognitive computing system for the hospitality industry. Thereby, these applications are used in a practical situation of two hospitality companies. Lastly, the willingness of guests to use a cognitive computing system during the stay is researched. Consequently, not all parts are researched during in this report. Further research needs to be done on the implementation, the cost of this implementation, more case studies for the other aspects of the hospitality industry and the cognitive system needs to be tested in practical.

To see if the cognitive system can be further implemented in the business processes of the hospitality companies and the related costs of this implementation, requires further research. Further research is necessary to find out if the theoretical implementation is able to function. According to the

literature the cognitive system can be used through different touchpoints in the business processes of a hospitality company. Besides, there are only two case studies evaluated, one of a hotel and one of a bungalow park, other case studies need to be carried out to discover if the cognitive system will work in other aspects of the hospitality industry. The survey results show that most of the guests are willing to use the cognitive system, in further research the guests need to test the cognitive system, so they can provide some feedback and improvements.

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Appendix I BPMN

Business Process

A process can be defined as an organization of activities with an explicit beginning and ending, which is deliberately focusing on the creation of a product or service for the (internal) customer. Processes are related to each other, the output of a process forms the input for another process (Kleijn & Rorink, 2012). Davenpoort (2005) agree "a business process is simply how an organization does its work – the set of activities it pursues to accomplish a particular objective for a particular customer, either internal or external" (p. 102).

Kleijn and Rorink (2012) argue that a business process relates to all activities inside and direct coherent with the primary process. Distinguishing the different types of processes, and subdividing each process into sub-processes and activities, is a feature of process approach of organizations. There are four different kinds of processes; managing, primary, secondary and improvement processes. Figure 1 shows the cohesion between the managing, primary, secondary and improvement processes.

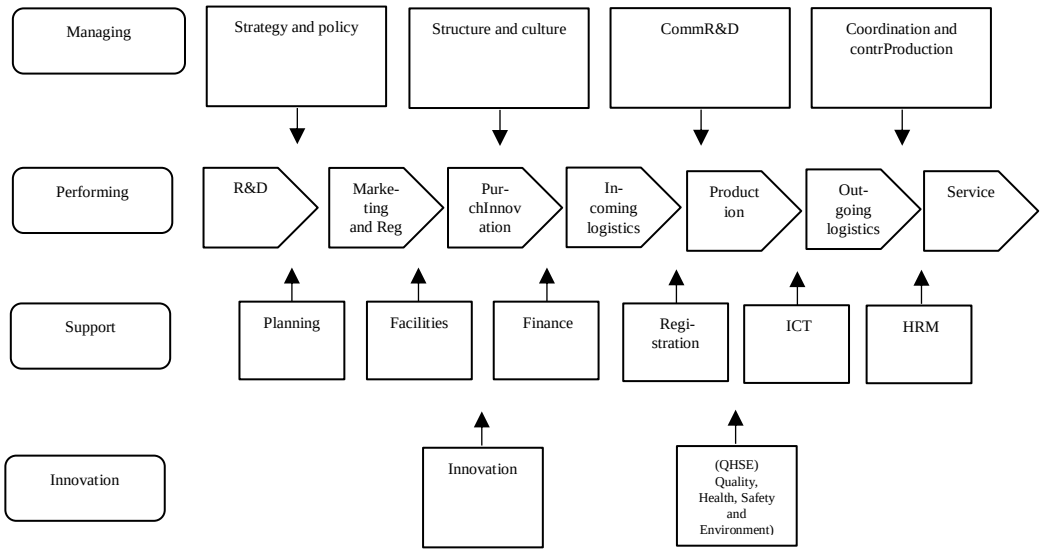


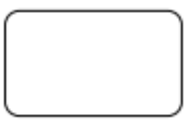
Figure 1 Cohesion between processes (Kleijn & Rorink, 2012, p. 113)

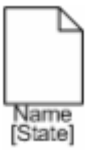
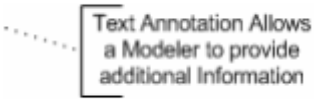
Managing processes involve all processes that drive the primary process at an enterprise level. The primary processes concern inside companies. Secondary processes are supporting the performance of the primary processes. The innovation processes concern all activities focusing on continuous innovation of business processes. Firms seek to standardize business processes. Davenpoort (2005) argues that there are different reasons for standardizing the business processes. Within the company, it can facilitate communications about the business processes, smooth handoffs across different process boundaries and to measure the performance. Across companies, the standard processes also facilitate better communication, efficient handoffs and performance of benchmarking. Service blueprinting and

Business Process Modeling Notation (BPMN) are two ways to represent processes within organization. Service blueprinting is described in 2.3.1.

BPMN is developed by the OMG (Milton & Johnson, 2012). According to Scheuerlein et al. (2012) BPMN was developed in the period from 2001 to 2005 and BPMN is standardized in 2007. The most recent version, BPMN 2.0, is published in 2011. White (2004) argue that the primary goal of BPMN is "to provide a notation that is readily understandable by all business users, from the business analysts that create the initial drafts of the processes, to the technical developers responsible for implementing the technology that will perform those processes, and finally, to the business people who will manage and monitor those processes" (p. 1). Milton and Johnson (2012) agree and suggest that the need for people to communicate about business processes in an organization is the reason that business process modeling emerged. Ko, Lee and Lee (2009) state that BPMN is a graphical standard to "allow users to express the information flow, decision points and the roles of business processes in a diagrammatic way" (p. 754). Scheuerlein et al. (2012) agree that the pathway that is computer based in BPMN is illustrated graphically. The pathways "are comprised of few semantically precisely defined symbols for tasks, sub-processes, alternatives, events and their different types. Several levels with e.g. concurrent processes may be imaged" (Scheuerlein, et al., 2012, p. 756). These graphical elements are divided in different categories, this makes it possible to recognize the basic types of elements and makes it possible to understand the diagram. The four basic categories, with their core concepts are visualized in table 1, which are flow objects, connecting objects, swim lanes and artifacts.

Table 1 Core concepts of BPMN

Flow objects		
Event	An event is what happens during a business process. It affects the flow and usually has a cause or an impact (White, 2004).	
Activity	Activities describe that the actual work is completed. "The work could be atomic, a "task", or could be more complex comprising several tasks, called a "sub-process" or just an "activity" (Milton & Johnson, 2012, p. 610).	

Gateway	The gateway is used to control the divergence and convergence of the sequence flow (White, 2004).	
Connecting objects		
Sequence flow	Shows the way of the activities in a process (Milton & Johnson, 2012; White, 2004)	
Message flow	Is representing communication between two process participants.	
Association	The association is used to associate data, text and other artifacts with flow objects.	
Swim lanes		
Pool	The participant is in a process (White, 2004).	
Lane	Is a sub-partition within a pool, this is extending the entire length of the pool (White, 2004).	
Artifacts		
Data object	Is required for an activity or is produced by an activity (Milton & Johnson, 2012).	
Group	Indicates that the process elements are related logically (Milton & Johnson, 2012).	
Annotation	Is providing additional text information for the reader (Milton & Johnson, 2012; White, 2004).	

BMPN for the hotel industry

Figure 2 shows a BMPN representation of the service blueprint in figure 2.3. This BPMN model is based on the theory from Milton and Johnson (2012) and White (2004). The BPMN model shows the actions of the hotel guests when they are visiting a hotel. The BPMN model is divided into two different pools; guest and hospitality company. The pool of the hospitality company has two different lanes employee and support system. The guest action has different actions in the other pools. When the guest makes a reservation, the employee records this to the reservations systems, When the guest arrives at the hotel, the front desk employee greets and the bags are taken. At the check-in at the reception the front desk employee gives the details, make the check-in, which is supported in a system, and prepare the keys. The guest is going to the room and receives the bags. The guest orders some food, this order is taken by an employee and the food is prepared. The employee brings the food to the guests and the guest will receive it. In the meanwhile, the guest sleeps and take a shower. Then the guest will checkout, the employee makes everything alright in the registration system. After that the guest will leave. All these different processes have an influence on the performance of the hotel and on the entire guest service experience. This BPMN model can be used for all hospitality companies with guests which have an overnight stay.

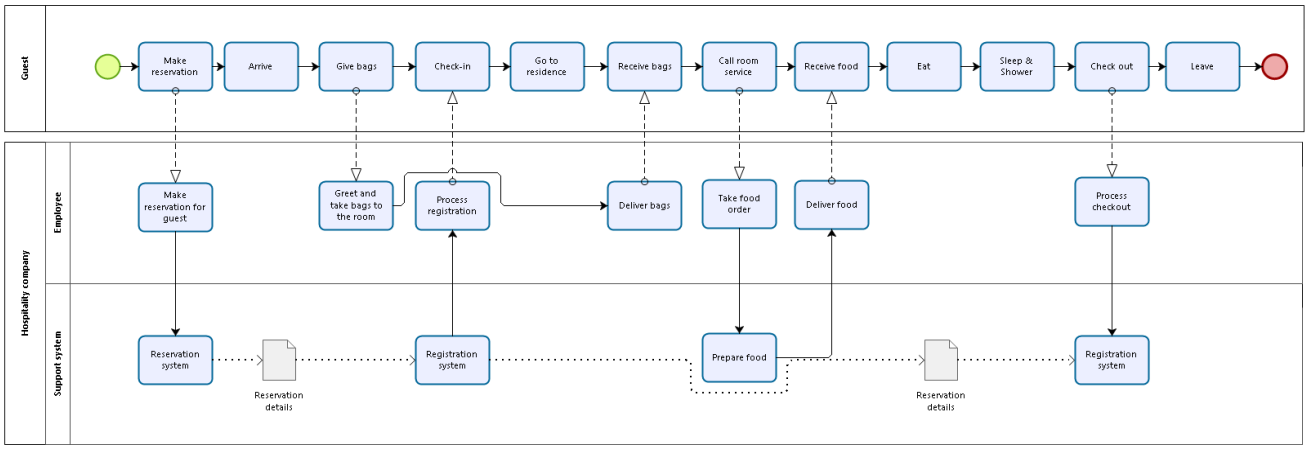


Figure 2 BPMN model hotel

According to Milton and Johnson (2012) service blueprinting is mostly used to represent service processes. "The customer-focused perspective of service blueprinting is very useful in understanding the critical touchpoints driving service satisfaction" (Milton & Johnson, 2012, p. 618). For improving the BPMN it is important to include key features of service blueprinting. Milton and Johnson (2012) argue that the BPMN, differs from service blueprinting. Both fully supports the description of the flow of process that each actor performs, but a service blueprint not always show the flow explicitly of the time passes of the actions. Thereby, a BPMN model has a wider range of symbols to specify how a task or activity is performed than a service blueprint. A service blueprint has four categories of actors.

According to Milton and Johnson (2012) a "BPMN can categorize actors using pools of swim-lanes, but does not mandate the categorization described by service blueprinting" (p.617). BPMN representations are often used in the communication with IT staff.

Summarizing, a BPMN differs from a service blueprint "because explicitly showing the relationship between actors from other companies and customers will help deliver a consistent service to the organization's customers" (Milton & Johnson, 2012, p. 619). In this research, the BPMN model will be used to find out which business process in the hotel can be replaced by a cognitive system. Figure 3 visualized the operationalization of the concept business process.

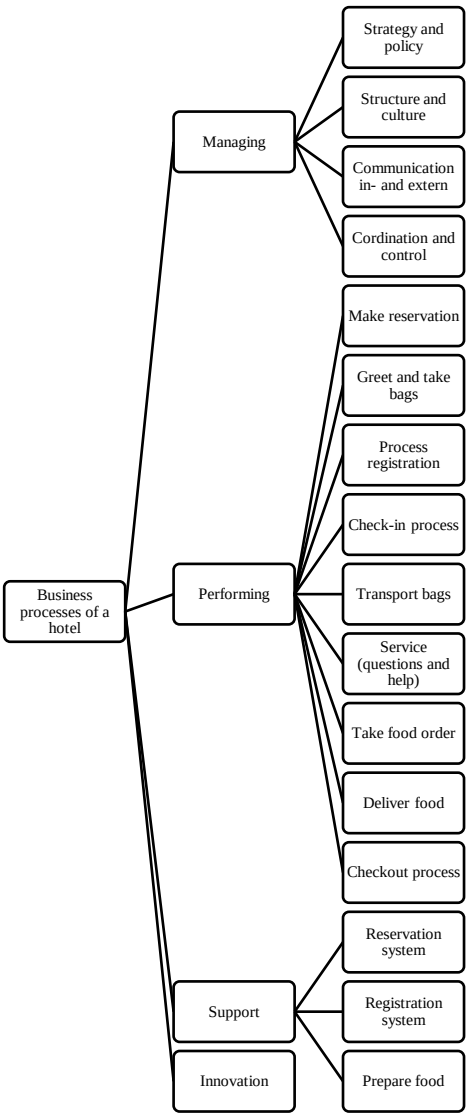


Figure 3 Operationalization business process

Appendix II Survey

UNIVERSITY OF TWENTE.

Thanks, that you are participating with this research. The results will be used for a Master Thesis research. In this research there will be checked how different business processes in hotels and bungalow parks can be supported or replaced by a cognitive system. Mapping the need for a cognitive system on the guest side is a valuable indicator for implementing a cognitive system. That’s why I ask your opinion.

Cognitive systems learn from the information they are provided with. For example, from structured and unstructured sources, such as documentation, manuals, specifications, blogs, reviews, and social media. From these data, computers try to "understand" the context. If this process succeeds, the computer can answer a question as one would do. Because a cognitive system can understand spoken language, the system can actually interact with humans (see video).

There are no correct or incorrect answers, this is your personal opinion.
- The questionnaire will take about 10 minutes.
- I would like to emphasize that the information you provide is treated confidentially and anonymously.
- **Please always fill in a response**, there is always one answer possible unless stated otherwise.

1. What is your gender?
- Male
- Female

2. What is your age?
- Younger than 18 years
- 18 - 24 years
- 25 - 34 years
- 35 - 44 years
- 45 - 54 years
- 55 - 64 years
- 75 - 84 years

3. What is your highest education?
- Basis education
- Lbo/Vvmbo
- Havo
- Vwo
- Mbo
- Hbo
- Wo

4. Country of residence?
- The Netherlands
- Germany
- United Kingdom
- Otherwise, namely

5. Are you familiar with a cognitive system?
- Yes
- No

Cognitive system

Cognitive systems learn from the information they are provided with. For example, from structured and unstructured sources, such as documentation, manuals, specifications, blogs, reviews, and social media. From these data, computers try to "understand" the context. If this process succeeds, the computer can answer a question as one would do. Because a cognitive system can understand spoken language, the system can actually interact with humans (see video).

6. Are you familiar with speech computers such as SIRI and chat box?
- Yes
- No

7. Hospitality companies (hotels, holiday parks, etc.) can offer a service so you can have personal experience based on your behavior, preferences and previous experiences. Would you use this service?
- Very likely

- Probably
- Neutral
- Unlikely
- Very unlikely

8. What kind of personal advice do you like?
- Routes (bicycle/walk)
- Restaurants
- Sights
- A day out
- Bars
- Nightlife (club/theater/musical)
- Shops
- Events
- Otherwise, namely

9. I would like to be greeted by a cognitive system.
- Very likely
- Probably
- Neutral
- Unlikely
- Very unlikely

10. It seems useful to me that a cognitive system checks my data for example by scanning my passport or customer card.
- Very likely
- Probably
- Neutral
- Unlikely
- Very unlikely

11. It seems useful to me to check-in quickly through a cognitive system.
- Very likely
- Probably
- Neutral
- Unlikely
- Very unlikely

12. It seems convenient to me to checkout quickly through a cognitive system.
- Very likely
- Probably
- Neutral
- Unlikely
- Very unlikely

13. I find a cognitive system useful during the stay for information.

- Totally agree → 14
- Agree → 14
- Neutral → 14
- Disagree → 15
- Totally disagree → 15

14. I would like to have information from a cognitive system about:

- Services of the company
- Information of the company
- Opening hours
- Sights
- A day out
- Routes (bicycle/walk)
- Restaurants
- Bars
- Nightlife (club/theater/musical)
- Shops
- Events
- Transport (public/taxi)
- Emergency services
- Daytrips
- Otherwise, namely

15. I would find it helpful to have a cognitive system in the private residence (hotel room, bungalow etc.) for different services.

- Totally agree → 16
- Agree → 16
- Neutral → 16
- Disagree → 17
- Totally disagree → 17

16. I would use the cognitive system during the stay in the private residence (hotel room, bungalow etc.) for:

- Services of the company
- Information of the company
- Restaurants
- Reserve restaurant
- Questions about cleaning
- Otherwise, namely

17. I would use a cognitive system during my stay.

- Very likely → 18
- Probably → 18
- Maybe → 19
- Unlikely → 20

- Very unlikely → 20

18. What is the reason for using a cognitive system?
- Comprehensive advice
- Personal experience
- Speed
- Better service
- Otherwise, namely

19. What is the reason for maybe using a cognitive system?
- Comprehensive advice
- Personal experience
- Speed
- Better service
- Prefer personal advice
- Otiose system
- Not necessary
- Otherwise, namely

20. What is the reason for not using a cognitive system?
- Prefer personal advice
- Otiose system
- Not necessary
- Otherwise, namely

21. I would use a cognitive system in:
- Hotel →22
- Bungalow park → 28
- Both hotel and bungalow park → Q33
- I do not want to use a cognitive system → End

22. You sleep in a hotel because of
- Work
- Holiday/leisure
- Both

23. With which company do you visit a hotel mainly
- Alone
- Partner
- Family
- Friends and relatives
- Business relations and colleagues
- With a group

24. Suppose you want more information about the hotel, Service and / or destination, how do you get this information.

- Use of a search engine (e.g., Google)
- Use of the hotel site
- Use of the destination site
- Otherwise, namely

25. What information do you find most interesting?

- Hotel amenities
- Hotel services
- Restaurants
- Sights
- Day out
- Signage
- Otherwise, namely

26. What services are an important indicator of your (dis) satisfaction while staying at a hotel?

- Waiting time
- In-/exterior
- Communication and the extent of contact with employees
- Other guests
- Advice
- Explanation
- Discretion
- Surroundings
- Otherwise namely

27. If you are satisfied with a service, will you book the same hotel or chain?

- Very likely → End
- Probably → End
- Maybe → End
- Unlikely → End
- Very unlikely → End

28. With which company do you visit a bungalow park mainly

- Alone
- Partner
- Family
- Friends and relatives
- Business relations and colleagues
- With a group

29. Suppose you want more information about the bungalow park, Service and / or destination, how do you get this information

- Use of a search engine (e.g., Google)
- Use of the bungalow park site
- Use of the destination site

- Otherwise, namely

30. What information do you find most interesting?
- Facilities at the bungalow park
- Services of the bungalow park
- Restaurants
- Sights
- Day out
- Signage
- Otherwise, namely

31. What services are an important indicator of your (dis) satisfaction while staying at a bungalow park?
- Waiting time
- In-/exterior
- Communication and the extent of contact with employees
- Other guests
- Advice
- Explanation
- Discretion
- Surrounding
- Otherwise, namely

32. If you are satisfied with a service, will you book the same bungalow park or chain?
- Very likely → End
- Probably → End
- Maybe → End
- Unlikely → End
- Very unlikely → End

33. You sleep in a hotel because of
- Work
- Holiday/leisure
- Both

34. With which company do you visit a hotel mainly
- Alone
- Partner
- Family
- Friends and relatives
- Business relations and colleagues
- With a group

35. Suppose you want more information about the hotel, Service and / or destination, how do you get this information.
- Use of a search engine (e.g., Google)
- Use of the hotel site

- Use of the destination site
- Otherwise, namely

36. What information do you find most interesting?
- Hotel amenities
- Hotel services
- Restaurants
- Sights
- Day out
- Signage
- Otherwise, namely

37. What services are an important indicator of your (dis) satisfaction while staying at a hotel?
- Waiting time
- In-/exterior
- Communication and the extent of contact with employees
- Other guests
- Advice
- Explanation
- Discretion
- Surroundings
- Otherwise, namely

38. If you are satisfied with a service, will you book the same hotel or chain?
- Very likely
- Probably
- Maybe
- Unlikely
- Very unlikely

39. With which company do you visit a bungalow park mainly
- Alone
- Partner
- Family
- Friends and relatives
- Business relations and colleagues
- With a group

40. Suppose you want more information about the bungalow park, Service and / or destination, how do you get this information
- Use of a search engine (e.g., Google)
- Use of the bungalow park site
- Use of the destination site
- Otherwise, namely

41. What information do you find most interesting?

- Facilities at the bungalow park
- Services of the bungalow park
- Restaurants
- Sights
- Day out
- Signage
- Otherwise, namely

42. What services are an important indicator of your (dis) satisfaction while staying at a bungalow park?

- Waiting time
- In-/exterior
- Communication and the extent of contact with employees
- Other guests
- Advice
- Explanation
- Discretion
- Surrounding
- Otherwise, namely

43. If you are satisfied with a service, will you book the same bungalow park or chain?

- Very likely
- Probably
- Maybe
- Unlikely
- Very unlikely

Appendix III Results survey

What is your gender?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	31	26,3	27,2	27,2
	Female	83	70,3	72,8	100,0
	Total	114	96,6	100,0	
Missing	System	4	3,4		
Total		118	100,0		

What is your age?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Younger than 18 years	8	6,8	7,0	7,0
	18 - 24 years	45	38,1	39,5	46,5
	25 - 34 years	27	22,9	23,7	70,2
	35 - 44 years	5	4,2	4,4	74,6
	45 - 54 years	18	15,3	15,8	90,4
	55 - 64 years	9	7,6	7,9	98,2
	75 - 84 years	2	1,7	1,8	100,0
	Total	114	96,6	100,0	
Missing	System	4	3,4		
Total		118	100,0		

What is your highest education?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Basis education	4	3,4	3,5	3,5
	Lbo/Vmbo	12	10,2	10,5	14,0
	Havo	11	9,3	9,6	23,7
	Vwo	5	4,2	4,4	28,1
	Mbo	27	22,9	23,7	51,8
	Hbo	44	37,3	38,6	90,4
	Wo	11	9,3	9,6	100,0
	Total	114	96,6	100,0	
Missing	System	4	3,4		
Total		118	100,0		

Country of residence?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	The Netherlands	111	94,1	97,4	97,4
	Germany	1	,8	,9	98,2
	United Kingdom	1	,8	,9	99,1
	Otherwise, namely	1	,8	,9	100,0
	Total	114	96,6	100,0	
Missing	System	4	3,4		
Total		118	100,0		

Are you familiar with a cognitive system?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	41	34,7	37,3	37,3
	No	69	58,5	62,7	100,0
	Total	110	93,2	100,0	
Missing	System	8	6,8		
Total		118	100,0		

Are you familiar with speech computers such as SIRI and chat box?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	89	75,4	80,9	80,9
	No	21	17,8	19,1	100,0
	Total	110	93,2	100,0	
Missing	System	8	6,8		
Total		118	100,0		

Hospitality companies (hotels, holiday parks, etc.) can offer a service so you can have personal experience based on your behavior, preferences and previous experiences. Would you use this service?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very likely	19	16,1	17,3	17,3
	Probably	48	40,7	43,6	60,9
	Neutral	26	22,0	23,6	84,5
	Unlikely	16	13,6	14,5	99,1
	Very unlikely	1	,8	,9	100,0
	Total	110	93,2	100,0	
Missing	System	8	6,8		
Total		118	100,0		

What kind of personal advice do you like?

		Responses		
		N	Percent	Percent of Cases
Personal advice	Routes (bicycle/walk)	38	8,4%	34,5%
	Restaurants	71	15,7%	64,5%
	Sights	70	15,5%	63,6%
	A day out	67	14,9%	60,9%
	Bars	47	10,4%	42,7%
	Nightlife (club/theater/musical)	47	10,4%	42,7%
	Shops	55	12,2%	50,0%
	Events	54	12,0%	49,1%

	Otherwise, namely	2	,4%	1,8%
Total		451	100,0%	410,0%

a. Dichotomy group tabulated at value 1.

I would like to be greeted by a cognitive system.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very likely	10	8,5	9,1	9,1
	Probably	30	25,4	27,3	36,4
	Neutral	29	24,6	26,4	62,7
	Unlikely	22	18,6	20,0	82,7
	Very unlikely	19	16,1	17,3	100,0
	Total	110	93,2	100,0	
Missing	System	8	6,8		
Total		118	100,0		

It seems useful to me that a cognitive system checks my data for example by scanning my passport or customer card.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very likely	29	24,6	26,4	26,4
	Probably	43	36,4	39,1	65,5
	Neutral	15	12,7	13,6	79,1
	Unlikely	10	8,5	9,1	88,2
	Very unlikely	13	11,0	11,8	100,0
	Total	110	93,2	100,0	
Missing	System	8	6,8		
Total		118	100,0		

It seems useful to me to check-in quickly through a cognitive system.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very likely	40	33,9	36,4	36,4
	Probably	41	34,7	37,3	73,6
	Neutral	11	9,3	10,0	83,6
	Unlikely	12	10,2	10,9	94,5
	Very unlikely	6	5,1	5,5	100,0
	Total	110	93,2	100,0	
Missing	System	8	6,8		
Total		118	100,0		

It seems convenient to me to checkout quickly through a cognitive system.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very likely	Very likely	44,9	48,2	48,2
	Probably	Probably	26,3	28,2	76,4
	Neutral	Neutral	9,3	10,0	86,4
	Unlikely	Unlikely	5,9	6,4	92,7
	Very unlikely	Very unlikely	6,8	7,3	100,0
	Total	110	93,2	100,0	
Missing	System	8	6,8		
Total		118	100,0		

I find a cognitive system useful during the stay for information.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Totally agree	30	25,4	27,3	27,3
	Agree	47	39,8	42,7	70,0
	Neutral	19	16,1	17,3	87,3
	Disagree	8	6,8	7,3	94,5
	Totally disagree	6	5,1	5,5	100,0
	Total	110	93,2	100,0	
Missing	System	8	6,8		
Total		118	100,0		

I would like to have information from a cognitive system about:

		Responses		
		N	Percent	Percent of Cases
Information from a cognitive system	Services of the company	39	7,1%	41,1%
	Information of the company	39	7,1%	41,1%
	Opening hours	68	12,5%	71,6%
	Sights	57	10,4%	60,0%
	A day out	40	7,3%	42,1%
	Routes (bicycle/walk)	34	6,2%	35,8%
	Restaurants	43	7,9%	45,3%
	Bars	23	4,2%	24,2%
	Nightlife (club/theater/musical)	32	5,9%	33,7%
	Shops	33	6,0%	34,7%
	Events	34	6,2%	35,8%
	Transport (public/taxi)	48	8,8%	50,5%
	Emergency services	27	4,9%	28,4%
	Daytrips	29	5,3%	30,5%
Total		546	100,0%	574,7%

a. Dichotomy group tabulated at value 1.

I would find it helpful to have a cognitive system in the private residence (hotel room, bungalow etc.) for different services.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	2	1,7	1,8	1,8
	Totally agree	16	13,6	14,7	16,5
	Agree	41	34,7	37,6	54,1
	Neutral	28	23,7	25,7	79,8
	Disagree	8	6,8	7,3	87,2

	Totally disagree	14	11,9	12,8	100,0
	Total	109	92,4	100,0	
Missing	System	9	7,6		
Total		118	100,0		

I would use the cognitive system during the stay in the private residence (hotel room, bungalow etc.) for:

		Responses		Percent of Cases
		N	Percent	
During the stay in the residence	Services of the company	45	19,1%	52,3%
	Information of the company	38	16,1%	44,2%
	Restaurants	56	23,7%	65,1%
	Reserve restaurant	55	23,3%	64,0%
	Questions about cleaning	40	16,9%	46,5%
	Otherwise, namely	2	,8%	2,3%
Total		236	100,0%	274,4%

a. Dichotomy group tabulated at value 1.

I would use a cognitive system during my stay.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very likely	19	16,1	17,6	17,6
	Probably	50	42,4	46,3	63,9
	Maybe	25	21,2	23,1	87,0
	Unlikely	5	4,2	4,6	91,7
	Very unlikely	9	7,6	8,3	100,0
	Total	108	91,5	100,0	
Missing	System	10	8,5		
Total		118	100,0		

What is the reason for using a cognitive system?

		Responses		Percent of Cases
		N	Percent	
Using	Comprehensive advice	26	22,6%	37,7%
	Personal experience	16	13,9%	23,2%
	Speed	54	47,0%	78,3%
	Better service	17	14,8%	24,6%
	Otherwise, namely	2	1,7%	2,9%
Total		115	100,0%	166,7%

a. Dichotomy group tabulated at value 1.

What is the reason for maybe using a cognitive system?

	Responses	Percent of Cases

		N	Percent	
Maybe	Personal experience	3	8,8%	12,0%
	Speed	9	26,5%	36,0%
	Better service	2	5,9%	8,0%
	Prefer personal advice	16	47,1%	64,0%
	Otiose system	1	2,9%	4,0%
	Not necessary	2	5,9%	8,0%
	Otherwise, namely	1	2,9%	4,0%
Total		34	100,0%	136,0%

a. Dichotomy group tabulated at value 1.

I should use a cognitive system in:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Hotel	26	22,0	24,1	24,1
	Bungalow park	4	3,4	3,7	27,8
	Both hotel and bungalow park	63	53,4	58,3	86,1
	I do not use a cognitive system	15	12,7	13,9	100,0
	Total	108	91,5	100,0	
Missing	System	10	8,5		
Total		118	100,0		

What is the reason for not using a cognitive system?

		Responses		
		N	Percent	Percent of Cases
Not using	Prefer personal advice	11	68,8%	78,6%
	Otiose system	2	12,5%	14,3%
	Not necessary	3	18,8%	21,4%
Total		16	100,0%	114,3%

a. Dichotomy group tabulated at value 1.

Answer: hotel

You sleep in a hotel because of

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Work	1	,8	3,8	3,8
	Holiday/leisure	21	17,8	80,8	84,6
	Both	4	3,4	15,4	100,0
	Total	26	22,0	100,0	
Missing	System	92	78,0		

Total	118	100,0		

With which company do you visit a hotel mainly

		Responses		
		N	Percent	Percent of Cases
Company visiting a hotel	Alone	3	6,4%	11,5%
	Partner	18	38,3%	69,2%
	Family	9	19,1%	34,6%
	Friends and relatives	12	25,5%	46,2%
	Business relations and colleagues	3	6,4%	11,5%
	With a group	2	4,3%	7,7%
Total		47	100,0%	180,8%

a. Dichotomy group tabulated at value 1.

**Suppose you want more information about the hotel,
Service and / or destination, how do you get this information**

		Responses		
		N	Percent	Percent of Cases
Finding information of a hotel	Use of a search engine (e.g., Google)	24	60,0%	92,3%
	Use of the hotel site	11	27,5%	42,3%
	Use of the destination site	3	7,5%	11,5%
	Otherwise, namely	2	5,0%	7,7%
Total		40	100,0%	153,8%

a. Dichotomy group tabulated at value 1.

What information do you find most interesting?

		Responses		
		N	Percent	Percent of Cases
Interesting information	Hotel amenities	15	21,1%	57,7%
	Hotel services	12	16,9%	46,2%
	Restaurants	12	16,9%	46,2%
	Sights	19	26,8%	73,1%
	Day out	9	12,7%	34,6%
	Signage	4	5,6%	15,4%
Total		71	100,0%	273,1%

a. Dichotomy group tabulated at value 1.

What services are an important indicator of your (dis) satisfaction while staying at a hotel?

		Responses		
		N	Percent	Percent of Cases
Service indicator hotel	Waiting time	11	15,5%	42,3%
	In-/exterior	10	14,1%	38,5%
	contact with employees	13	18,3%	50,0%
	Other guests	8	11,3%	30,8%
	Advice	6	8,5%	23,1%
	Explanation	8	11,3%	30,8%
	Surroundings	15	21,1%	57,7%
Total		71	100,0%	273,1%

a. Dichotomy group tabulated at value 1.

If you are satisfied with a service, will you book the same hotel or chain?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very likely	7	5,9	26,9	26,9
	Probably	13	11,0	50,0	76,9
	Maybe	6	5,1	23,1	100,0
	Total	26	22,0	100,0	
Missing	System	92	78,0		
Total		118	100,0		

Answer: bungalow park

With which company do you visit a bungalow park mainly

		Responses		Percent of Cases
		N	Percent	
Company bungalow park[a]	Partner	2	33,3%	50,0%
	Family	3	50,0%	75,0%
	Friends and relatives	1	16,7%	25,0%
Total		6	100,0%	150,0%

a. Dichotomy group tabulated at value 1.

Suppose you want more information about the bungalow park, Service and / or destination, how do you get this information

		Responses		Percent of Cases
		N	Percent	
Finding information bungalow park	Use of a search engine (e.g., Google)	3	37,5%	75,0%
	Use of the bungalow park site	3	37,5%	75,0%
	Use of the destination site	1	12,5%	25,0%
	Otherwise, namely	1	12,5%	25,0%
Total		8	100,0%	200,0%

a. Dichotomy group tabulated at value 1.

What information do you find most interesting?

		Responses		Percent of Cases
		N	Percent	
Interesting information	Facilities at the bungalow park	3	23,1%	75,0%
	Services of the bungalow park	2	15,4%	50,0%
	Restaurants	1	7,7%	25,0%
	Sights	2	15,4%	50,0%
	Day out	4	30,8%	100,0%
	Signage	1	7,7%	25,0%
Total		13	100,0%	325,0%

a. Dichotomy group tabulated at value 1.

What services are an important indicator of your (dis) satisfaction while staying at a hotel?

		Responses		Percent of Cases
		N	Percent	
service indicator bungalow park[a]	Waiting time	1	7,7%	25,0%
	In-/exterior	3	23,1%	75,0%
	Communication and the extent of contact with employees	3	23,1%	75,0%
	Advice	2	15,4%	50,0%
	Surrounding	4	30,8%	100,0%

Total	13	100,0%	325,0%

a. Dichotomy group tabulated at value 1.

If you are satisfied with a service, will you book the same bungalow park or chain?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very likely	3	2,5	75,0	75,0
	Probably	1	,8	25,0	100,0
	Total	4	3,4	100,0	
Missing	System	114	96,6		
Total		118	100,0		

Answer: both hotel and bungalow park

You sleep in a hotel because of

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Holiday/Leisure	55	46,6	88,7	88,7
	Both	7	5,9	11,3	100,0
	Total	62	52,5	100,0	
Missing	System	56	47,5		
Total		118	100,0		

With which company do you visit a hotel mainly

		Responses		
		N	Percent	Percent of Cases
Company visiting a hotel	Alone	5	4,6%	8,1%
	Partner	32	29,6%	51,6%
	Family	38	35,2%	61,3%
	Friends and relatives	27	25,0%	43,5%
	Business relations and colleagues	2	1,9%	3,2%
	With a group	4	3,7%	6,5%
Total		108	100,0%	174,2%

a. Dichotomy group tabulated at value 1.

Suppose you want more information about the hotel,
Service and / or destination, how do you get this information

		Responses		
		N	Percent	Percent of Cases
Finding information hotel	Use of a search engine (e.g., Google)	56	50,0%	90,3%
	Use of the hotel site	36	32,1%	58,1%
	Use of the destination site	18	16,1%	29,0%
	Otherwise, namely	2	1,8%	3,2%
Total		112	100,0%	180,6%

a. Dichotomy group tabulated at value 1.

What information do you find most interesting?

		Responses		
		N	Percent	Percent of Cases
Interesting information	Hotel amenities	42	22,1%	67,7%
	Hotel services	24	12,6%	38,7%
	Restaurants	33	17,4%	53,2%
	Sights	49	25,8%	79,0%

	Day out	33	17,4%	53,2%
	Signage	8	4,2%	12,9%
	Otherwise, namely	1	,5%	1,6%
Total		190	100,0%	306,5%

a. Dichotomy group tabulated at value 1.

What services are an important indicator of your (dis) satisfaction while staying at a hotel?

		Responses		
		N	Percent	Percent of Cases
Service indicator hotel	Waiting time	41	18,4%	66,1%
	In-/exterior	33	14,8%	53,2%
	Communication and the extent of contact with employees	43	19,3%	69,4%
	Other guests	12	5,4%	19,4%
	Advice	25	11,2%	40,3%
	Explanation	22	9,9%	35,5%
	Discretion	9	4,0%	14,5%
	Surroundings	35	15,7%	56,5%
	Otherwise, namely	3	1,3%	4,8%
Total		223	100,0%	359,7%

a. Dichotomy group tabulated at value 1.

If you are satisfied with a service, will you book the same hotel or chain?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very likely	20	16,9	32,3	32,3
	Probably	26	22,0	41,9	74,2
	Maybe	12	10,2	19,4	93,5
	Unlikely	3	2,5	4,8	98,4
	Very unlikely	1	,8	1,6	100,0
	Total	62	52,5	100,0	
Missing	System	56	47,5		
Total		118	100,0		

With which company do you visit a bungalow park mainly

		Responses		Percent of Cases
		N	Percent	
Company bungalow park	Alone	1	,9%	1,6%
	Partner	16	14,3%	25,8%
	Family	56	50,0%	90,3%
	Friends and relatives	31	27,7%	50,0%
	With a group	8	7,1%	12,9%
Total		112	100,0%	180,6%

a. Dichotomy group tabulated at value 1.

Suppose you want more information about the bungalow park, Service and / or destination, how do you get this information

		Responses		Percent of Cases
		N	Percent	
Finding information bungalow park	Use of a search engine (e.g., Google)	55	46,6%	88,7%
	Use of the bungalow park site	45	38,1%	72,6%

	Use of the destination site	17	14,4%	27,4%
	Otherwise, namely	1	,8%	1,6%
Total		118	100,0%	190,3%

a. Dichotomy group tabulated at value 1.

What information do you find most interesting?

		Responses		
		N	Percent	Percent of Cases
Interesting information	Facilities at the bungalow park	53	26,0%	85,5%
	Services of the bungalow park	30	14,7%	48,4%
	Restaurants	36	17,6%	58,1%
	Sights	37	18,1%	59,7%
	Day out	34	16,7%	54,8%
	Signage	11	5,4%	17,7%
	Otherwise, namely	3	1,5%	4,8%
Total		204	100,0%	329,0%

a. Dichotomy group tabulated at value 1.

What services are an important indicator of your (dis) satisfaction while staying at a hotel?

		Responses		
		N	Percent	Percent of Cases
Service indicator bungalow park	Waiting time	35	15,8%	56,5%
	In-/exterior	39	17,6%	62,9%
	Communication and the extent of contact with employees	39	17,6%	62,9%
	Other guests	17	7,7%	27,4%
	Advice	22	10,0%	35,5%
	Explanation	20	9,0%	32,3%
	Discretion	8	3,6%	12,9%
	Surroundings	38	17,2%	61,3%
	Otherwise, namely	3	1,4%	4,8%
Total		221	100,0%	356,5%

a. Dichotomy group tabulated at value 1.

If you are satisfied with a service, will you book the same bungalow park or chain?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very likely	17	14,4	27,4	27,4
	Probably	29	24,6	46,8	74,2
	Maybe	13	11,0	21,0	95,2
	Unlikely	3	2,5	4,8	100,0
	Total	62	52,5	100,0	
Missing	System	56	47,5		
Total		118	100,0		